

The new cross-country vehicles – series 463

200 GE

230 GE

300 GE

250 GD

300 GD

Introduction into service for customer service

This introduction into service is intended for the technical personnel entrusted with the repair and maintenance of Mercedes-Benz cross-country vehicles. The contents are only valid until the repairs instructions have been compiled on microfilm.

With this introduction into service, we shall be informing you on the following vehicles:

Model	Туре
463.2	200 GE 4 x 4 (only for Italy) 230 GE 4 x 4 300 GE 4 x 4
463.3	250 GD 4 x 4 300 GD 4 x 4

The previous models 460/461 are still being made with the engines M 102, OM 617 and OM 602.

For all repair jobs, adjusting values and maintenance jobs not itemized in this introduction into service, refer to the already available technical documentation.

We of course reserve the right to technical changes in in keeping with further development.

Mercedes-Benz Aktiengesellschaft Vertrieb Kundendienst und Teile

May 1990

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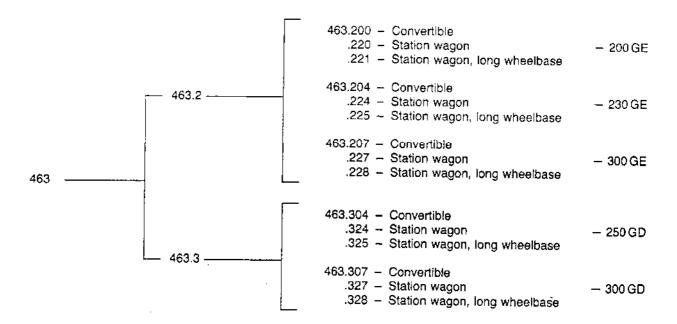
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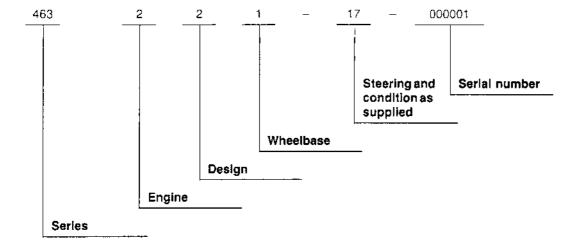
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Survey of types and components



Model coding



Structure of chassis number

Series	463						
Engine	3	Benzin Benzin = Diesel	M 102 E 20 M 102 E 23 M 103 E 30 OM 602 OM 603				
Design	0 1 2	= Conver = - = Station					
Wheelbase	1 4 5 6 7	= short = long = short = long = - = short = long = -	M 102 E 23/OM 602	2400 2850 2400 2850 2400 2850	,		
Steering and condition as supplied	27 57	= Right-h = Left-ha	nd drive installed and drive installed nd drive CKD, COMPLET and drive CKD, COMPLE				
Serial number	Cons	Consecutive number of manufactured vehicles					

Installation survey

Vehicle	Model	463.200¹)²) .220¹)²) .221¹)³)	463.204²) .224²) .225³)	463.304²) .324²) .325³)	463.307²) .327²) .328³)	463.207°) .227°)			
	Sales designation	· 200 GE 4 x4	230 GE 4 x4	250 GD 4 x4	300 GD 4 x4	.228³) 300 GE 4 x4			
Engine	Model	102.965	102.989	602.931	603.931	103.987			
	Sales designation	M	102	OM 602	OM 603	M 103			
	Installation			Standard	0117 000	141 103			
Clutch	Model	-							
	Sales designation	M 228 F&S M 240 F&S T 228 LUK T 240 LUK							
	Installation		·	Standard		1 2 10 2010			
Transmission	Model			717.439					
	Sales designation	GL 76/27K-5							
	Installation			Standard					
Transmission-	Model	_	722.396	-	722,399	722.397			
automatic	Sales designation	_	W4A 028	_	W4A				
	Installation	_	✓ SA	~	S	Α			
Transfer case	Model	750.650							
	Sales designation	VG 150 - 3W / 2,16							
P	Installation	Standard							
Front axle	Model	730.305 730.391							
	Sales designation	AL 0 / 3 C - 1,3 / 5,286 AL							
	Installation			Standard	·	/ 4,857			
Rear axle	Model	741.505 741.110 741.506') 741.114'							
	Sales designation		HL0/11S- 1,8 / 4,857						
<u>.</u>	Installation			Standard		.,			
Steering	Model			765.503					
	Sales designation		-	LS 2B					
	Installation			Standard	·				
Steering pump	Model			_	· .	1			
	Sales designation	Vickers VT 161							
	Installation								
Structure	Model		12 ²) 32 ²) 82 ³)		13²) 33²) 33³)	463.518²) .538²)			
	Sales designation					.588³)			
	Installation	Standard							

Model, country-specific e.g. Italy
 Wheelbase 2400 mm
 Wheelbase 2850 mm
 In vehicle model 463.221 / 225 / 325 / 328
 In vehicle model 463.228

Views of vehicle



Convertible

Views of vehicle

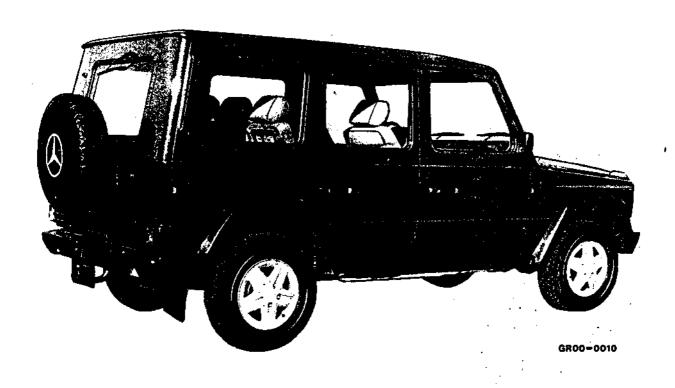




Station wagon

Views of vehicle





Station wagon - long wheelbase

The most important in brief

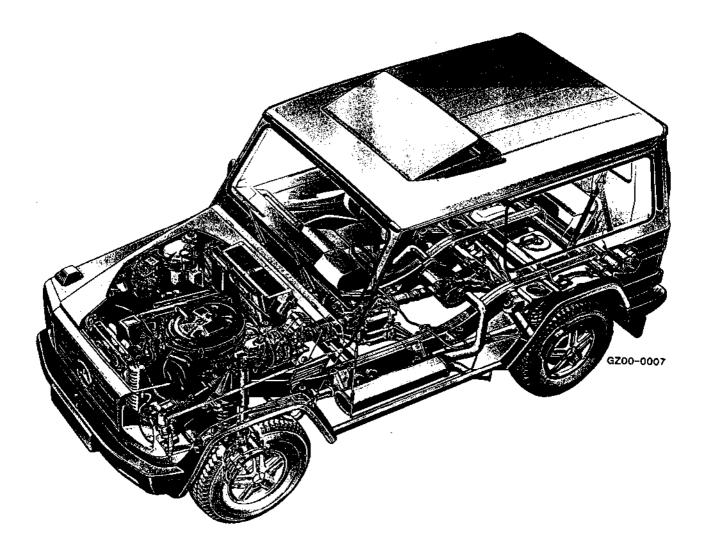
General

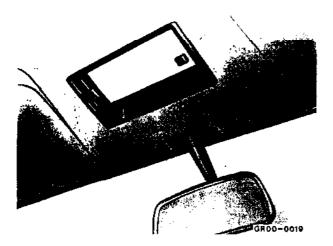
With the cross-country vehicle type 463 we have paid full contribution to the change in requirements and demands put by the customer. It is available as an open vehicle, as well as short and long station wagon.

The distinctive features of the new cross-country vehicle are:

- still more comfort through the new power train
- a definite increase in performance through the new 6cylinder-engines OM 603 and M 103
- upgrading of the outer appearance of the vehicle
- with a totally new interior design a move towards the more luxury car interior.

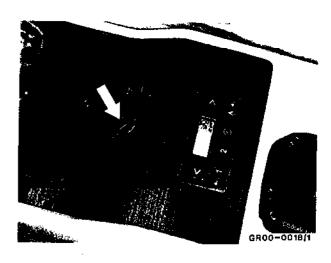
Furthermore, the new cross-country vehicles now have a permanent all-wheel drive. This concept has been developed, among other things, to be able to use the power train with ABS.





Roof frame panelling with integrated sun visors

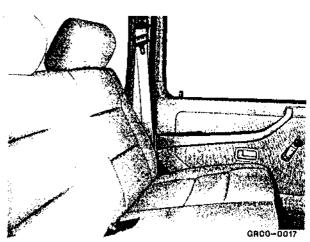
Dome light and reading light as well as switch for pop-up/
sliding roof.



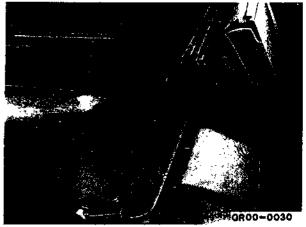
Both outside mirrors electrically adjustable from the inside



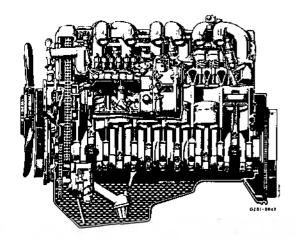
Covered compartment for first-aid kit, warning triangle and vehicle tool kit



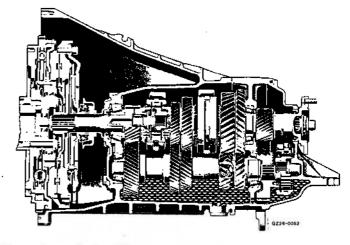
Maximum comfort of rear bench seat through body-contoured seating



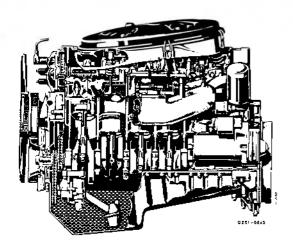
Divided rear seat bench, individually folding



Engine OM 603



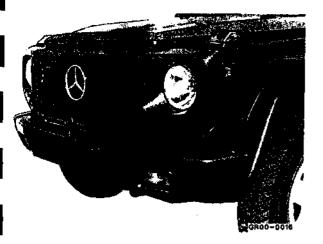
5-gear transmission (GL 76 / 27K-5)



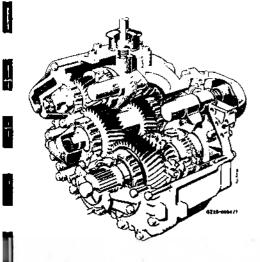
Engine M 103



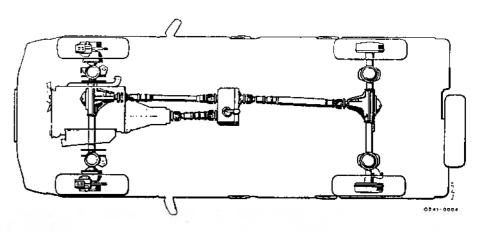
Fresh air intake for engine in left fender



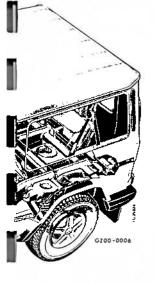
Headlight panelling in plastic
Radiator grill in vehicle colour
Bumper with integrated front fog lights



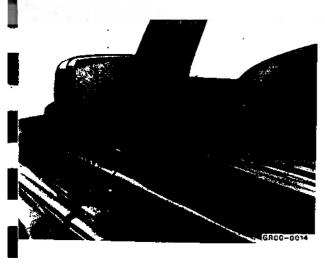
3-shaft transfer case VG 150



Permanent four-wheel drive

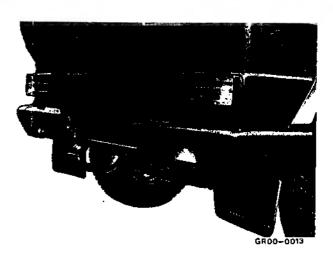


Tank filler neck concealed by tank flap. Flap is locked in connection with central locking system

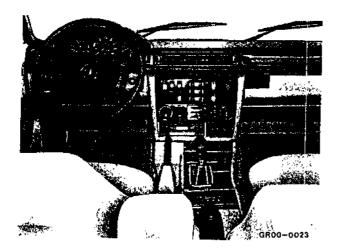


Larger outside mirrors, electrically adjustable and helated

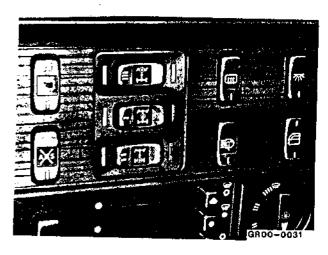
1-1-5



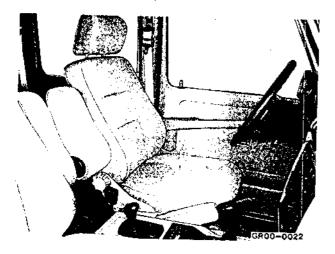
Rear lights with greater lens surface Bumper, rear with integrated reversing light and rear fog light



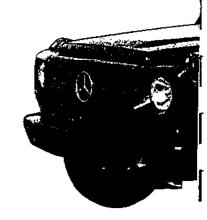
The interior has been redesigned to comply with optical and ergonomic viewpoints



Electrical, manual actuation of locks of transfer case and axles

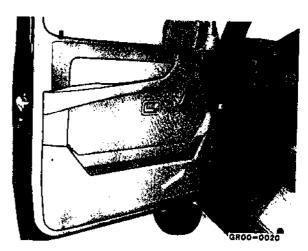


The seating has been designed under ergonomic and anatomic viewpoints



ZH00-0021

The upper anchoring points of the safety belts are adjustable in height



Door linings with comfortable armrests and fitted door handles as well as spacious door pockets

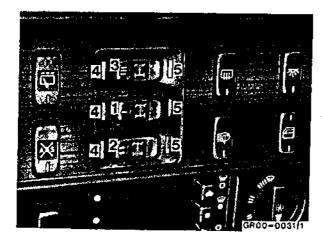
0	1 Engine	For the new cross-country vehicles of the 463 series, in addition to the already familiar engines M 102 and OM 602, the new 6-cylinder engines M 103 and OM 603 are offered for the first time.
25	5 Clutch	Diaphragm spring clutch Ø 228 or 240 mm
26	Mechanical transmission	5-gear transmission 717.439 (GL 76/27K-5) the speedometer drive takes place via the transfer case.
27	Automatic transmission	Transmission 722.3 (W 4 A 028) floor shift with parking position lock and individual gear indication.
28	Transfer case	Transmission 750.650 (VG 150) with permanent all-wheel drive and lockable interaxle differential.
31	Trailer operation	Trailer device inci. trailer socket, 13-pole and adapter 13/7-pole upon special request. Trailed loads for vehicles with short wheelbase 2620 kg (with long wheelbase 2950 kg). With permission to be used as a tractive unit, 4000 kg are possible.
41	Propeller shafts	Optimized propeller shaft angles for increased silent running.
42	Brakes	ABS upon special request (with activated lock switched off) hand-operated parking brake
46	Steering	L S 2 B Power steering pump VT 161
47	Fuel system	Plastic tank, 95 liters
49	Exhaust system	Has been adapted to the installation conditions and to the engine output with improved noise behaviour. Gasoline model as standard with exhaust gas purifying system (three-way catalytic converter). Removal and installation have been simplified by altering the layout.

Functional description - differential lock

General

The locks of the differentials for transfer case, front and rear axle are activated via 3 electrical tip switches. These are adjusted to the further operating elements and arranged on the centre console on the instrument panel.

For distinction between the individual tip switches they are provided with engraved symbols.



Tip switch - lock actuation

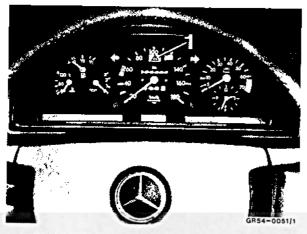
- 1 Tip switch transfer case, interaxle differential lock
- 2 Tip switch rear axle, differential lock
- 3 Tip switch front axle, differential lock
- 4 Switch-on signal lamp (yellow)
- 5 Function signal lamp (red)

The special feature is that the individual locks can only be operated one after the other in a logical sequence, corresponding to the conditions of use.

First only the interaxle differential lock in the transfer case can be engaged, then in addition the lock of the rear axle differential. Then, as last lock, the front axle lock can be engaged.

A counteracting electrical blocking device prevents any incorrect operation of the lock actuation.

In order to indicate to the driver the type of drive, when actuating the tip switch for the 1st lock (transfer case) the warning lamp familiar from 4 MATIC, ASR and ASD lights up in the instrument cluster.



1 Warning lamp

The switching off of the individual locks also takes place in a set order.

If e.g. the rear axle lock is released, the front axle lock is also disconnected.

If the interaxle differential lock in the transfer case is disconnected, then also the front and rear axle locks are released.

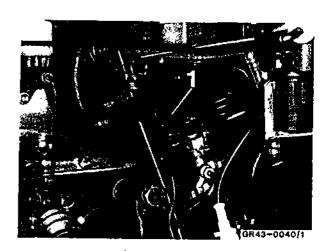
At the same time the indicator lamp in the instrument cluster goes out.

Note: The lock is not disengaged until after the red function signal lamp on the tip switch goes out.

The lock function is designed in such a way that after the switching off of the engine with engaged locks, these remain activated for approx 30 secs. and are then disconnected automatically via a time-lag relay.

Vehicles with engine M 102/103

In vehicles with engine M 102/103, for the differential lock actuation there is additionally a vacuum pump installed in the engine compartment.



1 Vacuum pump

Body, interior fitting

68 Interior fitting

New dashboard system as well as middle console

Instrument cluster same as W-124

more favorable positioning of switch and parking brake

lever

Seat belts height adjustable, belt buckles in the rear com-

partment can be retracted

Door linings with arm rests integrated in the door handles

and door pockets on the front doors

Fully lined as in car

77 Pop-up/sliding roof

Electrical pop-up/sliding roof as with car, as a special re-

quirement

80 Central locking system

Multi-position actuation

88 Attachments, outer flaps

Headlight panelling and radiator grill in new design as

plastic part and painted in vehicle colour

New bumpers

Tank filler neck in right side panel under flap

New outside mirrors, electrically adjustable and heated

Type identification as with car at the rear end on the left

91 Seating

Improved body-contoured shaping of the front seats as well

as extended seat cushion

Optimized design of rear seat

Seat back adjustment, infinitely variable

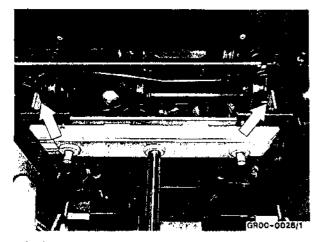
Centre arm rest, front on special request

New material design

Jacking up

- with car jack
- with floor jack
- with two-column lifting platform (5 tons)

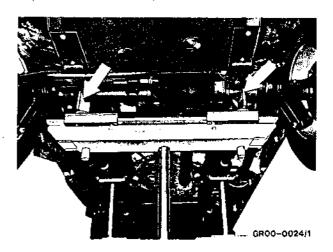
- with inspection pit



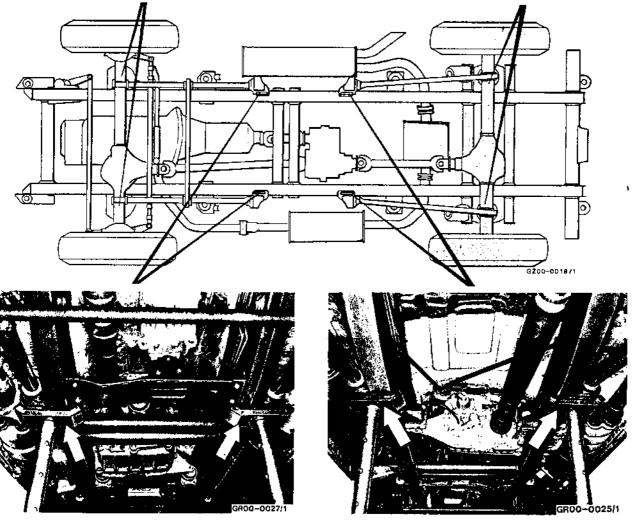
under axle tubes

with attachment (part no. 460 589 02 63 00) under axle tubes

At present only possible with wheel grippers on the 5 t lifting platform. Lifting with adapters under the door sill (also 2,5 t lifting platform) is in preparation. SI to follow. Please direct your requests to Mercedes-Benz AG. Dept. MBVD/TWP or VKT/MP2,



• jack up



support

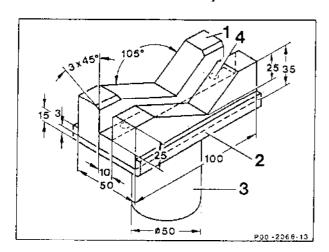
Body

Chocks self-assembly

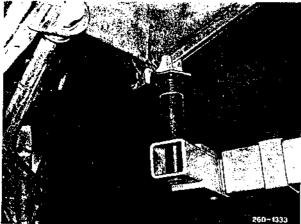
The body is lifted with the 2-column lifting platform together with the adapters approved of for self-assembly

Material

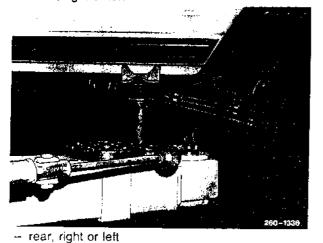
- 1. Hard rubber covering min. 60 Shore
- 2. Sheet steel mounting e.g. St 52-3
- Socket for adaptation to the lifting platform e.g tubular steel DIN 1629 Bi. 4
- 4. Countersunk screw e.g. M 5 x 20 DIN 964







- front, right or left



Frame

Accident repairs on the Celette straightening bench

Genera

For type 463 the available Celette straightening set order no. 306.310 is at present converted or supplemented.

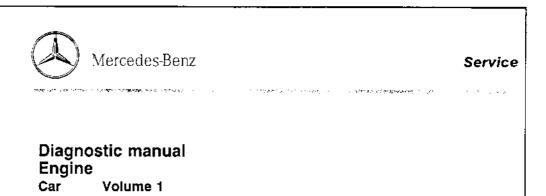
On the straightening set, accident vehicles can be completely reconditioned without removal of the components as well as just the vehicle frame or the body.

Mounting on the straightening bench

The complete vehicle can be lifted with the 5-ton 2-column lifting platform in connection with the wheel gripper adapters. Vehicles with removed front or rear axle cannot be lifted on the straightening bench. In this case, the body must be lifted off the frame and mounted separately.

The frame can be lifted with the 2-column lifting platform in the area of the longitudinal control arm brackets.

Workshop and parts references



Repair instructions on microfilm

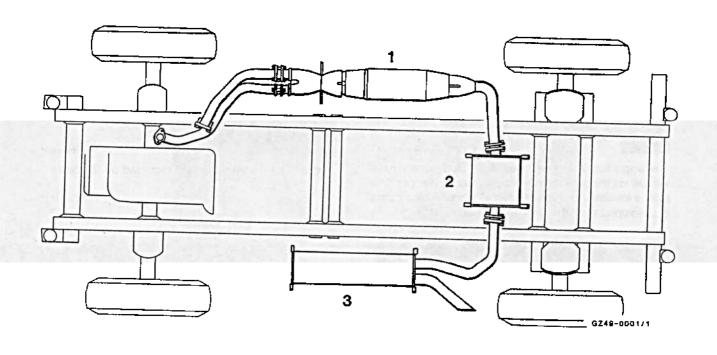
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\	10/83	Motor 102	Mechanik	01, 03 05
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(3)	07 100 2017 31 10/83	Motor 102	Mechanik I	05, 13, 18
50° VIII 6				20, 22
<u></u>	07100202003		Verbrennung Illa	
Ber vicab	10/86	Motor 102	KE-Einspritzung	07.3
	07 100 2020 33		Verbrennung ilib	09, 14, 15
	10/87	Motor 102	KE-Einspritzung	30, 47, 49
\bigcirc	07 100 202401			
Bervice	08/89	Motor 103	Mechanik I	01, 03 05
iBV	و النباع الركة الك			
Service	07 100 2037 01 08/89	Motor 103	Mechanik II	13, 18
5517125			moonank n	20, 22
	07100202501	Make # 400	Verbrennung I	1
SOCUE	01/87	Motor 103	KE-Einspritzung	07.3
	07100202531		Verbrennung li	09, 14, 15
Service	04/88	Motor 103	KE-Einspritzung	30, 47, 49
	07400000000			
Service	07 100 2023 03 03/89	Motor 601, 602.91, 603.91	Verbrennung I	07.1
\bigcirc	07 100 2027 03*	Motor 601, 602.91, 603.91	Verbrennung II	07.1, 09
Service 1 mm 1/2	03/89		verbielijung ji	14, 15
(\mathcal{A})	07100202803*	N-1- 004 000 04 000 04		30, 47
Service	03/89	Motor 601, 602.91, 603.91	Verbrennung III	49
	07 100 2022 32			l ns 12 10
	07/87	Motor 601, 602, 603	Mechanik II	05, 13, 18 7 20, 22
	07100010100			
Service	07 100 2131 02 06/89	Mechanisches Getriebe 71	7.43/44	26
	ير ستر 100 س		1	· *
\bigcirc	07100215701	Automodical action Collision		
Service	10/89	Automatisches Getriebe 7	22.3 09/88 🔿	27
$\overline{\alpha}$	07100238203	Lenkgetriebe 760, 765		
Service	02/88	Lenkhelfpumpe		46
	07 100 248337		<u> </u>	
Service 1	09/88	Aufbau - Montagearbeiten	II Typ 126	77, 88
			V 22 - 1880 A 24	
Service .	07 100 2501 07 	Lackierung und Korrosions	schutz	98
			,	V
			GZ00-	0020 🔭 🔭

Exhaust system

Installation survey

Vehicle Model	Туре	Engine Model	Output kW	, I HP	Catalytic c	onverter
.220 .221	200 GE 4 x 4')²) 200 GE 4 x 4')²) 200 GE 4 x 4')³)	102.965	83	113		x
		1	85	116	x	
463.204 230 GE 4 x 4²) .224 230 GE 4 x 4²) .225 230 GE 4 x 4³)	102.989	93	127		x	
		Mild and the	95	129	x	
463.207 .227 .228	300 GE 4 x 4 ²) 300 GE 4 x 4 ²) 300 GE 4 x 4 ³)	103.987	125	170		x
			128	174	X	
.324 .325	250 GD 4 x 4 ²) 250 GD 4 x 4 ²) 250 GD 4 x 4 ³)	602.931	69	94	x	
.327 .328	300 GD 4 x 4 ²) 300 GD 4 x 4 ²) 300 GD 4 x 4 ³)	603.931	83	113	×	

- Model, country-specific, e.g. Italy
 Wheelbase 2400 mm
- 3) Wheelbase 2850 mm



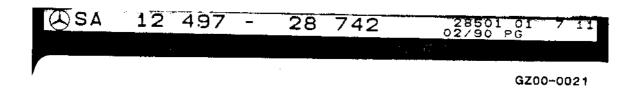
- Pre-muffler (or catalytic converter) 1
- 2 Middle silencer
- 3 Main silencer

ET microfiche

250GD-300GD	FGSI	-		1052 02 02/90 G	7 11 463
200GE-300GD	AUFBAU			1055 02-	7-11
		2	17 S. 18 6	02/90 G	463
200GE 307GF	FGST			1070 02 02/90 G	7 11 463

\odot	ОМ	602					050 02/90	2 18 PGL T	7 11 0E602
									02002
\odot	MO	603		ede lide di		. Reduction	12/85	3 15 PGE	7-11 603
				·					
\odot	M	102EIN	RIEMEN	TRIEB	-		050 11/89	· _ = -	7-11 0 102
						$\tilde{\mathcal{J}}_{i,j}^{(i)}$			102
3	M	103					050 12/89		103
				·	er seed of early	Mar New 17	1.00		

AGGREGATE GELAENDEWAGEN	1106 07 7 12
711.1-730.3	11/89 G
	• 17 17 M * 4
AGGREGATE GELAENDEWAGEN	1106 07 7 22
741.15-765.5	11/89 G
•	



Engine Installation survey

Vehicle model	Туре	Model	Engine output*) kW (PS)
463.200	200 GE 4 x 4¹)²) ¹)²) ¹)³)	102.965	83 (113) with cat
.220 .221			85 (116) without cat
463.204 230 GE 4 x 4²)	230 GE 4 x 4²)	102.989	93 (127) with cat
.224 .225	3)		95 (129) without cat
463.207	300 GE 4 x 4²)	103.987	125 (170) with cat
.227 .228	3)		128 (174) without cat
463.304 .324 .325	250 GD 4 x 4²) ²) ³)	602.931	69 (94)
463.307 .327 .328	300 GD 4 x 4 ²) ²) ³)	603.931	83 (113)

^{*} The specified output in accordance with guideline 88/195/EEC is available after deduction of all auxiliary outputs as actual output for the drive at the clutch.

- 1) Model country-specific e.g. Italy
- 2) Wheelbase 2400 mm
- 3) Wheelbase 2850 mm

General

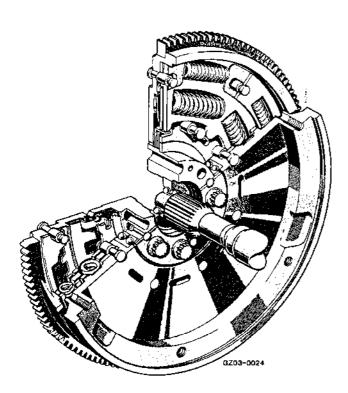
For the new cross-country vehicles of the 463 series, in addition to the familiar engines M 102 and OM 602, the 6-cylinder engines M 103 and OM 603 are available for the first time.

The gasoline engines are supplied as standard with catalytic converter except type 200 GE (Italy).

The cross-country vehicles of the 460 series are still offered with types 230 GE, 250 GD and 300 GD.

Two-mass flywheel

New with the cross-country vehicle is the two-mass flywheel, familiar from the cars, for reducing rotary oscillations of the crank assembly in connection with the manual transmission.



Note:

The vibration absorber installed in types 250 GD and 300 GD in model 460 is therefore omitted.

Deviations

The engines are more or less identical to the car engines. For repair work on the engine look up in corresponding car manuals.

Following details have been specially modified for cross-country vehicles:

- Oil pan
- Lambda control
- Fuel supply
- Control units for ignition and injection system
- Air intake
- Exhaust system
- Cooling system
- Engine suspension
- Position of air conditioner compressor

Oil pan

The oil pans have been adapted to the special installation conditions in the cross-country vehicle in order to ensure the oil supply of the engine in extreme conditions when driving up and down gradients and with the vehicle inclined.

Lambda control

The characteristics for the mixture adaptation and the lambda control have also been adapted to the special requirements of the cross-country vehicle. They take into consideration the air filter and exhaust system which have been modified as opposed to the car, as well as an adjustment of the engines without pre-catalytic converter.

Fuel supply

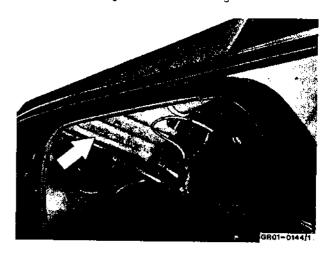
In contrast to the car, the gasoline engines have a high pressure fuel system with increased system pressure and nozzle opening pressure.

The fuel supply of the engines takes place via 2 series connected fuel pumps.

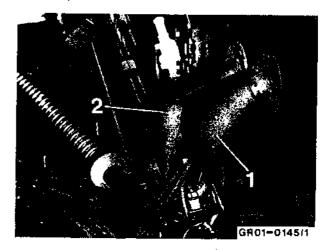
Air intake

The intake air is sucked in through a louver in the left fender above the lateral protective stripping.

The air is conducted forwards via a water separator and a cyclonic dust preseparator. Water and dust outlet pipe are led through the wheelhousing into the engine compartment ensuring there is no freezing.

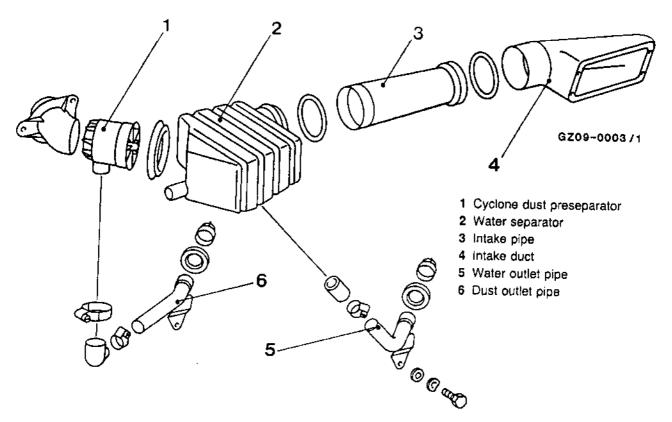


Water separator



- 1 Dust extraction valve
- 2 Water extraction valve

Exploded view Air intake



The preseparator is connected to the air filters by means of a rubber gaiter.



Arrangement of air filter, model 103.987

Arrangement of air filter, model 603,931

Note:

In the gasoline engines, differing to the car, there are reinforced filter cartridges with improved separation.

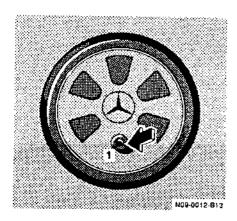
In the diesel engines the air filters are identical to the car air filters.

01-0164

As a special version a maintenance indicator is available for the air filters.



230 GEMaintenance indicator in the air filter1 Reset button



300 GE / 250 GD / 300 GD Maintenance indicator in the air filter 1 Reset button

Maintenance instructions:

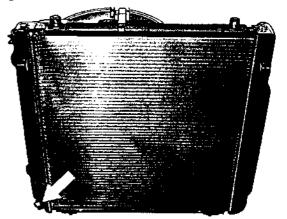
- If the red coloured area in the maintenance indicator is fully visible, clean or renew filter element.
- Actuate reset button so that the red coloured area disengages.

Cooling

All engines are equipped with temperature controlled viscosity fan clutches in connection with plastic fans.

In all engines a new uniform cross-flow radiator is used, made of light metal alloy.

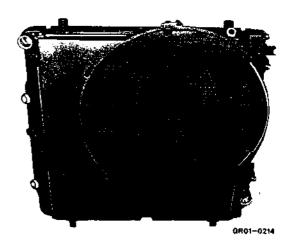
The cooling system with a radiator surface of 30,2 dm² is also designed for use in tropical conditions with all engine versions.



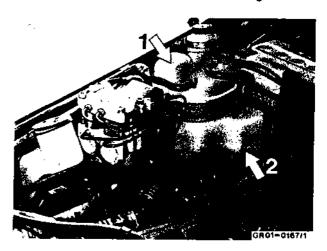
GR01-0213/1

Coolant drain plug

Engine oil cooler in diesel engines and 6-cylinder gasoline engines as well as gear oil with automatic transmission are integrated in the radiator tanks.



The radiator is fixed to the frame. The coolant expansion tank is in the engine compartment on the right.

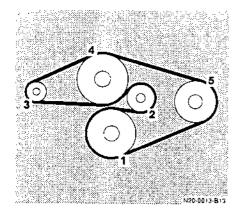


Arrangement, expansion tank

- 1 Expansion tank
- 2 Overflow pan (only M 103)

Arrangement of V-belts

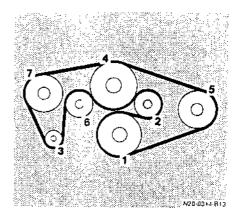
Vehicles without air conditioner



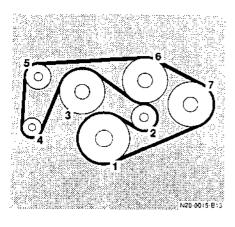
200 GE 230 GE

- 1 Crankshaft
- 2 Tensioning roller
- 3 Three-phase alternator

Vehicles with air conditioner

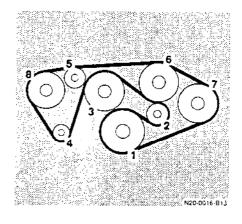


- 4 Coolant pump fan
- 5 Power steering pump
- 6 Deflection Roller
- 7 Refrigerant compressor

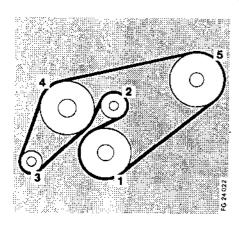


300 GE

- Crankshaft
- 2 Tensioning roller
- 3 Fan

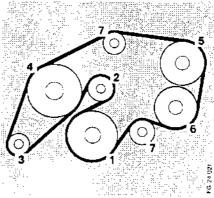


- 4 Three-phase alternator
- 5 Deflection roller
- 6 Coolant pump
- 7 Power steering pump
- 8 Refrigerant compressor

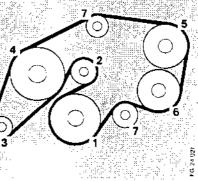


250 GD 300 GD

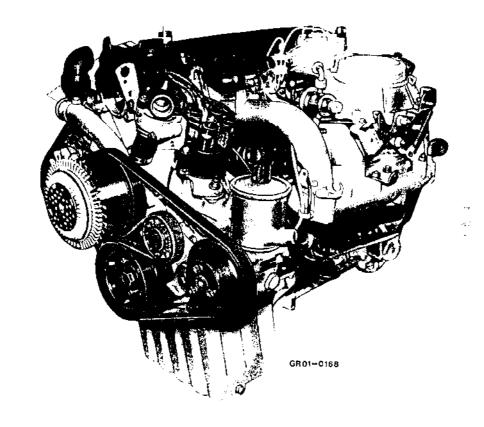
- Crankshaft
- 2 Tensioning roller
- 3 Three-phase alternator

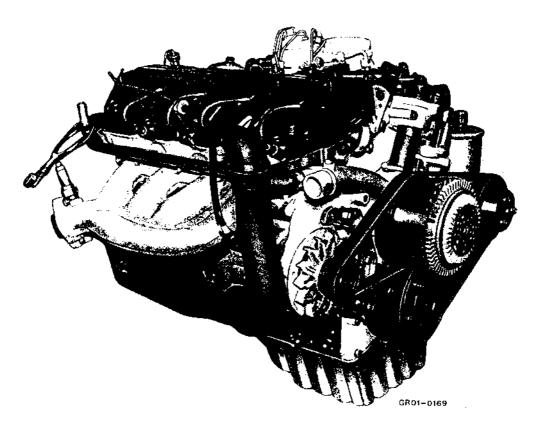


- 4 Coolant pump fan
- 5 Power steering pump
- 6 Refrigerant compressor

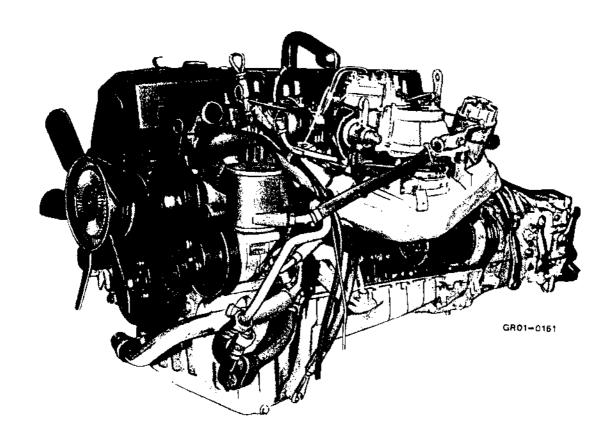


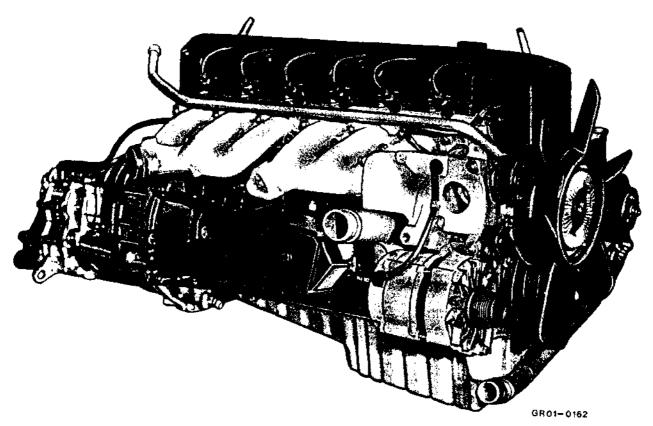
7 Deflection roller



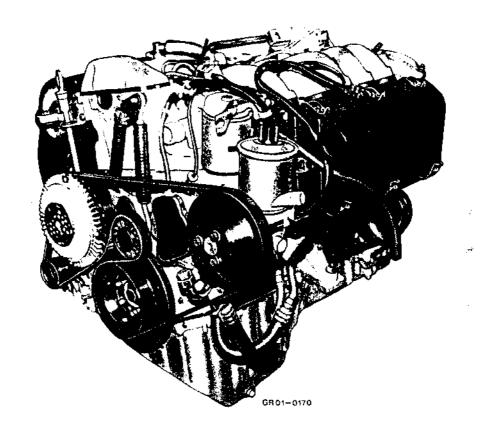


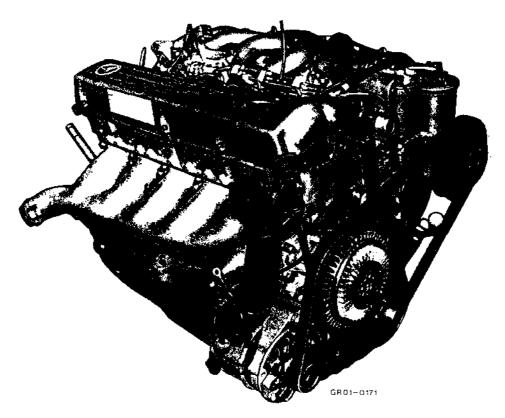
Engine 102



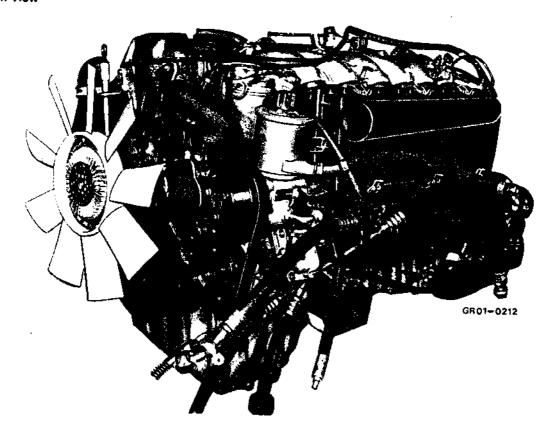


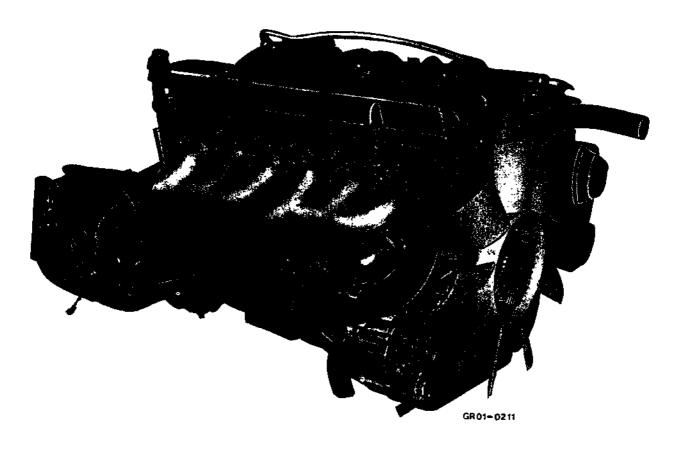
Engine 103



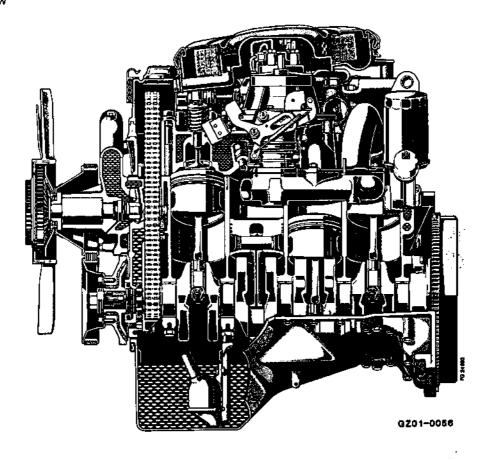


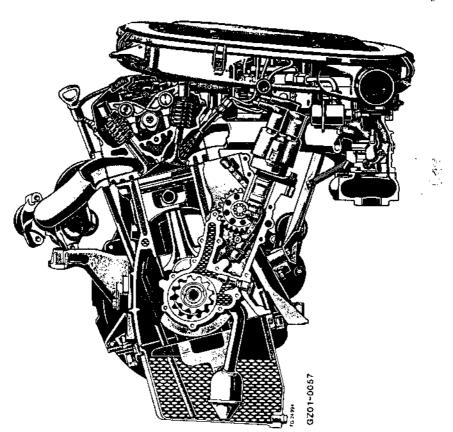
Engine 602



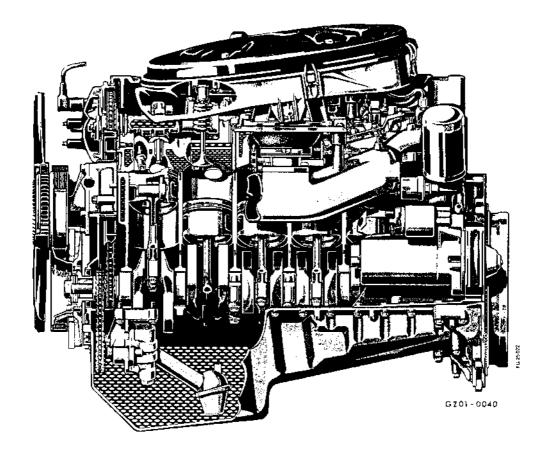


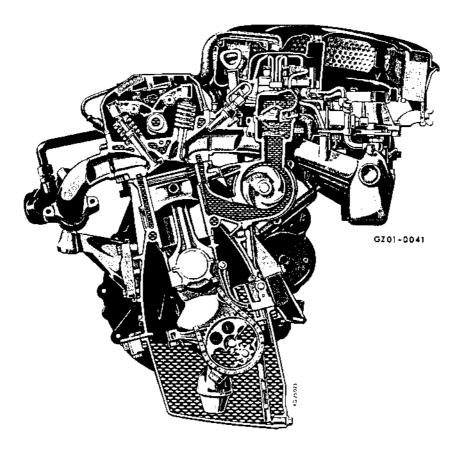
Engine 603





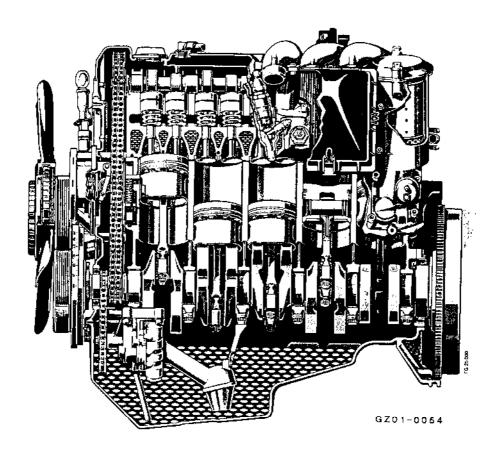
Engine 102

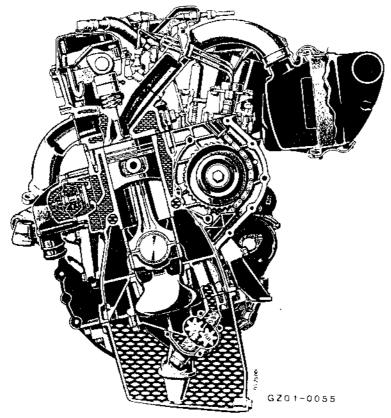




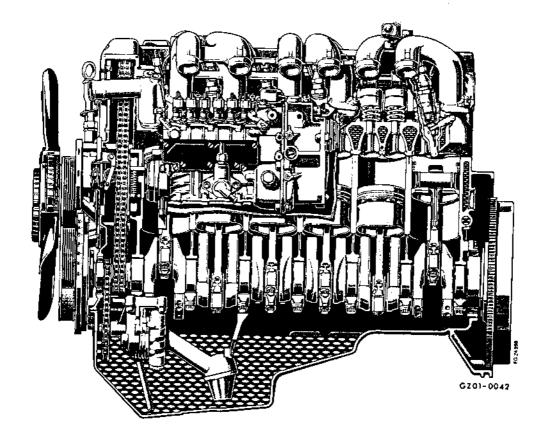
Engine 103

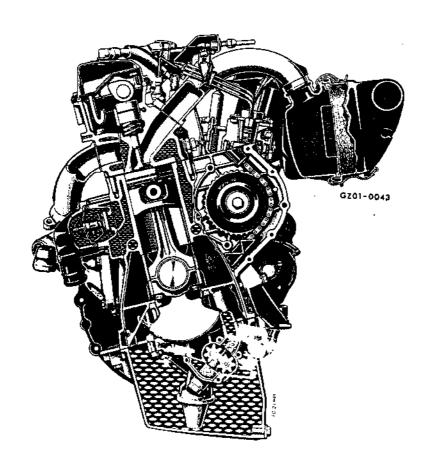
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Engine 602

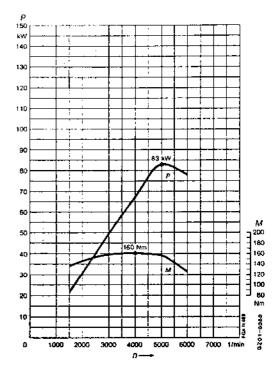




Engine 603

M 102 E 20 KAT

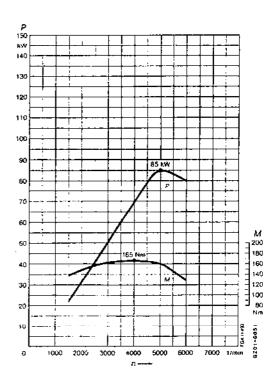
Number of cylinders		4
Displacement	cm ³	1996
Bore/stroke	mm	89,0 / 80,2
Output')	kW	83
at speed	min ⁻¹	5000
max. torque')	Nm	160
at speed	min ⁻¹	4000
Compression ratio	ε	9,1



M 102 E 20 without KAT

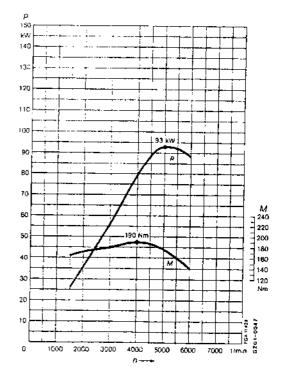
Number of cylinders		4
Displacement	cm ³	1996
Bore/stroke	mm	89,0 / 80,2
Output')	kW	85
at speed	min ⁻¹	5000
max. torque')	Nm	165
at speed	min ⁻¹	4000
Compression ratio	Ε	9,1

1) The specified output in accordance with guideline 88/195/EEC is available after deduction of all auxiliary outputs as actual output for the drive at the clutch.



M 102 E 23 KAT

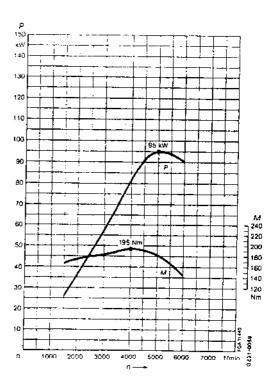
Number of cylinders		4
Displacement	cm ³	2298
Bore/stroke	mm	95,5 / 80,2
Output')	kW	93
at speed	min ⁻¹	5000
max. torque')	Nm	190
at speed	min ⁻¹	4000
Compression ratio	ε	9



M 102 E 23 without KAT

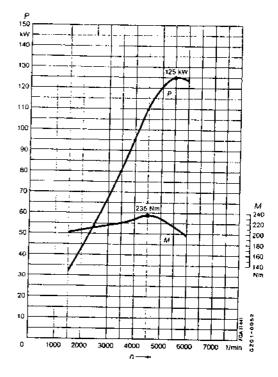
Number of cylinders		4
Displacement	cm ³	2298
Bore/stroke	mm	95,5 / 80,2
Output¹)	kW	95
at speed	min ⁻¹	5000
max. torque¹)	Nm	195
at speed	min ⁻¹	4000
Compression ratio	ε	9

 The specified output in accordance with guideline 88/195/EEC is available after deduction of all auxiliary outputs as actual output for the drive at the clutch.



M 103 E 30 KAT

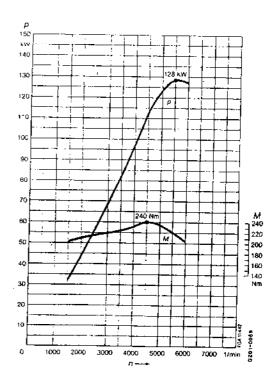
Number of cylinders		6
Displacement	cm ³	2960
Bore/stroke	mm	88,5 / 80,2
Output')	kW	125
at speed	min ⁻¹	5500
max. torque¹)	Nm	235
at speed	min ⁻¹	4500
Compression ratio	ε	9,2



M 103 E 30 without KAT

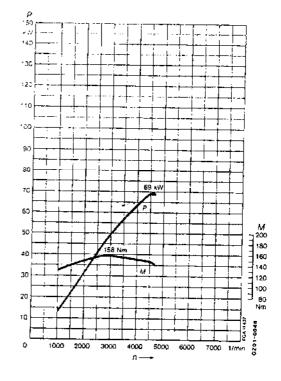
Number of cylinders	,	6
Displacement	cm ¹	2960
Bore/stroke	mm	88,5 / 80,2
Output ¹)	kW	128
at speed	min ^{−1}	5500
max. torque')	Nm	240
at speed	min ⁻¹	4500
Compression ratio	E	9,2

 The specified output according to guideline 88/195/ EEC is available after deduction of all auxiliary outputs as actual output for the drive at the clutch.



OM 602 D 25

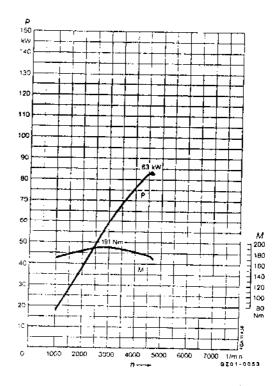
Number of cylinders	-	5
Displacement	cm ³	2497
Bore/stroke	mm	87,0 / 84,0
Output')	kW	69
at speed	mih ⁻¹	4600
max. torque¹)	Nm	158
at speed	min ⁻¹	2600 to 3100
Compression ratio	ε	22



OM 603 D 30

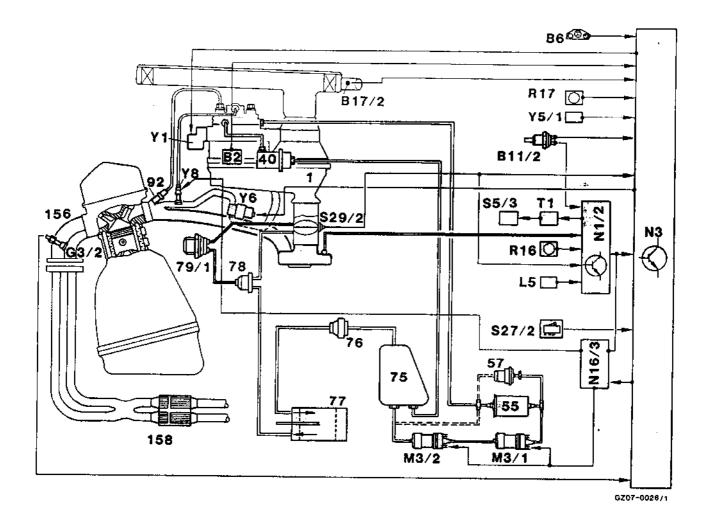
Number of cylinders		6
Displacement	cm ³	2996
Bore/stroke	mm	87,0 / 84,0
Output')	kW	83
at speed	min ⁻¹	4600
max. torque')	Nm	191
at speed	min ⁻¹	2700 to 2900
Compression ratio	ε	22

 The specified output according to guideline 88/195/EEC is available after deduction of all auxiliary outputs as actual output for the drive at the clutch.



Functional diagram mechanical/electronic gasoline fuel injection system

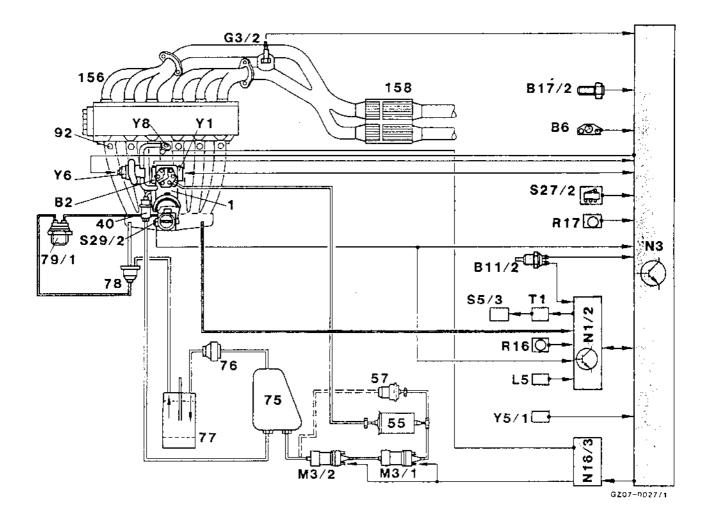
Engine 102.989 KAT



1 40 55 57 75 76 77 78 79/1 92 156 158 B 2 B 6	Mixture control unit Membrane pressure regulator Fuel filter Fuel accumulator Fuel tank Tank vent valve Carbon canister Purge valve Thermo valve 70°/35°C Injection valve Exhaust manifold CH with CO – measuring connection Underfloor catalyst Sending unit, air flow meter Hall sensor speed	M 3/1 M 3/2 N 1/2 N 3 N 16/3 R 16 R 17 S 5/3 S 27/2 S 29/2 T 1 Y 1 Y 5/1	Switching unit – electronic ignition with variable characteristics (EZL) Control unit, CIS E-injection system Relay, fuel pump Adapter plug (EZL) Adapter plug (CIS E) High voltage distributor Microswitch, overrun fuel cutoff Throttle valve switch full load/idle speed recognition Ignition coil Electrohydraulic actuator Electromagnetic clutch, refrigerating
	_		

Functional diagram mechanical/electronic gasoline injection system

Engine 103.987 KAT



1	Mixture control unit	M 3/1	Fuel pump 1
40	Membrane pressure regulator	M 3/2	Fuel pump 2
55	Fuel filter	N 1/2	Switching unit, electronic ignition (EZL)
57	Fuel accumulator	N 3	Control unit CIS-E
75	Fuel tank	N 16/3	Relay, fuel pump
76	Tank vent valve	R 16	Adapter plug (EZL)
77	Carbon canister	R 17	Adapter plug (CIS-E)
78	Purge valve	\$ 5/3	High voltage distributor
79/1	Thermo valve 70°/35°C	S 27/2	Microswitch, overrun fuel cutoff
92	Injection valve	\$ 29/2	Throttle valve switch full load/idle speed
156	Exhaust manifold		recognition
158	Underfloor catalyst	T 1	Ignition coil
B 2	Sending unit, air flow meter	Y 1	Electrohydraulic actuator
B 6	Hall sensor speed	Y 5/1	Electromagnetic clutch, air conditioner
B 11/2	Temperature sensor, coolant, 4-pole		compressor
B 17/2	Temperature sensor, intake air	Y 6	ldle speed actuator
G 3/2	O ₂ -probe, heated	Y 8	Start valve
L 5	Position transmitter, crankshaft		

Checking and adjusting values - Engine 102, 103

Engine			10	2.965	10	2.989	10:	3.987
			KAT	without KAT	KAT	without KAT	KAT	without
Control unit CIS-E		Part no.	008 5	45 37 32	008 5	45 38 32	008 54	45 39 32
Current at actuator	Ignition switched on	mA	20	10	20	10		20
After starting voltage in- crease and warm-up	oltage in- crease at + 20° C coolant lease and temperature		12 1	o 16 ⁴)	16	to 20	26 t	o 30 ⁴)
	Warm-up basic value³) at	kΩ	2,2 to 2,8		2,2 to 2,8		2,2 to 2,8	
	+ 20° C coolant tempera- ture	mA	7 to 11 ³)		9 to 13°)		10 to 14³)	
	Coolant temperature	mΩ	290	to 370	290	to 370	-290	to 370
	+ 80° C	mA	1)	0 to 3	1)	0 to 3	1)	0 to 3
	Acceleration enrichment with accelerator pedal actuation and 20°C coolant temperature	mA	>	15	>	15		15
Engine warmed up	Partial load-mixture adjustment	mA	1)	0 to 5	1)	0 to 5	1)	0 to 5
	Full-load enrichment at 2000/min	mA	-2 to 7		1 to 9		4 to 9	
	overrun fuel cutoff	mA ap- prox.	-60		-60		-60	
Speed	Idling speed Control range Breakaway speed	1/min % ° 4 1/min	35 to 45 21 – 27		35 21	± 50 to 45 - 27	35 21	± 50 to 45 - 27
ambda contro	of On/off ratio when idling	%	50 ± 5°)	± 50		± 50	6450	
1) Indicator hu			00 2 3)		50 ± 5^{2})		50 ± 5^2)	

Indicator hunting.

²⁾ Check lambda control at 2500/min and read off average value. Compare this value to the idling speed value, if necessary readjust. The average value at idling speed must not differ from value measured at 2500/min by more than \pm 10. To check, remove regenerating line and plug.

³⁾ Read off value 60 to 120 seconds after start.

⁴⁾ Read off value 0 to 20 seconds after start.

Fuel pressures - Engine 102, 103

System pressure	with cold or warmed up eng	ine	bar	6,2 to 6,4 Gauge pressure
Lower chamber pressure	with engine warmed up	under the system pressure measured beforehand	bar	approx. 0,4
	at coolant temperature + 20°C	when idling, under the system pressure measured beforehand	bar	approx. 0,5
	with overrun fuel cutoff	lower chamber pressure same as system pressure		_

Fuel pump - Engine 102, 103

MB no.	-		002 091 59 01
Voltage	with engine stationary	min. V	11,5
Measurement specification	with engine stationary and a voltage at fuel pump	min. V	11,5
Delivery¹)	Measuring point: fuel line downstream of membrane pressure regulator	min. l/s	1/40
Power consumption	n	А	6 to 10

¹⁾ To measure the delivery, the fuel container must be at least half full.

Injection valves - Engine 102, 103

Bosch no./MB no., br	ass version		0 437 502 054 / 000 078 58 23	
Bosch no./MB no., ste	eel version		0 437 502 035 / 000 078 57 23	
Opening pressure in gauge pressure	with new injection valves	bar	4,2 to 4,7	
390 p. 0000.0	with run-in injection valves at least	bar	3,7	

Checking electrical components - Engine 103

A. Testers and connection diagrams
B. Fault tables for on/off ratio indicator
C. Test programme with socket box
1. to 12. Test steps in accordance with on/off ratio

13. indicator

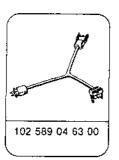
14. Speed signal Overrun fuel cutoff

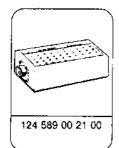
Note:

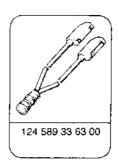
The tests which are not listed are identical to those of the repair manual "Engine 103, combustion I".

A. Testers and connection diagrams

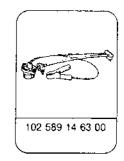
Special tools 🕏









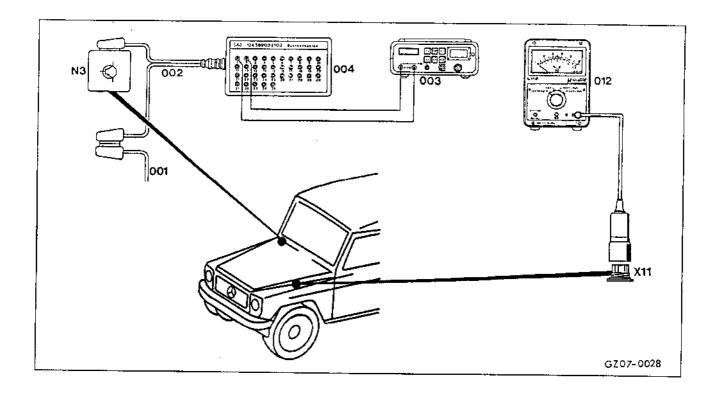




Commercially available testers

Multimeter	e.g. Sun, DMM-5	
Twin unit	e.g Hermann, ECD 53	
Lambda control tester	e.g Hermann, L 115	
Engine tester	e.g Bosch, MOT 002.02	

Connect testers according to connection diagram



Connection, lambda control tester and socket box

001	Coupling, control unit CIS-E
002	Test cable 124 590 22 62 00

003 Multimeter 004 Socket box 012 Lambda control tester

N3 Control unit CIS-E injection system

X11 Diagnostic box, 9-pole

B. Fault tables for on/off ratio indicator

Indicator, on/ off ratio %	Fault circuit/fault type	Test step
0	Ground at diagnostic unit (X11) socket 2, interruption.	4.0
	Line, diagnostic unit (X11) socket 3 or 6, interruption or lambda tester defective.	
	Mixture adjustment to rich, only in engines with lambda control.	
10	Transmitter, air flow meter (B2) reversed or defective.	5.0 to 5.4
	Assignment of coupling, throttle valve switch (S29/2), idling speed and full-load contact reversed or short circuit (full-load contact closed with insufficient air throughput).	
20	Full-load contact defective or throttle valve switch (\$29/2) reversed. Indication 20% only with actuated throttle valve switch (\$29/2).	6.0 to 6.3
30	Short circuit or line interruption between control unit CIS-E (N3) and temperature sensor coolant (B11/2) or temperature sensor coolant (B11/2) defective	7.0 to 7.2
40	Line to transmitter, air flow meter (82) has interruption or short circuit or transmitter, air flow meter (82) defective.	8.0 to 8.4
50	Without lambda control: all monitored signals satisfactory.	9.0 to 9.2.2
	With lambda control: O ₂ -probe(G3/2) not ready or defective, line interruption.	
60	Speed signal at control unit CIS-E (N3) unreasonable.	13.0 to 13.2
70	TD-signal (speed signal) at control unit CIS-E (N3) unreasonable.	10.0 to 10.2
80	Line to temperature sensor, intake air (B17/2) has interruption or short circuit or temperature sensor, intake air (B17/2) defective.	11.0 to 11.3
90	_	-
100	Voltage or ground at control unit CIS-E (N3) missing or control unit CIS-E (N3) defective.	12.0
	Lambda tester defective.	
ļ	In addition with fambda control (G3/2):	
	Lambda adjustment too lean.	
	O ₂ -probe defective (short circuit to ground).	
ndicator	With lambda control:	_
nunting	No fault in the monitored signals.	

C. Test programme with socket box

Test conditions

- Engine oil temperature approx. 80°C
- All electrical consumers switched off
- Battery voltage 11 to 14V

Symbols for measuring instruments:

Socket box

Lambda control tester

[**...**;

Multimeter

Bridge

ب د

Socket

Pin

Symbols for type of measuring with multimeter:

<u>→__(V)</u>___

Voltage measurement (volt, DC voltage)

<u>~~~(A)</u>+⊷

Current measurement (ampere, direct current)

<u>→</u>-(Ω)+

Resistance measurement (Ohm)

Notes

- With constant on/off ratio indicator, first carry out test steps 1 to 3.
- If in a test step e.g point 6, the specified value is satisfactory, test step 6.1 no longer has to be carried out.
- For examples and explanations for column "measuring instrument/test connection" refer to preface of the diagnostic manual.

Indicator, on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/function	Possible cause/remedy
	1.0 Ground posi- tions	N3	Ignition: ON	11 to 14 V	Ground connection (W11) loose, line interruption
		N3 X4/10 7 + Ki. 30		11 to 14 V	Control unit CIS-E defective
		N3 X4/10 20 - KI. 30		11 to 14 V	Ground connection (W16) loose, line interruption
_	2.0 Voltage sup- ply, control unit CIS-E (N3)	N3 2 - <u></u> <u>⊕</u> 1	Ignition: ON	11 to 14 V	Fuse in overvoltage suppressor (K1/1), overvoltage suppressor (K1/1) defective or not inserted, line to (K1/1) socket 1 (terminal 30) interrupted, actuation to (K1/1) socket 3 (terminal 15) interrupted, line from (K1/1) socket 2 (terminal 87 E) to (N3) socket 1 interrupted
-	2.1 Line from ter- minal 30	N3 K1/1 2	Ignition: OFF overvoltage sup- pressor K1/1 re- moved	11 to 14 V	Line interruption from X4/10 → K1/1
	Lines from terminal 15	N3 K1/1 2 — C3	Overvoltage sup- pressor removed ignition: ON	11 to 14 V	Line interruption from X26→ K1/1
		N3 X26 2 - V+ (1	X26 removed, ig- nition: ON	11 to 14 V	Line interruption from S2/1 → X26
	Line, terminal 87 e	N3 K1/1 1 - Q 2	Ignition: OFF	< 1 Ω	Line interruption from K1/1 → N3

Indicator, on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prerequisite	Specified value/ function	Possible cause/remedy
_	3.0 Check cur- rent at elec- trohydraulic actuator (Y1)	Connect test cable 102 589 04 63 00 to actuator	Ignition: ON	without KAT: 10 mA KAT: 20 mA	electrohydraulic actuator, li- nes, control unit CIS-E, adapter plug (CIS-E)
			Engine idling	CAT: hunting 0 ± 3 mA without KAT: 1 to 3 mA	Adjust lambda control Check O₂-probe, test step 9.0
-	3.1 Fault circuit, electrohyd- raulic ac- tuator (Y1)	N3 10	Connect test cable tgnition: OFF Control unit CIS-E removed	19,5 ± 1 Ω	Electrohydraulic actuator, lines
	3.2 Electrohyd- raulic ac- tuator	Y1 Y1 — 1 — 2	Coupling (Y1) re- moved	19,5 ± 1 Ω	Renew electrohydraulic ac- tuator
	3.3 Line	N3 Y1 10 (2		< 1 Ω	Line interruption
	3.4 Line	N3 Y1 12 - 1		< 1 Ω	Line interruption
0%	4.0 Line from (N3) to (X11)	N3	Ignition: OFF, control unit CIS-E removed	< 1 Ω	Line interruption at (X11), voltage supply of (X11) sock- et 6, or ground at (X11) sock- et 2 interrupted. Lambda control tester defective

Indicator on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/function	Possible cause/remedy
10%	5.0 Distinction test		Ignition: ON Open microswitch (throttle valve must not be opened)	1	Indicator 40%, refer to test step 8.0 Indicator 20%, refer to test step 6.0 Indicator 70%, refer to test step 5.1
	5.1 Fault circuit, idling speed contact (S29/ 2)	N3 2 - 2 13	Ignition: OFF	< 1 Ω	
			Actuate accelerator pedal	x	Assignment of coupling (S29/2x1) reversed, idling speed contact, lines
	5.2 Idling speed contact (S29/ 2)	S29/2x1 S29/2x1 1 1 2	1	< 1 Ω	-
			Actuate accelerator pedal	œ	Adjust or renew throttle valve switch
	5.3 Line	N3 S29/2x1 13 = 0 = 1		< 1 Ω	Line interruption
	5.4 Line	N3 S29/2x1 2 - Q - 2		< 1 Ω	Line interruption
	6.0 Fault circuit, full-load con- tact (S29/2)	N3	Ignition: OFF	∞ .	
		ĺ	Accelerator pedal in full throttle position	< 1 Ω	Assignment of coupling (S29/2x1) reversed, full-load contact, lines
	5.1 Full-load contact(\$29/	2 3	Remove (S29/2x1) coupling	∞ .	-

Indicator, on/off rat i o	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/ function	Possible cause/remedy
			Accelerator pedal in full throttle posi- tion		Adjust or renew throttle valve switch
	6.2 Line	N3 529/2x1 5 = 0 - 3		< 1 Ω	Line interruption
	6.3 Line	N3 \$29/2x1 2 - Q - 2		< 1 Ω	Line interruption
30%	7.0 Fault circuit, temperature sensor, cool- ant (B11/2)	N3 7 - Y - 21	Engine idling, control unit CIS-E connected	At + 80° C 0,29 to 0,35 V other val- ues refer to table, temperature sensor	Temperature sensor, coolant, line
	7.1 Temperature sensor, cool- ant (B11/2)	N3 ■■■ B11/2 7 - ①* (Coupling at temperature sensor removed	refer to diagram, temperature sensor	Renew temperature sensor
	ľ	N3 ■ B11/2 21 - ① + - =	j	< 1 Ω	Line interruption
 1 	8.0 Fault circuit, transmitter, air flow meter (B2)		Engine idling, control unit CIS-E connected	4,6 to 5,1 V	Transmitter, air flow meter, control unit CIS-E, lines
		N3 7 - 		0,55 to 0,95 V	Transmitter, air flow meter, control unit CIS-E, fines

Test steps

indicator, on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/function	Possible cause/remedy
	8.1 Transmitter, air flow meter (B2)	B2 B2 1 - Q - 3	1 *	3,6 to 4,4 kΩ	
		B2 B2 1 → - ② → 2	Slowly deflect air flow sensor plate by hand)	Renew air flow meter
	8.2 Line	N3 B2 7 - 1	Ignition: OFF con- trol unit CIS-E re- moved	<1Ω	Line interruption
	8.3 Line	N3 B2 18 - 0 3		< 1 Ω	Line interruption
	8.4 Line	N3 B2		< 1 Ω	Line interruption
50%	9.0 Fault circuit O₂ probe (G3/2)	N3 7 - Û⁺- 8	Engine idling	Hunting between 0,1 to 0,9 V	O₂ probe, lines, check adapter plug CIS-E, mixture adjustment, control unit CIS-E
	9.1 Insulation O ₂ probe line	N3 7 8	Ignition: OFF, control unit CIS-E and coupling (G3/ 2x1) removed	(188)	Line defective
	9.2.1 O₂ probe	N3 8 J 12 V	Engine idling, Lambda tester connected, coupling (G3/2x1) con- nected	0 to 10% am	O ₂ probe defective

¹⁾ Ω -value increases continuously up to half of the deflection and then drops again.

Indicator on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/ function	Possible cause/remedy
	9.2.2 Control unit CIS-E	N3 7 J 8	Engine idling, lambda tester connected, coupl- ing (G3/2x) re- moved	90 to 100% am	Control unit CIS-E, line in- terruption from (N3) to (X11)
60%	Speed sig- nal, refer to 13.0		-	_	-
70%	10.0 TD signal	N3 2 - V*- 25	Engine idling con- trol unit CIS-E connected	6 to 12 V	Lines, ignition trigger (N1/2)
	10.1 Line	N3 X11/1 25 - 1 0 +	Ignition: OFF	< 1 Ω	Line interruption
	10.2 Line	N1/2 X11/1 TD ~¯ ® *-	(N1/2) connector 1 removed	< 1 Ω	Line interruption
	11.0 Fault circuit, temperature sensor, in- take air (B17/ 2)			at + 20° C 1,32 to 1,62 V for other values refer to table, temperature sensor	Temperature sensor, intake air (B17/2), lines

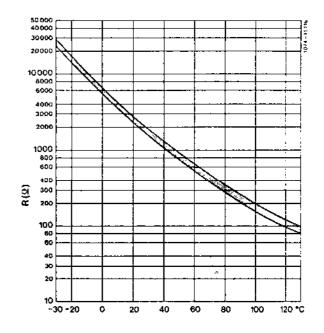
Indicator, on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/ function	Possible cause/remedy
	11.1 Temperature sensor, in- take air (B17/ 2)	B17/2 B17/2 3 - 0 2	Coupling at temp- erature sensor re- moved	refer to diagram, temperature sensor	Renew temperature sensor
-	11.2 Line	N3 B17/2 11 - 3		< 1 Ω	Line interruption
. 	.11.3 Line	N3 B17/2 7 - ② - 2		< 1 Ω	Line interruption
90%	without assignment		_	-	_
100%')	12.0				refer to test steps 1, 2, 3, 9 and check on/off ratio
-	13.0 Speed signal	2 6	Ignition: ON, roll vehicle approx. 1 m	0 to 12 V indicator hunting without consumer 0 to 9 V with con- sumer	Lines, Hall sensor
-	13.1 Connect con- trol unit CIS- E	to (X11)	Drive vehicle in 3rd gear/driving position 3 on road/vehicle per- formance tester, fully accelerate at approx. 2000/min (approx. 6 sec.)	on/off ratio hunt- ing after release of accelerator pedal	With indication 60%: renew control unit CIS-E
-	13.2 Lines	(A2) (A2)	(X30/1) remove	< 1 Ω	Line interruption

¹⁾ Idling speed too high.

Indicator, on/off ratio	Test step/ scope of test	Measuring instru- ment/test connection	Actuation/prere- quisite	Specified value/function	Possible cause/remedy
_	14.0 Overrun fuel cutoff	Connect to diagnostic socket (X11)	Increase engine speed to 2000 to 2500 1/min, then close throttle valve	On/off ratio jumps briefly to 50%	Check control adjustment, check throttle valve switch adjustment, microswitch, lines
_	14.1 Microswitch	N3 24 - 2	Actuate in idle position accelerator pedal	< 1 Ω	Microswitch, lines Microswitch, lines
	14.2 Check cur- rent at elec- trohydraulic actuator (Y1)	trohydraulic actuator	Increase engine speed to 2000 to 2500/min, then close throttle valve	approx.— 60 mA up to restart- ing of com- bustion	refer to test step 3.0

Diagram, temperature sensor - Engine 103

Resistance values, temperature sensor, coolant EZL/CIS-E: (B11/2) and temperature sensor, intake air CIS-E (B17/2).



Table, temperature sensor - Engine 103

Voltage ratings, temperature sensor, coolant EZL/CIS-E (B11/2) and temperature sensor, intake air CIS-E (B17/2).

Temperature °C	Resistance Ω	Voltage at socket 11 Air (Volt)	Voltage at socket 21 Water (Volt)
-20	15 700	2,85 to 3,49	3,24 to 3,94
-10	9 200	2,50 to 3,06	2,84 to 3,47
0	5 900	2,10 to 2,56	2,39 to 2,93
10	3 700	1,69 to 2,07	1,94 to 2,37
20	2 500	1,32 to 1,62	1,51 to 1,84
30	1 700	1,03 to 1,25	1,16 to 1,42
40	1 180	0,77 to 0,94	D,88 to 1,08
50	840	0,57 to 0,69	0,66 to 0,80
60	600	0,42 to 0,52	0,50 to 0,61
70	435	0,32 to 0,40	0,38 to 0,46
80	325	0,25 to 0,31	0,29 to 0,35
90	247	0,18 to 0,22	0,22 to 0,26

Installation survey - Engine mounts

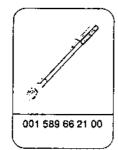
Engine	Component combination	Engine mount right	Colour marking	Engine mount, left	Colour marking	Engine mount, rear	Colour marking
102.965	GL 76/27K-5 GL 76/27K-5 + Air conditioner	460 240 68 18 460 240 68 18	blue	460 240 68 18 460 240 68 18	plue	460 240 57 18 460 240 56 18	green blue
102.989	GL 76/27K-5 GL 76/27K-5 + Air conditioner W 4 A 028 W 4 A 028 + Air conditioner	460 240 68 18 460 240 68 18 460 240 68 18 460 240 66 18	blue blue blue green	460 240 68 18 460 240 68 18 460 240 68 18 460 240 68 18	blue blue blue blue	460 240 57 18 460 240 56 18 460 240 57 18 460 240 57 18	green blue green green
103.987	GL 76/27K-5 GL 76/27K-5 + Air conditioner W 4 A 028 W 4 A 028 + Air conditioner	460 240 68 18 460 240 66 18 460 240 66 18 460 240 66 18	blue green green green	460 240 66 18 460 240 66 18 460 240 66 18 460 240 66 18	green green green	460 240 57 18 460 240 57 18 460 240 63 18 460 240 63 18	green green red red
602.931	GL 76/27K-5 GL 76/27K-5 + Air conditioner	460 240 68 18 460 240 68 18	blue blue	460 240 66 18 460 240 66 18	green green	460 240 56 18 460 240 56 18	blue
603.931	GL 76/27K-5 GL 76/27K-5 + Air conditioner W 4 A 028 W 4 A 028 + Air conditioner	460 240 68 18 460 240 66 18 460 240 66 18 460 240 66 18	blue green green green	460 240 66 18 460 240 67 18 460 240 66 18 460 240 67 18	green yellow green yellow	460 240 57 18 460 240 56 18 460 240 63 18 460 240 63 18	green blue red red

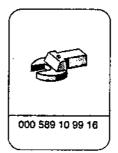
01 Removal and installation of engine

M 103

Special tools ${\cal Z}$







Workshop installation

Fender protective covers	e.g Datex, D-4354 Datteln Post-office box 11 39 Order no. 000 5 662 54391	
Engine director, car	e.g Bäcker GmbH & Co KG Post-office box 14 05 80, 5630 Remscheid-Hasten Make Wilbär, Type no. 31 88	
Evacuating and filling device for air conditioners	e.g. Christof Fischer, Kälte-Klima Augsburgerstr. 289 D-7000 Stuttgart	

Capacities - 300 GE

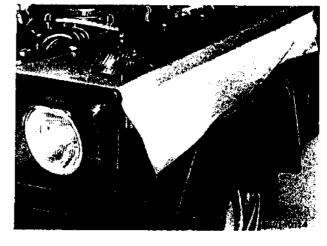
	Capacities approx.	Service product	Sheet no.
Engine with oil filter	max. 6,5 l min, 5 l	Motor oil	226.5 227.5
Cooling system (with heater)	7,8 1	Coolant	310, 325.1, 325.2
Power steering	11	Steering gear oil	236.3

Tightening torques

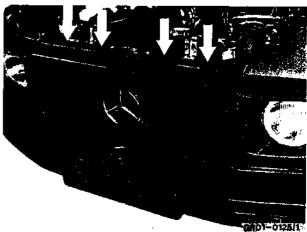
Designation	Nm
Engine mount, front	75
Engine mount, rear	23
Propeller shaft to transmission flange	35

Removal

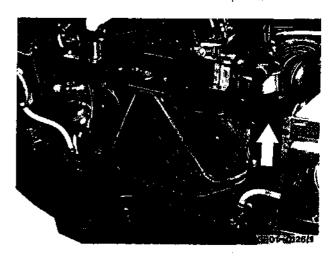
- 1 Mount fender protective covers, left and right.
- 2 Disconnect battery at negative terminal.



3 Remove radiator cowl.

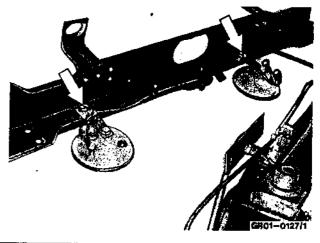


4 Detach front end reinforcement brace with hood catch.



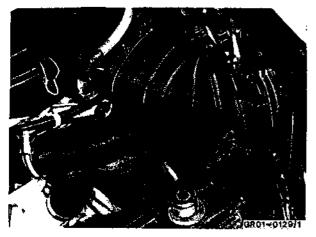
5 Detach horn on support.

Note: Do not disconnect cable.

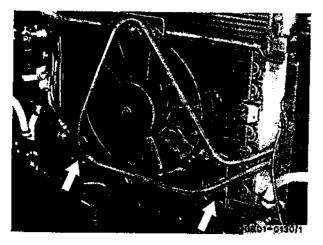




6 Detach cover in wheelhousing, left.



7 Detach rubber gaiter between dust preseparator and air filter.



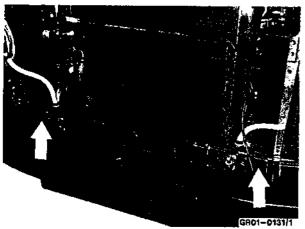
8 Detach cooling loop, steering with auxiliary fan, air conditioner. Detach hoses to the power steering pump and to the steering box.

Note: Draw off steering oil beforehand.



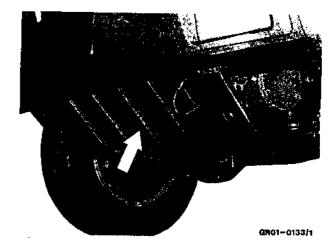
112 589 00 72 00

9 Detach fastening bolt of cooling loop in wheel house.



10 Release lower radiator cowl and flap forward.

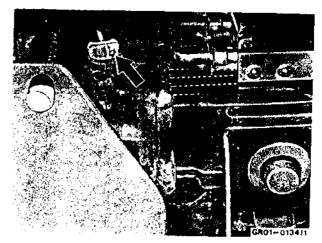
11 Detach underride guard.



12 Drain coolant.

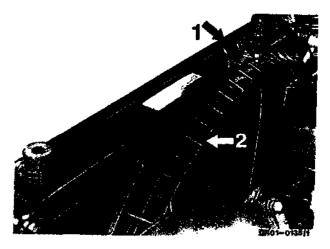
Note: Open vent at the top on the radiator.

13 Detach upper and lower coolant hose from radiator.



14 Detach ring (2). For this purpose pull out locking pin(1) and turn ring (2) to the left.

Note: Place ring (2) on fan.

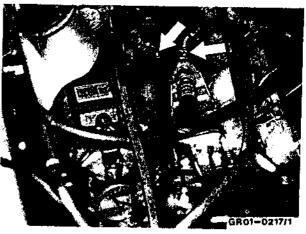


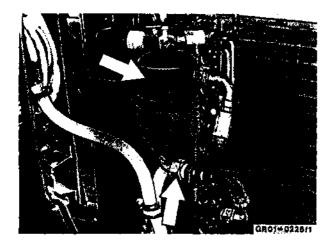
15 Connect hose lines of evacuating device to service valves of air conditioner.

16 Evacuate air conditioner.

Caution:

Observe safety precautions when working on the air conditioner.

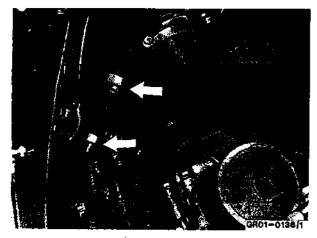




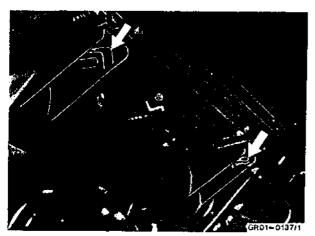
17 Detach pressure line, air conditioner at condenser.

Note: When intervening in the cooling circuit, immediately close all openings air-tight with plug.

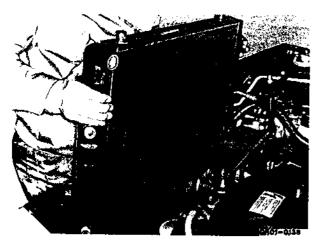
18 Detach receiver with drier.



19 Detach supply and return line on engine oil cooler.



20 Detach radiator mounting.

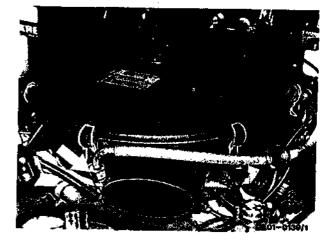


21 Remove radiator.

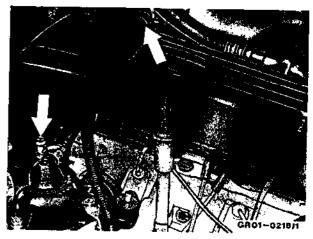
22 Detach vacuum line.

23 Detach air filter.

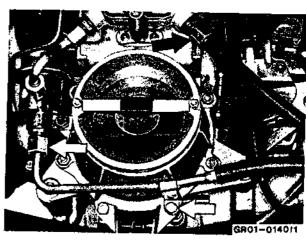
Note: The air filter housing is fastened with 3 nuts.



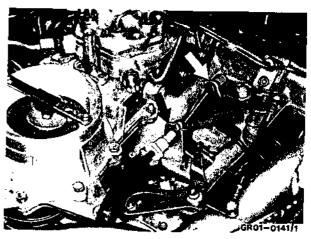
24 Detach coolant line.

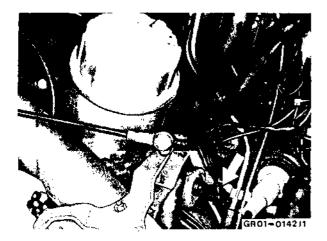


25 Disconnect fuel lines.

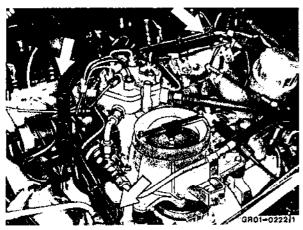


26 Detach throttle control.

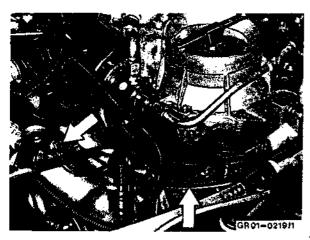




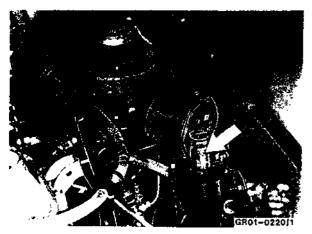
27 Disconnect electrical line from oil pressure switch of oil filter.



- 28 Detach protective tube for mounting set of lines.
- 29 Remove electrical fines to cylinder head and injection system.

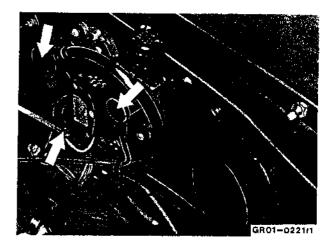


- 30 Detach ground cable.
- 31 Detach vacuum line.

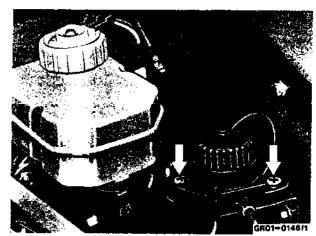


32 Detach high voltage cable to ignition coil.

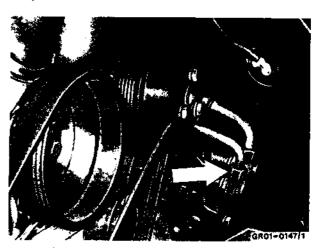
33 Detach plug connector and vacuum line on ignition trigger.



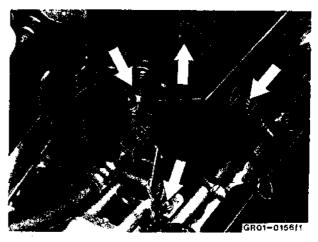
34 Release diagnostic unit and detach plug connector.

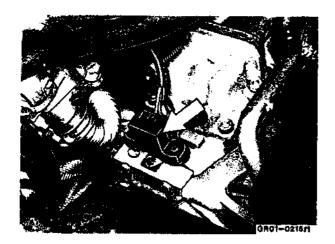


35 Detach hydraulic line on steering box.

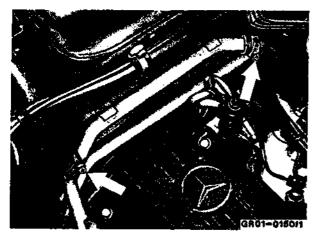


- 36 Detach heat guard.
- 37 Detach intake line, air conditioner.

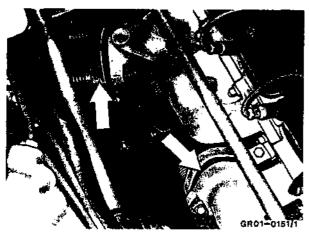




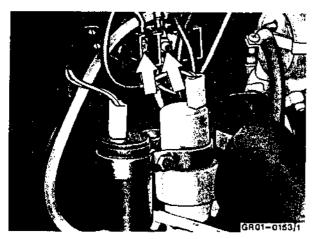
38 Detach plug connector, air conditioner.



39 Detach heater hoses.

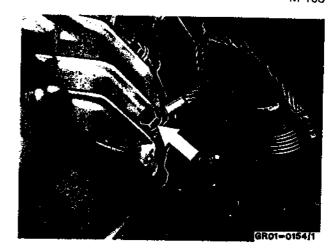


40 Detach exhaust pipe from exhaust manifold.



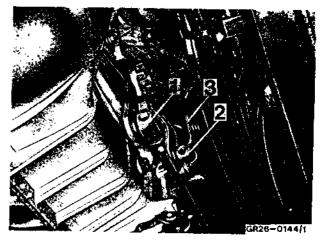
41 Disconnect electrical lines on alternator.

42 Disconnect ground cable from transmission.



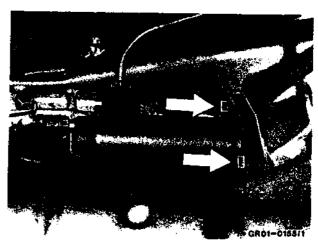
- 43 Release and detach gear shift linkage.
 - 4th/3rd gear

 - 2 2nd/1st gear 3 Reverse/5th gear

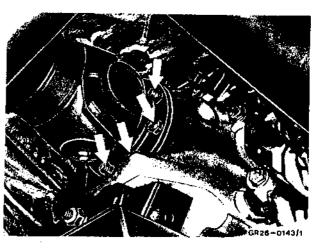


44 Remove clutch slave cylinder.

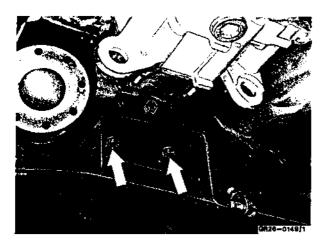
Note: Do not release hydraulic line from stave cylinder.



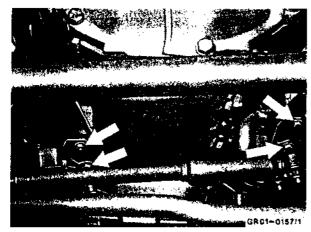
45 Detach universal-joint drive shaft on transmission flange.



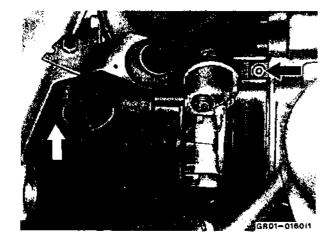
M 103



46 Remove transmission mount.



- 47 Detach engine mount, righteand left.
- 48 Attach lifting tackle.
- 49 Lift engine slightly forward.



- 50 Detach position transmitter, crankshaft.
- 51 Detach electrical lines to starter.
- 52 Lift engine and drive out towards the front.
- 53 Clean all parts, check, exchange as required.

Installation

The installation takes place in the same manner in reverse order. At the same time the following must be observed:

Note: New engine mounts must be slackened after 500 to 1500 km.

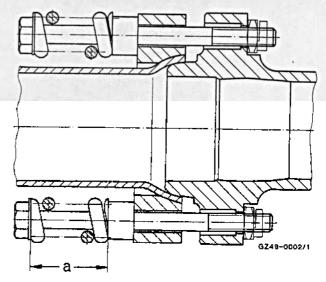
- For slackening engine mounts, refer to page 89.
- If necessary bleed clutch control system.

M 103

- Tighten bolts on propeller shaft to 35 Nm.



- Tighten bolts, exhaust pipe to exhaust manifold until springs have attained block length, then release bolts by 2 revolutions. (corresponds to adjustment a=31 mm).



- Observe repair notes, air conditioner, refer to group 83.
- Connect battery.

Note: First connect (+) and then (-) terminal.

Fill with engine oil as required.

- Check fuel system for leaks.
- Fill with coolant. Check cooling system for leaks.
- Check throttle control, if necessary adjust.
- Fill steering system with oil, let engine run at idling speed and bleed the steering by repeatedly turning to the left and right. At the same time constantly check the oil level.

Note: During trial runs the air intake louver in the left fender must not be concealed by the fender protection cover.

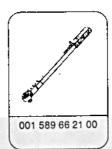
- Carry out trial run.

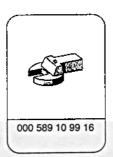
01 Removal and installation of engine

OM 603

Special tools 🕏







Workshop installation

Fender protection cover	e.g Datex, D-4354 Datteln Post-office box 11 39 Order no. 000 5 662 54391
Engine director, car	e.g Bäcker GmbH & Co KG Post-office box 14 05 80, 5630 Remscheid-Hasten Make Wilbär, Type no. 31 88
Evacuating and filling device for air conditioners	e.g Christof Fischer, Kälte-Klima Augsburgerstr. 289 D-7000 Stuttgart

Capacities - 300 GD

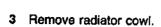
	Capacities approx.	Service product	Sheet no.
Engine with oil filter	max. 8,5 I min. 6,5 I	Motor oil	226.0/1/5 227.0/1/5 228.0/1/2/3
Cooling system (with heater)	7,5 1	Coolant	310 325.1
Power steering	max. 1 l	Steering gear oil	236.3

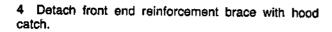
Tightening torques

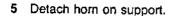
Designation	Nm
Engine mount, front	75
Engine mount, rear	23
Propeller shaft to transmission flange	35

Removal

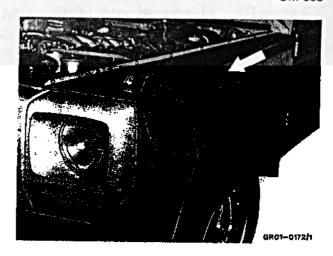
- 1 Mount fender protective covers, left and right.
- 2 Disconnect battery at negative terminal.

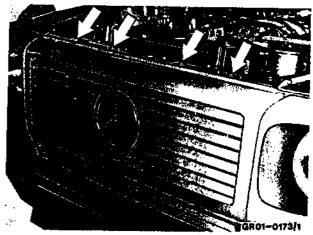


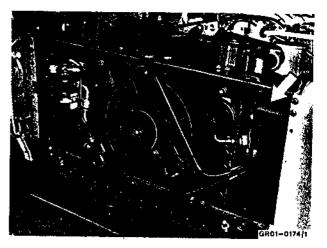


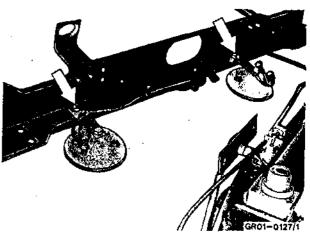


Note: Do not disconnect cable.

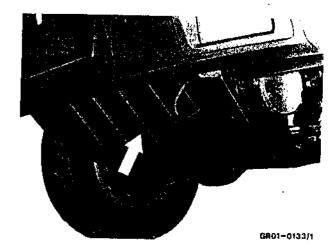








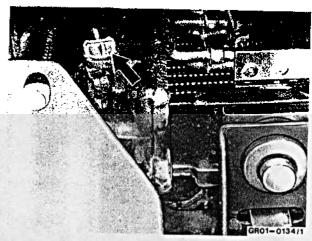
11 Detach underride guard.



12 Drain coolant.

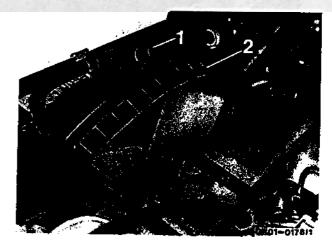
Note: Open vent at the top on the radiator.

13 Detach upper and lower coolant hose from radiator.



14 Detach ring (2). For this purpose pull out locking pin(1) and turn ring (2) to the left.

Note: Place ring (2) on fan.

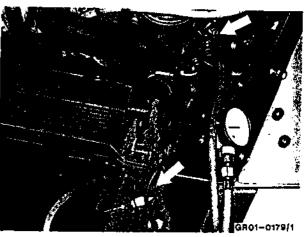


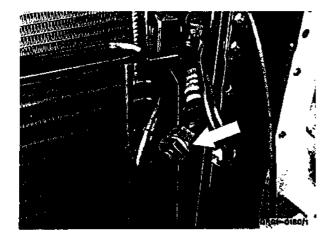
15 Connect hose lines of evacuating device to service valves of air conditioner.

16 Evacuate air conditioner.

Caution:

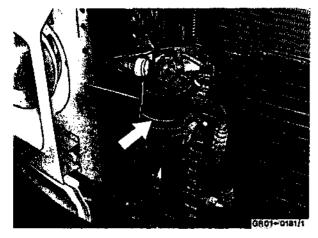
Observe safety precautions when working on the air conditioner.



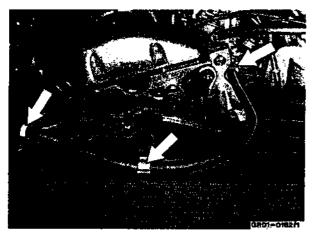


17 Detach pressure line, air conditioner at condenser.

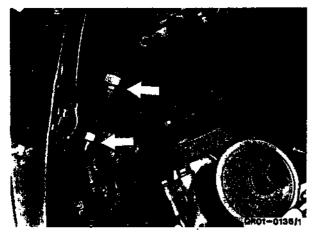
Note: When intervening in the cooling circuit, immediately close all openings air-tight with plug.



18 Detach receiver with drier.

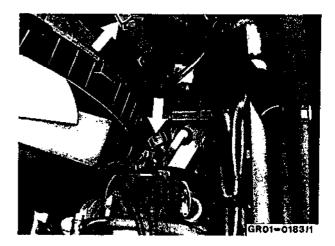


19 Detach coolant line.

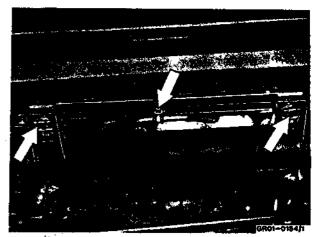


20 Detach supply and return line on engine oil cooler.

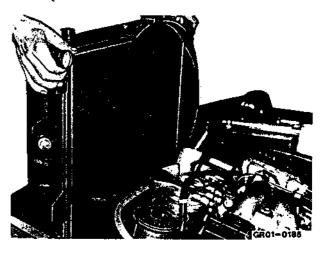
21 Detach supply and return line on gear oil cooler.



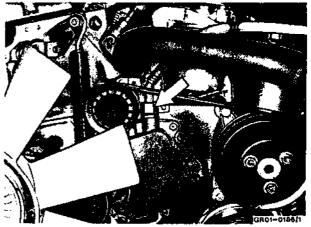
- 22 Detach radiator mounting.
- 23 Detach oil cooler pipe.

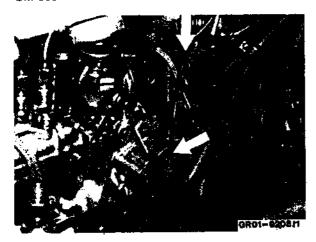


24 Remove radiator.



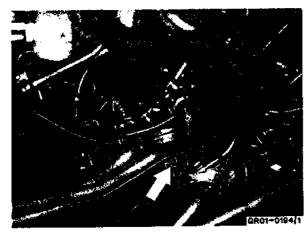
25 Disconnect line at vacuum pump.



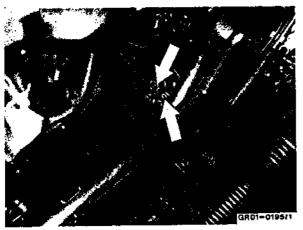


35 Remove vacuum lines to injection pump.

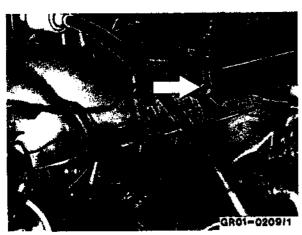
Note: Vacuum unit stop: line brown/blue, vacuum control valve: line black



36 Disconnect electrical line from oil pressure switch of oil filter.

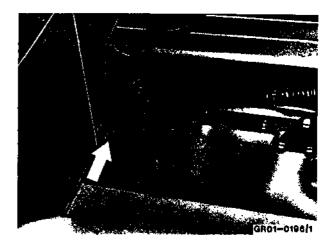


37 Detach electrical fines to starter.

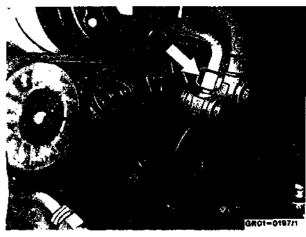


38 Detach line, heating water supply.

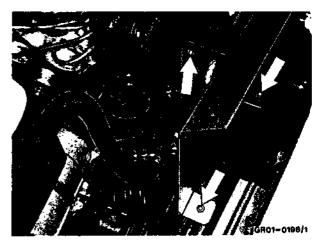
39 Detach heater hose.



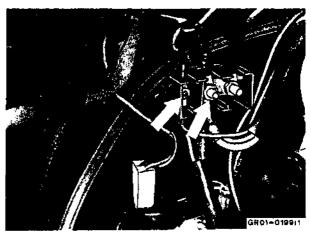
40 Detach hydraulic line at steering box.



41 Detach heat guard.



42 Disconnect electrical lines on alternator.

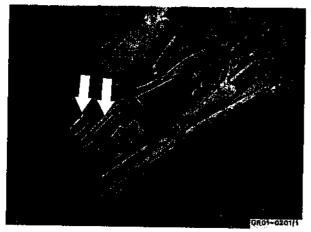




43 Disconnect ground cable from transmission.



44 Detach exhaust pipe from exhaust manifold.



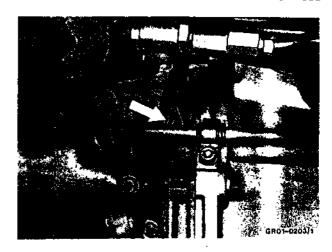
- 45 Release and detach gear shift linkage.
- 46 Detach plug connector to starter lock switch.

Note: The plug connector for the starter lock switch is secured with a lock (white plastic ring). Before pressing off the plug connector the lock must be turned up towards the top.

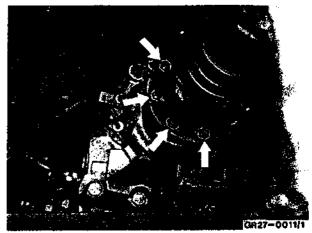


47 Detach plug connector at kickdown - solenoid valve.

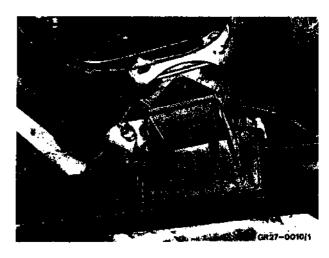
48 Detach speed sensor.



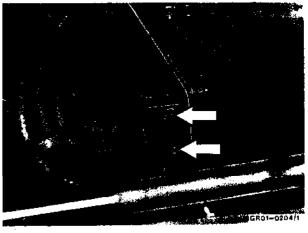
49 Detach universal-joint drive shaft on transmission flange.

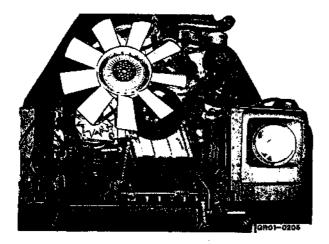


50 Remove transmission mount.

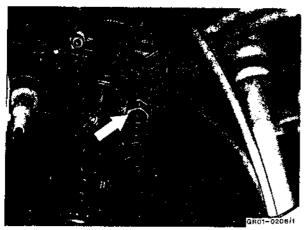


51 Detach engine mount on right and on left.





- 52 Attach lifting tackle.
- 53 Lift engine slightly forward.



- 54 Detach intake line, air conditioner.
- 55 Lift engine and drive out towards the front.
- 56 Clean all parts, check, exchange as required.

Installation

The installation takes place in the same manner in reverse order. At the same time the following must be observed:

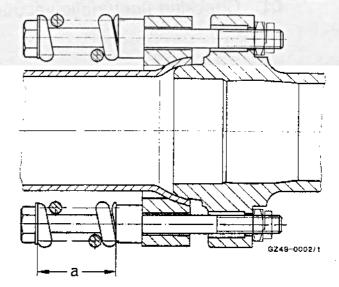
Note: New engine mounts must be slackened after 500 to 1500 km.

- For slackening engine mounts, refer to page 89.
- If necessary bleed clutch control system.



- Tighten bolts on propeller shaft to 35 Nm.

- Tighten bolts, exhaust pipe to exhaust manifold until springs have attained block length, then release bolts by 2 revolutions. (corresponds to adjustment a = 31 mm).



- Observe repair notes, air conditioner, refer to group 83.

Connect battery.

Note: First connect (+) and then (-) terminal.

Fill with engine oil as required.

- Check fuel system for leaks.
- Fill with coolant. Check cooling system for leaks.
- Check throttle control, if necessary adjust.
- Fill steering system with oil, let engine run at idling speed and bleed the steering by repeatedly turning to the left and right. At the same time constantly check the oil level.

Note: During trial runs the air intake louver in the left fender must not be concealed by the fender protection cover.

- Carry out trial run.

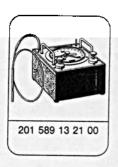
01 Checking pneumatic vacuum cutout for leaks

OM 602/603

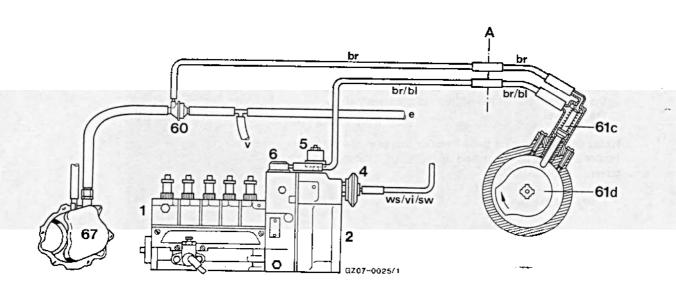
Test values

Vacuum	bar	0,8
Vacuum loss in 30 send.	bar	max. 0,2

Special tools 🕏



Functional diagram



- 1 Injection pump
- 2 Governor
- 4 Vacuum unit, idle speed enrichment
- 5 ADA unit (altitude pressure compensator)
- 6 Vacuum unit (stop)
- 60 Non-return valve
- 61c Valve, glow plug and starter switch
- 61d Cam disc, glow plug and starter switch (Valve open)

- A Partition wall
- e Intake side, brake (brake booster)
- v Vacuum reservoir

ws = white

vi = violet

sw = black

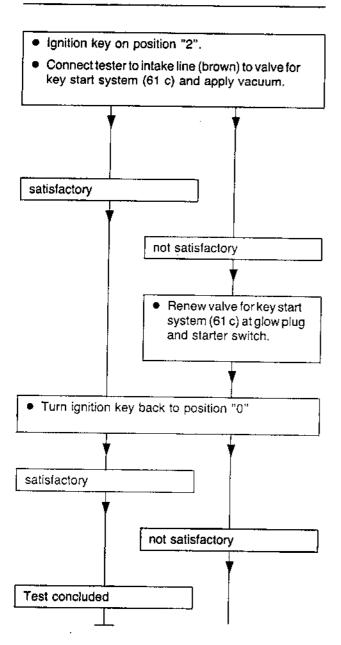
br = brown

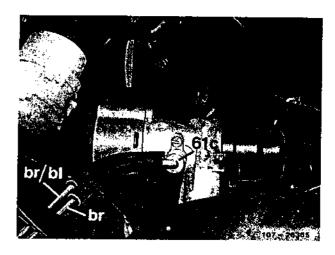
bt = blue

OM 602/603

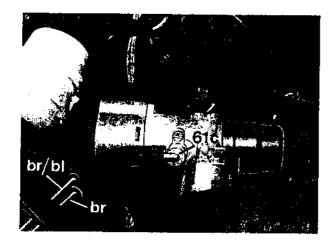
Note: Before carrying out this test, check all hose lines and connection pieces for cracks or leaks.

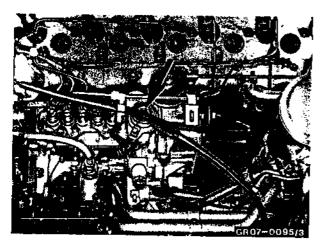
Test procedure

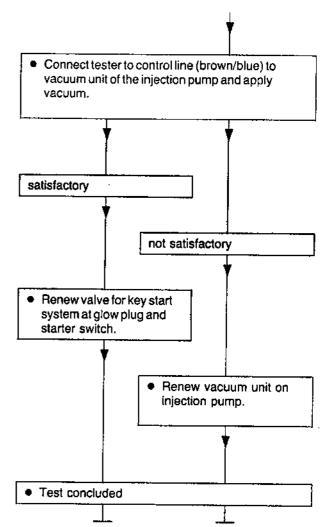




OM 602/603



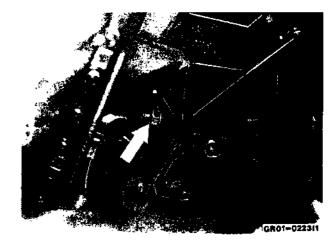




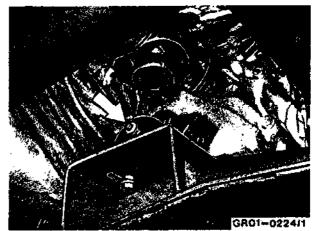
Slackening

Note: The engine mounts must be released in the 1st after-sales service.

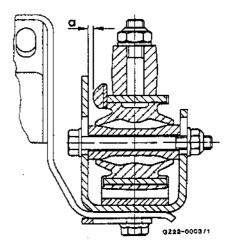
1 Release nuts of stop screws at both front engine mounts.



- 2 Release nut of stop screw of rear engine mount.
- 3 Shake engine in crosswise direction.
- 4 Tighten nuts of stop screws of the engine mounts in one go.



5 Check reference size a = 2 - 4 mm.



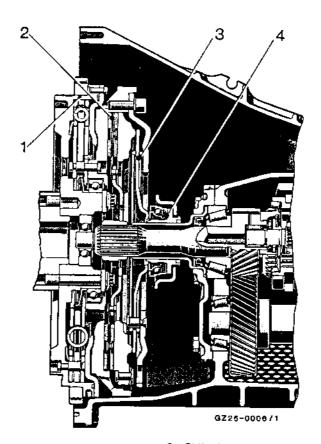
Clutch

Installation survey

Vehicle Model	Туре	Installation	Shift clutch (Part no.)	Disc Ø/lining (Part no.)	
.220 .221	200 GE 4 x 4') ²) 200 GE 4 x 4') ²) 200 GE 4 x 4') ³)	Standard	MF 228 (004 250 49 04) optional	Ø 228 mm/organic (010 250 96 03) optional	
.204 .224 .225	230 GE 4 x 4 ²) 230 GE 4 x 4 ²) 230 GE 4 x 4 ³)		(004 250 65 04) optional (005 250 00 04)	(008 250 66 03)	
.304 .324 .325	250 GD 4 x 4 ²) 250 GD 4 x 4 ²) 250 GD 4 x 4 ²)				
.307 .327 .328	300 GD 4 x 4²) 300 GD 4 x 4²) 300 GD 4 x 4²)				
.207 .227 .228	300 GE 4 x 4 ²) 300 GE 4 x 4 ²) 300 GE 4 x 4 ³)	Standard	MF 240 (004 250 66 04) optional (004 250 67 04)	Ø 240 mm/organic (010 250 95 03) optional (008 250 68 03)	

- Model, country-specific e.g. Italy
 Wheelbase 2400 mm
 Wheelbase 2850 mm

Arrangement



- 1 Two-mass flywheel
- 2 Clutch disc

- 3 Shift clutch
- 4 Release bearing

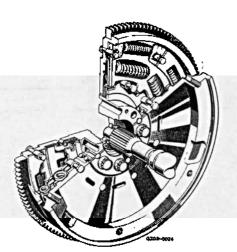
General

All vehicles with manual transmission are equipped with a **two-mass flywheel**.

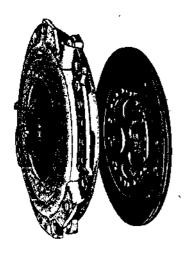
The rotary vibrations generated by the engine are reduced by the two-mass flywheel and their transmission to the transmission-propeller shaft area reduced.

This achieves improved driving and reduced noise, also in the lower speed range.

The types with engines 102, 602 and 603 are equipped with a two-mass flywheel with a torsion range of approx. \pm 40° and the engines 103 with a torsion range of approx. \pm 15°.



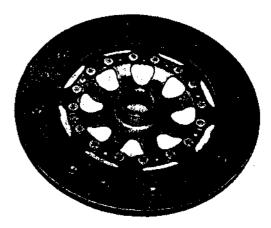
Because of the restricted space conditions through the two-mass flywheel, the clutch pressure plate is designed with a smaller overall height,



GR25-0016

The vehicles with engines 102, 602 and 603 are equipped with a clutch with a diameter of 228 mm. The contact force of the clutch pressure plate is 5900–6600 N.

The vehicles with the engines 103 on the other hand are provided with a clutch with a diameter of 240 mm. The contact force of the clutch pressure plate is 7410 – 8410 N.

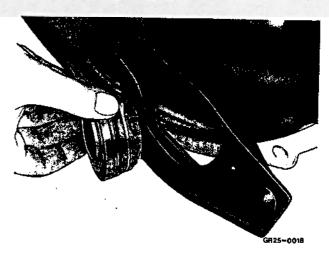


GR25-0022

The clutch disc is without torsional damping as the damping takes place in the two-mass flywheel.

Repair note

The hub splining of the clutch disc for the two-mass flywheel is nickel-plated, this means that greasing of the splining is no longer required.



The release fork has been reinforced and modified in shape. The release bearing is lower.

Tightening torques

Version			Dry single	disc clutch	and a land
Shift clutch		004 250 65 04')	004 250 49 04') 005 250 00 04')	004 250 67 041)2)	004 250 66 041)2)
Manufacturer		F&S	LUK	F&S	LUK
Designation		MF	228		240
Contact force	N	5900 to 6600 7410 to 84			
Clutch disc		008 250 66 03 010 250 96 03') 008 250 68 03')2)			
Version	1	without torsion damper			
Manufacturer	fin	F&S	LUK	F&S	LUK
Outer diameter	mm	22	28	24	
Thickness of clutch disc with ring	mm		10		
Lining thickness	mm	3,6			
Lining quality		Organic lining			
Permissible wear of lining each side	mm	1.0			

Special tools ${\cal Z}$



Expendable materials

Cons. No.	Designation	Part Number
1	Lubricant: Molybdenum disulphide running-in paste	000 989 51 51
		<u> </u>

Tightening torques

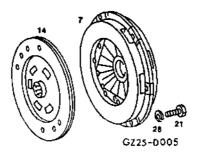


Fig. no.	Designation	Nm
21	Shift clutch to flywheel	25

¹⁾ optional 2) In engine 103

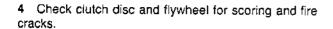
Removal

- 1 Remove transmission.
- 2 Release fastening bolts of the clutch one after the other by 1 to 1 1/2 revolutions respectively until the clutch is released over the entire circumference.

Note: Immediate complete release of the individual fastening bolts can lead to damage to the diaphragm spring and to the thrust ring jumping off.

3 Fully unscrew fastening bolts, remove pressure plate and driver plate from the flywheel.

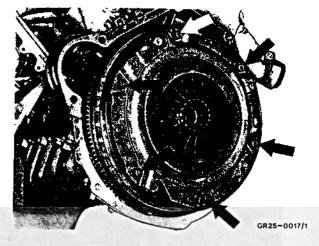
Note: Handle and store the clutch carefully. Any throwing or dropping of the clutch could lead to bending of the spring bands between contact plate and cover plate which would result in considerable imbalance when installed. The clutch disc is to be treated just as carefully in order to avoid bending (lateral runout) of the friction facing.

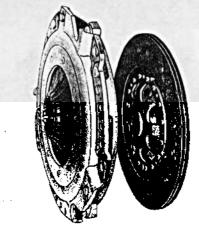


Note: If cracks or scorching are evident on the flywheel, renew flywheel.

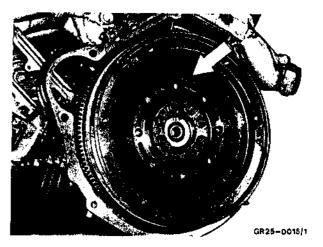
- 5 Remove release bearing of input shaft.
- 6 Clean all parts, check, exchange as required.

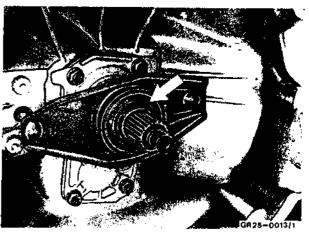
Note: The release bearing has permanent lubrication and is not to be washed out.

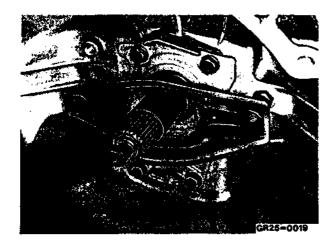




GR25-0016



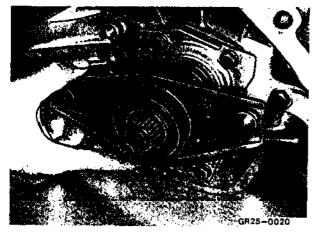




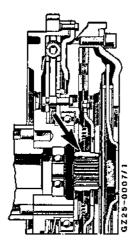
7 Test release fork at contact surfaces for wear.

Installation

1 Slightly coat guide tube and guide surfaces of the release fork and release bearing with lubricant no. 1



2 Slide release bearing onto the guide tube in such a way that the guide surfaces engage in the release fork.

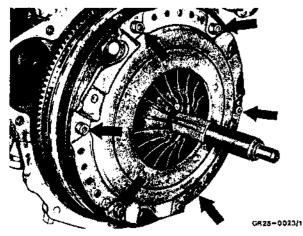


3 Centre and fit new shift clutch and clutch disc using special tool.



201 589 08 15 00

Note: Install clutch disc in such a way that the long hub boss lies on the flywheel side.



4 Screw, in fastening bolts and tighten one after the other by 1 to 1 1/2 revolutions respectively until the clutch is tightened.

When installing make sure that the clutch is pulled evenly and without burrs over the entire circumference into the guide of the flywheel.

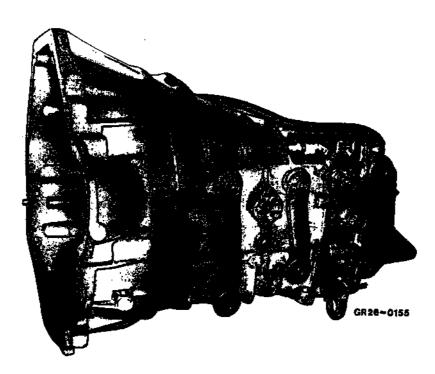
5 Install transmission.

Manual 5-gear transmission

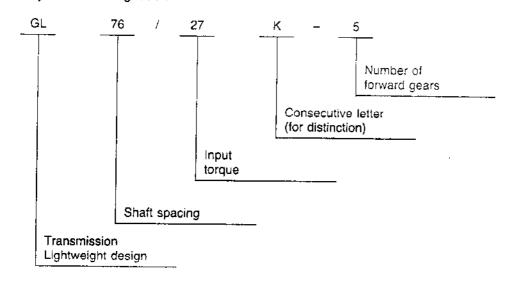
The new cross-country vehicle type 463 is equipped with the manual 5-gear transmission GL 76/27 K-5 (model 717.439).

With the exception of the increased version of the 3rd gear, the transmission is identical to model 717.433 which is installed in car types 124.026/030/ and .130.

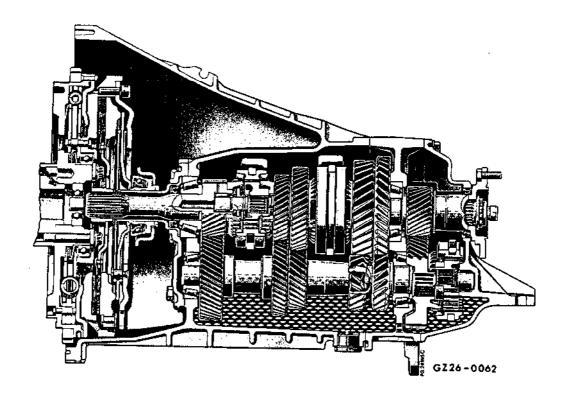
Overall view



Key to sales designation



Overall view



Manual 5-gear transmission

General

In the transmission 717.43 (GL 76/27K-5) all housing parts and cover are made in die-cast light metal. Transmission and clutch housing are designed to achieve high strength. The clutch housing is fully integrated and inclined 15° to the right.

It is a gear change box in countershaft design, with 5 locking synchromesh forward gears and a synchronized reverse gear. The reverse gear has a standstill synchronization. The reverse gear can only be inserted with the vehicle stationary. When operating the reverse gear, the synchronization of the 5th gear is applied by the shifting gate and the drive shaft, countershaft and the gears of the main shaft are brought to a standstill.

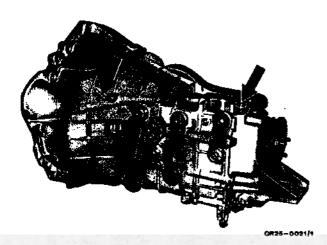
Once the gears and shafts have been brought to a standstill, the synchronization is freed again by a guide plate, and with further shifting the reverse gear is inserted.

The reverse gear is installed in the rear part of the gearbox housing and in the intermediate plate.

The 5th gear is in the rear transmission cover.

Main shaft and countershaft are mounted with 2 tapered roller bearings each, the countershaft is additionally in a needle bush.

Due to the fording ability of the cross-country vehicle, breather lines are positioned on the transmission and clutch housing.



The mating surface towards the engine is sealed with a high-temperature resistant silicon (e.g.: Elastosil N 189).

The rear transmission cover has been modified based on the installation conditions in type 463.

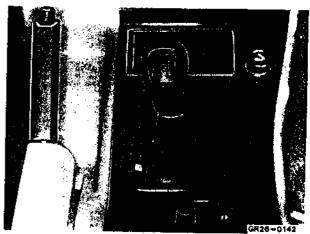
Based on the two-mass flywheel, following changes have had to be carried out on the manual 5-gear transmissions 717.43:

Pivot sleeve on front transmission cover shortened by 10,5 mm and the drive shaft shortened by 22,3 mm. For this reason there are new model designations.

The speedometer connector is plugged as the speedometer drive takes place via the transfer case.

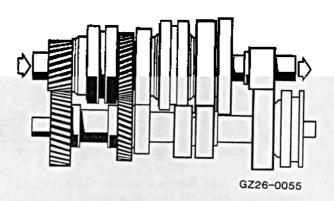
The rubber mount for all shift levers has been made 4 mm narrower than with the car due to space conditions.

The floor shift is in principle the same as with the car. The removal and installation of the floor shift remains unchanged, the shift rods have been adapted to the installation conditions. The shift mechanism is adjusted as before.



The shift pattern is in "H" form, corresponding to the requirements. The 1st gear is on the left, at the front. The 5th gear is on the right at the front and the reverse gear on the left at the rear, which can only be engaged after lifting of the shift lever.

The 3rd gear has been increased, i.e. the ratio is i = 1.365 (car i = 1.376).



The position of the gear shift with regard to the frame is the same for all engines.

Assembly instructions

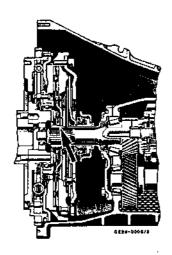
Details are only given on deviations of the cross-country vehicle. Basically the repair instruction 717.43 of the workshop manual for cars applies.

- The hub splining of the clutch disc for the two-mass flywheel is nickel plated, in this way a greasing of the SAE-splining of the input shaft is no longer required.
- In the transmission cover, front there is a Viton ring installed with dust lip as a sealing. Renew radial seal, refer to repair manual 717.43 Job no. 26-230.
- On the output flange, 8 holes 100 mm Ø, there is a Viton ring installed with dust lip as sealing. Renew radial seal, refer to repair instructions 717.43 Job no. 26-310.

Maintenance instruction

The capacity for the transmission 717.439 is 1,5 ltr.

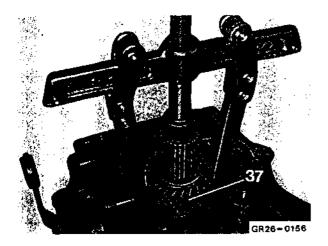
For approved oils, refer to service product specifications, Sheet 236.2.



The 5th gear on the main shaft is greater in diameter.
 The order of repair is therefore different. The 5th gear
 (37) must now be removed with a two-claw puller.

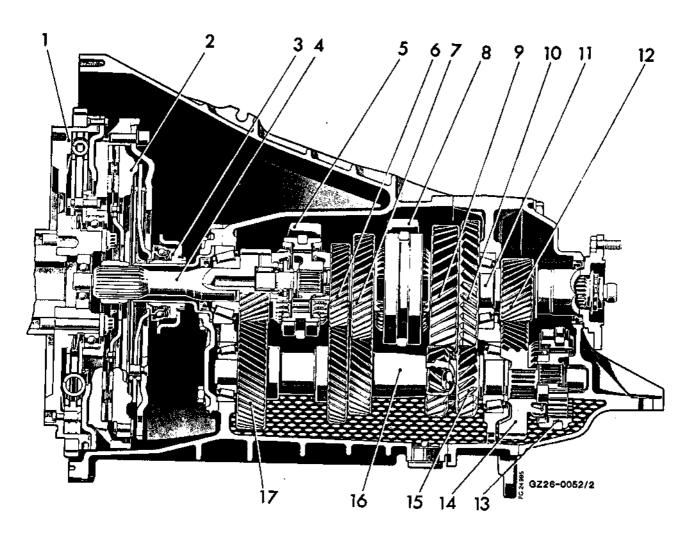
Puller 000 589 88 33 00 Puller arms 126 589 00 34 00

(Repair instructions 717.43 Job no. 26-330 figure 7).



If difficulties arise, remove intermediate plate with puller. In this way the outer bearing race is pulled out of the intermediate plate and this can then be removed. Observe shim rings. Now over the helical gear, 1st gear, pull off the tapered roller bearing and the helical gear, 5th gear.

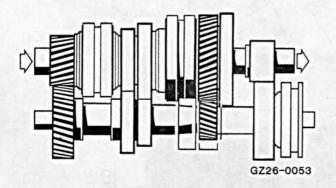
Sectional view

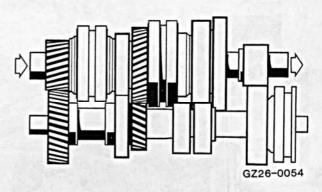


5-gear transmission GL 76/27 K-5

1	Two-mass flywheel	9	3st gear wheel	
2	Clutch	10	Reverse gear - main shaft	
3	Release bearing	11	Main shaft	
4	Input shaft	12	5th gear wheel	
5	Shift mechanism, 3rd and 4th gear	13	Shift mechanism, 5th gear	
6	3rd gear wheel	14	Countershaft gear, 5th gear	
7	2nd gear wheel	15		
8	Shift mechanism, 1st and 2nd gear	16	Reverse gear – Countershaft Countershaft	
	The second secon	17		
		17	Countershaft gear	

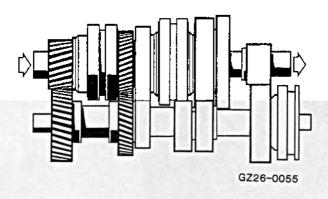
Power flow

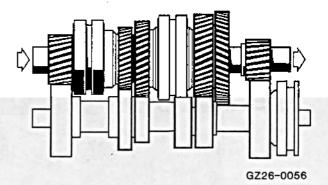




1st gear

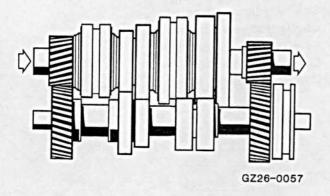
2nd gear

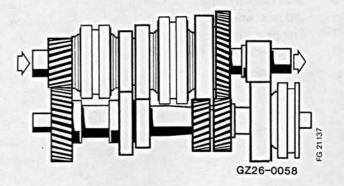




3rd gear

4th gear





5th gear

Reverse gear

Technical data

Gear ratios i

Transmission		717,43
Constant	i	1,567
	Number of teeth	30 47
1st gear	i	3,856
	Number of teeth	32 13
2nd gear	i	2,182
	Number of teeth	<u>39</u> 28
3rd gear	i	1,365
	Number of teeth	<u>27</u> 31
4th gear	i	1,0
	Number of teeth	_
oth gear	i	0,799
	Number of teeth	<u>26</u> 51
Reverse gear	i	4,218
	Number of teeth	3 <u>5</u> 13

Technical data

Diameter on propeller flange for running surface of sealing ring	Value when new	mm	40,00 39,84
	Limit value in event of repair	mm	39,34
Permissible lateral and vertical runout of propeller flange		mm	0,05
Concentricity deviation at propeller flange (measured with orifice flange)	mm	< 0.07
Diameter of input shaft at running surface for sealing ring	Value when new	mm	29,90 29,85
	Limit value in event of repair	mm	29,70

Capacity

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Automatic transmission fluid (236.2)	ATF	1,5

Tightening torques

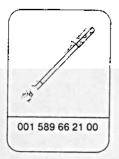
Designation	Nm
Shift lever 1st to 4th gear to gear shift linkage	30 ± 3
Shift lever reverse gear and 5th gear outside	25 ± 3
Transmission housing cover on intermediate plate	28 ± 3
Flange to main shaft')	160 ± 30
Transmission housing cover, rear to transmission housing	40 ± 5
Transmission housing cover, front to transmission housing	20 ± 3
Oil filler screw to transmission housing	60 ± 10
Oil drain plug to transmission housing	60 ± 10
Knuckle pin to transmission housing	35 ± 4
Locking device to transmission housing	8 ± 2
Vent to transmission housing	40 ± 5

¹⁾ Secure nut by calking to base of groove

Capacity

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Automatic transmission fluid (236.2)	ATF	1,5

Special tools 🏂



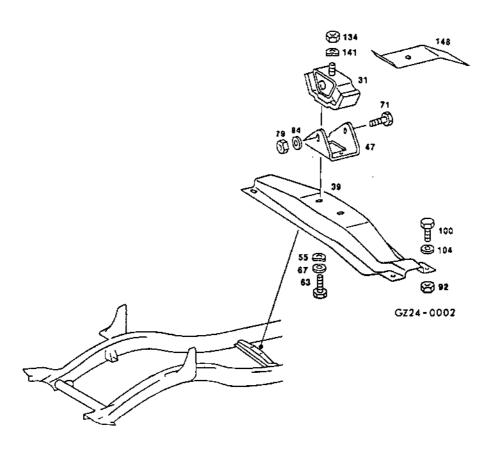


Tightening torques

Designation	Nm
Flange to main shaft')	160 ± 30
Oil filler screw to transmission housing	60 ± 10
Oil drain plug to transmission housing	60 ± 10
Vent to transmission housing	40 ± 5
4) 6	

¹⁾ Secure nut by calking to base of groove.

Mounting, transmission

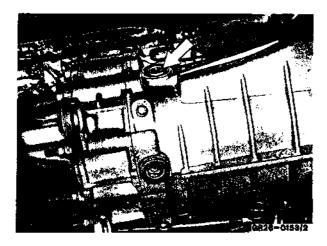




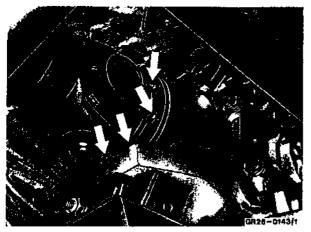
26

Removal

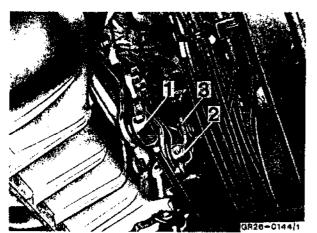
1 Disconnect battery at negative terminal.



2 If necessary drain gear oil. -



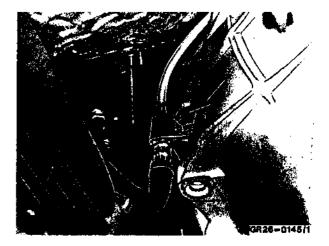
3 Remove universal-joint drive shaft and tie up on the side.



- Release and detach gear shift linkage.

 - 1 = 3rd/4th gear 2 = 1st/2nd gear
 - 3 = 5th/reverse gear

5 Detach bracket, hydraulic line for clutch slave cylinder from transmission.



6 Detach breather line on the transmission.



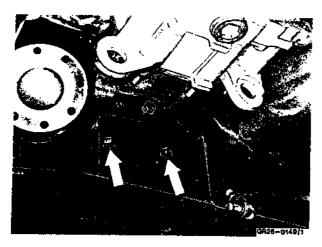
7 Detach breather line on clutch housing.



8 Remove clutch slave cylinder.

Note: Do not release hydraulic line from slave cylinder.

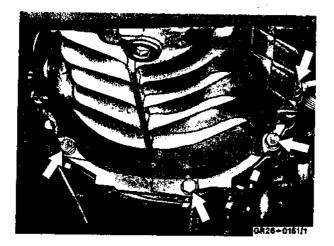




9 Unscrew bolts on transmission mount.

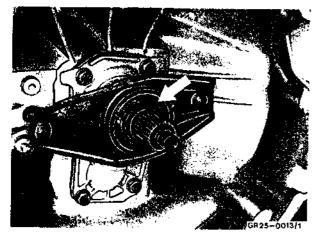


- 10 Unscrew bolts on transmission mount.
- 11 Raise transmission and remove transmission support.
- 12 Support engine at rear on oil pan.



- 13 Remove starter.
- 14 Unscrew all bolts on the clutch housing.
- 15 Lift out transmission horizontally towards the rear.

Note: Do not swing transmission down until the input shaft has been pulled out of the driven plate.



16 Check release bearing and release fork for wear and renew if necessary.

Einbauen

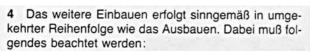
Hinweis: Die Nebenverzahnung der Kupptungsscheibe ist vernickelt, die Antriebswelle wird daher nicht eingefettet.

1 Am Schaltgetriebe 1. Gang einlegen.



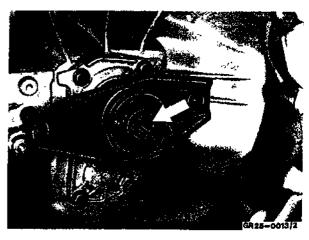
Hinweis: Am Abtriebsflansch drehen, damit die Antriebswelle leichter in die Kupplungsscheibe eingeführt werden kann.

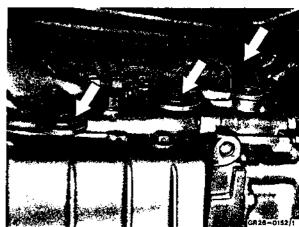
3 Schaltgetriebe in Leerlauf schalten.

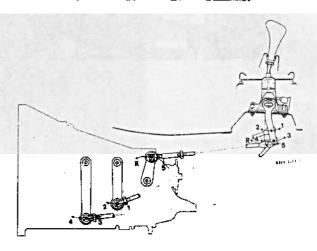


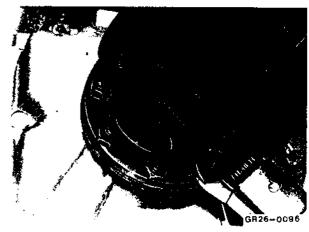
- Masseband an Kupplungsgehäuse anbauen.
- Dichtringe an der Hohlschraube und Dichtbbeilage am Nehmerzylinder erneuern.
- Zuordnung der Schaltstangen beachten und bei Bedarf einstellen, siehe Seite 109.
- Bei eingebauter Distanzplatte am Getriebelager ist dieselbige wieder einzubauen,
- 5 Gelenkwelle anbauen und Schrauben mit 35 Nm festziehen.

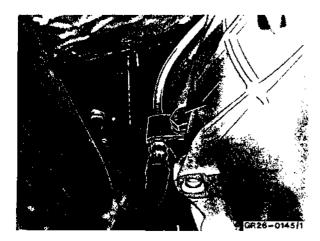




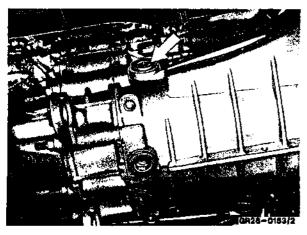








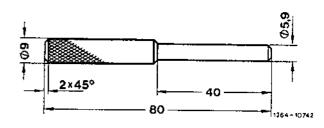
6 Install hydraulic line for drive clutch actuation free of tension and without chafed spots.



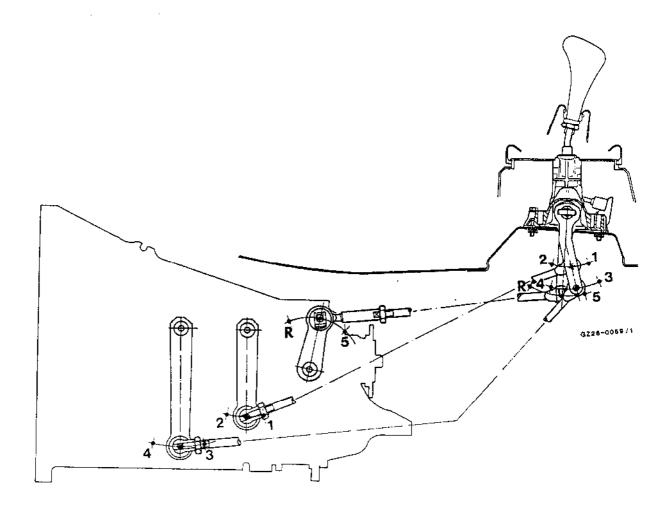
7 Fill with oil, at the same time observe oil quality and capacity.

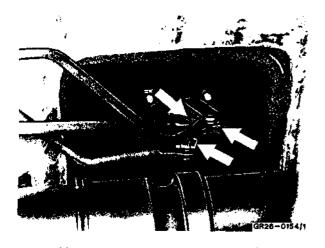
Tool for self-assembly

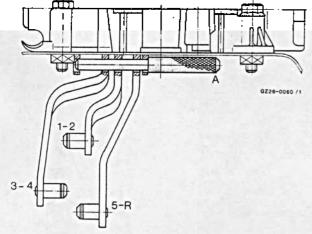


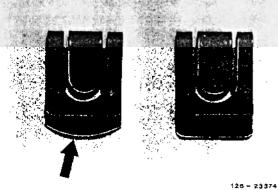


Arrangement









Adjustment

Note: Prepare fixing bolt according to the specified dimensions.

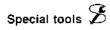
1 Move transmission into idle position, disengage shift rods at the intermediate shift levers of the floor shift after removing the clip retainers.

- 2 Fix the three intermediate shift levers at the bottom, on the floor shift through pushing the fixing bolt (A) in the bores provided for this purpose.
- 3 Adjust shift rods to length and press the rod heads freely onto the bolts of the intermediate shift levers and secure with clip retainers. Here the shift levers on the transmission must not move out of their centre position.

Caution!

Only use clip retainers with radius (arrow). If clip retainers are used without radius, they may be forced out and the shift rods fall from the intermediate shift levers.

- 4 Remove fixing bolt out of the intermediate shift levers.
- 5 Test function of shift mechanism with engine running.



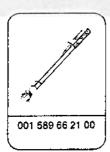


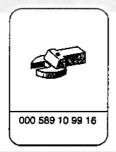








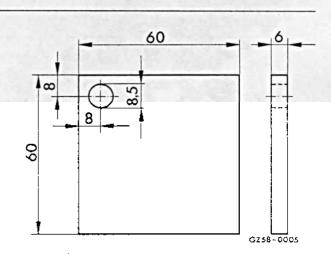




Tool for self-assembly

Base plate for measuring stand

Material: St 37



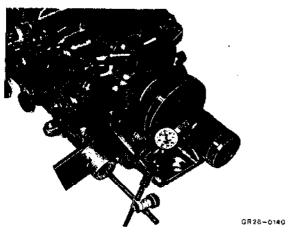
Test values

•	1	1
O		- ^ ^*
Overall concentricity deviation at flange	i mm	[[1]]
Overall concentrately deviation at hange	1 10 15 14) ~ U.U/

Tightening torques

Designation	Nm
Flange to main shaft	160 ± 30
Flange to propeller shaft	35







Test

Note: Carry out this test in the event of complaints caused by wobbling at the flanges.

Detach propeller shaft and attach orifice flange.

B

460 589 01 23 00

2 Attach dial gauge and bracket-to the transmission housing.

9

001 589 53 21 00 363 589 02 21 00

Note: The base plate (self-assembly) can be used as an attachment possibility.

- 3 Check the overall concentricity deviation < 0,07 mm at the front measuring surface.</p>
- 4 If the dimension is not attained, detach the flange with the retaining wrench and puller.

B

460 589 01 31 00 460 589 02 33 00

5 Attach the flange again after turning through 120°.

Note

- This process called "matching" can be repeated max.
 times, if the specified value is not attained, renew the flange.
- To attach, bring flange with nut up to contact surface and tighten to 160 \pm 30 Nm.
- In unfavourable tolerance position of the gearing, heat the flange to 170°C and bring with nut to contact surface. After cooling down tighten to 160 \pm 30 Nm.
- 6 After test secure nut on flange.
- 7 Mount universal-joint drive shaft and tighten to 35 Nm.



000 589 10 99 16 001 589 66 21 00

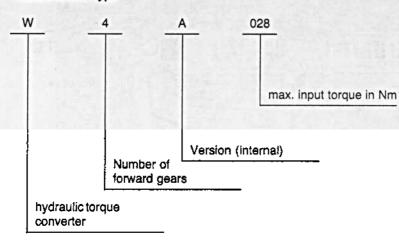
4-gear – automatic transmission Installation survey

Vehicle			Transmission -		
Model	Туре	Installation	Version	Model	Sales designation
463.204 .224 .225	230 GE 4 x 4 ¹) 230 GE 4 x 4 ¹) 230 GE 4 x 4 ²)	SA (Code G 40)	4-gear torque converter transmission	722.396	W4A 028
.307 .327 .328	300 GD 4 x 4') 300 GD 4 x 4') 300 GD 4 x 4 ²)			722.399	
.207 .227 .228	300 GE 4 x 4 ¹) 300 GE 4 x 4 ¹) 300 GE 4 x 4 ²)			722.397	

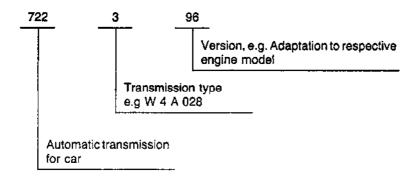
- 1) Wheelbase 2400 mm
- 2) Wheelbase 2850 mm

Key to sales designation

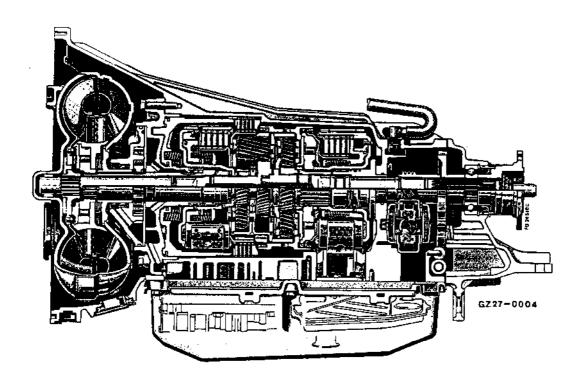
Transmission type



Transmission



Overall view

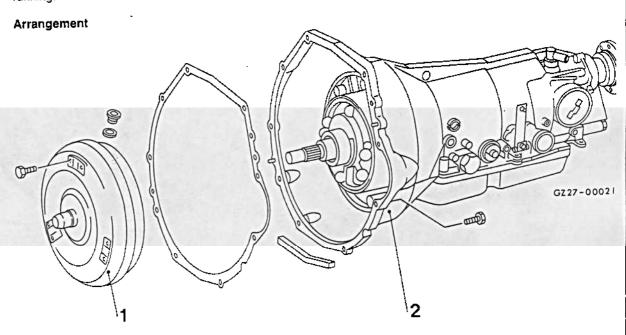


4-gear automatic transmission W4A 028

General

In connection with the new engines, as special version, the new automatic transmission W4A 028 can be supplied which is derived from the car and equipped with a parking lock. The use of helical gears ensures low-noise running.

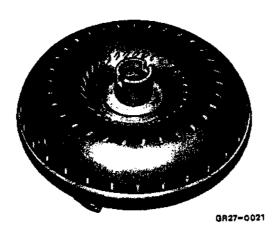
The transmission housing and the torque convert housing are in one-piece and manufactured with int grated oil distributor plate of cast aluminium. This resu in fewer sealing joints and therefore also fewer sealing problems and an improved rigidity of the housing.



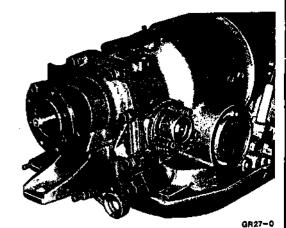
- 1 Torque converter
- 2 Transmission

The familiar torque converter with 270 mm \varnothing is used.

The drive flange has a 100 mm \varnothing and a 8-1 mounting.



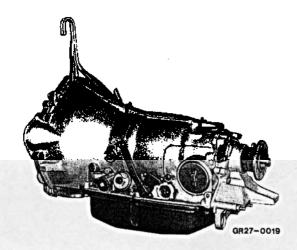
Note: The retaining pin is no longer present. Always observe this when removing the transmission.



The 4-gear torque converter transmission W4A 028 is rated for a max. input torque of 280 Nm.

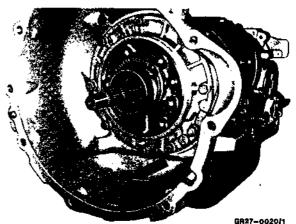
Fording ability

To enable water and mud crossings, as opposed to the car version, the gaskets (flange at rear) and the torque converter housing have had to be sealed, and the ventilation has had to be altered.



The torque converter housing is additionally vented.

The drain hole of the torque converter housing has a plastic plug.

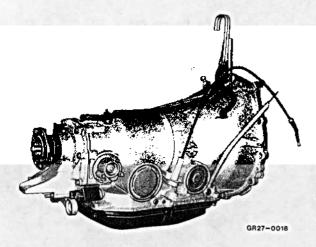


Oil pan

The oil pan has been enlarged by approx. 2 I to approx. 9 I. A suction snorkel was then required on the oil filter for the deeper oil pan.

Assembly instructions

Basically the repair instructions 722.3 of the workshop manuals for the car is valid.



Primary pump

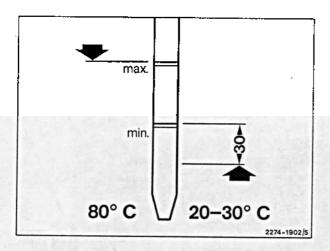
Here a roller bearing is installed instead of a plain bearing.

For approved oils, refer to Service Product Specifications Sheet 236.4/6/7.

The output shaft is additionally mounted in the supporting flange.

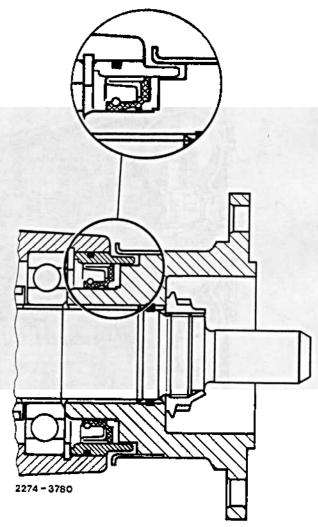
Maintenance instruction:

The oil level in the transmission is correct if the maximum marking is indicated at an oil temperature of approx. 80°C (operating temperature of transmission).



At an oil temperature of 20 to 30°C, the oil level should be **30 mm below the minimum marking** on the oil dipstick.

The sealing of the transmission flange is effected with Labyrint and double-lip sealing ring.

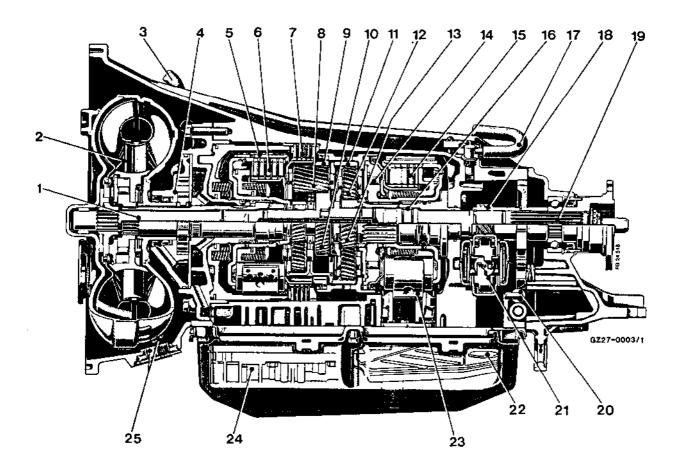


The renewal of the radial seal is carried out as described in the workshop manual for the transmission W4A 018.

Speedometer drive

As the drive of the speedometer on the cross-country vehicle is effected from the transfer case, the connection in the automatic transmission is plugged.

Sectional view

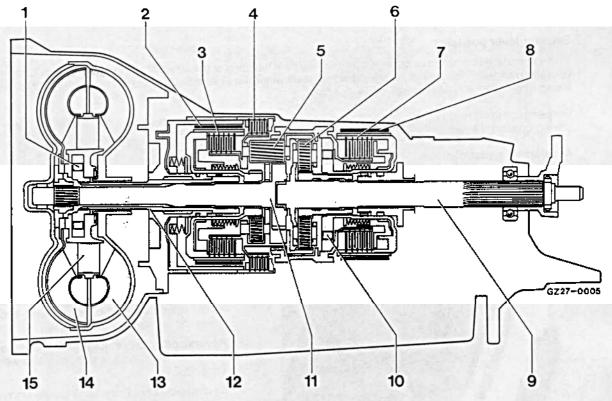


4-gear automatic transmission W4A 028

- 1 Input shaft
- 2 Torque converter
- 3 Vent, torque converter housing
- 4 Primary pump
- 5 Brake band B1
- 6 Clutch K1
- 7 Lamellae brake B3
- 8 Ravigneaux planetary gearset
 - Wide planet gear
- 9 Hollow gear
- 10 Sun gear
- 11 Rear planetary gearset
 - Hollow gear
- 12 Planet gear
- 13 Sun gear

- 14 Sliding freewheel
- 15 Clutch K2
- 16 Bearing-output shaft
- 17 Vent, transmission housing
- 18 Drive gear-governor and auxiliary pump
- 19 Output shaft
- 20 Parking lock linkage
- 21 Flyweight governor
- 22 Oil filter
- 23 Brake band B2
- 24 Control plate
- 25 Oil drain-torque converter





- Converter freewheel
- 2 Brake band B1
- 3 Clutch K1
- 4 Lamellar brake B3
- 5 Ravigneaux-planetary gearset
- 6 Rear planetary gearset
- 7 Clutch K2
- 8 Brake band B2

- 9 Output shaft
- 10 Sliding freewheel F
- 11 Input shaft
- 12 Stator shaft
- 13 Impeller gear
- 14 Turbine wheel
- 15 Stator

Gear ratios

Gear	Ratio	Actuated or effective shift elements	Gear ratio i =	
1. in front (Ravigneaux) i = 2,696 and rear planetary gearset i = 1,436		Brake band 2 Freewheel')	3,871	
2.	in the front (Ravigneaux) i = 1,565 and rear planetary gearset i = 1,436	Brake band 1 Brake band 2	2,247	
3. in the rear planetary gearset		Clutch 1 Brake band 2	1,436	
4.	no gear ratio	Clutch 1 Clutch 2	1	
Reverse gear	in the front (Ravigneaux) i = 1,696 and rear planetary gearset i = 3,294	Lamellar brake 3 Freewhee!')	5,586	

¹⁾ In 1st gear, in selector lever position "L" or "2" and in the reverse gear, by connecting the clutch 2 the freewheel is bypassed.

Selector lever positions

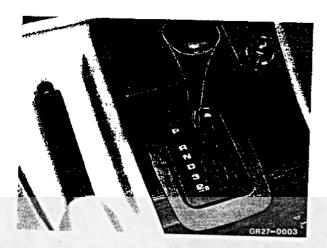
The automatic transmission facilitates and simplifies the handling of the vehicle. The selector lever is for selecting the operating ranges. The operating of the individual gears within the selected area takes place automatically dependent on the driving speed and accelerator pedal position.

Only engage the desired driving position at engine idle speed. Do not release the brake until moving off. With engaged driving position there is otherwise a risk of the vehicle prematurely moving off (crawling of the vehicle).

Accelerator pedal position

Less accelerator pedal actuation = early shift up = slight acceleration Greater acceleration pedal actuation = late shift up = high acceleration

Kickdown: Kick down accelerator pedal over the full throttle pressure point = full load shift down = maximum acceleration. A shift down can only take place if the driving speed is below the maximum speed of the next lower gear.



With the selector lever it is possible to adjust the automatic shifting to particular operating conditions.

- "P" Parking lock. The parking lock is an additional safety when parking the vehicle. Only engage "P" when the vehicle is stationary.
- "R" Reverse gear. Only engage and disengage reverse gear when the vehicle is stationary and with engine idling.
- "N" Neutral position. The engine can be started only in selector lever position "P" or "N". There is no power transmission from the engine to the rear axle.

With released brakes the vehicle can move. Only engage "N" with the vehicle stationary or when rolling at moderate speed.

- "D" Direct. The gears are automatically engaged one after the other. "D" provides optimum driveability in almost all operating conditions.
- "3" Shift up only up to 3rd gear. Favorable for driving moderate gradients in order to exploit the exhaust brake effect up to maximum permissible engine speed in 3rd gear.
- "2" Shift up only up to 2nd gear. Favorable for driving up moderate gradients in order to avoid changing over between 2nd and 3rd gear as well as for driving down moderate gradients in order to exploit the exhaust brake effect in 2nd gear.
- "B" Brake setting. Transmission remains in 1st gear. For extreme downhill driving and prolonged downhill driving of mountain passes, particularly with trailer.

Important notes

- When manoeuvering in very tight spaces, regulate the driving speed through metered releasing of the service brake. Only apply a slight amount of pressure to the accelerator pedal, do not play with the accelerator pedal.
- For short stop, e.g. at traffic lights, don't change position and just hold the vehicle with the brake.
- For longer stop with engine running switch selector lever to position "P" or "N".
- For prolonged uphill driving, especially with large load (trailer operation), select a lower gear range in good time.

Shift points

230 GE

Tyres 205 R 16			KD shift points in km/h									
Rear axle i = 4	1,860		Selector lever position									
		D		3				2				
*		Idle throttle	Full throttle	Kick- down	Idle throttle	Full throttle	Kick- down	Idle throttle	Full throttle	Kick- down		
						Think!		1				
Upshift	1-2	10,0	26,5	40,5	10,0	26,5	40,5	10,0	26,5	40,5		
	2-3	25,0	67,0	70,0	25,0	67,0	70,0		ALC: N			
	3-4	36,5	105,0	109,5		ART ES						
Downshift	3-4	22,5	76,0	98,0	Will the	Decision .						
	3-2	16,0	30,0	59,5	16,0	30,0	59,0					
	2-1	0,0	11,0	23,5	0,0	11,0	23,5	0,0	11,0	23,5		

Selector lever position 1: 1-2 Gear change does not take place

2-1 Gear change takes place at kickdown shift point

Transmission moves off in 2nd gear, 1st gear can be engaged with full throttle below approx. 10 km/h.

Note: For the test mount the standard tyres "205 R 16".

^{* 1-2} Idle throttle shifting is possible if 1st gear is engaged in standstill with kickdown or with selector lever actuation D-1-D.

Shift points

300 GE

Tyres 205 R 16			KD shift points in km/h									
Rear axle i = 4	1,375		Selector lever position									
			D		3				2			
		Idle throttle	Full throttle	Kick- down	Idle throttle	Full throttle	Kick- down	Idle throttle	Full throttle	Kick- down		
Upshift	1-2	7.3	18.5	29	11,5	29,5	47,0	11,5	29,5	47,0		
	2-3	31,0	79,5	81,0	31,0	79,5	81,0		100	1000		
	3-4	43,5	126,0	127,0	PER S				DE OR	SEX.		
Downshift	3-4	1026,5	5181,0	7\115,0			100		80274	0.17		
	3-2	12-19,0	2439,0	4369,5	19,0	39,0	69,5					
	2-1	0,0	6 10,0	1422,5	0,0	10,0	22,5	0,0	10,0	22,5		

Selector lever position 1: 1-2 Gear change does not take place
2-1 Gear change takes place at kickdown shift point

Transmission moves off in 2nd gear, 1st gear can be engaged with full throttle below approx. 10 km/h.

Note: For the test mount standard tyres "205 R 16".

^{* 1-2} Idle throttle shifting is possible if 1st gear is engaged in standstill with kickdown, or with selector lever actuation D-1-D.

Shift points

300 GD

Tyres 205 R 16		KD shift points in km/h										
Rear axle i = 4	,111		Selector lever position									
		Ballin.	D			3		HAD	2	DE S		
		Idle throttle	Full throttle	Kick- down	Idle throttle	Full throttle	Kick- down	Idle throttle	Full throttle	Kick- down		
			The Park		- 38.		100	•	Related V	HIE III		
Upshift	1-2	11,0	27,5	37,5	11,0	27,5	37,5	11,0	27,5	37,5		
	2-3	21,0	63,0	64,5	21,0	63,0	64,5	maxi		THE P		
	3-4	27,5	98,5	100,5				mus n				
Downshift	3-4	19,0	73,0	89,5				(Party)				
	3-2	14,0	30,0	56,0	14,0	30,0	56,0			ga Dire		
	2-1	0,0	16,0	29,5	0,0	16,0	29,5	0,0	16,0	29,5		

Selector lever position 1: 1-2 Gear change does not take place
2-1 Gear change takes place at kickdown point

Transmission moves off in 2nd gear, 1st gear can be engaged with full throttle below approx. 10 km/h.

Note: For the test mount the standard tires "205 R 16".

^{*1-2} Idle throttle shifting is possible if 1st gear is engaged in standstill with kickdown or with selector lever actuation D-

Technical data

Diameter at joint flange for running surface of sealing ring	Value when new	mm	40,00 39,84
	Limit value in the event of repair	mm	39,34
Permissible lateral and vertical runout of propeller flange		mm	0,05
Overall concentricity deviation at propeller flange (measured with	mm	< 0,07	
Diameter of drive shaft at running surface for sealing ring	Value when new	mm	29,90 29,85
	Limit value in the event of repair	mm	29,70

Capacity

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Automatic transmission fluid (236.6/7)	ATF-Dexron II	7,0

Tightening torques

Designation	Nm
Screw plug (torque converter)	14 + 1,4
Front cover on transmission housing	13 ± 1,3
Supporting flange to transmission housing	11 ± 1,1
Starting lock and reversing light switch to transmission housing	8 ± 0,8
Range selector lever to shaft, range selector lever	8 ± 0,8
Oil pipe to transmission housing	8 ± 0,8
Lower cover, compl. to transmission housing	8 ± 0,8
Rear transmission housing to transmission housing	13 ± 1,3
Screw plug (measuring point: modulating, regulating, operating pressure)	- 13 ± 1,3
Twelve-point collar nut on output shaft')	120 ± 12
Screw plug (oil pan)	14 ± 1,4
Oil pan to transmission housing	7 ± 0,7
Dil filler pipe to transmission housing	
Drive connection, engine transmission	8 ± 0,8
Dil cooler pipe to transmission housing	42 ± 4
) Secure put by collise to better of	40 ± 4

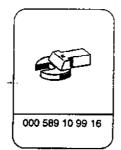
1) Secure nut by calking to bottom of groove

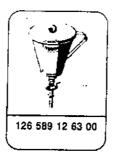
Capacity

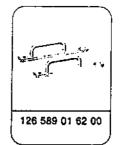
Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Automatic transmission fluid (236.6, 236.7)	ATF-Dexron II	7,0

Special tools 🕏













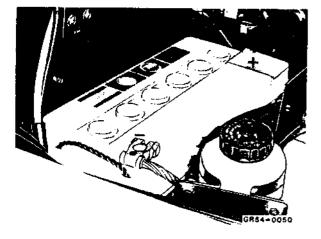
Expendable materials

Cons. No.	Designation	Part Number
1 1	Lubricant: Molybdenum disulphide running-in paste	000 989 51 51

Tightening torques

Designation		Nm
Screw plug	Torque converter	14 +1,4
	Transmission	
Automatic transmission on engine	M 10 x 40 M 10 x 90 M 12	55 45 65
Propeller shaft to flange		35
Torque converter to driver		42
Supply and return line to transmission		40 ± 4

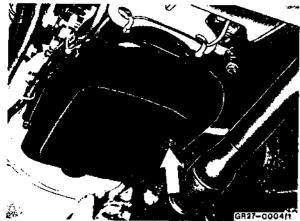
!6/68**6**



Removal

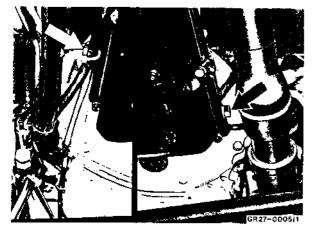
Disconnect battery at negative terminal.





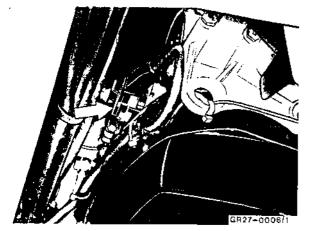
2 If necessary drain gear oil.





- 3 Detach supply and return line to oil cooler.
- 4 Detach vent.





5 Remove plug connector for starter lock switch.

Caution!

The plug connector for the starter lock switch is secured with a lock (white plastic ring).

Before pressing off the plug connector, the lock must be turned towards the top.

Carefully press off the plug connector with two screw drivers at the cable outgoing and at the strap.

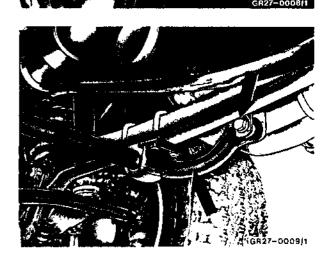
6 Detach cable at the kickdown solenoid valve.



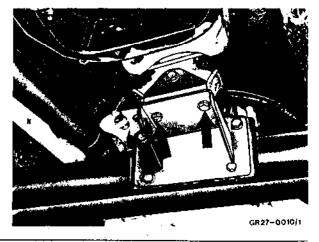
7 Detach shift rod.



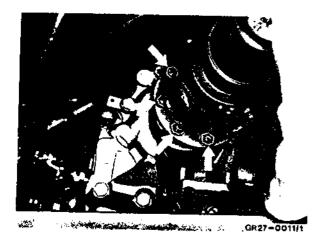
8 Detach stabilizer.



9 Unscrew bolts on transmission mount.



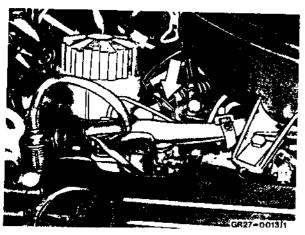
27 Removal and installation of automatic transmission



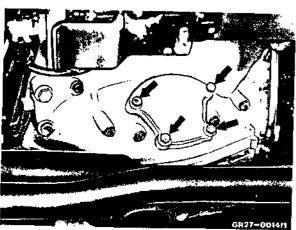
10 Remove universal-joint drive shaft and tie up on the side.



11 Detach oil filler pipe.



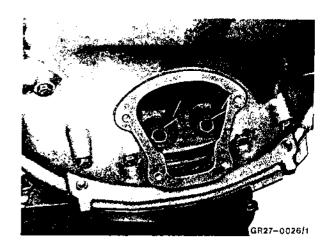
12 Detach wire cable.



13 Detach end cover.

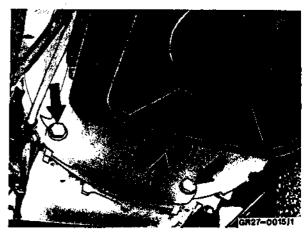
14 Detach torque converter from driver.

Note: Respectively turn in such a way that the driver bolts (6) are accessible.



- 15 Unscrew drain plug at the torque converter and let oil run out.
- 16 Place support beneath automatic transmission, detach and remove from engine.

Note: The retaining pin in the torque converter housing is no longer provided.



17 Put down transmission in upright position and remove torque converter.

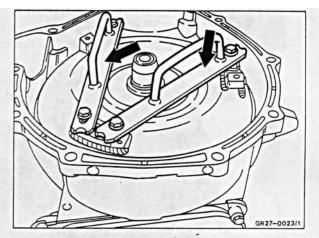


126 589 01 62 00

Caution

If the gear oil smells burned or if it contains lining wear, the torque converter, oil cooler pipes and oil cooler must be flushed.

If there are metal chips in the gear oil pan the torque converter must be renewed. Metal chips are not completely removed by flushing and can later lead to transmission damage.



18 Flush torque converter, for this purpose fill with 1 liter of petroleum. Insert flushing drift (1) and drive with a hand drilling machine at reduced speed for approx. 2 minutes. Afterwards drain petroleum via the drain plug.



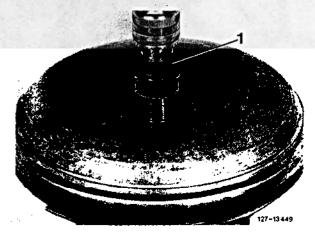
116 589 00 15 00

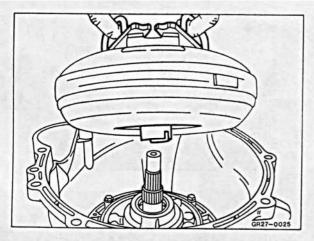
Note: Repeat flushing procedure 2 to 4 times until the petroleum runs out clean.

19 Bolt oil cooler with oil cooler pipes to the syringe and flush out with cleaning fluid. Then thoroughly blow out.

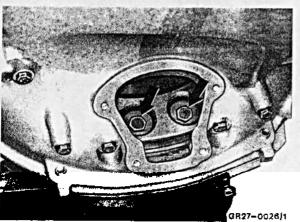


112 589 00 12 00





27







Installation

1 Coat drive flange with lubricating grease.

Note: Turn torque converter backwards and forwards when inserting so that the gearing engages.

- 2 The further installation takes place in the same manner in reverse order to the removal. At the same time the following must be observed:
- Tighten torque converter to driver to 42 Nm.
- Attach automatic transmission on engine.

Tightening torques: M 10 x 40 = 55 Nm M 10 x 90 = 45 Nm M 12 = 65 Nm

- With installed spacer plate on the transmission bearing, this must be installed again.
- Renew sealing rings for supply and return line, tighten lines to 40 Nm.
- Tighten drain plug on torque converter and on oil pan

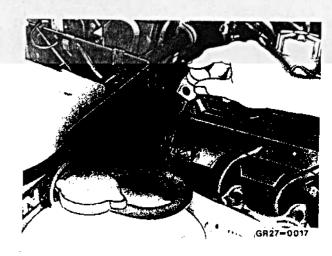
3 Mount universal-joint drive shaft and tighten to 35 Nm.

2 000 589 10 99 16 001 589 66 21 00

4 Fill up gear oil through the filler funnel with filter and carry out oil level check.

2 126 589 12 63 00

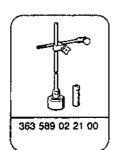
5 With the transmission at service temperature, with correct oil level, the indication must be at the maximum marking.



27 Check concentricity of flange

Special tools ${\cal Z}$

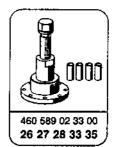


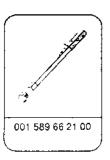




26 27 28 33 35









Test values

Overall concentricity deviation at the flange	mm	< 0,07
Tightening torques		
Designation		Nm
Flange to main shaft		120 ± 12
Flange to propeller shaft		35

Test

Note: Carry out this test in the event of complaints caused by wobbling at the flanges.

Detach propeller shaft and attach orifice flange.

5 460 589 01 23 00

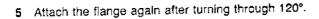
2 Attach dial gauge and bracket to the transmission housing.

363 589 53 21 00 363 589 02 21 00

- 3 Check the overall concentricity deviation < 0,07 mm at the front measuring surface.
- 4 If the dimension is not attained, detach the flange with the retaining wrench and puller.



460 589 01 31 00 460 589 02 33 00



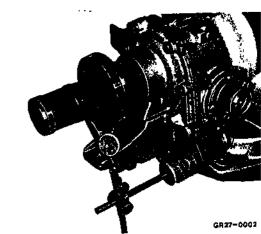
Note:

- This process called "matching" can be repeated max. 2 times, if the specified value is not attained, renew the flange.
- To attach, bring flange with nut up to contact surface and tighten to120 \pm 12 Nm.
- In unfavourable tolerance position of the gearing, heat the flange to 170°C and bring with nut to contact surface. After cooling down tighten to120 \pm 20 Nm.
- 6 After test secure nut on flange.
- 7 Mount universal-joint drive shaft and tighten to 35 Nm.



000 589 10 99 16 001 589 66 21 00



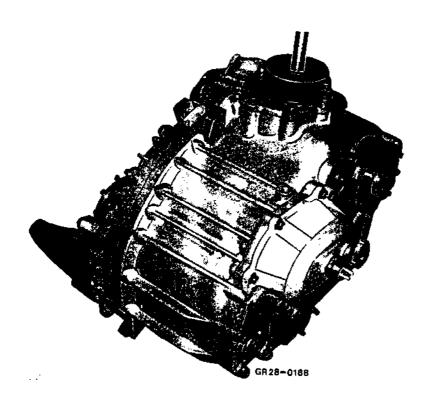




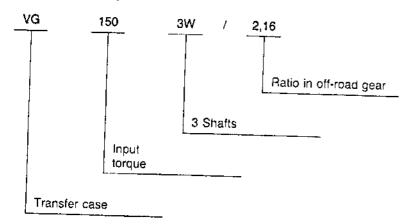
Transfer case

Installation survey

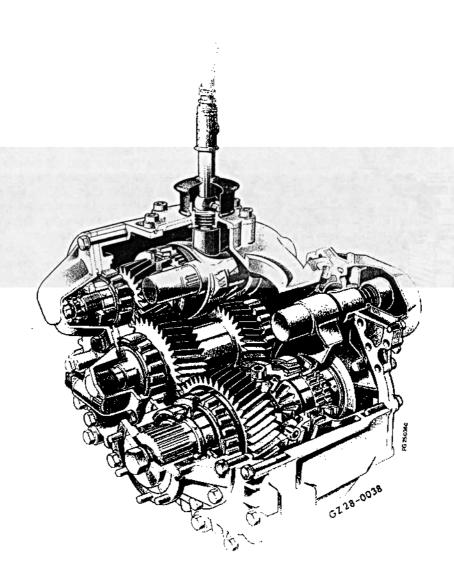
The new 3-shaft transfer case "VG 150 - 3W/2.16" (model 750.650) is installed in the new type 463.



Key to sales designation



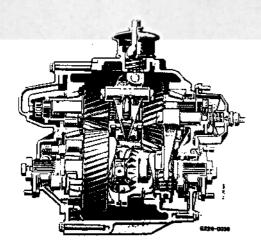
Overall view



Transfer case VG 150

General

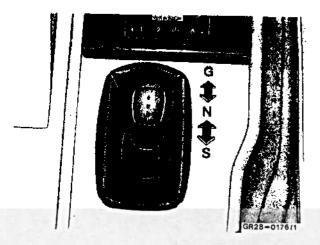
The vehicles have a permanent 4 x 4 drive in road gear and off-road gear with lockable differential.



The drive torques are distributed 50% to the front and rear axle respectively.

The ratio is 1:1.05 in the road gear or 1:2,16 in the off-road gear.

The shifting takes place at the transfer case-shift lever.



Positions

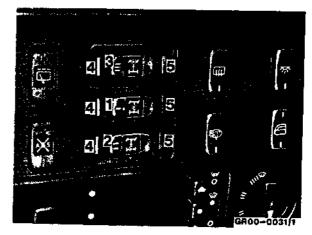
- "N" = Neutral position. No power transmission to the drive axles.
- "S" = Road position. Front and rear wheels are driven.
- "G" = Off-road position. In the transfer case a ratio (i= 2,16) is connected. The off-road position is for driving in off-road conditions and for steep uphill and downhill driving.

For the first time the drive train is can be operated with ABS. The anti-lock braking system is installed as a special version.

If a lock is activated, the ABS switches itself off. Independent of this feature, with the ABS-switch the system can be influenced in such a way that the ABS is basically disconnected.

This solution pays tribute to special conditions in difficult off-road conditions: an uncontrolled full brake application results in a shorter braking distance on loose soil, as the front wheels block and dig into the ground or build up a wedge in front of themselves.

The activation of the individual differential locks of transfer case and axles takes place via electrical switches in the middle console.

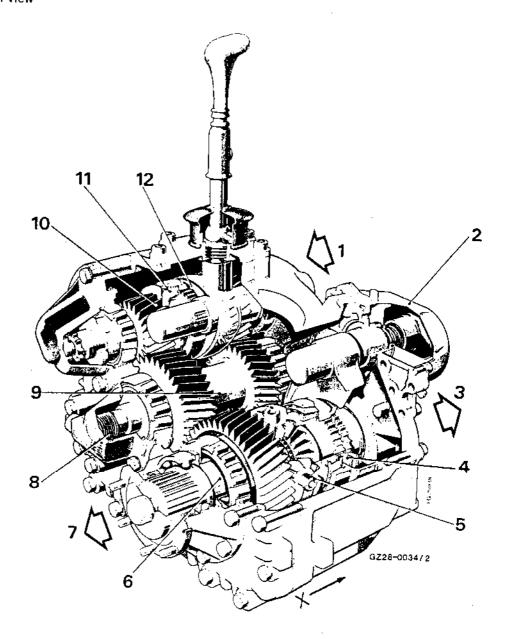


- 1 Switch, transfer case, differential lock
- 2 Switch, rear axte, differential lock
- 3 Switch, front axle, differential lock
- 4 Switch-on signal lamps (yellow)
- 5 Function signal lamps (red)

The differential lock in the transfer case is actuated pneumatically and in the axles hydropneumatically.

The lock actuation, which has a counteracting electrical blocking device, can only take place in a certain sequence corresponding to the physical conditions with increasing traction requirement, i.e first the locking of the transfer case, then additionally the rear axle lock and finally the locking of the front axle. With this arrangement it is then possible to keep specific influences effecting the driving behaviour and directional control of the vehicle as small as possible with connected locks.

Sectional view



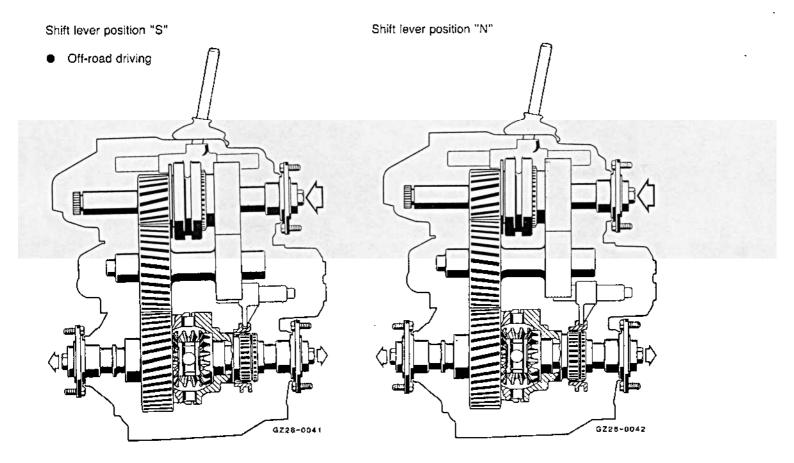
Transfer case VG 150

- 1 Drive from engine
- 2 Shift cylinder differential lock
- 3 Output drive to front axie
- 4 Differential lock
- 5 Differential
- 6 Output shaft
- 7 Output drive to rear axle

- 8 Speedometer drive
- 9 Intermediate shaft
- 10 Input shaft
- 11 Synchronizing body
- 12 Shift fork
- X Direction of travel

Power flow Neutral position Driving on roads GZ28-0043

GZ28-0040

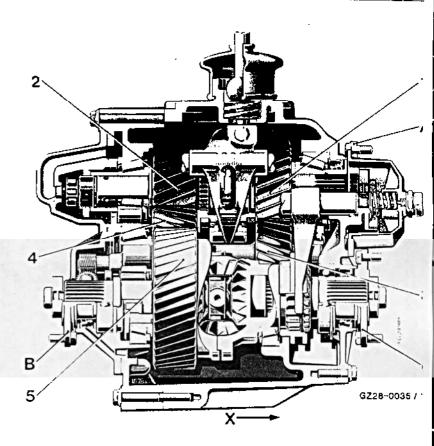


Shift lever position "G"

Differential lock switched on

Shift lever position "G"

Technical data



A = Input shaft

B = Output shaft to rear axle

C = Output shaft to front axle

X = Direction of travel

Numbers of teeth

Cons. No.		1	2	3	4	5	Ratios i
Number of teeth	Road gear	29	-	26	35	41	i = 1,05
	Off-road gear	126-24	19	_	35	41	i = 2,158

Capacities

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)	
Gear oil (235.1)	80	2,8	

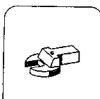
Tightening torques

Nm
76 ^{+ 15} _{- 0}
76 ^{+ 15} _{- 0}
35
40
60
60

Capacity

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Gear oil (235.1)	SAE 80	2,8

Special tools 🕏



000 589 10 99 16



Tightening torques

Designation	Nm
Mounting, transfer case	40
Universal-joint drive shaft to drive flange and output flange	35
Oil drain-screw plug	60
Oil filler-screw plug	60



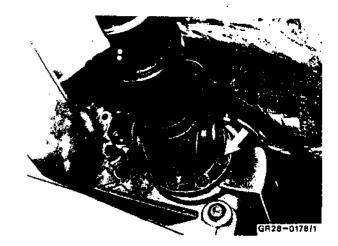
Removal

1 Lift off gaiter and remove shift lever.

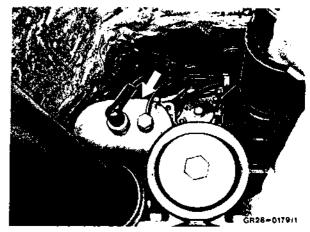


- 2 Shift transmission to neutral position, transfer case to "S" and raise left front wheel.
- 3 Detach universal-joint drive shaft from front axle, at the same time turn left front wheel.
- 4 Tie up universal-joint drive shaft on the side.

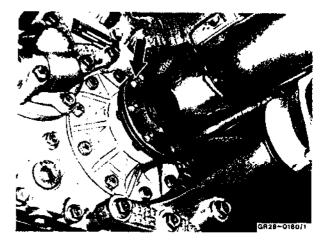
- 5 Shift transmission to neutral position and transfer case to "N".
- 6 Detach universal-joint drive shaft, at the same time turn the universal-joint drive shaft.
- 7 Tie up universal-joint drive shaft on the side.



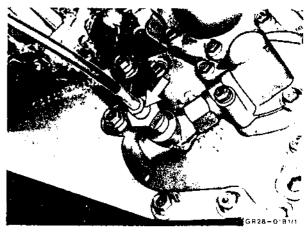
8 Detach breather line.

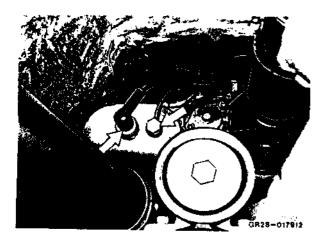


- 9 Shift transmission to neutral position and transfer case to "S".
- 10 Detach universal-joint drive shaft to rear axle, at at the same time turn left rear wheel.
- 11 Tie up universal-joint drive shaft on the side.

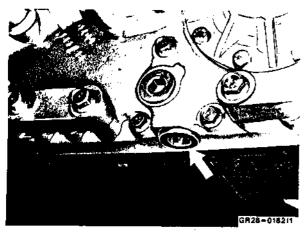


12 Remove speedometer-drive shaft.

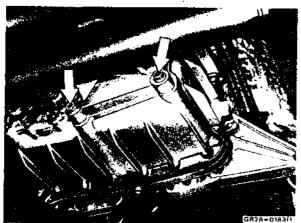




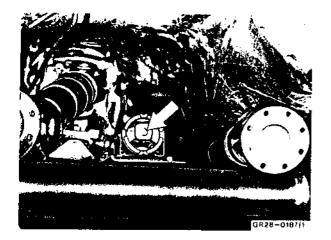
13 Detach pneumatic line and cable connector at shift cylinder of differential lock.



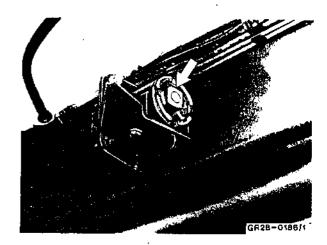
14 Drain and collect oil.



- 15 Place support beneath transfer case with jack.
- 16 Detach transfer case at transmission mount.
- 17 Slightly lower transfer case on the right, swing the left forward and then lower completely.



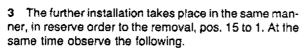
18 Check rubber mounts for wear, if necessary renew.



- Mount, rear

Installation

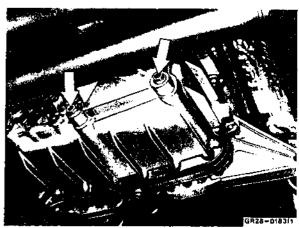
- 1 Lift transfer case and mount with the left rear support on the bracket.
- 2 Fasten transfer case and tighten screw to 40 Nm.

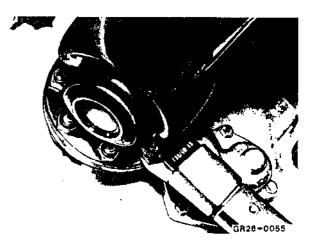


- Tighten nuts to 35 Nm.

2 000 589 10 99 16 001 589 66 21 00

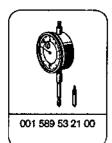
 Fill with oil, when doing so, note the specified oil quality and capacity.

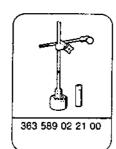


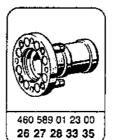




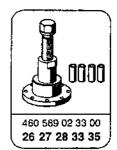
Special tools $oldsymbol{\mathcal{Z}}$

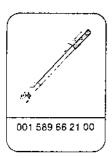


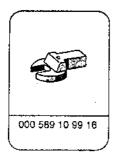








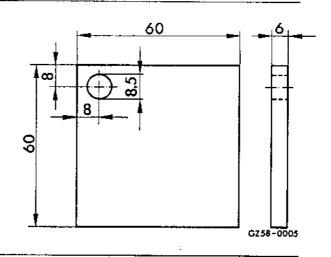




Tool for self-assembly

Base plate for measuring stand

Material: St 37



Test value

· · · · · · · · · · · · · · · · · · ·		
Overall concentricity deviation at flange	mm	< 0,07

Tightening torques

Designation	Nm
Flange to main shaft	76 ^{+ 15} - 0
Flange to propeller shaft	35

Test

Note: Carry out this test in the event of complaints caused by wobbling at the flanges.

Detach propeller shaft and attach orifice flange.

5 460 589 01 23 00

2 Attach dial gauge and bracket to the transmission housing.

5 001 589 53 21 00 363 589 02 21 00

Note: The base plate (self-assembly) can be used as an attachment possibility.

- 3 Check the overall concentricity deviation < 0,07 mm at the front measuring surface.
- 4 If the dimension is not attained, detach the flange with the retaining wrench and puller.

460 589 01 31 00 460 589 02 33 00

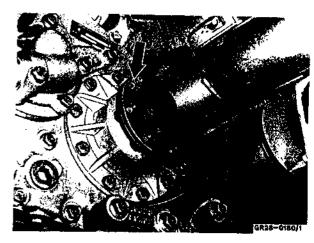
5 Attach the flange again after turning through 120°.

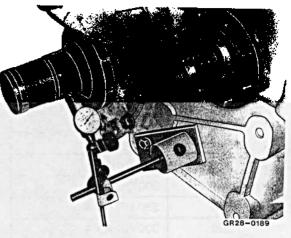
Note:

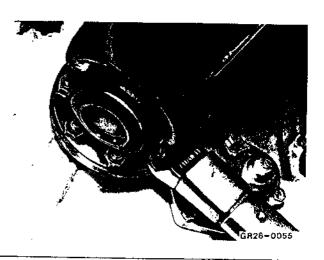
- This process called "matching" can be repeated max.
 2 times, if the specified value is not attained, renew the flange.
- To attach, bring flange with nut up to contact surface and tighten to 76⁺¹⁵₋₀ Nm.
- With unfavourable tolerance characteristic of the gearing, heat the flange to max. 90° C and bring with the nut up to contact surface.

 After the cooling down, tighten to 76^{+15}_{-0} Nm.
- 6 After test secure nut on flange.
- 7 Mount universal-joint drive shaft and tighten to 35 Nm.

000 589 10 99 16 001 589 66 21 00





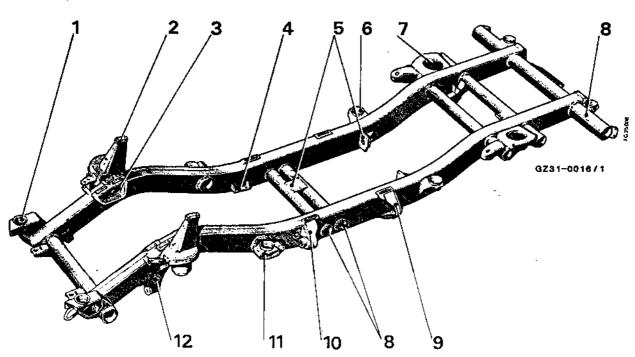


Frame

Installation survey

Chassis		Frame		
Model ——-	Sales designation	Frame length mm	Wheelbase mm	Installation
463.200	200 GE 4 x 4	3580	2400	Standard
.220				
.204	230 GE 4 x 4			
.224				
.207	300 GE 4 x 4			
.227				
.304	250 GD 4 x 4			
.324				
307	300 GD 4 x 4			
.327	-			
.221	200 GE 4 x 4	4080	2850	_
.225	230 GE 4 x 4	_		
.228	300 GE 4 x 4			
.325	250 GD 4 x 4			
.328	300 GD 4 x 4			

Overall view



- 1 Support, body mounting, front
- 2 Bracket, shock absorber and front springs
- 3 Support, engine mounting
- 4 Support, transmission mounting
- 5 Support, transfer case mounting
- 6 Support, body mounting, rear
- 7 Bracket, rear springs, shock absorber and at cross member mount for brake pressure regulator and rear transverse link
- 8 Tubular cross member (rear with support for body mounting)
- 9 Bracket, rear arm
- 10 Bracket, front longitudinal control arm
- 11 Support, body mounting
- 12 Bracket, front transverse link

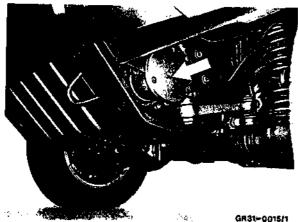
146

General

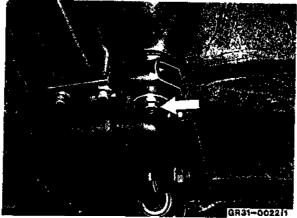
Important changes to the frame of type 460:

The frame has been reinforced near the front bumper and jaw-type coupling for improved power application.

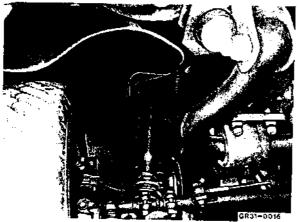
The steering box has been staggered to the outside by 10 mm respectively with left-hand and right-hand drive.



The first frame tubular cross member is used as a 4,4 litre vacuum reservoir.

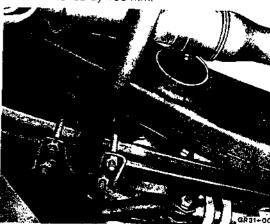


The body mounts at the front have been moved to the inside by 150 mm.

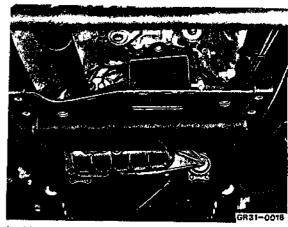


The gasket at the front spring bracket is cut. The front shock absorber bracket has been modified corresponding to the shock absorber which is 40 mm shorter.

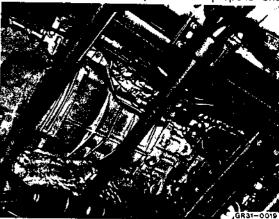
The front and rear frame tubular supports, outside habeen shortened by 185 mm.



In place of the previously installed second tubular crc member, two cross members with smaller cross-secti are installed.



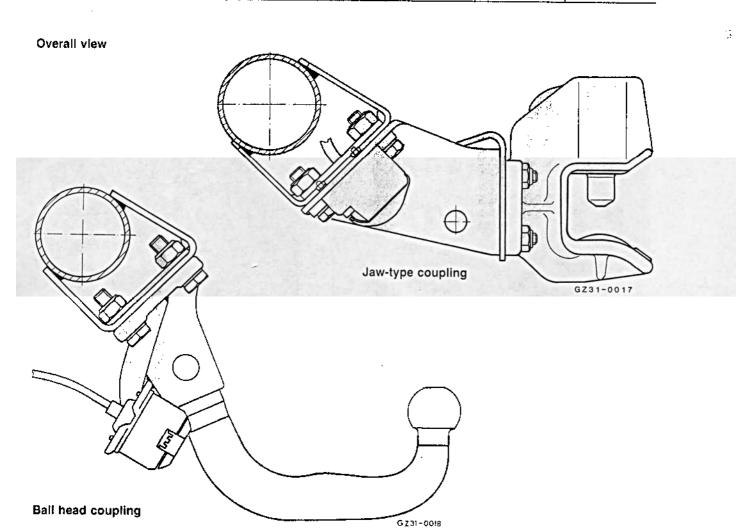
In this way there is more space for the propeller share



The stabilizer with elbow has been taken up on the insid in a new mount.

Trailer coupling Installation survey

Chassis Model	Sales designation	Trailer coupling Manufacturer	Type	Part no.	Version	Installation
463.200	200 GE 4 x 4	Rockinger	243 U	002 315 61 99	Jaw-type	SA 28510/02
.220			115 E		coupling	
.221		ORIS	D96/4	001 315 68 99	Ball head	SA 28510/03
.204	230 GE 4 x 4				coupling	
.224						
.225		li			J	İ
.207	300 GE 4 x 4	•			i	
.227	∃ i					
.228	7					
.304	250 GD 4 x 4					
.324						
.325	-					İ
.307	300 GD 4 x 4					
.327	-		!			
.328						



General

New special equipment

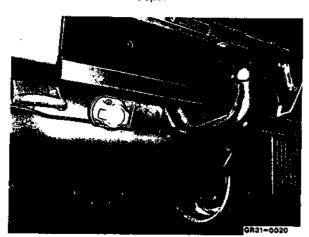
Code Q 23 SA 28 510/02

Jaw-type coupling, Rockinger, including bumper, rear, 2-piece

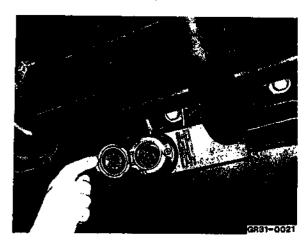
Modified special equipment

Code Q 55 SA 28 510/04

Ball head reinforced in depth



The trailer couplings are offered including trailer socks 13-pole and adapter 13/7-pole.



Technical data

The technical specifications only refer to the coupling, not to the vehicle.

Type 243 U 115 E

Part Number 002 315 61 99

Permissible D-value (drawbar characteristic value)	18 kN
Permissible trailer load	250 kg
Type approval	~ M 4147
Weight	4,470 kg

Type D 96/4

Part Number 002 315 68 99

Permissible D-value (drawbar characteristic value)	14,65 kN
Permissible trailer load	120 kg
Type approval	~ M 4571
Weight	6,120 kg

Trailed loads

Wheelbase	unbraked	braked
2 400	750 kg	2620 kg
2 850	750 kg	2950 kg

Note: With authorization as a tractive unit, trailed loads are possible up to 4000 kg.

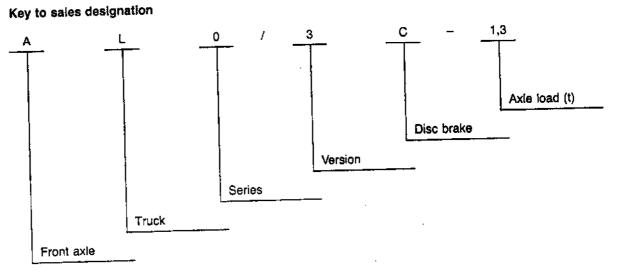
Tightening torques

Designation	Thread	Nm
Trailer coupling - mounting	M 10	39
	M 14 x 1,5	127

Front axle Installation survey

Chassis		Front axle			. V-valon	Installation
Model	Sales designation	Model	Sales designation	Brake	Version	
463.200 .220 .221	200 GE 4 x 4')	730.305	AL 0 / 3 C - 1,3 / 5,286	Disc brake	with differential lock	Standard
463.204 .224 .225	230 GE 4 x 4	730.305	AL 0 / 3 C - 1,3 / 5,286 AL 0 / 3 C - 1,3 / 4,857	Disc brake	with differential lock	Standard SA 020428/08
463.207 .227 .228	300 GE 4 x 4	730.391	AL 0 / 3 C - 1,3 / 4,857 AL 0 / 3 C - 1,3 / 4,375	Disc brake	with differential lock	Standard SA 020428/22
463.304 .324 .325 .335	250 GD 4 x 4	730.305	AL 0 / 3 C - 1,3 / 5,286 AL 0 / 3 C - 1,3 / 6,167	Disc brake	with differential lock	Standard SA 020428/11
463.307 .327 .328	300 GD 4 x 4	730.305	AL 0 / 3 C - 1,3 / 5,286 AL 0 / 3 C - 1,3 / 4,111 AL 0 / 3 C - 1,3 / 4,375 AL 0 / 3 C - 1,3 / 4,857		with differential lock	Standard SA 020428/09 SA 020428/22 SA 020428/08

Model – country-specific, e.g. Italy
 SA = Special version



General

In the cross-country vehicle, series 463 the front axle version ALO/3 C-1,3 is installed.

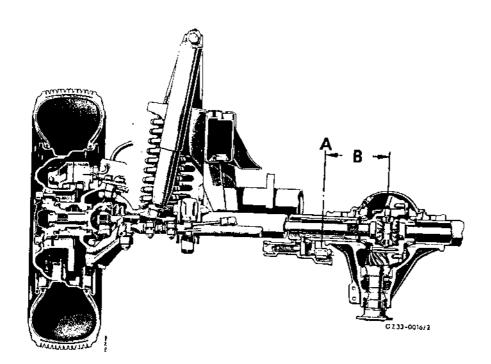
As standard the axle is installed with track width 1425 mm.

The axle housing centre is staggered 190 mm to the right.

With installation of the special version 021 007, increased track width, the track width is increased by 50 mm.

Note: For track widths, refer to Group 40

As a special version 020 304 chromium plated ball joint heads can be provided on the front axle.

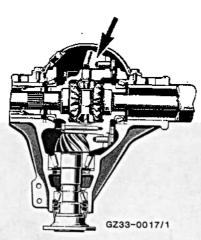


A = Centre of axle

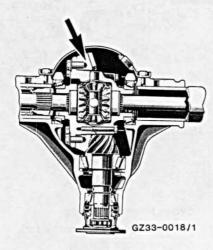
B = 190 mm

Axle housing

Based on the installation of 3-shaft transfer case "VG 150" in place of the 2-shaft transfer case, the ring gear in the axle housing is positioned on the right side, previously on the left. This alters the direction of rotation in the differential.



Ring gear arrangement (new version)



Ring gear arrangement (previous version)

Wheel bearing

The constant-velocity joint shafts are installed as a reinforced version.

The joint housing and the hub bearing with sealing have been adapted accordingly.

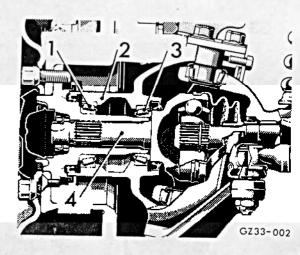
The tapered roller bearings in the joint housing or on the wheel hub have been enlarged.

New version

Tapered roller bearing, outside 55 \varnothing x 90 \varnothing x 23 mm Tapered roller bearing, inside 50 \varnothing x 80 \varnothing x 20 mm

Previous version

Tapered roller bearing, outside 46 \varnothing x 75 \varnothing x 18 mm Tapered roller bearing, inside 41 \varnothing x 68 \varnothing x 17 mm



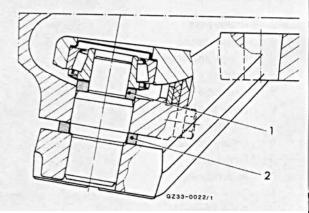
- 1 Tapered roller bearing, outside
- 2 Joint housing
- 3 Tapered roller bearing inside
- 4 Constant velocity joir

Steering knuckle bearing, top

For measuring, add two fitted washers (part no. 000988 019002) of 1 mm each on kingpin.

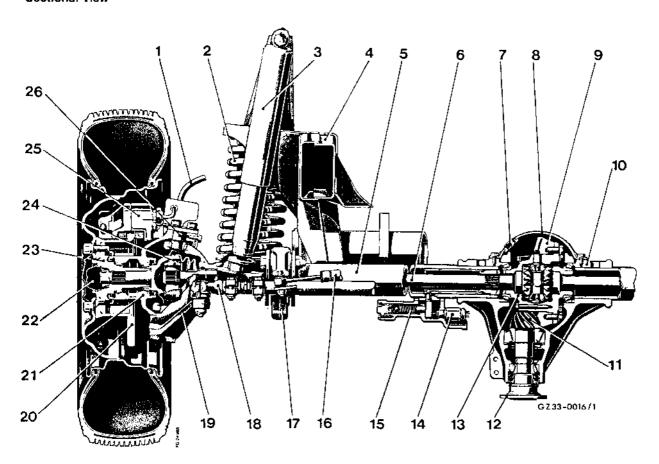
Steering knuckle bearing, bottom

The bottom kingpin has a tight fit in the last 5 mm in the joint housing. Therefore, for measuring the washers be inserted, a spacer ring of 6 mm must be inserted between bearing inner race and kingpin, inside, are between the steering knuckle arm and joint housind outside, a spacer ring of 4 mm must be inserted.



- 1 Spacer ring 29,5 \varnothing x 19,5 \varnothing x 6 \pm 0,01
- 2 Spacer ring 40,0 Ø x 30,5 Ø x 4 ± 0,01 (Self-assembly) Dimension specification in mm

Sectional view



AL 0/3 CS - 1,3

- 1 Brake lines
- 2 Helical spring
- 3 Shock absorber
- 4 Frame
- 5 Axle tube
- 6 Drive shaft
- 7 Oil filter screw
- 8 Differential cover
- 9 Ring gear
- 10 Axle housing
- 11 Drive pinion
- 12 Drive flange
- 13 Differential case

- 14 Switch for indicator lamp
- 15 Slave cylinder for differential lock
- 16 Steering shock absorber
- 17 Trailing arm
- 18 Tie rod
- 19 Steering arm
- 20 Brake disc
- 21 Joint housing
- 22 Grease cap
- 23 Wheel hub
- 24 Drive shaft constant velocity joint
- 25 Fixed caliper
- 26 Kingpin

Technical data

Ratio

Axle model	Numbe	r of teeth	Ratio i	Installation
	Ring gear	Bevel gear		mstanation
730.305	37	7	5,286	Standard
700.004	37 35 34 37	9 8 7 6	4,111 4,375 4,857 6,167	SA 020428/09 SA 020428/22 SA 020428/08 SA 020428/11
730.391	34	7	4,857	Standard
	35	8	4,375	SA 020428/22

Axle-transmission combination

Vehicle-	Transmission		Axle ratio	o i			
Sales designation	5-Gear GL76/27K5	4-Gear Automatic W4A 028	5,286	4,111	4,375	4,857	6,167
200 GE 4 x 4	0		0	x	X	×	
230 GE 4 x 4	0	x	0	×	×	-	X
300 GE 4 x 4	0	x		^	-	X	×
250 GD 4 x 4	0	^		N L L L VALUE	X	0	1 21135
	0		0	X	X	X	x
300 GD 4 x 4	0	x	0	x	×	X	v

Capacity

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Gear oil (235)	80 W 90	1,1

o Standard version x Special requirement

Setting values

Backlash	mm	0,10 to 0,15
Friction coefficient between drive pinion and radial seal	Nm	
Friction torque for turning complete differential	Nm	2,5 to 3,0 20,0 to 40,0
Permissible wheel bearing clearance	mm	0,02 to 0,04
Preload on the kingpins	mm	0,3 ± 0,05
Switch activation distance of lock in slave cylinder	mm	8 to 10
Overall concentricity deviation at propeller flange	mm	< 0,07

Tightening torques

Designation		Thread	Nm
Wheel mounting bolts	Steel rim	M 14 x 1,5 - 10.9	190
MORES AND AND STATE	Light metal rim		140
Drag link to steering arm		M 16 x 1,5	120 to 140
Stabilizer to bracket		M 12 8.8	70
Shock absorber to front axle		M 14 x 1,5 - 8.8	70
Transverse link to frame		M 16 x 1,5 - 8.8	210
Trailing arm to frame	Market Control	M 16 x 1,5 - 8.8	130
Gasket retainer to joint housing		M 8 8.8	20 to 25
Steering shock absorber bracket t	o axle housing or tie rod')	M 10 8.8	45 to 50
		M 8 8.8	23 to 27
Cover to axle housing		M 8 10.9	60 to 70
Bearing cap to axle housing		M 10 10.9	65 to 75
Cover to differential housing		M 8 10.9	40 to 45
Shift lever to shifter shaft	THE PERSON NAMED IN	M 10 x 1,25	20 to 25
Shift cylinder to axle tube		M 8 8.8	22 to 25
Pressure switch to shift cylinder	Witter alger Helenige	M 18 x 1,5	95 to 105
Ring gear to differential housing		M 12 x 1 - 12.9	170 to 190
Kingpin to joint housing		M 14 x 1,5 – 12.9	170 to 190
Steering knuckle arm or steering a	rm to joint housing	M 14 x 1,5 - 12.9	250 to 280
Tie rod to steering arm		M 16 x 1,5 - 2)	120 to 140
ixed caliper to joint housing		M 14 x 1,5 – 10.9	190 to 220
		M 16 x 1,5 - 10.9	250 to 280
Universal-joint drive shaft to flange		M 8 x 1,0	35

Clamp steering damper at 20° left-hand lock.
 Lower nut (04.2 hardness)

Test values

Overall concentricity deviation at flange	mm	< 0,07

Tightening torques

Designation	Nm
Flange to propeller shaft	35

Special tools ${f Z}$

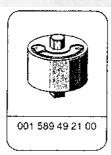


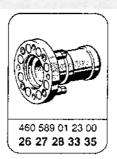






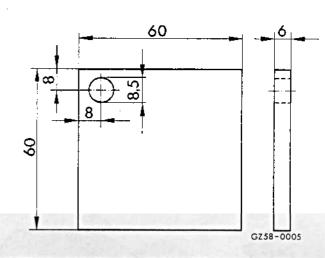






Tool for self-assembly

Base plate for measuring stand



Material: St 37-2

Expendable materials

Designation	Part Number
Sealing compound: Omnifit FD 10	002 989 00 20
Lubricant: multipurpose grease	commercially

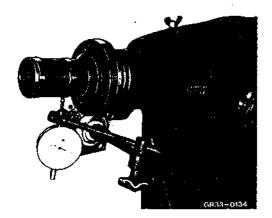
Test

Note: Carry out this test in the event of complaints caused by wobbling at the flanges.

1 Detach propeller shaft and attach orifice flange.



460 589 01 23 00



2 Attach dial gauge and bracket to the transmission housing.

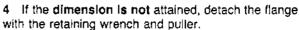


001 589 53 21 00

363 589 02 21 00

Note: The base plate (self-assembly) can be used as an attachment possibility.

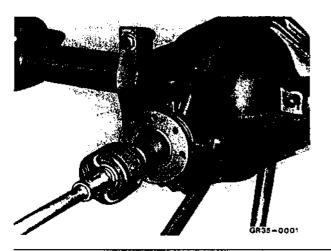
3 Check the overall concentricity deviation < 0,07 mm at the front measuring surface.





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460 589 02 33 00

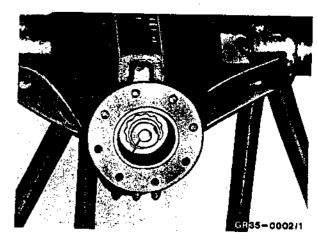


Removal

5 Measure friction torque of entire axle (without wheels) the flange with special tools each time before the flange and sealing rings are disassembled. Note measured friction torque.

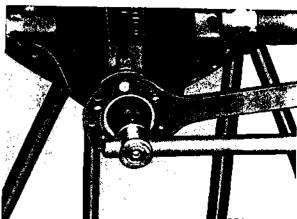


000 589 10 99 15 001 589 49 21 00 6 Mark position of nut in relation to bevel gear.



7 Remove nut.

2 000 589 10 99 15 460 589 01 31 00

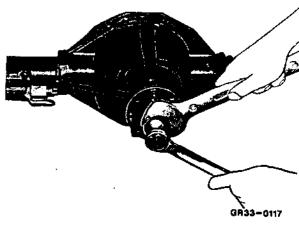


Remove flange.

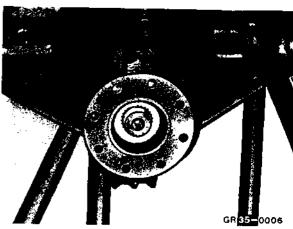
ક 460 589 02 33 00

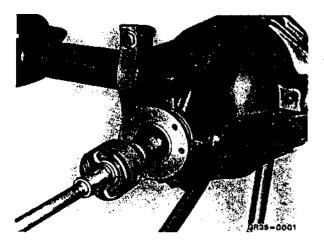
Note: Do not remove flange with hard hammer blows under any circumstances. This would damage the bearings.

9 Check flange for damage and scoring.



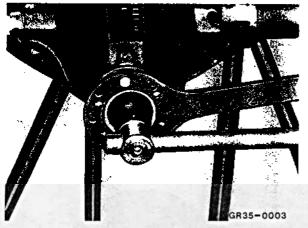
10 Install flange.





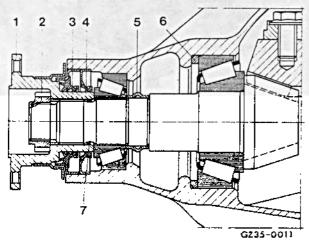
- 11 Screw on old nut up to the marking.
- 12 Measure friction torque.





- 13 Remove nut.
- 14 Install new nut. Atternately tighten nut and measurefriction torque until the friction torque measured in point 12 is reached. The friction torque to be adjusted should exceed the value measured in point 12 by 0,5 Nm.

2 000 589 10 99 15 460 589 01 31 00



Note: If the nut is too tight, the upsetting ring is upset too much. For this reason the bevel gear must be removed, upsetting ring exchanged and the bevel gear adjusted again.

- 1 Flange
- 2 Nut
- 3 Radial seal
- 4 Radial seal
- 5 Upsetting ring
- 6 Shim
- 7 O-ring

15 Check concentricity deviation on flange by means of special tool.

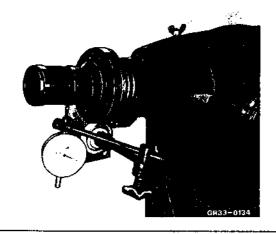
Total concentricity deviation < 0,07 mm

B

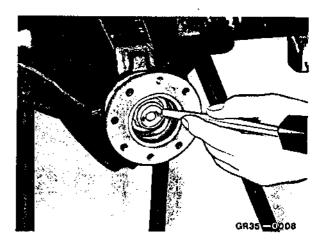
001 589 53 21 00 363 589 02 21 00

460 589 01 23 00

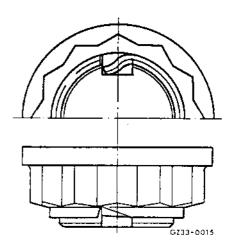
Note: If the dimension 0,07 mm is exceeded, detach flange, turn 120° and reinstall and repeat the measurement. This process, called "matching", should be repeated max. 2 times. If with this method, the specified value is still not attained, the flange must be renewed.



16 Secure nut.



Note: Axially shear off lock collar of nut and bend in to base of groove so that the tab rests against the left flank of the locking groove.

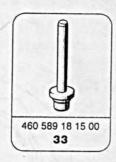


Setting values

Permissible wheel bearing clearance	A mm	0,02 to 0,04
Preload on the kingpins	mm	0,3 ± 0,05

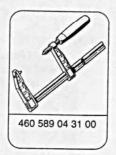
Special tools 🕏











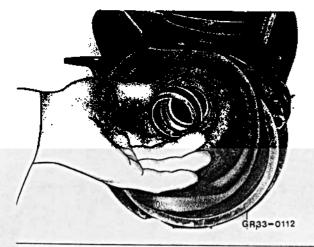
Expendable materials

Designation	Part Number
Lubricant: multipurpose grease	commercially

Note: The adjustment must only be carried out if either axle bridge housing, joint housing, kingpin or king pin bearing have been renewed or the shim rings transposed.

The adjustment should be carried out with a new drive shaft.

install axle shaft into joint housing and tighten with slotted nut on block.



Adjustment of the steering knuckle bearing

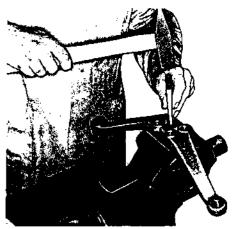
1 Insert corresponding guide ring from special tool in axle tube.



460 589 01 14 00

Note: Guide ring must slide onto bearing race of drive shaft without clearance.

2 Centre track rod arm or upper bearing cover with blow of punch.



- 3 Install new tapered roller bearings with nilos ring.
- 4 Install joint housing with drive shaft and king pin at top and bottom without guide bushings and determined shims.

Note:

Steering knuckle bearing, top

For measuring add two fitted washers (part no. 000988 019002) of 1 mm each on kingpin.

Steering knuckle bearing, bottom

The lower kingpin has a tight fit the last 5 mm in the joint housing. For measuring the washers to be inserted a spacer ring of 6 mm must therefore be inserted between bearing inner race and kingpin, inside and a spacer ring of 4 mm must be inserted between steering knuckle arm and joint housing, outside. (Spacer rings, self-assembly)

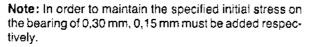
5 Compress kingpin and track rod arm untilplay is no longer present in the steering knuckle bearing.



460 589 04 31 00

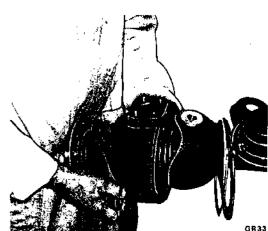
Note: Before measuring move towards the joint housing back and forth so that bearing seats.

6 With feeler gauge determine the distance between joint housing and kingpin or track rod arm and spacer ring (4 mm), write down the value.

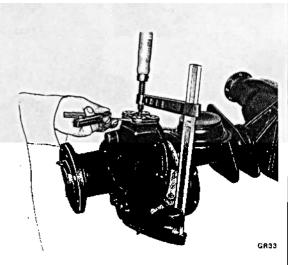


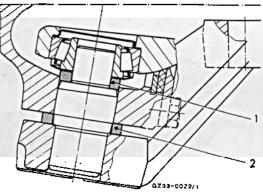
Example:

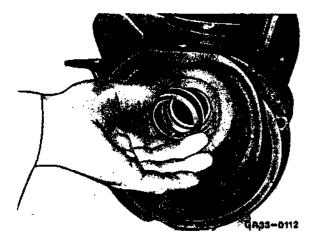
top	bottom	
2,00 mm	2,00 mm	Washer (above)
- 1,30 mm	- 1,10 mm	Spacer ring 6-4 mm (bottom) measured size of gap with feeler gauge
+ 0,15 mm	+ 0,15 mm	
= 0,85 mm	= 1,05 mm	required shim rings



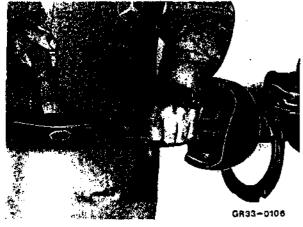
GR33



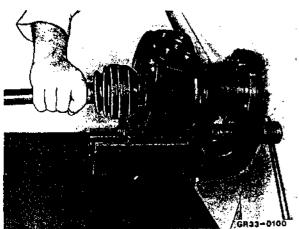




- 7 Remove joint housing with drive shaft.
- 8 Remove guide ring.
 - 460 589 01 14 00



9 Coat new shaft seal with lubricant and drive in flush (max. 0,3 mm lower).



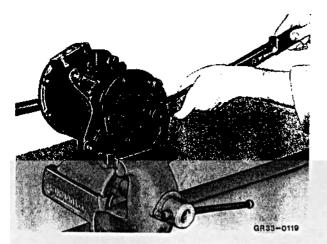
10 Clamp joint housing in vise.

5 717 589 00 31 00

11 Remove the drive shaft installed for checking alignment, install old shaft again.

Adjust wheel bearing clearance

Note: Only use new slotted nuts and lock tabs.



12 Grease inner slotted nut at contact surface to wheel hub with lubricant and while simultaneously turning the joint housing, tighten to 200 Nm. (Seating and aligning of bearing rollers).

Release inner slotted nut and apply again. (Bearing with no clearance)

Release inner slotted nut by 1/8 revolution, insert lock tab.

B

460 589 00 07 00 717 589 00 31 00 13 Sand outer slotted nut on contact surface to lockhab with sandpaper. Grease slotted nut with lubricant and tighten to 170 to 210 Nm.

460 589 00 07 00 717 589 00 31 00



GR33-0094

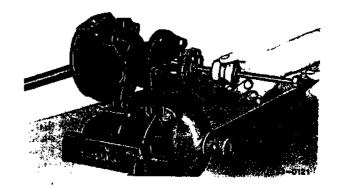
14 Check wheelbearing clearance.



15 Secure external slotted nut.

16 Fill grease cap with lubricant and install.

116 589 22 33 00

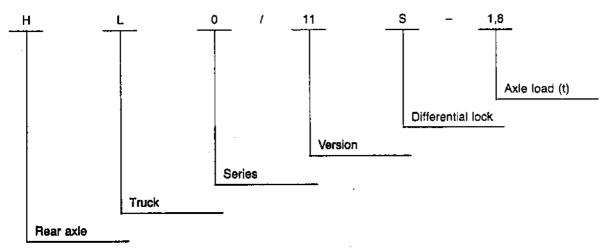


Rear axle Installation survey

Chassis		Rear axle				
Model	Sales designation	Model	Sales designation	Brake	Version	Installation
463.200 .220	200 GE 4 x 4')	741.505	HL 0 / 11 S - 1,8 / 5,286	Drum brake	with differential lock	Standard
.221		741.506	HL 0 / 11 S - 1.8 / 5.286	Drum brake	with differential lock	Standard
463.204 .224	230 GE 4 x 4	741.505	HL 0 / 11 S - 1,8 / 5,286 HL 0 / 11 S - 1,8 / 4,857	Drum brake	with differential lock	Standard SA 020428/05
.225	·	741.506	HL 0 / 11 S - 1.8 / 5.286	Drum brake	with differential lock	Standard
463.207 .227	300 GE 4 x 4	741.110	HL 0 / 11 S - 1,8 / 4,857 HL 0 / 11 S - 1,8 / 4,375	Drum brake	with differential lock	Standard SA 020428/13
.228		741.114	HL 0 / 11 S - 1.8 / 4.857	Drum brake	with differential lock	Standard
463.304 .315 .324	250 GD 4 x 4	741.505	HL 0 / 11 S - 1,8 / 5,286 HL 0 / 11 S - 1,8 / 6,167	Drum brake	with differential lock	Standard SA 020428/01
.325		741.506	HL 0 / 11 S - 1.8 / 5.286	Drum brake	with differential lock	Standard
463.307 .327	300 GD 4 x 4	741.505	HL 0 / 11 S - 1,8 / 5,286 HL 0 / 11 S - 1,8 / 4,111 HL 0 / 11 S - 1,8 / 4,375 HL 0 / 11 S - 1,8 / 4,857	Drum brake	with differential lock	Standard SA 020428/20 SA 020428/13 SA 020428/05
.328		741.506	HL 0 / 11 S - 1.8 / 5.286	Drum brake	with differential lock	Standard

¹⁾ Model, country-specific e.g. Italy SA = Special version

Key to sales designation



General

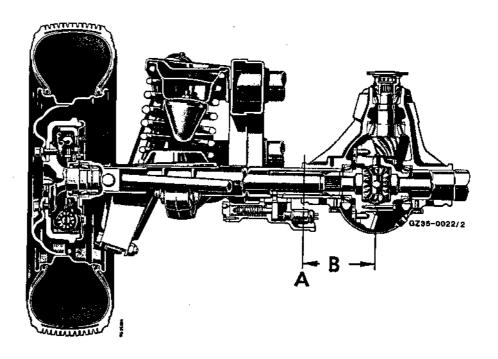
In the cross-country vehicle, series 463 the rear axle version HLO/11 S-1,8 is installed.

As standard the axle is installed with track width 1425 mm.

The axle housing centre is staggered to the right by 100 mm with track width 1425 mm 125 mm with track width 1475 mm

With installation of the special version 020454 a 50 $\scriptstyle\rm I$ increased track width is attained.

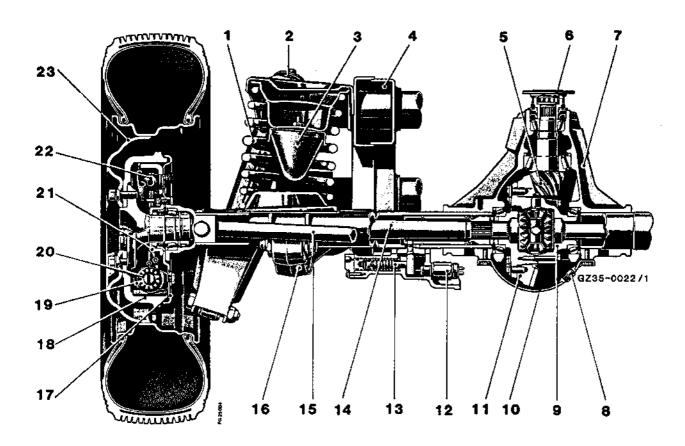
Note: For track widths, refer to Group 40



A = Centre of axie

B = 100 mm

Sectional view



HL 0/11 S - 1,8

- 1 Helical spring
- 2 Shock absorber
- 3 Auxiliary rubber spring
- 4 Frame
- 5 Drive pinion
- 6 Drive flange
- 7 Axle housing
- 8 Oil filler screw
- 9 Differential housing
- 10 Differential cover
- 11 Ring gear
- 12 Switch for indicator lamp

- 13 Slave cylinder for differential lock
- 14 Input shaft
- 15 Transverse link
- 16 Trailing arm
- 17 Brake support plate
- 18 Brake drum
- 19 Brake shoe
- 20 Automatic brake adjuster
- 21 Axle tube bearing cover
- 22 Wheel brake cylinder
- 23 Disc wheel

Technical data

Ratio

Axle model	Number	Number of teeth		Installation	
	Ring gear	Bevel gear		Starting Starts	
741.110 .114	34	7	4,857	Standard	
.110	35	8	4,375	SA 020428/05	
741.505 .506	37	7	5,286	Standard	
.505	37 35 34 37	9 8 7 6	4,111 4,375 4,857 6,167	SA 020428/20 SA 020428/13 SA 020428/05 SA 020428/01	

Axle-transmission combination

Vehicle-	Transmission	version	Axle ratio	i	The Park	The state of the s	
Sales designation	5-Gear GL76/27/K-5	4-Gear Automatic W4A 028	5,286	4,111	4,375	4,857	6,167
200 GE 4 x 4	0		0	x	x	x	x
230 GE 4 x 4	0	x	0	x	x	x	×
300 GE 4 x 4	0	x			x	0	
250 GD 4 x 4	0		0	x	x	x	x
300 GD 4 x 4	0	X	0	x	x	x	×

Capacity

Service product (Sheet No. of MB Service Product Specifications)	SAE grade	Capacity (I)
Gear oil (235)	80 W 90	1,8

o Standard version x Special requirement

Setting values

Backlash	mm	0,10 to 0,15
Friction coefficient between drive pinion and radial seal	Nm	2,5 to 3,0
Friction torque for turning complete differential	Nm	20,0 to 40,0
Switch activation distance of differential lock in the slave cylinder	mm	8,0 to 10,0
Axial clearance of rear axle shaft (condition as new)	mm	0,15 to 0,251)
Overall concentricity deviation at propeller flange	mm	< 0,07

¹⁾ max 0,5 mm with increased mileage

Tightening torques

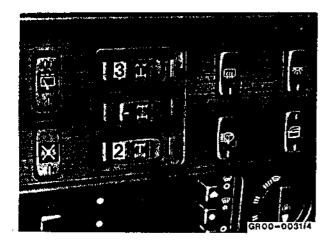
Designation		Thread	Nm	
Wheel mounting bolts	Steel rim	M 14 x 1.5 – 10.9	190	
	Light alloy rim	THE MALE TO SERVE	140	
Cover to axle housing		M 8 10.9	60 to 70	
Cover on differential housing		M 8 10.9	40 to 45	
Bearing cap to axle housing		M 10 10.9	65 to 75	
Ring gear to differential housing		M 12 x 1,0 - 12.9	170 to 190	
Slotted nut to rear axle shaft		M 45 x 3,0	300 to 350	
Bearing cover to axle tube support		M 10 x 12	77 to 88	
Shift lever to shifter shaft, differential lock		M 10 x 1,25	20 to 25	
Shift cylinder to axle tube		M 8 - 8.8	22 to 25	
Pressure switch to shift cylinder		M 18 x 1,5	95 to 105	
Shock absorber to rear axle		M 16 x 1,5 - 8.8	100	
Transverse link to frame		M 16 x 1,5 - 8.8	210	
Transverse link to rear axle		M 16 x 1,5 - 8.8	210	
Trailing arm to frame		M 16 x 1,5 - 8.8	130	
Longitudinal control arm to rear axle		M 16 x 1,5 - 8.8	210	
Universal-joint drive shaft to flange		M 8 x 1,0	3 5	

Front and rear axle

Actuating the tip switches on the instrument panel for the rear axle or front axle electrically actuates the switchover valves, rear axle or front axle.

Note:

The tip switch for the transfer case must be actuated before actuating the tip switch rear or front axle.



Tip switches - lock actuation

- 2 Tip switch rear axle, differential lock
- 3 Tip switch front axle, differential lock



2

Pressure intensifier unit (wheelhousing, right)

- 1 Rear axle
- 2 Front axle

In the pressure intensifier unit the hydraulic piston is moved down by a diaphragm, as a result of which brake fluid with a pressure of approx. 15 bar enters the slave cylinder of the rear or front axle.

(Diagram of differential lock, hydraulic system, refer to page 176)

Switchover valves

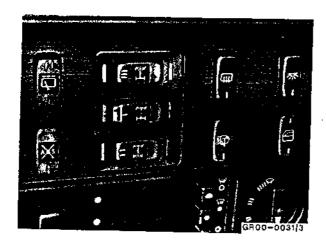
- 1 Rear axle
- 2 Front axle

Through the actuation of the switchover valves a vacuum is conducted via the intake connection (approx. 0,4 bar) to the pressure intensifier unit. ((pneumatichydraulic valve)

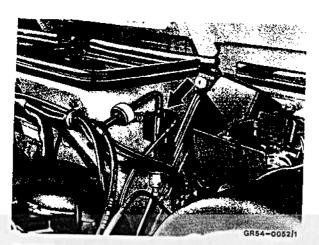
Transfer case

By actuating the electrical tip switch, transfer case on the instrument panel, the switchover valve is actuated (installed in engine compartment, left, next to air duct).

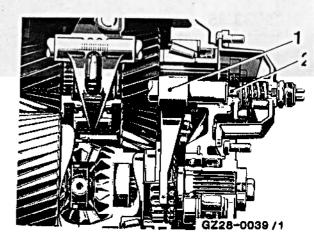
This operates the interaxle differential lock via a shift fork with the vacuum shift cylinder.



1 Tip switch transfer case, interaxle differential lock



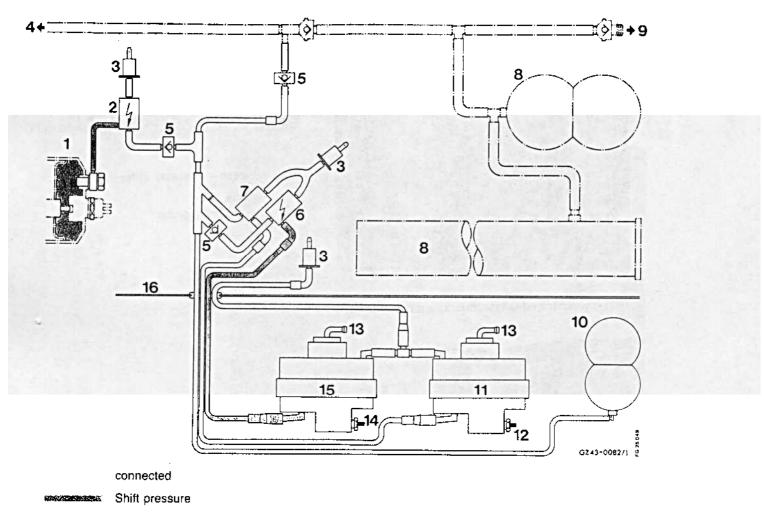
Switchover valve - transfer case, interaxle differential lock



Transfer case - Interaxle differential lock

- 1 Shift fork
- 2 Vacuum shift cylinder

Diagram



Supply pressure

Hydraulic pressure

Differential lock -- pneumatic system (Transfer case and rear axle connected) **Diesel vehicles**

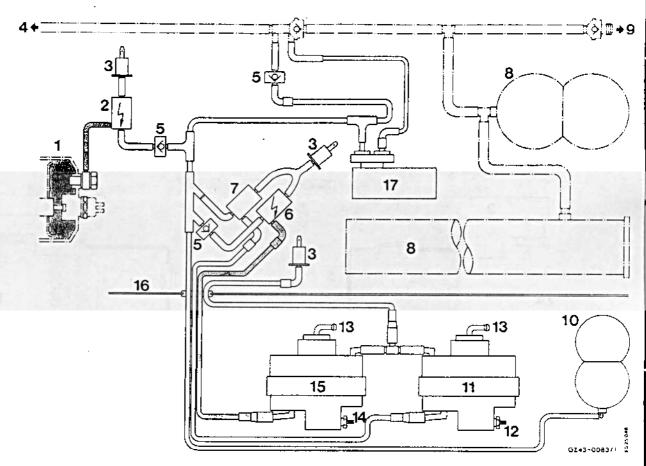
1	Transfer case
2	Electrical switchover valve, transfer case
3	Changeover filter
4	to vacuum pump, engine
5	Non-return check valve
6	Electrical switchover valve, rear axle

- 7 Electrical switchover valve, front axle8 Vacuum reservoir (brake)
 - Contents: Frame cross tube 4,4 Ltr.

 Reservoir 1,8 Ltr.

- 9 to brake booster
- 10 Vacuum reservoir, differential lock, contents 0,4 Ltr
- 11 Pressure intensifier unit, front axle
- 12 Hydraulic connection to front axle
- 13 to reservoir, hydraulic system
- 14 Hydraulic connection to rear axle
- 15 Pressure intensifier unit, rear axle
- 16 Wheelhousing, right

Diagram



connected

St.

Shift pressure

Supply pressure

Hydraulic system pressure

Differential lock – pneumatic system (Transfer case and rear axle connected) Gasoline vehicles

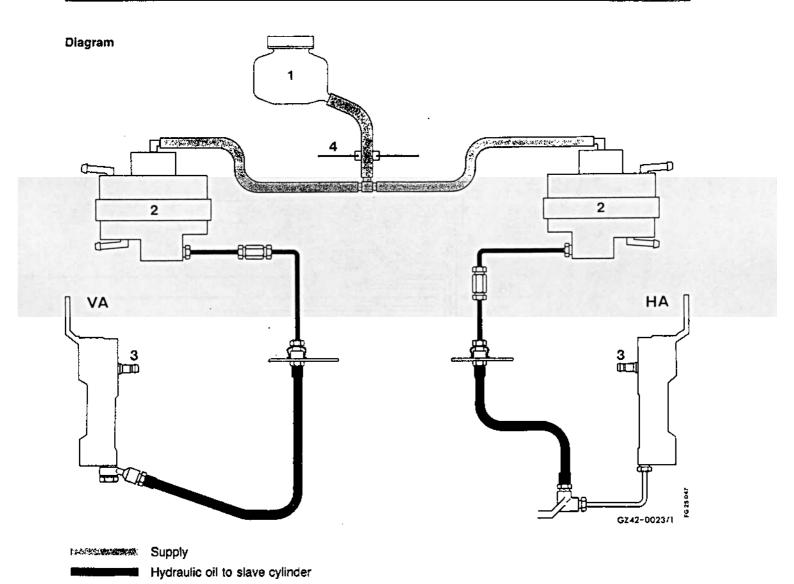
1	Transfer case

- 2 Electrical switchover valve, transfer case
- 3 Changeover filter
- 4 to intake manifold, engine
- 5 Non-return check valve
- 6 Electrical switchover valve, rear axle
- 7 Electrical switchover valve, front axle
- 8 Vacuum reservoir (brake)

Contents: Frame cross tube 4,4 Ltr.

Reservoir 1,8 Ltr.

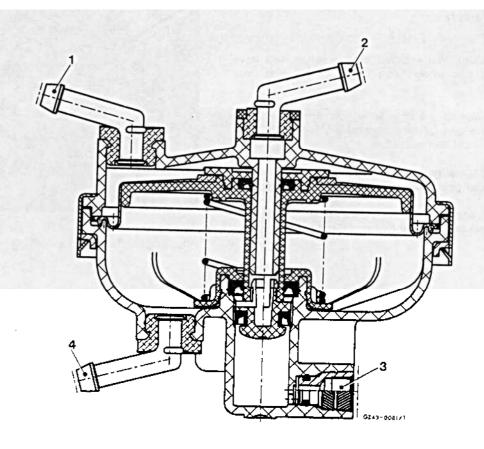
- 9 to brake booster
- 10 Vacuum reservoir, differential lock, contents 0,4 Lt
- 11 Pressure intensifier unit, front axle
- 12 Hydraulic connection to front axle
- 13 to reservoir, hydraulic system
- 14 Hydraulic connection to rear axle
- 15 Pressure intensifier unit, rear axle
- 16 Wheelhousing, right
- 17 Auxiliary vacuum pump



Differential lock, hydraulic system

- 1 Reservoir
- 2 Pressure intensifier unit
- 3 Slave cylinder, differential locks
- 4 Wheelhousing, right
- VA Hydraulic cylinder, front axle
- HA Hydraulic cylinder, rear axle

Sectional view



Pressure Intensifier unit (Pneumatic system – hydraulic system)

- 1 Vent
- 2 to brake fluid reservoir (hydraulic system)
- 3 to lock actuation
- 4 Intake connection (vacuum)

Wheels and tyres

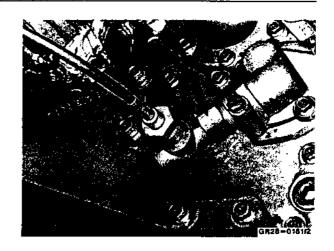
General

As standard, the vehicles of the series 463 have mounted disc wheels size 6 J x 16 H2 with tyres 205 R 16.

If other allowed tyre sizes are mounted at a later date, the angular gear for the speedometer drive on the transfer case must be replaced.

On the angular gear, the Mercedes-Benz part no. and the angular gear ratio is specified.

Optional, approved tyre sizes and disc wheels are to be taken from the table for tyre and disc wheel sizes.



Angular gear (fitted on transfer case)

Allocation - angular gear

Tyres/axle-angular gear ratio

Tyre size	Axle ratio i								
	4,111	4,375	4,857	5,286	6,167				
	Angular gear ratio								
205 R 16	0,789 : 1	0,833 : 1	0,928 : 1	1,000 : 1	1,176:1				
215 R 16 225/75 R 16	0,761 : 1	0,809 : 1	0,904 : 1	1,000 : 1	1,142 : 1				
255/75 R 15	0,761 : 1	0,809 : 1	0,894 : 1	0,961 : 1	1,142 : 1				
7,00 R 16	0,736 : 1	0,761 : 1	0,857 : 1	0,928 : 1	1,100 : 1				
7,50 R 16	1-	0,761 : 1	0,833 : 1	0,904 : 1	1,055 : 1				

Angular gear Ratio i	Mercedes-Benz Part Number
0,736 : 1	001 542 19 30
0,761 : 1	001 542 36 30
0,789 : 1	000 542 86 30
0,809 : 1	002 542 46 30
0,833 : 1	002 542 03 30
0,857 ; 1	002 542 88 30
0,894 : 1	002 542 90 30
0,904 : 1	001 542 15 30
0,928 : 1	001 542 58 30
0,961 : 1	003 542 31 30
1,000 : 1	000 542 06 30
1,055 : 1	000 542 60 30
1,100 : 1	000 542 13 30
1,142 : 1	001 542 27 30
1,176 : 1	001 542 20 30

Tyres

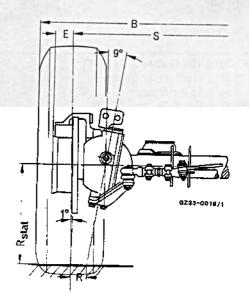
In the special version, wide tyres 255/75 R 15, in order to maintain the necessary clearance for the steering angle, the front axle with track width 1475 mm (standard 1425 mm) must be installed with enlarged fenders.

A track width of 1475 mm and enlarged fenders is also required with the rear axle.

Note: The disc wheel 7 Jx 15 H2 with rim offset 63 mm is only to be installed with type 463 (not with type 460/461).

With the tyre size 255/75 R 15 and disc wheel 7 J 15 X 15 H2 rim offset 63 mm a steering offset of 40 mm is attained. (Type 460 = 63 mm)

The smaller the steering offset, the less effect of outside forces in the steering system, such as tyre imbalance, uneven braking forces right and left, jolts from the road surface etc..



B = Width
E = Rim offset
R = Steering offset
R stat = Static loaded radius
S = Track width

Technical data

Technical data Tyre (comparison type 460 / 461 / 463)

Chassis	Tyre size	Disc wheel size	Track width (S) mm	Steering offset (R) mm	Stat. loaded radius (R stat) mm	Overall width (B) mm	Rim offset
463	205 R 16 225/75 R 16 7,00 R 16 7,50 R 16	6 JK x 16 H2	1425 1425 1425 1425	43 41 40 37	336 338 356 369	1653 1663 1643 1660	63
	255/75 R 15	7 J x 15 H2	1475	40	351	1750	63
	255/75 R 15 10 R 15 LT	7 J x 15 H2	1477 1471	63 58	347 370	1755 1768	37
	7,00 R 16 C 7,50 R 16 215 R 16 C 6,50 R 16 205 R 16	5 1/2 JK 16 H2	1424 1423 1424 1424 1425	38 36 42 39 43	362 371 341 354 334	1649 1656 1664 1622 1654	63

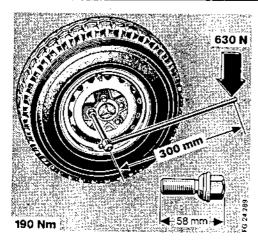
Tyre and disc wheel size

Tyre size	Tyre Manufacturer	Disc wheel Size	Versio Steel	n Alumini- um²)	Tyre marking Load Index	Speed Identification Speed Index	
205 R16 104 S XM+S 244 RTL') 205 R16 M+S TL M 529') Hi-Grip Reinforced 205 R16 Reinf. TL max. C 50')	Michelin Semperit Uniroyal	6Jx16 H2	x x	x x	104 104 104	S R R	
225/75 R16C monoply T90 (M+S)¹) Uniroyal Continental			×	x x,	113/110 113/110	S S	
7,00 R16 XCL 113/112 N Tubetype ⁴) 7,50 R16 XS 108/106 N Tubetype ⁴)	Michelin Michelin		x x	x x	113/112 108/106	N N	
225/75 R15 C 110/108N (104/102R) (M+S) TL Wrangler') ⁴) 255/75 R 15 XCH4 TL (M+S)')	Good Year Michelin	7J x 15 H2 ³)	x x	110/108N 104/102R 104	R S	

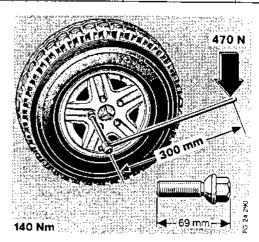
optional
 Special requirement
 Special requirement only valid with track width 1475 mm in connection with fender enlargement.
 not valid with 300 GE

Tightening torques

Designation	Thread	Nm	
Vheel fastening bolts			
Steel plate disc wheels	M 14 x 1,5 - 10.9	190	
Light metal alloy-disc wheels	M 14 x 1,5 10.9	140	



Steel plate disc wheels



Light alloy disc wheels

Tyres - pressure table

Wheelbase 2 400 mm 2 850 mm

Cold tyres
Tyre pressure in bar

Tyres	to km/h	Load condition	Tyre pressure in bar				
205 R 16 Reinforced	171	Partial load	2,2	2,2	2,2	2,2	
104 R or 104 S		Maximum load	2,2	2,5	2,2	3,0	
225/75 R 16 C LM 90 M+S	180	Partial load	2,5	2,5	2,5	2,5	
Continental		Maximum load	2,5	3,0	2,5	3,5	
225/75 R 16 C monoply T90 M+S	180	Partial load	2,5	2,5	2,5	2,5	
Jniroyal		Maximum load	2,5	3,0	2,5	3,5	
255/75 R 15 104 S XCH 4 TL M+S Michelin	171	Partial load	2,2	2,2	2,2	2,2	
		Maximum load	2,2	2,5	2,2	3,0	
255/75 R 15 C 110/108 N (104/102R) M+S TL	171	Partial load	2,5	2,5	2,5	2,5	
Wrangler Goodyear		Maximum load	2,5	3,0	2,5	3,5	
7,00 R 16 XCL 113/112 N Tubetype	170	Partial load	2,5	2,5	2,5	3,0	
Michelin		Maximum load	2,5	3,5	2,5	4,0	
7,50 R 16 XS 108/106 N Tubetype	160	Partial load	2,5	2,5	2,5	2,5	
Michelin		Maximum load	2,5	3,0	2,5	3,5	

Caution!

The tyre pressure changes every 10°C air temperature by 0,1 bar. This must be observed in air pressure checks carried out indoors, especially in winter.

Example:

Room temperature = approx. 20°C Ambient temperature = approx. 0°C

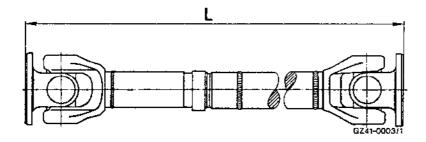
Pressure to be adjusted = specified pressure +0,2 bar

Propeller shafts

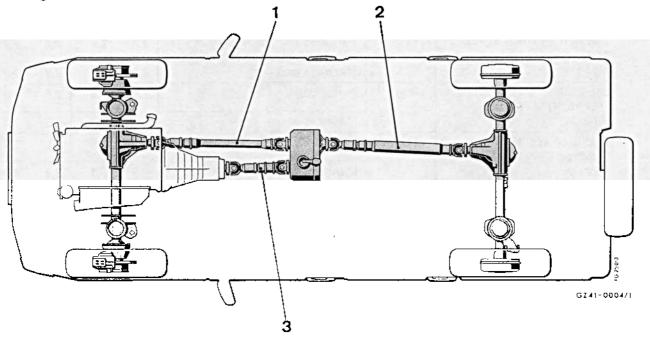
Installation survey

Arrangement	Item no.	Length L mm')	Offset of universal joints
Propeller shaft to front axle	1	945 + 1,5 -2,5	50°
Propeller shaft to rear axle	2	545 + 1,5 -2,5	110°
	2	990 ^{+ 1,5} _{-2,5})	0°
Propeller shaft to transmission	3	520 ^{+1,5} _{-2,5})	90°
	3	440 ^{+1,5} _{-2,5} ³)	90°
Propeller shaft to automatic transmission (special	3	391 ± 24)	90°
version)	3	306 ± 23)	90°

- 1) Propeller shaft retracted
- 2) only for wheelbase 2850 mm
- 3) only for type 300 GD/300 GE4) only for type 200 GE/230 GE



Arrangement



- Propeller shaft to front axle
- 2 Propeller shaft to rear axle

3 Propeller shaft to transmission/automatic transmission

General

The high achievement realized in the new drive concept is also to be found in the clear improvement of sllent running of the entire propeller shaft assembly.

Extensive measures such as reduction of deflecting angle of the propeller shafts by up to 50%, new mounting of the transfer case, reduction in out-of-roundness of all propeller shafts, optimized body mounting as well as an improved floor insulation have particularly contributed to the comfort-orientated design of these vehicles.

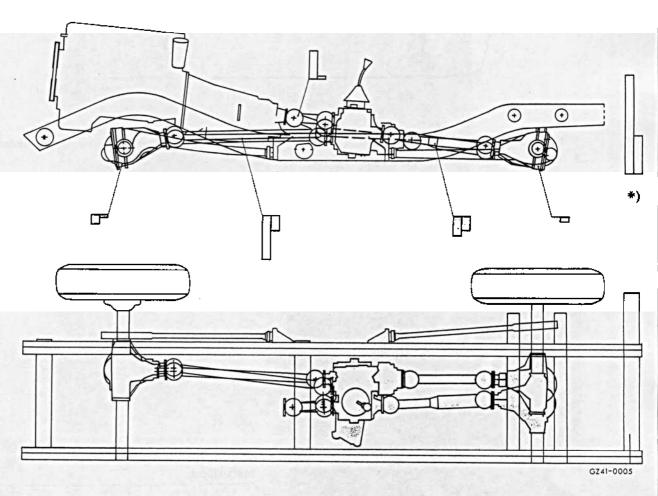
Through the installation of the new transfer case (VG 150) the direction of rotation of the propeller shaft to the front axle has been changed.

Note:

When installing the propeller shafts observe the following:

The slip joints of the joints must be fitted together arrow to arrow or arrow on grease nipple.

Do not tighten the flange bolts until the propeller shaft has been turned so that the grease nipples in the slip joint point towards the top.



Propeller shaft arrangement - comparison, type 460/463

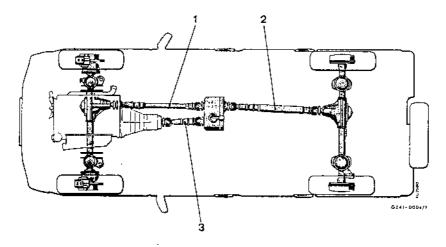
with 2 shafts - transfer case - type 460

with 3 shafts - transfer case - type 463

*) Dimension for vibration comfort

Tightening torques

Designation	Nm
Fastening nut to universal-joint drive shaft flange	
- to transmission	35
- to transfer case	35
 to front axle 	35
- to rear axle	35



- 1 Propeller shaft to front axle
- 2 Propeller shaft to rear axle

3 Propeller shaft to transmission/automatic transmission



Removal

- 1 Release and detach nuts.
- 2 Remove propeller shaft.



Installation

 Check arrow mark for the propeller shaft. Arrows on slip joint and on the tube or arrow and grease nipple must always face each other.

Note: The universal joints of the universal-joint drive shaft to the front axle are offset to each other by 50°.

2 Position propeller shaft on flange of component and tighten to 35 Nm.

Note: Do not tighten flange bolts until the propeller shaft has been turned so that the grease nipples in the slip joint point towards the top.

Brake system

Installation survey

Vehicle Model	Туре	Brake system – Version	Installation
463.200 .220 .221	200 GE 4 x 4 ¹) ²) 200 GE 4 x 4 ¹) ²) 200 GE 4 x 4 ¹) ³)	Dual-circuit hydraulic brake system, disc brake on front axle, drum brake and ALB on rear axle	Standard
.204 .224 .225	230 GE 4 x 4 ²) 230 GE 4 x 4 ²) 230 GE 4 x 4 ³)		
.207 .227 .228	300 GE 4 x 4 ²) 300 GE 4 x 4 ²) 300 GE 4 x 4 ³)	Anti-lock braking system (ABS)	Special version SA 028 506 Code: B 02
.304 .324 .325	250 GD 4 x 4 ²) 250 GD 4 x 4 ²) 250 GD 4 x 4 ³)		ethan ethan actuel User at ministral in its Santon actual
.307 .327 .328	300 GD 4 x 4 ²) 300 GD 4 x 4 ²) 300 GD 4 x 4 ³)		

Model country-specific, e.g. Italy.
 Wheelbase 2400 mm
 Wheelbase 2850 mm

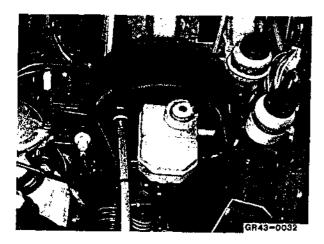
Discription of function Brake system

The vehicles are equipped with a hydraulic dual-circuit brake with vacuum assistance. The required vacuum for the brake booster is produced by a vacuum pump. In all vehicles there is a non-return valve installed in the vacuum line on the brake booster.

On the front axle, fixed caliper-disc brakes with 4 cylinders per fixed caliper are installed, on the rear axle, drum brakes of the duo-servo design are used. The brake on the front and rear axle adjusts automatically.

When braking in forward movement **only the rear** brake shoes of the rear axle adjust. To enable the front brake shoes to adjust, occasionally apply heavy braking in reverse movement.

The pressure applied to the brake pedal is conducted via the piston rod to the dual-circuit master brake cylinder. The dual-circuit master brake cylinder is coupled with the tandem brake booster.



This increases the pressure applied by the driver. The increased pressure is conducted via the brake lines to the fixed calipers of the disc brake and to the wheel brake cylinders of the drum brake. The brake pads of the disc brake are applied to the brake disc through the pistons of the fixed calipers and the brake shoes of the drum brake are applied through the pistons of the wheel brake cylinders.

In a case of failure of the vacuum, the system continues operating as a normal hydraulic brake system, however, requiring a correspondingly increased foot pressure.

Brake pressure distribution

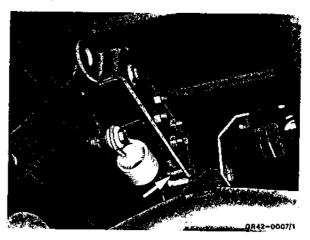
Brake circuit 1 acts on both fixed calipers, with 4 piston each, on the front axle.

Brake circuit 2 acts on the 2 wheel brake cylinders on the rear axle.

Upon failure of one brake circuit, the vehicle is braked at one axle only.

Automatic load-dependent control

To control the brake pressure at the rear axle, a brake pressure regulator is used with variable changeover pressure. Up to a certain hydraulic pressure (changeover pressure), the pressures upstream and downstream of the regulator are the same. If there is further pressure increase upstream of the regulator, it only allows a reduced pressure through to the wheel brake cylinders of the rear axle.

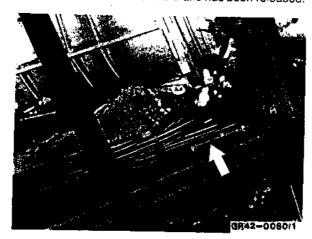


The brake pressure regulator and the relay lever are secured to the frame. The brake pressure regulator is connected to the relay lever by the control spring and the relay lever is connected by a linkage to the rear axle.

If there is an increase in the rear axle load, the rear spring deflects and via the linkage and the relay lever increases the preload of the control spring and thus the changeover point and the braking force of the rear axle.

Admission pressure control valve

The admission pressure control valve is in the brake line to the rear axle, screwed to the distributor. This valve maintains a admission pressure of 0.5 bar to 1,2 bar at the rear wheel brake after the brake has been released.



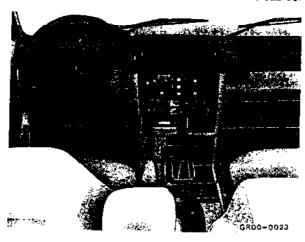
Through the pressure spring load the admission pressure control valve keeps the brake fluid in the brake lines continuously under gauge pressure when the brakes are **not** applied. The slightest pressure increase resulting from brake application therefore causes an immediate braking effect. In this way, the free travel at the brake pedal is reduced.

Furthermore, as a result of the gauge pressure, the lips of the wheel brake cylinder gaiters are pressed with greater tension against the cylinder wall and the penetration of air is avoided.

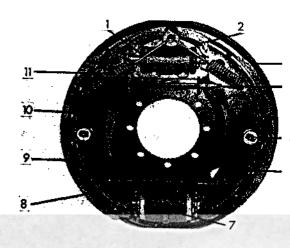
Handbrake

The parking brake is designed as a lever brake; it is situated beside the driver's seat.

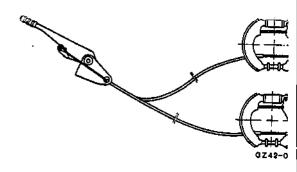
The handprake acts on the rear wheels via two cables.



Upon actuating the parking brake lever in the pass compartment, the parking brake lever (10) is puthe brake anchor plate centre. Through this move the brake shoe (6) rests up against the brake downenthe brake shoe (6) is applied, the brake stranger supports itself against push rod (4) and via the effect from the supporting point to the pivot point the brake shoe (9), it is applied against the brake



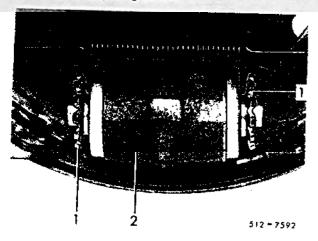
- 1 Wheel brake cylinder
- 2 Supporting ridge
- 3 Brake support plate
- 4 Push rod with spring and spring retainer
- 5 Pressure spring with spring retainer and dowe
- 6 Front brake shoe
- 7 Automatic adjuster
- 8 Lower return spring
- 9 Rear brake shoe
- 10 Brake lever
- 11 Upper return spring



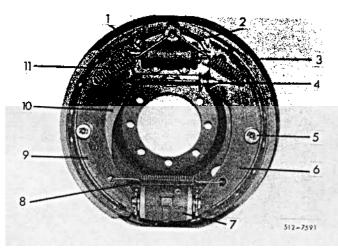
Duo-servo drum brake

In the duo-servo brake, the support mechanism (automatic adjuster) is mounted freely mobile between the brake shoes i.e. it is free-floating.

This support is solely for passing the applied brake force (support pressure) from one brake shoe to the other and serves as an adjusting device.



When actuating the brake in forwards drive, the ducacting wheel brake cylinder (1) forces the brake shoe (6) and — via the automatic adjuster (7) as transmission element—also the brake shoe (9) against the brake drum in drum direction of rotation.



When reversering, the same process takes place in reverse direction. In this way both brake shoes are primary shoes in forward and reverse movement.

Discription of function

Automatic adjuster on the rear axie

The automatic adjustment adjusts the secondary shoe in forwards drive and the primary shoe when reversing.

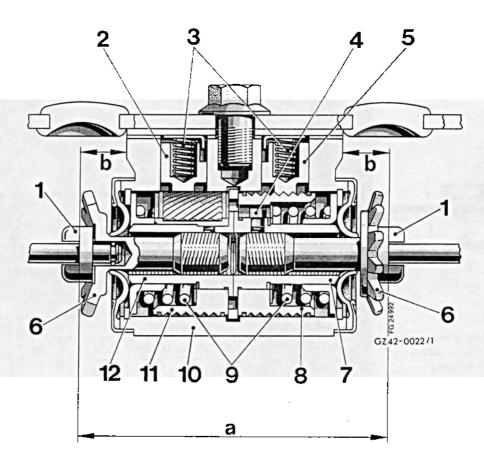
If the brake is not actuated, the adjuster is centred by the pressure springs (11).

With brake actuation in forwards drive, the threaded bushings (7 and 12), the adjusting bushing (8) and the adjusting screws (6) are moved to the right. If a certain axial path is exceeded, the adjusting pin (5) jumps into the next tooth of the adjusting bushing (8).

At the end of the braking process the pressure spring a brings all moved parts back into initial position. At t same time the adjusting bushing (8) and the thread-bushing (7) connected to it by the follower (4) are turne

As a result of the force of the brake shoe return sprinon the brake shoes, the adjusting screw (6) is preventfrom turning by the thrust piece (1). In this way tl dimension **a** increases (adjustment).

The automatic adjustment in reversing taken place as forward drive, only in reverse direction.



- 1 Thrust piece
- 2 Adjusting pin
- 3 Pressure spring
- 4 Follower
- 5 Adjusting pin
- 6 Adjusting screw

- 7 Threaded bushing
- 8 Adjusting bushing
- 9 Pressure spring
- 10 Housing
- 11 Adjusting bushing
- 12 Threaded bushing

Adjustment a = 82 mm

Hydraulic units

Admission pressure control valve (8.05)

Task

Maintaining a certain pressure in the rear axle brake circuit after the braking process.

Maintenance

Special maintenance is not required.

Technical data

Installation		Standard
Admission pressure	mm	0,5 to 1,2
Permissible operating pressure	bar "	max. 120

Master brake cylinder (19.03)

Task

Producing the brake pressure for the wheel brakes by means of brake fluid.

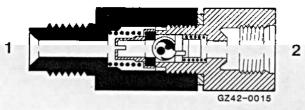
Maintenance

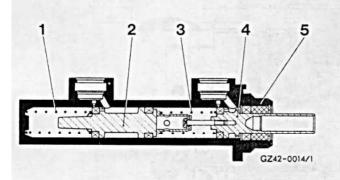
Special maintenance is not required.

Technical data

Installation		Standard
Pressure range up to	bar	max. 120

Note: Regularly check brake fluid in the brake fluid reservoirs.





- 1 Pressure spring
- 2 Intermediate piston
- 3 Pressure spring
- 4 Piston
- 5 Housing

Wheel brake cylinder (19.05)

Task

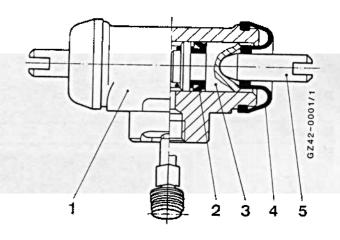
Transmission of the pressure produced in the master brake cylinder by the pistons to the brake shoes.

Maintenance

Special maintenance is not required.

Technical data

Installation		Standard
Permissible operating pressur	bar	max. 120
Cylinder diameter	mm	17,46



- 1 Housing
- 2 Gaiter
- 3 Piston
- 4 Safety cap
- 5 Thrust pin

ALB – automatic load-sensitive brake pressure regulator (26.03)

Task

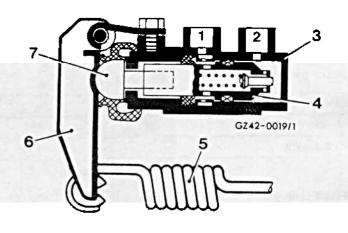
Automatic regulation of the brake pressure in the wheel brake cylinders, dependent of the load status of the vehicle.

Maintenance

Special maintenance is not required. For checking the adjustment, refer to 221.

Technical data

Installation		Standard
Test pressure before ALB	bar	100
Permissible operating pressure	bar	max. 140



- Energy input
- 2 Energy output
- 3 Housing
- 4 Control plunger
- 5 Spring
- 6 Lever
- 7 Thrust pin

Technical data			
Master brake cylinder			
Diameter		mm	25,4
Stroke	total	mm	36,00
	Circuit 1	mm	13,00
THE PARTY OF BUILDING	Circuit 2	mm	23,00
Admission pressure control valve			
Admission pressure control in the rear ax	xle brake circuit	bar	0,5 to 1,2
Inside diameter		mm	181,20
Outside diameter		mm	303,00
		mm	181,20
Thickness		mm	16,00
Permissible wear limit		mm	13,00')
Permissible wobble		mm	0,15
1) max. 1,5 mm per side			
Brake pads			
Dimension of pad when new		mm	14,00
Minimum size of pad		mm	2,00
Pad-quality		O TABLES	asbestos-free
# # # # # # # # # # # # # # # # # # #		I ATTEM	
Fixed caliper			
Piston diameter	of State of	mm	44,00
Pistons per fixed caliper	— · · · · · · · · · · · · · · · · · · ·		4

automatic

Adjustment

Brake	drum	^		
Diane	willing	On	raar	RYIA

Inside diameter	mm	260,00
Repair size 1 Repair size 2	mm	261,00
Tiepali Size Z	mm	262,00

Brake lining

Lining thickness		
Repair size, standard	mm	55,00
Repair size 1	mm	8,70
Repair size 2	mm	9,20
Wear limit	mm	9,70
Pad quality	mm	3,50
ao quanty	mm	asbestos-free

Wheel brake cylinder

Cylinder diameter	THE PARTY OF THE P	
Number per axle	mm	17,46
Adjustment		2
· injustification (OAS BUILDING HERE	automatic

Effective braking area

Front axle		
Rear axle	cm ²	297,00
Total	cm²	448,00
· OKAT	cm²	745,00

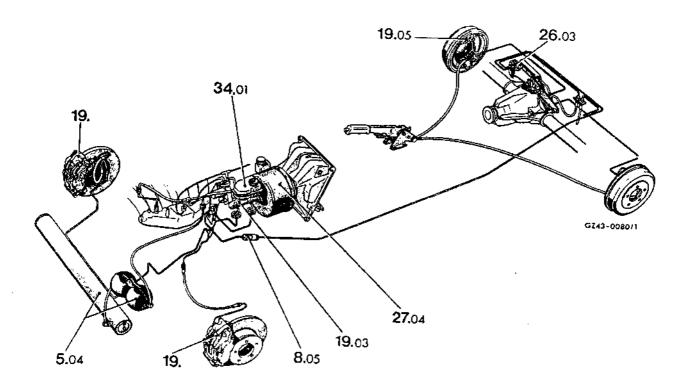
ALB regulator

Input pressure (test pressure)	bar	max. 100

Brake fluid

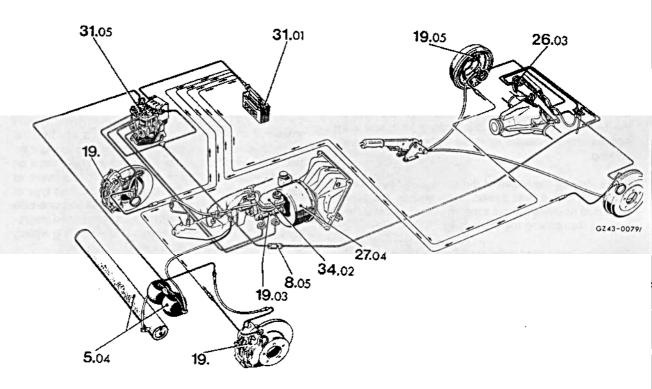
pacity	
pacity	
	0.5

Brake diagram



5.04	Vacuum reservoir	19.05	Wheel brake cylinder, rear axie
8.05 19.	Prepressure valve		Brake pressure regulator
	Fixed caliper Master brake cylinder	27.04	Brake servo unit
	master brake cylinder	34.01	Brake fluid reservoir

Brake diagram for ABS



5.04	Vacuum reservoir	25.00	5 .
8.05	Prepressure valve	26.03	Brake pressure regulator
19.	Fixed caliper	27.04	Brake servo unit
19.03	•	31.01	Control unit
19.05	Master brake cylinder	31.05	Hydraulic unit
19.03	Wheel brake cylinder, rear axle	34.02	Brake fluid reservoir

Anti-lock braking system (ABS) General

The anti-lock braking system (ABS) is one of the active safety elements of a vehicle, which decisively reduce the risk of an accident.

The following demands are therefore put to the ABS:

- The directional control of the vehicle must be ensured during the braking process, both with slow increase of the brake pressure up to the locking limit and with sudden brake pressure increase in the event of panic braking.
- As long as the speed of the vehicle lies sufficiently below the curve limit speed, a braking in the curve should be possible without impairing the directional control and maintaining the steerability.

The curve limit speed is the speed with which the vehicle can just get through a curve without drive, without it leaving the road surface under the influence of centrifugal force.

If the brake pedal is actuated too much, this would lead to the blocking of the wheels in a system without ABS, the ABS must change the brake pressure in the wheel brakes in such a way that the wheels do not block, rather meter the brake force in such a way to optimally utilize the adhesion between tyre and road surface.

In this way, in panic brakings, vehicles with ABS have following advantages over vehicles with uncontrolled brake systems:

- Greater directional control
- Better steerability
- Shortest possible braking distance

Mode of operation of the ABS

After switching on the ignition and as soon as a speed of 5 to 7 km/h is attained, the ABS is ready for operation. All braking processes in the locking range are regulated from the control speed of 8 km/h.

Type of control in ABS

With the cross-country vehicle, the Quasi-Select-Low control (QSL) is used. QSL-regulation means both wheels of an axle are regulated in such a way that the available traction between tyre and road surface is optimally utilized, and that the difference in brake force on one axle cannot become too great in the event of extremely slippery conditions on one side. This type of control results in a good braking effect also with one-side slippery road conditions, with simultaneous good steerability and reduces the "tearing" at the steering wheel, otherwise common at front axles.

Terms

Reference speed

It is a reference value for ascertainment of the brake slip. It is permanently available at the electronic control unit and is constantly being recalculated by the electronic control unit from the wheel speed signals of the sensors.

Slip threshold

The wheel slip is the difference between the reference speed and the actual wheel speed. When certain limit values are exceeded (slip thresholds), there is a risk of blocking.

The control cycle using an example

The control cycle is described at one wheel. Depending on the road surface quality, approx. 4 to 10 control cycles run off per second. The control process is the same at the other wheels.

From the wheel speed which is measured by the speed sensor, the electronic control works out the rotational wheel, deceleration and acceleration signals. A reference speed is formed by linking the individual wheel speeds, which represents the approached vehicle speed. Slip signals are derived from the comparison of the wheel speed and the reference speed.

If a wheel is tending to block through too much pressure in the brake cylinder, a condition recognized from the wheel speed development (wheel slip), the pressure is then held constant, i.e. a further pressure increase is not possible.

If there is still a tendency to blocking, as the constant pressure is still too high, the pressure is lowered by opening the discharge valve in the solenoid valve. At the same time the brake fluid in the reservoir is pumped back by the return pump into the master brake cylinder. If the pressure is so low that the wheel wants to accelerate again, no further pressure reduction takes place, rather the pressure is again held constant.

If the reacceleration of the wheel exceeds a threshold valve, the pressure is intermittently increased again by opening the intake valve in the solenoid valve. At the same time the pressure does not exceed the pressure in the master brake cylinder produced by the application of foot pressure.

Through corresponding signals of the electronic control unit in the hydraulic unit, the three control phases

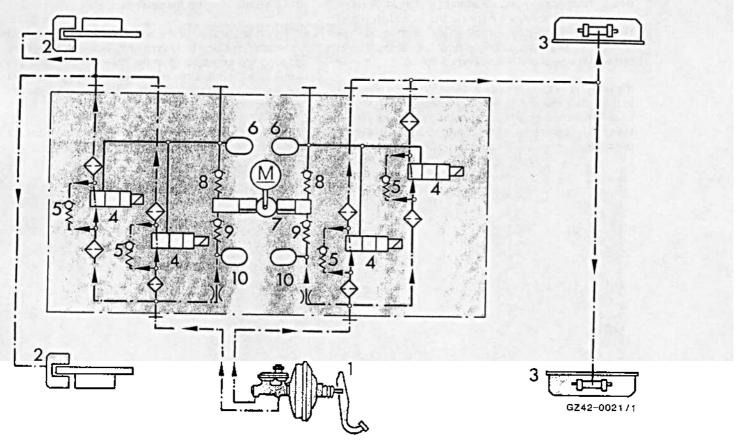
- pressure build-up
- pressure holding and
- pressure reduction

can be actuated.

Control phases

Pressure build-up phase

In the pressure build-up phase, the pressure modulated by the master brake cylinder is conducted via the opened solenoid valves to the wheel brakes.



Hydraulic unit (diagram, pressure buildup)

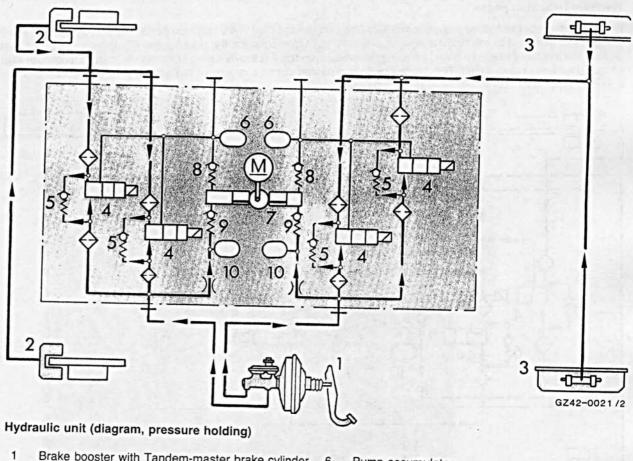
- 1 Brake booster with Tandem-master brake cylinder
- 2 Front wheel brake
- 3 Rear wheel brake
- 4 Solenoid valve
- 5 Non-return valve

- Pump accumulator
- Return pump
- 8 Pump intake valve
 - Pump outlet valve
- 10 Noise damper

9

Pressure holding phase

In the pressure holding phase, the brake pressure from the hydraulic unit to the wheel brakes is held constant due to the fact that the outlets and inlets in the solenoid valves are closed.

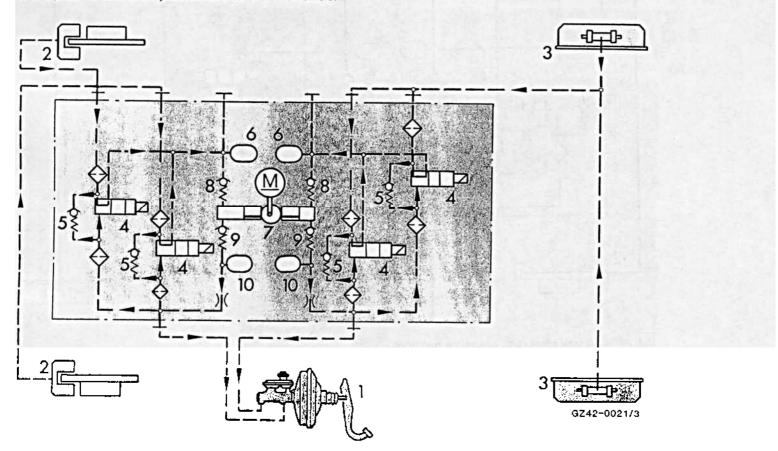


- Brake booster with Tandem-master brake cylinder
- Front wheel brake 2
- 3 Rear wheel brake
- 4 Solenoid valve
- 5 Non-return valve

- Pump accumulator
- Return pump
- Pump intake valve 8
- 9 Pump outlet valve
- 10 Noise damper

Pressure reduction phase

During the pressure reduction phase, brake fluid flows via the solenoid valves and the accumulators (6) into the return pump (7). In order not to exhaust the volume of the master brake cylinder, the return pump (7) delivers the brake fluid against the available pressure back to the master brake cylinder. For the damping of the noise, there is a damper (10) provided for each brake circuit. This control cycle is repeated during a regulated braking, up until the releasing of the brake pedal or until shortly before standstill of the vehicle.



Hydraulic unit (diagram, pressure reduction)

- 8 Brake booster with Tandem-master brake cylinder
- 2 Front wheel brake
- 3 Rear wheel brake
- 4 Solenoid valve
- 5 Non-return valve

- Pump accumulator
- 7 Return pump
- 8 Pump intake valve
- 9 Pump outlet valve
- 10 Noise damper

Design and function

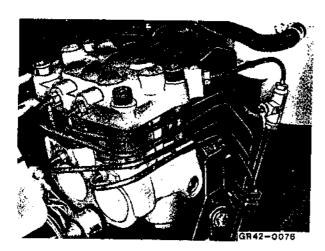
The anti-lock braking system comprises the known conventional brake system and following additional parts:

- Hydraulic unit (ABS)
- Tachometer
- Electronic control unit
- Set of lines with relay and overvoltage suppressor

Hydraulic unit

Independent of the pressure in the master brake cylinder, the hydraulic unit can change the pressure to the brake cylinders during the control. A pressure increase towards the pressure admitted by the master brake cylinder is however not possible.

The hydraulic unit consists of four quick-acting solenoid valves. With these valves each one is respectively assigned to the left or right front wheel brake as well as the left or right rear wheel brake.



By actuating the valves with different current intensities, the brake fluid pressure to the individual brake cylinders is

a) let through

The electromagnetic control valve is de-energized, the pressure flow is not hindered

b) held

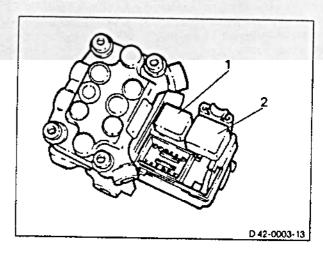
The electromagnetic control valve is actuated in such a way that a further pressure increase is prevented.

c) reduced

The electromagnetic control valve is actuated in such a way that the pressure in the brake cylinder is lowered. At the same time a hydraulic pump (integrated in the hydraulic unit) starts and pumps the fluid back into the pressure line between master brake cylinder and electromagnetic control valve.

On the connector socket of the hydraulic unit is the relay for the solenoid valves and the relay for the return pump. In the valve relay there is additionally a blocking diode installed.

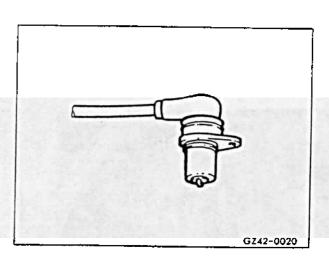
The hydraulic unit is connected to the vehicle ground via a ground strap.



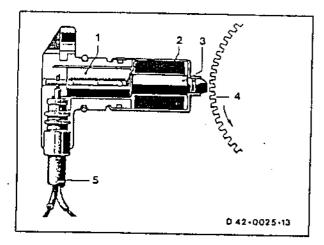
- 1) Valve relay
- 2) Motor relay

Speed sensor

For measurement of the wheel speeds, rod-shaped speed sensors or pulse generators are used. In the four-channel system installed in our vehicles, the wheel speed of each wheel is measured separately.



The speed sensors comprise a magnetic core and a coil. If the rotor standing at a certain distance from the speed sensor rotates, then the magnetic field changes which results in an alternating voltage being induced in the coil. This alternating voltage alters its frequency corresponding to the wheel speed, i.e. the frequency is proportional to the wheel speed.



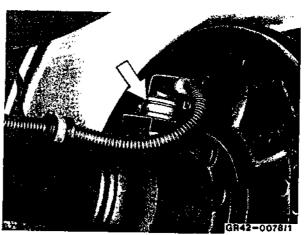
Speed sensor (sectional view)

- 1 Permanent magnet
- 2 Coil
- 3 Pole pin
- 4 Gear (rotor)
- 5 Connection cable

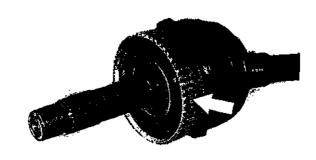
The speed sensors for the front axle are installed in the joint housing.



The speed sensors for the rear axle are installed in the axle tube.

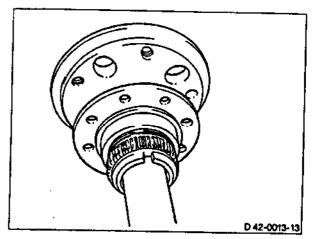


The speed sensors scan the wheel speeds via the rotor gearing.



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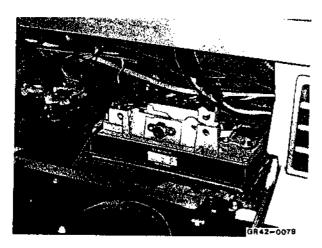
Rotor gearing, front axle



Rotor gearing, rear axle (slotted nut)

Electronic control unit

The electronic control unit is in p.c. board design. The p.c. boards have printed circuits on both sides and are equipped single-sided with components such as resistors, diodes, transistors and integrated circuits.



The control unit processes the signals of the speed sensors and drives the valves in the hydraulic unit. The entire signal conditioning and signal processing is digital.

The electronic control unit can be functionally divided into:

- signal conditioning section
- logic section and
- safety circuit

Signal conditioning section

In the signal conditioning section, the signals supplied by the speed sensors are transformed into a form compatible for the logic section.

In order to prevent disturbances in the wheel speed measurement which may occur through production tolerances and movements in the steering knuckle, the input signals are filtered before their processing. Deceleration and acceleration signals are obtained from the wheel speed signals, which are processed in the logic section.

Logic section

Following input signals are available for the logic section of the electronic control unit for each regulated wheel:

- Wheel slip.
- Wheel speed acceleration
- Wheel deceleration

The output signals of the logic section control the solenoid valves of the hydraulic unit. At the same time, in the brake calipers or brake cylinders of the wheel brakes, the following hydraulic functions can be carried out:

- Pressure build-up
- Pressure holding
- Pressure reduction

Safety circuit

The safety circuit has the task of recognizing faulty signals in the electronic control unit and faults outside of the electronic control unit in the electrical installation. It also intervenes in the control during extreme driving conditions, e.g. aquaplaning. In the event of fault detection the system is disconnected, this being indicated to the driver by the lighting up of the indicator lamp.

The safety circuit furthermore permanently monitors the battery voltage. If the specified voltage (10,5 V) is fallen short of, the system is also disconnected until the voltage again lies in the specified range.

In addition to the monitoring function the safety circuit has an active section, the test cycle.

The test cycle process begins when, after moving off, the wheel speed is greater than 5 to 7 km/h in all four speed channels. The speed sensor voltage is used for the activation of this process and is thus automatically checked in this way. The test cycle itself checks parts of the monitoring circuit as well as the logic section. For this purpose certain test sample signals are supplied to the electronic control unit and these are checked as to whether the correct output signals are available.

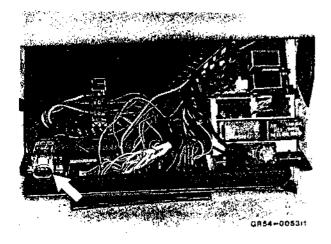
Set of lines with relay, overvoltage suppressor

For the ABS there is a additional set of lines.

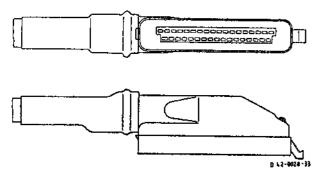
To ensure the function of the ABS under all operating conditions, the voltage supply is operated via the relay, overvoltage suppressor which is driven from terminal 15 (ignition lock).

Mode of functioning of the overvoltage suppressor

The overvoltage protection is effected by means of a Z-diode with a Zener voltage of 22 Volt. If this voltage is attained the Z-diode is conductive in reverse direction and in this way prevents an inductive voltage build-up over 22 volt.



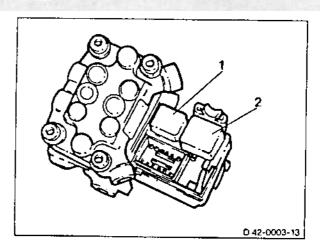
The electronic control unit is connected to the set of lines over a 35 pole plug-and-socket connection.



The set of lines with 12 pole plug connector leads to the hydraulic unit.

Under the protective cover of the hydraulic unit are two relays.

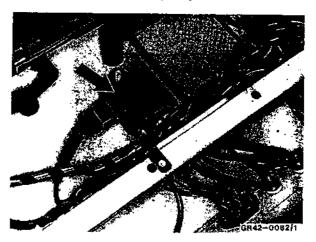
The motor relay (2) drives the return flow pump and over the valve relay (1) the current flows to the solenoid valves.



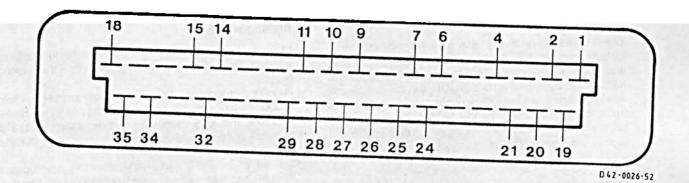
(AX) switch

The task of the AX switch is, dependent on the vehicle deceleration (greater or smaller than 0,45 g')), to influence the function of the ABS in such a way that the friction conditions between tyre and road surface are considered.

1) g = acceleration due to gravity



Assignment plan for connection strip on ABS control unit



- Plus from protection relay
 Actuation for valve, front left
- 4 Ground for sensor, front left6 Plus for sensor, front left
- Plus for sensor, front leftPlus for sensor, rear left
- 9 Ground for sensor, rear left
- 10 Ground for control unit
- 11 Plus for sensor, front right
- 14 Monitor, return pump
- 15 D +/terminal 61

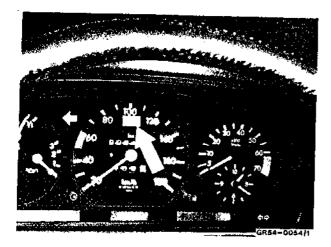
2

- 18 Actuation for valve, rear left
- 19 Actuation for valve, rear right

- 20 Ground for valve
- 21 Ground for sensor, front right
- 24 Surplus for sensor, rear right
- 25 Stop light switch
- 26 Ground for sensor, rear right
- 27 Actuation for valve relay
- 28 Actuation for motor relay
- 29 ABS indicator lamp
- 32 Plus to valve relay, terminal 30
- 34 Ground for valve
- 35 Actuation for valve, front right

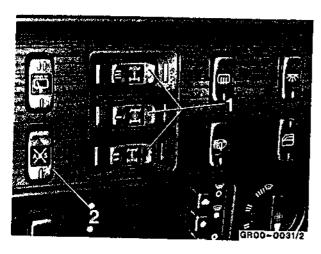
Driving with ABS

When switching on the ignition a yellow indicator lamp with the symbol ABS lights up in the instrument panel and goes out after the engine starts. If this does not happen there could be an undervoltage in the vehicle onboard electrical system or the power supply to the electronic control unit could be interrupted. After driving at approx. 5 km/h a self check is carried out by the ABS. If a fault is determined the indicator lamp lights up again.



Once a speed of approx. 8 km/h is exceeded for the first time, the ABS can carry out controlled braking.

If a lock (1) is activated, the ABS switches itself off. Independent of this feature, the ABS can basically be disconnected with the switch (2).



This switching allows for the special conditions in difficult off-road conditions. An uncontrolled panic braking with blocked wheels leads to a shorter braking distance on a loose surface as the wheels can dig themselves into the ground, build up a wedge in front of themselves.

Braking with ABS

In normal braking processes where there is no tendency to block, the ABS has no influence at all on the braking process.

In braking processes where one or several wheels would block, based on the road condition or the brake pressure, the ABS intervenes and regulates the brake pressure of the wheels concerned in such a way that the wheels do not block.

The driver senses the intervention of the ABS control through an slight pulsing movement of the brake pedal.

Emergency stops

In emergency stops it is recommendable to fully depress the brake pedal and to leave the brake force control to the ABS. It is substantially safer, more accurate and faster than the driver.

Note: Brakes pulling to one side

the brakes may pull to one side if:

- the brakes are unilaterally oil-soiled, worn or stiff
- the road surface is slippery just on one side.

The ABS cannot prevent this condition. As the vehicle remains easy to steer, a critical situation can very often be prevented.

Caution!

If the indicator lamp in the instrument cluster lights up, the ABS is disconnected and only uncontrolled braking of the vehicle is possible. The conventional brake system remains operable. The vehicle must be checked and must be reconditioned as soon as possible.

Important notes for repair work

Welding work

In welding work with an electro-welding set, the ground cable of the battery must be disconnected.

Painting

During painting jobs, the electronic control unit may be briefly subjected to max. 95°C and for a longer length of time (approx. 2 h.) to max. 85°C.

Jobs on the brake system

When carrying out jobs on the hydraulic brake system always ensure that the ignition cannot be switched on throughout the entire job. Once air enters the hydraulic unit it is very difficult to get rid of it and this may not even be possible at all. The hydraulic unit then has to be renewed. Furthermore, always pay attention to correct allocation of the lines.

Functional test

After all jobs on the brake system concerning parts which are not direct parts of the ABS, a simple functional check is sufficient. That is, with the engine running and intact ABS, the indicator lamp must switch off and must not light up after exceeding the speed of approx. 5 km/h.

These jobs include for example exchanging or renewing brake cylinders, brake linings, brake hoses, brake discs, brake servo unit, master brake cylinder, brake cables and parts of the parking brake as well as the brake lines.

If jobs are being carried out on the hydraulic unit, electronic control unit, speed sensors, set of lines or components of the ABS are exchanged, e.g. in the case of accident repairs, then the entire ABS must be checked.

Handling of the ABS parts in vehicles involved in accidents

Parts with no visible damage do not have to be renewed. The exchange of the hydraulic unit is e.g. only necessary if the cover of the solenoid valves is damaged or if electrical lines are damaged.

References to faults

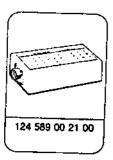
Following starting help through an external battery or starting aid, the fuse in the overvoltage suppressor may be defective. Also possible when charging the battery in the vehicle.

Too much wheel bearing play - through wobbling, the measurement of the wheel tachometer may be influenced.

Mounting unequal tyre sizes can lead to faults. Additionally the interaxle differential in the transfer case is overloaded. Therefore always mount tyres of one size.

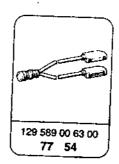
Functional test with adapter

Special tools ${\cal Z}$









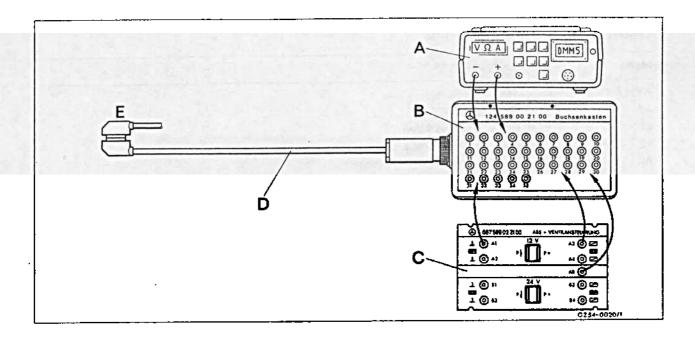
Commercially available tool

Multimeter

e.g. Sun Type DDM 5

> Thorn Emi Type Avometer 2003

Connection diagram



- A Multimeter
- B Socket box 124 589 00 21 00
- C ABS test adapter 667 589 02 21 00
- D Connection cable 129 589 00 63 00

E Cable harness, vehicle

Connecting testers

- 1 With switched off ignition, disconnect multiple connector on electronic control unit.
- 2 Connect multiple connector of vehicle cable harness to connection cable (129 589 00 63 00) at socket box (124 589 00 21 00).
- 3 Connect digital multimeter and ABS test adapter according to the respective test steps.

Note:

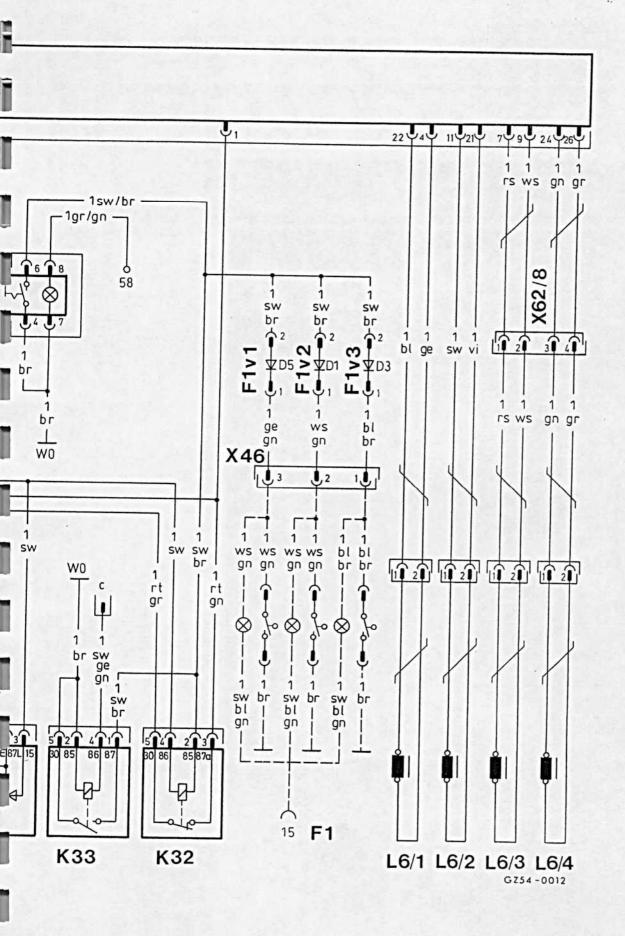
The vehicle must not be driven with connected adapter.

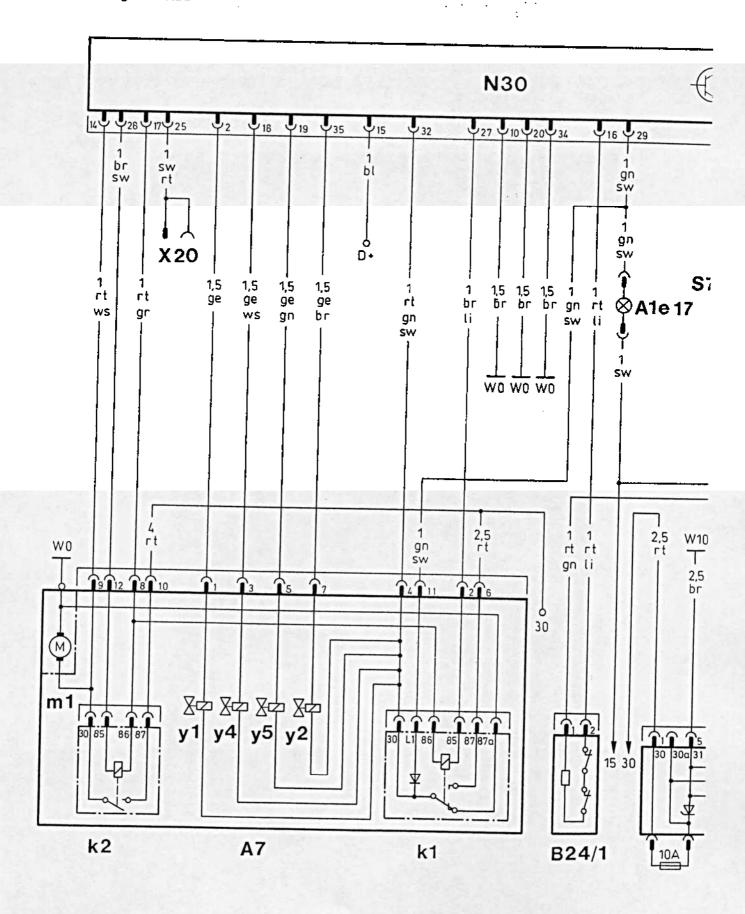
During the test all remaining consumers must be switched off.

With this test method the entire ABS system can be checked with exception of the electronic control unit.

Legend to current flow diagram - AB\$

Mark	Designation
A1e17	Test, ABS
A7	Hydraulic unit, ABS
k1	Relay, solenoid valve
k2	Relay, return pump, charging pump
m†	Return pump, charging pump
y1	Solenoid valve, front axle, left
y2	Solenoid valve, front axle, right
y 4	Solenoid valve, rear axie, left
у5	Solenoid valve, rear axle, right
B24/1	Acceleration sensor, ABS (AX switch)
F1	Fuse and relay box (central electric unit)
F1v1	Plug-in diode 1
F1v2	Plug-in diode 2
F1v3	Plug-in diode 3
K1/1	Relay, overvoltage suppressor, 87E/7-pole.
K32	Relay, disconnection, ABS 1
K33	Relay, disconnection, ABS 2
L6/1	Speed sensor, front axle, left
L6/2	Speed sensor, front axle, right
L6/3	Speed sensor, rear axle, left
L6/4	Speed sensor, rear axle, right
N30	Control unit, ABS
S76/1	Switch ABS on/off
X20	Adapter, stop light switch, 2-pole.
K46	Connector, ABS indicator lamp, 3-pole.
K62/8	Connector, rear axle, distributor
1	CIS-E 3 control unit, terminal 1 (gasoline)
	ELR control unit, terminal 15 (diesel)
	Connector, feed-in, switch, interaxle differential





Test procedure

Connection diagram

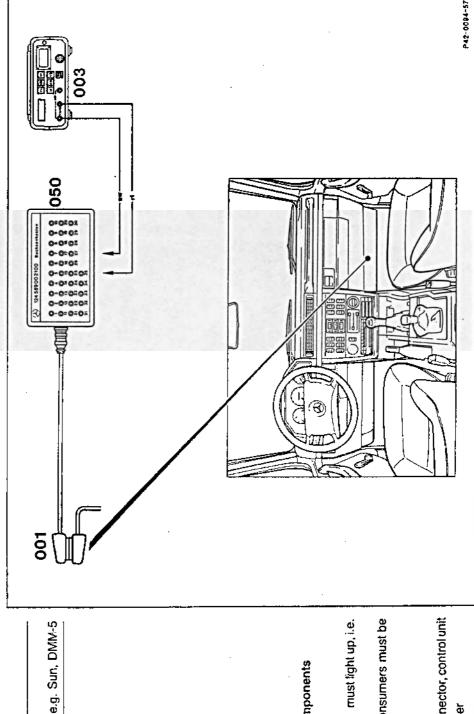
With switched off ignition remove plug connector from electronic control unit ABS (N30) and connect to socket box (050). Connect multimeter (003) to the respective test connection of the socket box.

Note: The vehicle must no be driven with connected socket box.

Commercially available tools

Multimeter

Special tools



Socket box for connecting electrical components

Precondition for test

- must light up, i.e. In all test steps with "ignition on" LED battery voltage satisfactory.
- In all test steps the remaining power consumers must be switched off.

001 Plug connector, control unit 003 Multimeter

050 Socket box

		 -		-				
Test step	Scope of test	Меа	Measuring instru- menVtest connection		Actuation/precondition	Rated value	Possible cause/remedy	
1.0	Relay, overvoltage sup- pressor (K1/1)	5	→	-	Ignition: OFF	< 0,1 V	Relay, overvoltage suppressor	renew
-	Relay, overvoltage suppressor (K1/1)	5		-	Ignition: ON	11 to 14 V	Charging state of battery Fuse, relay, overvoltage suppressor Relay, overvoltage suppressor Connection lines Plug-and-socket connection	not satisfactory renew renew interrupted bad contact
						Indicator lamp ABS: ON	Relay, solenoid valve Indicator lamp, ABS	renew
2.0	Relay, solenoid valve (K1)	10	<u>+</u> ·®+ 32		Ignition: OFF	< 1 Ω	Relay, solenoid valve	renew
2.1	Switch ABS (S76/1) ABS disconnection relay 1 (K32)	10	•	₽. Q. Q.	Ignition: ON Switch, ABS, actuated Switch, ABS, not actuated	< 0,1 V Indicator lamp ABS: ON 11 to 14V	Off switch, ABS ABS disconnection relay 1 Connection lines	renew renew interrupted
2.2	ABS disconnection relay 2 (K33)	10		1 Ac	Ignition: ON Actuate switch, interaxle diffe- rential	< 0,1 V Function signal lamp illuminated	ABS disconnection relay 2 Connection lines	renew
23	Acceleration transmitter (B24/1)	92	@	- Ig	Ignition: OFF	520 to 600Ω	Acceleration transmitter Connection lines	renew
е	Three-phase alternator Terminal 61(D+)	8	± ® ÷ 15		Let engine run briefly: (max. 5 scnd.) Battery charge indicator lamp: off	11 to 14 V	Cable connection Connection lines Three-phase alternator defective	bad contact interrupted

Test step	Scape of test	Measuring instru- ment/test connection	Actuation/precondition	Specified value	Possible cause/remedy	
. 4	Stop light switch (Connection X20)	20(1) 25	Ignition: ON Brake pedal: actuated	11 to 14 V	Connection lines Plug-and-socket connection Stop light switch	interrupted bad conlact renew
S	Relay, solenoid valve (K1)	20	2 Ignition: ON	11 to 14 V	Cable connector Connection lines Relay, solenoid valve	bad contact interrupted
		<i>12</i> 1 1 02		Indicator lamp ABS: OFF		
9	Diode in relay, solenoid valve (K1)	20 🛨 🕚 🛨 29	gnition: ON	0,4 to 1,5V	Relay, solenoid valve	гепем
2	Internal resistance, speed sensor, front axle, left (L6/ 1)	4 @ *- 22	2 Ignition: OFF	0,45 to 1,2 kΩ	Plug-and-socket connection Connection lines Speed sensor	bad contact interrupted renew

		-						
est step	Scope of test	Mea	Measuring instru- ment/test connection	5	Actuation/prerequisite	Specified value	Possible cause/remedy	
80	Insulation resistance, speed sensor, front axle, left (L6/1)	34	•	83	Ignition: OFF	> 20 KΩ	Plug-and-socket connection Speed sensor	bad contact renew
o	Internal resistance, speed sensor, front axle, right (L6/2)	21	÷.	-	lgnition: OFF	0,45 to 1,2 kΩ	Plug-and-socket connection Connection lines Speed sensor	bad contact interrupted renew
10	Insulation resistance, speed sensor front axle, right (L6/2)	34		=	Ignition: OFF	> 20 kΩ	Plug-and-socket connection Speed sensor	bad contact renew
	Internal resistance, speed sensor, rear axle, left (L6/3)	5	÷(©)	-	Ignition: OFF	0,65 to 1,8 kΩ	Plug-and-socket connection Connection lines Speed sensor	bad contact interrupted renew
12	Insulation resistance, speed sensor, rear axle, left (L6/3)	34	+ (0)		ignition: OFF	> 20 kΩ	Plug-and-socket connection Speed sensor	bad contact renew
				4				

				ļ			6 B	
Test step	Scope of test	Mea	Measuring instru- ment/test connection	noi	Actuation/prerequisite	Specified value	Possible cause/remedy	
13	Internal resistance, speed sensor, rear axle, right (L6/4)	26	→ .®.→	24	Ignition: OFF	0,65 to 1,8 kΩ	Plug-and-socket connection Connection lines Speed sensor	bad contact interrupted renew
4	Insulation resistance, speed sensor, rear axle, right (L6/4)	34		24	Ignition: OFF	> 20 kD	Plug-and-socket connection Speed sensor	bad contact renew
to	Internal resistance, sol- enoid valve, front axle, left (Y1)	2	÷(®)-	32	Ignition: OFF	0,7 to 2,2 Ω	Plug-and-socket connection up Hydraulic unit Connection lines Hydraulic unit	bad contact interrupted renew
16	Internal resistance, solenoid valve, front axle, right (Y2)	35	•-@ <u>-</u>	32	Ignition: OFF	0,7 to 2,2 Ω	Plug-and-socket connection open Hydraulic unit Connection lines Hydraulic unit	bad contact interrupted renew
17	Internal resistance, solenoid valve, rear axle, right (Y5)	19	- .®-	32	lgnition: OFF	0,7 to 2,2 Ω	Plug-and-socket connection open Hydraulic unit Connection lines Hydraulic unit	bad contact interrupted renew
0	Internal resistance, sol- enoid valve, rear axle, left (Y4)	82	→ (®)-	32	lgnition: OFF	0,7 to 2,2 fl	Plug-and-socket connection open Hydraulic unit Connection lines Hydraulic unit	bad contact interrupted renew
					,			

	e/remedy	clearance too great et connection bad contact es interrupted or transposed renew	bad o trans trans	bad contact livery pump renew renew	clearance too great toonnection bad contact interrupted or transposed
	Possible cause/remedy	Wheel bearing Plug-and-socket connection Connection lines Speed sensor	Mass Brake lines at hydraulic unit Connection lines Hydraulic unit	Ground Relay, return delivery pump Hydraulic unit	Wheel bearing Plug-and-socket connection Connection lines
	Specified value	V 0,1 V ~	Wheel must be able to be turned	Wheel must be able to be turned	vi √ V 1,0 Vi
Actuation/oracamicity	recease the equipment	Ignition: OFF Wheel, front, left: Turn wheel (approx. 1/s)	Ignition: ON Wheel, front, left: Turn wheel (approx. 1/s) Switch: P= press Brake pedal: actuate	lgnition: ON Brake pedal: actuate Switch: P ↓ press Wheel, front, left: Turn wheel (approx. 1/s)	Ignition: OFF Wheel, front, right: Turn wheel (approx. 1/s)
Measuring instru-	ment/test connection	4 (8) 22	34	34 () 27 17 () 1 20 () 20 () 28	11 11
Test step Scope of test		Voltage, speed sensor Front axle, left (L6/1)	Solenoid valve front axle, left pressure holding (Y1)	Solenoid valve, front axle, left, pressure reduction (Y1)	Voltage, speed sensor Front axle, right (L6/2)
Test step		6	50	24	8

	bad contact transposed transposed renew	bad contact renew renew	bad contact interrupted renew	bad contact transposed transposed renew	
Possible cause/remedy	Ground Brake lines to hydraulic unit Connection lines Hydraulic unit	Ground Relay, return delivery pump Hydraulic unit	Plug-and-socket connection Connection lines Speed sensor	Ground Brake lines to hydraulic unit Connection lines Hydraulic unit	
Specified value	Wheel must be able to be turned	Wheel must be able to be turned	> 0,1 V ~	Wheel must be able to be turned	
Actuation/prerequisite	lgnition: ON Wheel, front, right: Turn wheel (approx. 1/s) Switch: P= press Brake pedal: actuate	lgnition: ON Brake pedal: actuate Switch: P ↓ press Wheel, front, right: Turn wheel (approx. 1/s)	lgnition: OFF Wheel, rear, left: turn wheel (approx. 1/s)	lgnition: ON Wheel, rear, left: turn wheel (approx. 1/s) Switch: P= press Brake pedal: actuate	
Measuring instru- ment/test connection	34 () 27 17 20 19 20	34 () 27 17 () 1 20 () 135 20 () 146 () 1	6 →	34 (27 18 19 10 10 10 10 10 10 10 10 10 10 10 10 10	
Scope of test	Solenoid valve, front axle, right, pressure holding (Y2)	Solenoid valve, front axle, right, pressure reduction (Y2)	Voltage, Speed sensor Rear axle, left (L6/3)	Solenoid valve, rear axle, left pressure holding (Y4)	
Test step	23	24	25	26	

	bad contact renew renew	bad contact interrupted renew	bad contact transposed transposed renew	bad contact renew renew
Possible cause/remedy	Ground Relay, return d elivery pum p Hydraulic unit	Plug-and-socket connection Connection lines Speed sensor	Ground Brake lines to hydraulicunit Connection lines Hydraulicunit	Ground Relay, return d elivery pump Hydraulic unit
Specified value	Wheel must be able to be turned	≥ 0,1 V ~	Wheel must be able to be turned	Wheel must be able to be turned
Actuation/prerequisite	lgnition: ON Switch: P ↓ press Brake pedal: actuate Wheel, rear, left: turn wheel (approx. 1/s)	Ignition: OFF Wheel, rear, right: Turn wheel (approx. 1/s)	Ignition: ON Switch: P= press Brake pedal: actuate Wheel, rear, right: turn wheel (approx. 1/s)	lgnition: ON Brake pedal: actuate Switch: P ↓ press Wheel, rear, right: turn wheel (approx. 1/s)
Measuring instru- ment/test connection	34 () 17 () 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	26 - ®- 24	34	34
Test step Scope of test	Solenoid valve, rear axle, left, pressure reduction (Y4)	Voltage, speed sensor Rear axle, right (L6/4)	Solenoid valve, rear axle, right, pressure holding (Y5)	Solenoid valve, rear axle, right, pressure reduction (Y5)
Test step	27	58	53	30

Actuation/prerequisite Specified value
lgnition: ON + engine ON Interaxle differential
Ignition: ON + engine ON Differential lock, rear axle If necessary turn wheels
Ignition: ON + engine ON Differential lock, front axle SA If necessary turn wheels
Ignition: OFF Separate plug-and-socket connection Actuate off-switch ABS
lgnition: OFF Separate plug-and-socket connection Actuate off-switch, ABS
lgnition: OFF Separate plug-and-socket connection Actuate off-switch, ABS

Test value

Toci programa hafara ALD		
Test pressure before ALB	l bar	100

Special tools 🕏



Adjusting values for ALB

Rear axle load (kg)	Controlled pressure			
	Wheelbase 2400 mm	Wheelbase 2850 mm		
900	42	40		
1000	47	47		
1100	51	53		
1200	55	58		
1300	60	64		

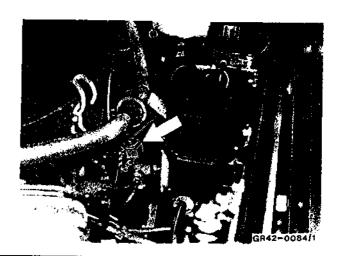
Checking/adjusting

- 1 For checking the load-dependent modulation, determine the rear axle load with the vehicle ready for driving (weigh).
- 2 Connect special tool to the test connections.

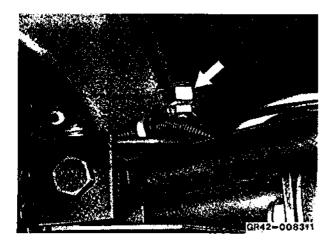


001 589 64 21 00

test connection unmodulated pressure

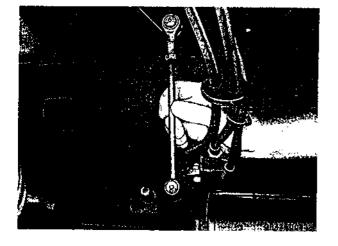






test connection modulated pressure

- 3 Actuate brake pedal until the pressure gauge in the front axle brake circuit indicates 100 bar.
- 4 Compare brake pressure of rear axle with values of table "Adjusting values".



5 If necessary, correct modulated pressure by lengthening or shortening linkage at threaded rod.

Note: Linkage rod shortened: modulated pressure is lowered. Linkage rod lengthened: modulated pressure increased.

6 Detach special tool.



001 589 64 21 00

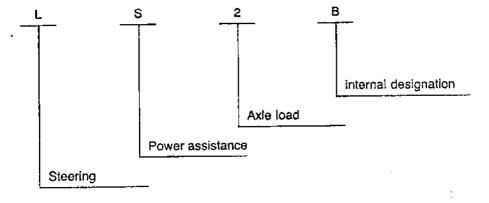
Note: If the adjustment path of the control linkage is not sufficient, this can be enlarged or reduced by adjusting the control spring bearing in the elongated hole of the double lever.

Steering

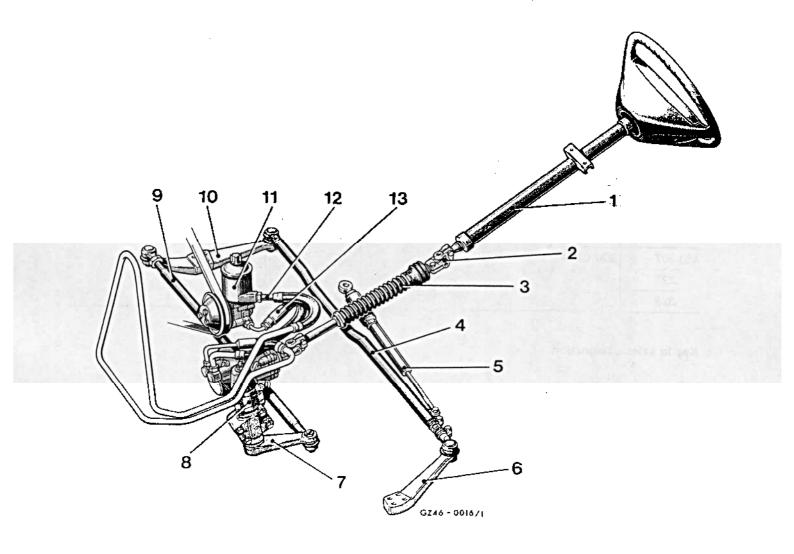
Installation survey

Chassis		Steering				
Model	Sales designation	Model	Sales designation	Manufacturer	Design	Installation
463.200	200 GE 4 x 4	765.503	765.503 LS 2 B Mercedes-Be	Mercedes-Benz	Worm and nut power steering	Standard
.220						
.221			Marie Santia			
463.204	230 GE 4 x 4					
.224			- A S			
.225		_	-			
463.207	300 GE 4 x 4					
.227		1				
.228						
463.304	250 GD 4 x 4		1			1
.324				·		
.325						
463.307	300 GD 4 x 4					
.327						
.328						<u> </u>

Key to sales designation



Overall view



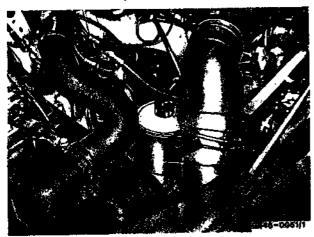
Steering system

- 1 Steering shaft with steering column tube
- 2 Universal joint
- 3 Steering shaft slip joint
- 4 Tie rod
- 5 Steering damper
- 6 Steering arm
- 7 Pitman arm

- 8 Hydro-steering box
- 9 Drag link
- 10 Steering knuckle arm
- 11 Power steering pump
- 12 Return line
- 13 Pressure line

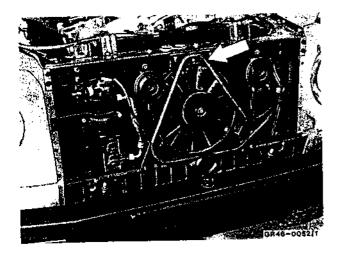
General

The steering pump with steering oil reservoir is arranged on the left, on the engine, as in the car.

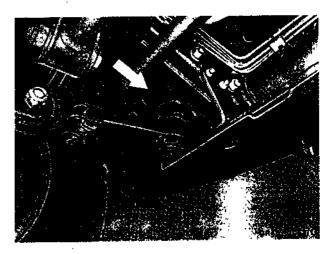


The components and the geometry of the steering remain basically unchanged.

For cooling the steering oil there is a "cooling loop" arranged in front of the radiator.

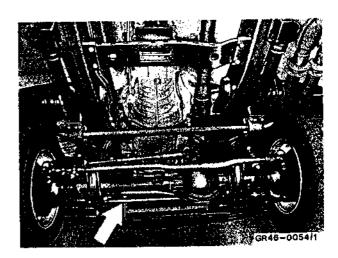


The steering box is moved 10 mm to the outside.



In vehicles with wide tyres, the track width is increased by 50 mm, therefore the steering arm has had to be additionally offset by 17 mm.

This resulted in an extension of the drag link of 18 mm.



Technical data

Manufacturer			Mercedes-Benz
Design		THEFT	Power steering
Sales designation	wild a	militari	LS 2 B
Model	LIZES!	ERFY TEN	765.503
Ratio in steering box	AND BOOK	San History	14,6 : 1
Operating pressure (without pressure limiter)	POLICE	bar	82
Tightening angle pitman shaft		max. °	96
Stroke of power pistons		mm	2 x 23,5
Effective piston area	·	cm²	60,15
Piston dia.		mm	90
Circulating pressure	арргох.	bar	2,5
Limit pressure control	approx.	bar	50 to 30
Power assistance begins	арргох,	bar	3 Nm (manual effort
Operating pressure, pump pressure	max.	bar	82 ± 5
Delivery, pump	••	Vmin.	5 (at 50 bar)
Permissible clearance at circumference of steering wheel center adjustment with engine running	- -	approx. mm	30 to 40
Steering wheel turns from stop to stop		approx.	3,8
Steering angle, depending on tyres	·	max °	35,5

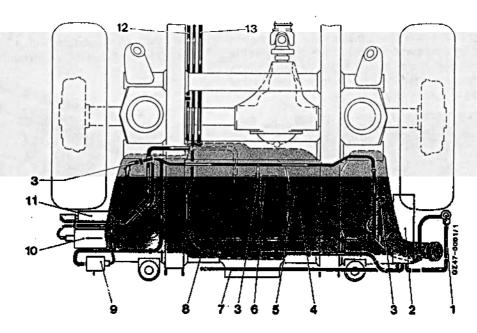
Setting values

Steering limiter	State of the second	S. Astron
- at engine idle speed	1/min	800
- against steering lock	Nm	25 (Test value)
- Torque drop to	Nm	20 (Test value)
- Steering limiter valve	turns	2 to 2,5
- Adjustment range towards each side	max. °	35,5
Total friction torque of steering	Ncm	110 to 160
Wheel alignment	mm	0 to -2

Tightening torques

Designation	Thread	Nm/Tightening angle
Steering to frame	M 12 x 1,5	50 + 120°
Clamping bolt, universal joint	M 8	20
Castle nut, drag link	M 16 x 1,5	120 to 140
Castle nut, tie rod	M 16 x 1,5	120 to 140
Pitman arm to steering	M 27 x 1,5	400
Steering wheel mounting		50

Fuel system



Line diagram - 200 GE, 230 GE, 300 GE

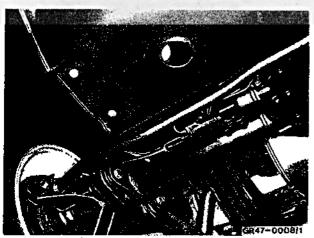
- 1 Combination-valve
- 2 Carbon filter *
- 3 Breather
- 4 Tank
- 5 Supply line

- 6 Fuel pump *
- 7 Breather to outside
- 8 Regenerating line
- 9 Pressure reservoir *
- 10 Filter *

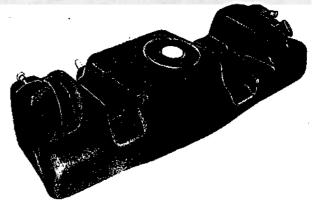
- 11 Fuel pump *
- 12 Supply line
- 13 Return line

General

The fuel tank is designed in plastic and is arranged crosswise between rear axle and rear bumper. It is protected by an underride protection plate.



The tank design is the same for diesel and gasoline models. The volume is approx. 95 litres. Additional tanks are no longer available.

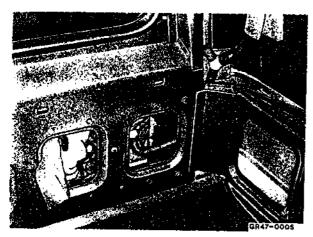


GR47-0004

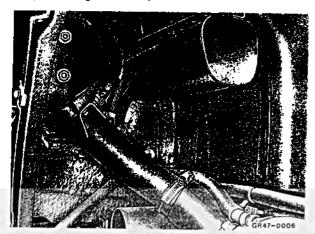
For the gasoline engines (injection), the fuel delivery is with a double pump system.

^{*} omitted with 250 GD and 300 GD

The venting of the tank takes place via a combination valve in the right side wall of the body. Integrated in the combination valve there is also a gravity valve which acts as a protection against fuel running out if the vehicle is turned over.

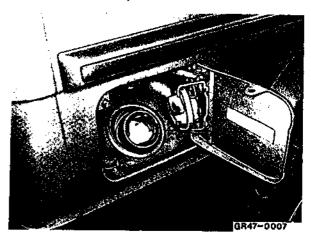


The fuel evaporation control system with carbon filter can be installed in all gasoline engines as a special version SA 12 467 (Code K 71) or corresponding to the respective legislative requirements.



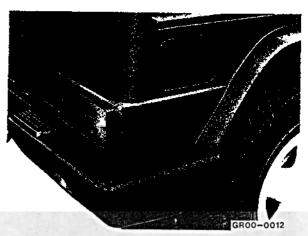
The filler cap is air-tight and is the same version as with the car.

The filler neck is equipped with a "non-leaded" panel in connection with catalytic converters.



As a special version a filter is available for the tank filler neck. SA 28 512 (Code K45)

The tank flap is locked upon actuation of the central locking system (special version).

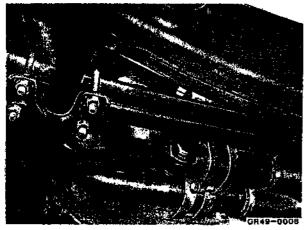


The emergency unlocking is on the door pillar at the rear, on the right.

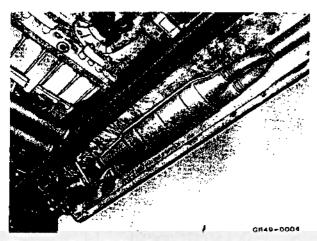
- Remove edge protection and rear wall cover.
- Pull the strap up until the tank flap unlocks.

General

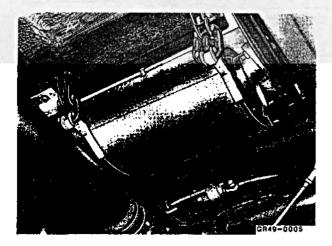
The exhaust pipe routing is conducted in front of the splash wall across and outwards into the wheelhousing, then under the vehicle floor outside of the frame side member, right in the direction of travel to the rear.



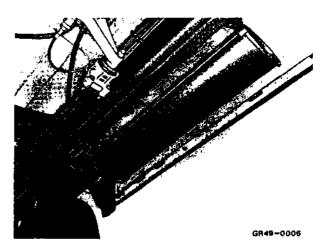
The catalytic converter or pre-muffler is installed in front of the frame tube support with EGR or diesel version.



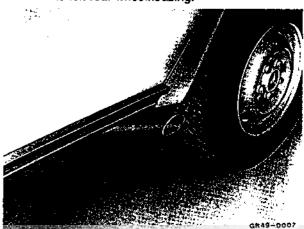
The single flow is further routed in cross direction to the vehicle via the side member to the middle silencer. The pipe is insulated in this area with all types. A heat guard is positioned over the middle silencer.



It continues in single flow via the left side member to the main silencer, on the left, under the vehicle floor, outside of the frame side member. A heat guard is arranged between main silencer and body side member.



The tail pipe is conducted at 40° to the rear and out in front of the left rear wheelhousing.



The entire exhaust system is mounted on the body.

Technical data

Clearance O₂-probe support – Engine 103	mm	13
Clearance, exhaust pipe-middle silencer	mm	18

Test

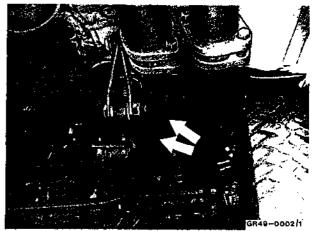
Engine M 103

O₂-probe support to frame side member
 Clearance: 13 mm



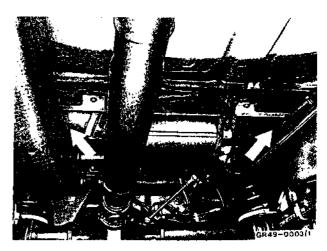
All vehicles

- Between stabilizer, front and exhaust pipe.



 Between frame side member, rear and exhaust pipe, on middle silencer.

Clearance: 18 mm



Electrical system – Engine Installation survey Alternator/starter

Vehicle Model	Engine Type	Model	Alternator Installation	Туре	Starter Installation	Туре	
463.200 .220 .221	M 102	102.965	Standard SA 12328/51	K1 – 14 V 23/55 A N1 – 14 V 36/80 A	Standard	GF→12V1,5kW	
463.204 .224 .225	M 102	102.989					
463.207 .227 .228	M 103	103.987	Standard	N1 – 14 V 36/80 A		Top (Kamera)	
463.304 .324 .325	OM 602	602.931	Standard SA 12328/46	K1 – 14 V 23/55 A N1 – 14 V 36/80 A	Standard	EV→12V2,2kW	
463.307 .327 .328	OM 603	603.931					

Technical data

Alternator (G2)

Electrical system			12 \	/olte
Manufacturer Type		12 Volts Bosch K1 – 14 V 23/55 A N1 – 14 V 36/80 A		
				Design
Output W		770	1120	
Rated voltage V		V		
Amperage with	Alternator speed 1500 min ⁻¹	Α	23	36
Alternator speed 6000 min ⁻¹		A	55	80
Alternator speed i	max. 1/mir	7-1	15000	17500

Starter (M1)

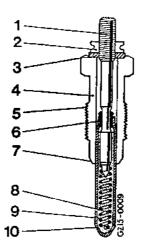
Engine type		102/103	602/603	
Electrical system	THE PART AND IN	12 Volts		
Manufacturer		Bosch		
Туре		GF → 12 V 1,5 kW	EV → 12 V 2,2 kW	
Design		Pre-engaged drive		
Output	kW	1,5	2,2	
Rated voltage	V		2,2	
Normal direction		right		
Number of teeth on pinion		9	10	
Power consumption KI. 50	A	51/5		
Protection type (installed)		IP 56		

Engine 602/603 - Pre-glowing system

Pencil-type glow plug (R9)

Manufacturer			Beru/Bosch	
Type			0100 221 162 / 0250 201 026	
Design			Pencil-type glow plug	
Connection type			1-polig	
Electrical system V		V	12	
Rated voltage V		V	11,5	
Rated current	Starting current	Α	< 30	
	after 20 scnd.	Α	approx. 10,5	
Screw-in thread			M 12 x 1,25	
Number			5 (6)	
Identification			transparent with annular groove around hexagon head	

Sectional view



Pencii-type glow plug

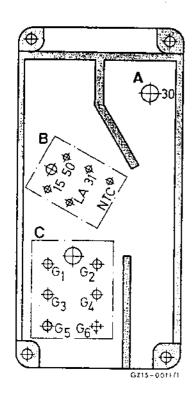
- 1 Terminal pin
- 2 Round nut
- 3 Insulating washer
- 4 Plug body
- 5 Screw-in thread

- 6 Sealing
- 7 Conical seat
- 8 Glow plug heating wire
- 9 Insulating powder
- 10 Glow tube

Preheating time relay (N14)

Manufacturer		Mercedes-Benz		
Part no. (5-Cylinder) ¹)		008 545 01 32		
Part no. (6-Cylinder) ²)		009 54	45 93 32	
Rated voltage V			12	
Preheating current (5-Cylinder) ')	A	after 15 to 20 scnd. 80	Starting peak current ≦ 140	
Preheating current (6-Cylinder) 2)	A	after 15 to 20 scnd. 95	Starting peak current ≦ 160	
Preheating time at +20°C approx. sec.			5	
Safety cut-out		Preheating time +25 +10 sec.		
Fuse (5-Cylinder) 1)		Electronic short-circuit protection 170 ± 17%		
Fuse (6-Cylinder) ²) A		Electronic short-circuit protection 195 ± 17%		

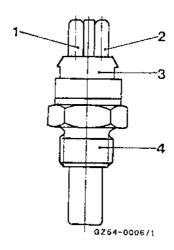
¹⁾ Engine 602 2) Engine 603



- A Mains supply (30)
- B Connector, control
- C Connector, glow plugs

Double temperature sensor (811/7)

Resistor			N	C
Resistance value at	- 20°C	Ω	25053	± 3170
(NTC 2)	0°C	Ω	8230 :	± 658
	+ 25°C	Ω	2442 :	± 170
	+ 80°C	Ω	291 :	± 16
Resistance value at (NTC 1)	+ 40°C	Ω	287	± 35
	+ 60°C	Ω	134	13,5
	+ 100°C	Ω	38,5 :	3
	+ 128°C	Ω	18,4 :	2,2
Screw-in thread			M 14	x 1,5
Tightening torque		Nm	30	



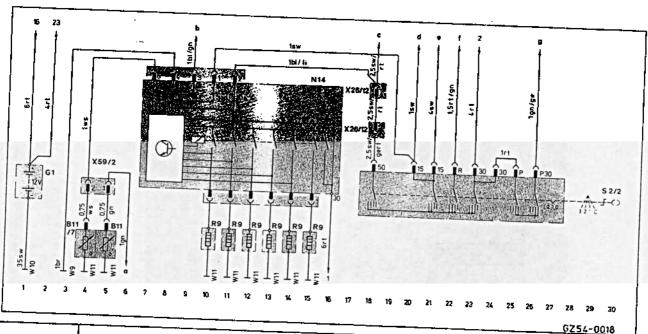
- 1 NTC 1 2 NTC 2 3 Clip connection 4 Screw-in thread

Pre-glowing system with temperature-dependent after-heating time and safety cut-out, 12 volts

General

With the diesel engine the combustion is effected by selfignition of the fuel injected into the highly compressed and thus highly heated combustion air.

When the engine is cold the self-ignition temperature is not attained by compression alone. A preheating system is therefore required with the task of increasing the temperature of the compressed air and, through ignition of fuel particles at the glow plugs, thus enabling the starting of the cold engine.



Identification	Designation	Place of installation	Current path
11/7 1 14 9 9/2 6/12	Instrument cluster (Temp.ind. A1p1) Instrument cluster (Preheating check A1e16) Cable connection, front wall (X5/5 Kl. 2 (50)) Instrument cluster (charging check A1e5) Fuse F9, input (15) Fuse F15, input (15) Headlight rotary switch S1 (P30) Temperature transmitter (preheating) Battery Preheating relay Glow plugs Glow plug and starter switch Connector transmission, 6-pole. Connector, temperature sensor, coolant	Engine Engine compartment Engine compartment Engine compartment Drive switch	6 9 18 20 21 22 26 4.5 1 15 10 - 15 30 18

Function

The starting procedure takes place in several stages:

Preheating

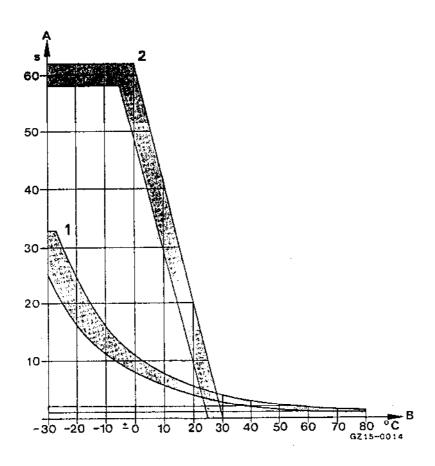
The preheating is carried out automatically by switching on the drive switch and, depending on the coolant temperature, takes 1 to 33 seconds. When the glow plug indicator light goes out the engine is ready to start and should be started immediately, at the latest however after 25 seconds.

Starting

At the end of the preheating time the glow plugs remain switched on up to the end of the starting procedure. If the starting procedure is not initiated within 25 seconds after the glow plug indicator light goes out, the safety cut-out switches off the entire preheating system.

After-heating time

At coolant temperatures of < 25°C an after-heating takes place after the engine has started. The after-heating time depends on the temperature and improves the warming up properties of the engine.



Heating curve

- A Heating time
- B Coolant temperature

- Preheating curve
- 2 After-heating curve

Safety cut-out time:

Preheating time +25s +10s - 5s

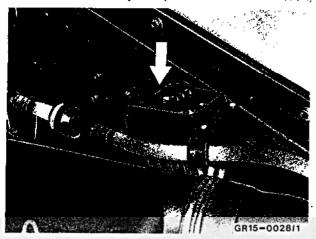
Preheating time relay

The preheating time relay is equipped with an electronic unit for the temperature dependent control of the glow plugs, a monitoring electronics and a power relay and controls the following functions:

- Operating the preheating current
- Startability indicator
- Safety cut-out
- Fault indication

The preheating time relay ensures that:

- preheating time and the after-heating time are as short as possible
- the preheating system is disconnected if not starting procedure takes place (safety cut-out)
- the preheating device is disconnected if there is a short circuit in the system (short-circuit disconnection)



Preheating time

The preheating time depends on the coolant temperature which is picked up by a temperature transmitter. The entire heating time comprises the preheating time, the heating time during the starting procedure and, with coolant temperatures of < 25°C, the after-heating time.

Fuse of the preheating circuit

In place of the 80 A fuse there is an electronic short-circuit protection installed. If a short circuit occurs the power circuit is interrupted. After removal of the short circuit the relay is made operative again by turning the key in the steering lock back to "0".

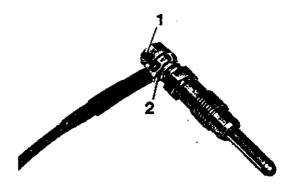
Monitoring of the glow plugs

The glow plugs are individually monitored by a microprocessor in the preheating time relay.

In addition the glow plugs are permanently monitored during the driving period by a small testing current. If one or several glow plugs fail, this is indicated through the lighting up of the preheater indicator for approx. 1 minute with the engine running.

Glow plugs

The pencil-type glow plugs basically comprise a body with screw-in thread M 12 x 1,25 and a heating rod pressed into the body.



115-26300

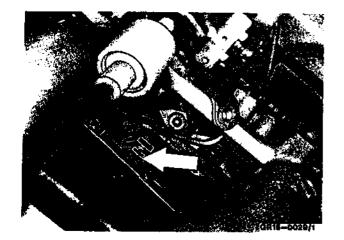
The single-pole terminal pin is bolted to the body by a fixed brass round nut.

The pencil-type glow plugs are rated for a voltage of 11,5 volt and are operated in parallel connection.

When switching on the preheating system, there is a current flow of < 30 ampere per glow plug.

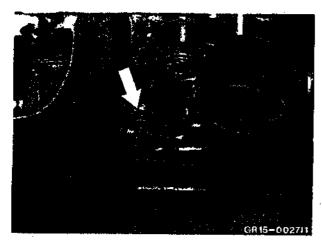
The resistance of the glow plug is temperature dependent (R20 approx. 0,5 Ohm).

The nut (1) is captive with the cable terminal (2) of the connection line.



Temperature transmitter

For the control of the preheating time and after-heating time, with the engine 603 there is a temperature transmitter screwed into the cylinder head.



With the engine 602, the temperature transmitter is screwed into the housing of the coolant pump.

Checking

Faults in the preheating system are indicated by the glow plug indicator light. The possible cause can be determined from the length of time the indicator tamp is illuminated.

Fault indication through glow plug indicator light

Fault indication	Cause
a) during the preheating	
 Lamp does not light up during the preheating; lights up for 1 minute after safety cut-out time or after-heating time 	One or several glow plugs defective
- Lamp does not light up	a) No heating current: relay defective
	b) Heating current available; indicator lamp defective
- Lamp only lights up briefly	Short circuit in the glow circuit
Lamp lights up during the preheating; remains permanently illuminated at the end of the safety cut-out time or after glow time	Relay contacts do not open; relay defective Caution: Battery discharge
- At all coolant temperatures, max. preheating time approx. 30 scnd.	Connection line to temperature transmitter interrupted
	 Temperature transmitter without function (Resistance R = ∞)
	- Preheating time relay defective
b) during the driving period	- · · · · · · · · · · · · · · · · · · ·
- Lamp lights up for approx. 1 minute	One or several glow plugs defective

Electrical equipment

Technical data

Battery

Voltage Capacity Low-temperature test current		piece	1 12 66 300')	
		V		
		Ah		
		A		
Electrolyte level a	bove upper edge of electrode	mm	10 to 12	
Charging current	with first charge	Α	max. 5%	
	normal when recharging	Α	max. 10% of battery capacity	
	with fast charge	Α	to 75%	
Maximum tempera	ature	°C	60	
Freezing point	well charged	°C	-70	
	half charged	℃	-25	
	discharged	°C	- 8	
Specific gravity of acid		kg/l	1,28	

¹⁾ at commencement of gasing falling to 5%

Electrolyte density (normal)

The operability of the battery is approximately shown by the electrolyte density.

Electrolyte density acc. to Baumé*	Specific weight*	Charging state of battery
32° Bé	1,285	well charged
24° Bé	1,20	half charged
16° Bé	1,12	empty, charge immediately

^{*} at an electrolyte temperature of +20°C

1) with increased output battery (88 Ah), the low-temperature test current is 395 A

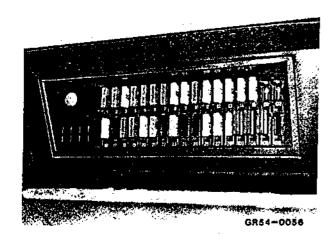
Bulbs

Designation	Power rating W	Form according to DIN 72 601
Main headlight	60/55	H4
Parking light	4	HL
Tail light	5	R 19/5
License plate light	5	C 11
Turn signal, front	. 21	P 25-1
Turn signal, rear	21	P 25-1
Stop light	21	P 25-1
Reversing light	21	P 25-1
ndicator lamps	2	Н
nstrument lighting	2	CARAMAN H - GA
lighting, glove compartment	5	C 11
Dome light, front	10	K 12
Dome light, front	5	H 2
Rear compartment lighting	10	
Rear fog light	21	K 12 P 25-1

Turn signal transmitter

Type Design		EL 12V 21 W2 (4) E electronic	
Output per turn signal lamp W		21	
Turn signal lamps per side of vehicle	Piece	2	
Total turn signal lamps with hazard warning flasher Piece		4	

Fuses (behind cover in footwell - passenger side)



Assi	gnment	plan

Fuse Index¹) No.		Designation	Current
F1	1	Parking light, tail light, left	7,5
F2	2	Parking light, tail light, right	7,5
F3	3	Front fog light, rear fog lamp	15
F4	4	High beam, left	7,5
F5	5	High beam, right	7,5
F6	6	Low beam, left	7,5
F7	7	Low beam, right	7,5
F8	8	Windscreen wiper, windscreen washer, front	15
F9	9	Heater blower, switch - air circulation, light for glove compartment	15
F10	10	Stop light, instrument cluster, heated washer jet, hall sensor, differential lock, revolution counter	
F11	11	Flasher device, horn, outside mirror heating, - adjustment	15
F12	12	Windscreen wiper, windscreen washer, rear	15
F13	13	Hazard warning system, clock, dome light, front, socket	
F14	14	Dome light, rear, heated rear window	20
F15	15	Radio, cigar lighter, SA-strip	15
F16	16	Central locking system	15
F17	17	Automatic transmission: kickdown	
F18	18	Headlight washer system	15
F19	19	Air conditioner: fan, compressor	7,5
F20	20	Auxiliary heating: glow plug	25
F21	21	Auxiliary heating: control unit, blower, time switch	10
F22	22	Seat heating, left and right	25
F23	23	Air conditioner: auxiliary fan	25

¹⁾ Identification in the circuit diagram

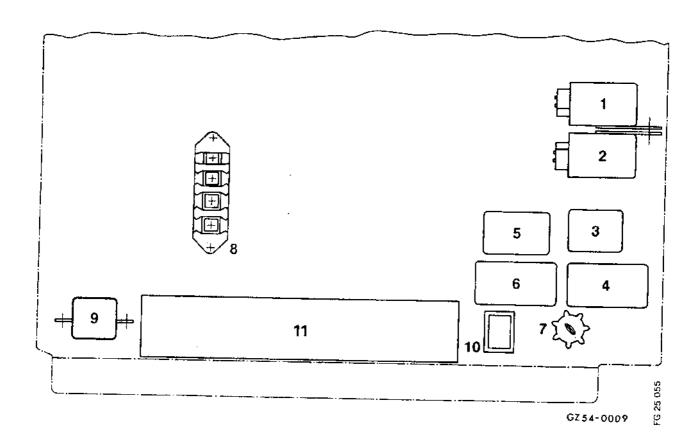
Assignment plan (Continuation)

Fuse Index')	No.	Designation	Current A
F24	24	Window lifter, front, right and rear left	25
F25	25	Window lifter, front, left and rear, right	25
F26	26	SA strip, terminal 30	7,5
F27	27	SA strip, terminal 15	15
F28	28	Free for special requirement	
D3	-	Differential lock, transfer case	
D4	v=: 1	Differential lock, rear axle	
D5	- 1	Differential lock, front axle	_
D6	1 - 1	Free for special requirement	

¹⁾ Identification in the circuit diagram

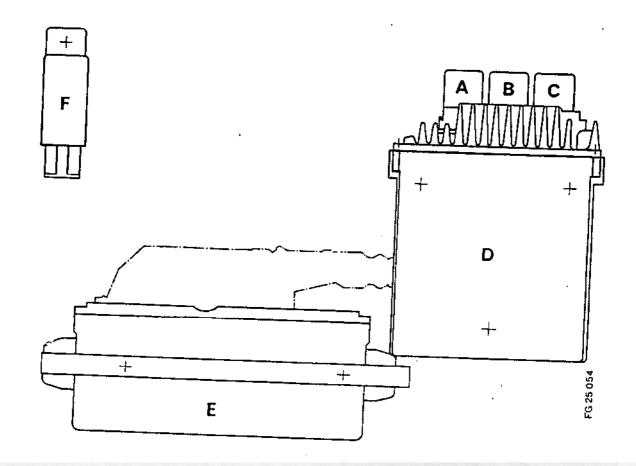
Relay assignment plan

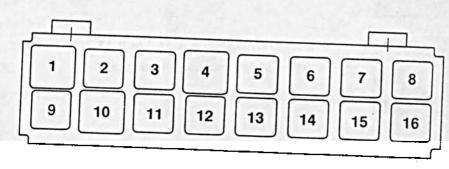
Device plate



- 1 Intermittent action relay, front
- 2 Intermittent action relay, rear end
- 3 Relay, kick down
- 4 Control unit, refrigerant compressor 102/103/602/603
- 5 Control unit, central locking system
- 6 Relay, fuel pump 102 and 103 Control unit; ELR 603
- 7 Adapter plug CIS-E
- 8 Cable connector
- 9 Overvoltage suppressor
- 10 Bracket, plug-and-socket connection TD
- 11 Fuse box

Device plate, dash panel

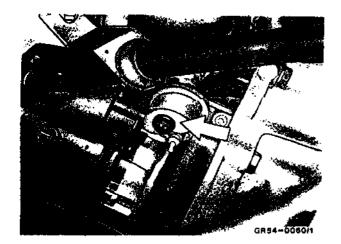




GZ 54-0010

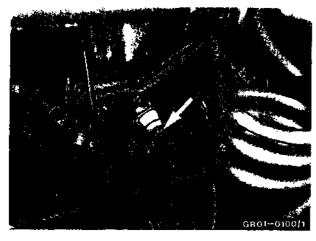
- Relay, headlight washer system 1
- 2 Relay, day driving light
- 3 Relay, window lifter
- 4 Turn signal relay
- 5 Relay for heated rear window
- 6
- 7 Disconnecting relay LABS
- 8
- 9
- Time relay, differential locks 10
- Relay, blower, auxiliary heating 11
- Relay, circulating pump, auxiliary heating 12

- Relay I, air conditioner, auxiliary fan 13
- Relay II, temperature regulator, air conditioner 14
- Disconnecting relay II, ABS 15
- 16
- Α Relay, lock RA
- Relay, lock, interaxle differential, transfer case ₿
- С Relay, lock, FA
- D Control unit, CIS-E 3
- Ε Control unit, ABS
- F Antenna relay



Electrical components
Sending unit B5

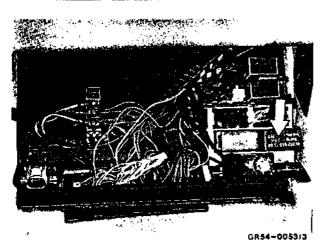
оп pressure (М 102/103)



Sending unit B 5
Oil pressure (OM 602/603)



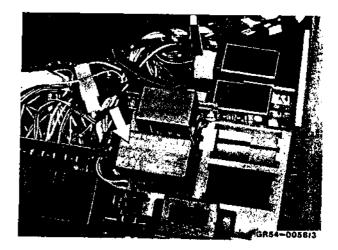
Temperature transmitter B 11/7 or B 13
Preheating system and coolant indicator



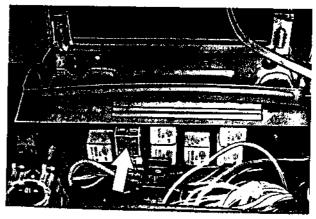
Control unit N 6
Air conditioner

Control unit N 8

Electronic idle speed control (ELR)



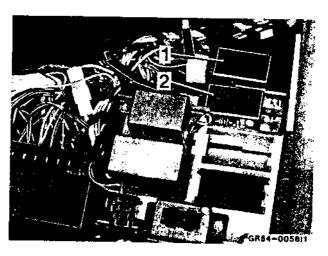
Turn signal, warning flasher transmitter N9



GR54-0057/1

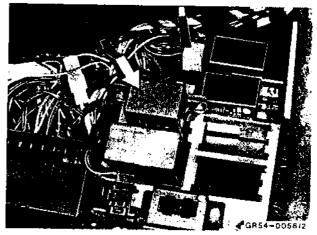
Pulse generator N 12

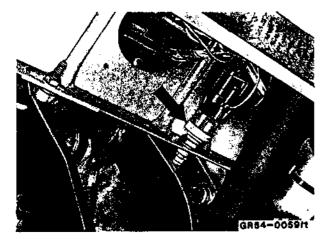
Windscreen wiper, rear (1) Windscreen wiper, front (2)



Control unit N 59

Central locking system

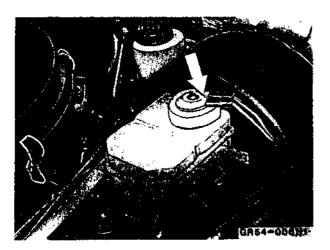




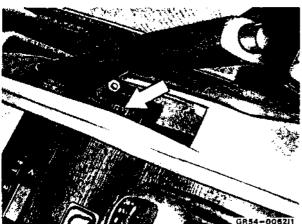
Switch \$9 Stop light switch



Switch \$10 Brake wear indicator



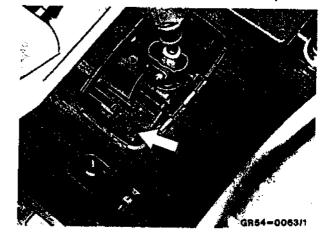
Switch S 11 Brake fluid reservoir



Switch \$12 Handbrake

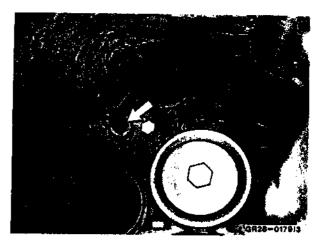
Switch S16/2

Reversing light



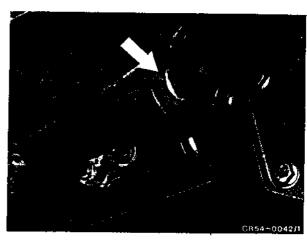
Switch S 96

Differential lock, interaxle differential



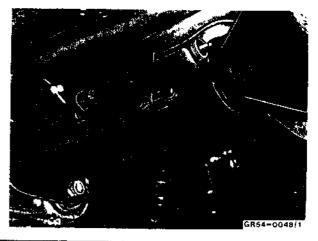
Switch S97

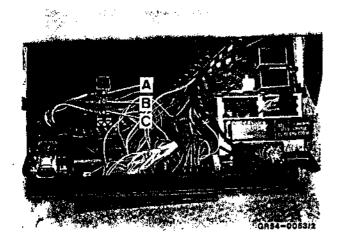
Differential lock, rear axle



Switch S98

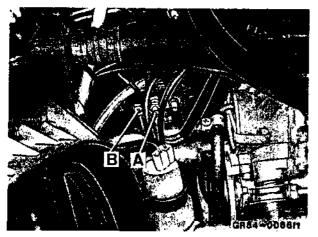
Differential lock, front axle





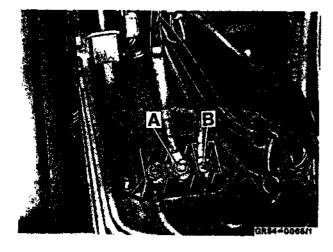
Plug-and-socket connections Cable connector X5/1

A = connection D+ B = connection 15 C = connection 30



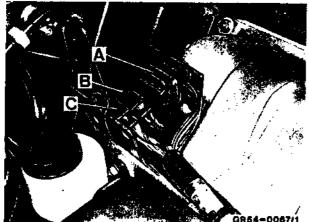
Cable connector X5/4

A = connection B+ B = connection D+



Cable connector X 5/5

A = connection 30 B = connection 50



Plug-and-socket connection X 26/12, X 52, X18 Main cable harness

A = X 26/12

B = X 52 C = X 18

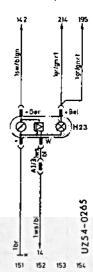
Identification in circuit and current path diagrams

Target designation of lines 1

The target designation of a line indicates the current path, on which the line continues.

E.g.: The upper lines continue on the current paths 142, 214, 195

The lower line continues on current path 14.



Identification of the ground connection points 1

W1 = Main ground (behind instrument cluster)

W1 = Main ground (footwell, right/cross member, right)

W2 = Ground, front, right (in light unit) W9 = Ground, front, left (in light unit)

W10 = Ground, battery

W11 = Ground, engine (electrical line screwed on)

W12 = Ground, middle console
W20 = Ground, door, front, left
W21 = Ground, door, front, right
W26 = Ground, rear end column, left

W27 = Ground, rear end column, right

E.g.:

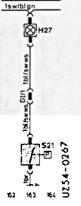
Line designation 1 bl/swws

Line cross-section = 1 mm²

Basic colour bl = blue

1st Colour code sw = black

2nd Colour code ws = white



Color codes of the lines

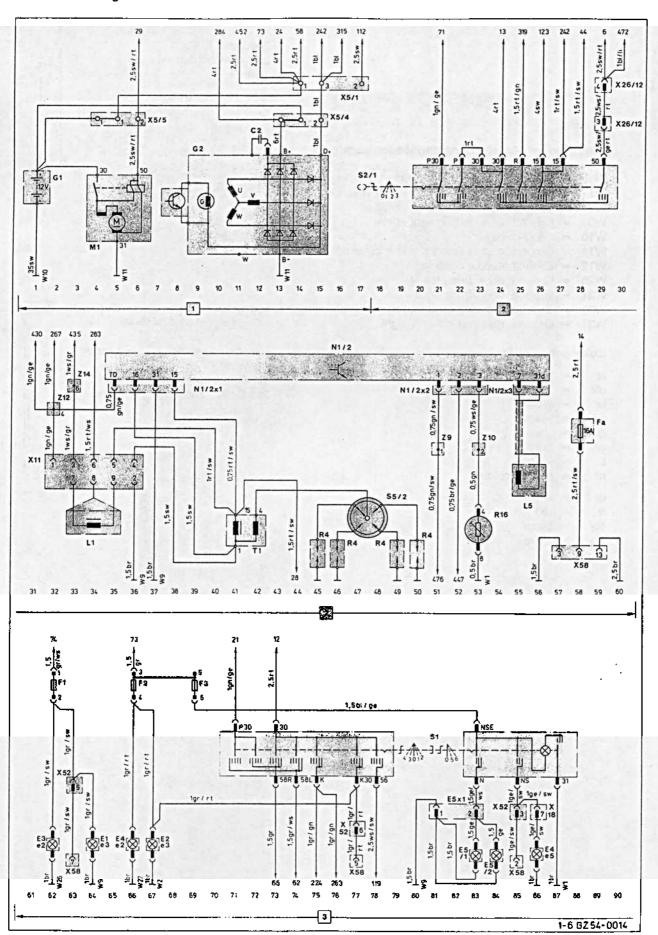
bl = blue blk = blank br = brown ge = yellow gn = green

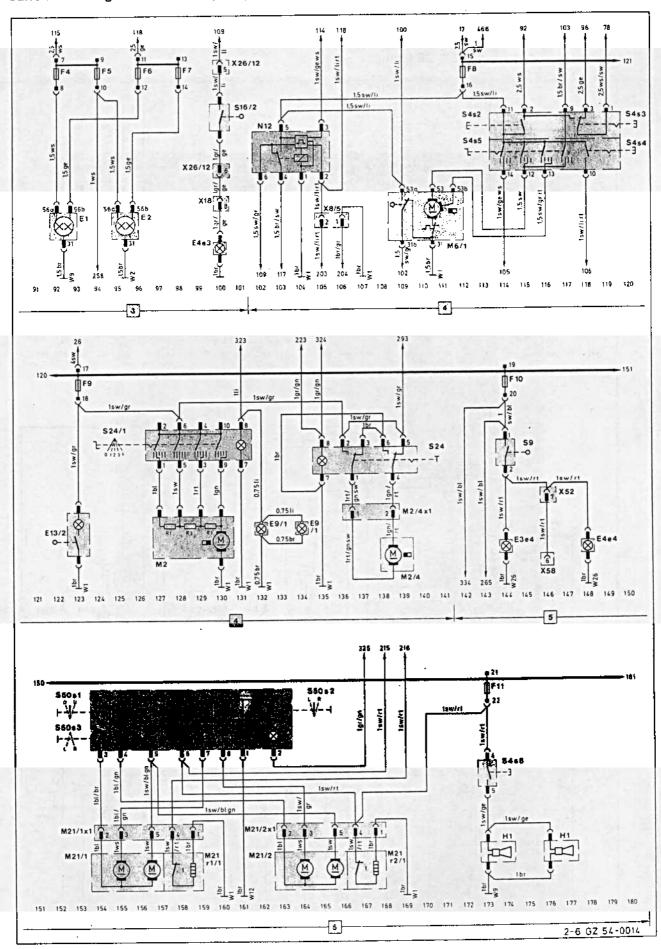
gr = grey li = violet

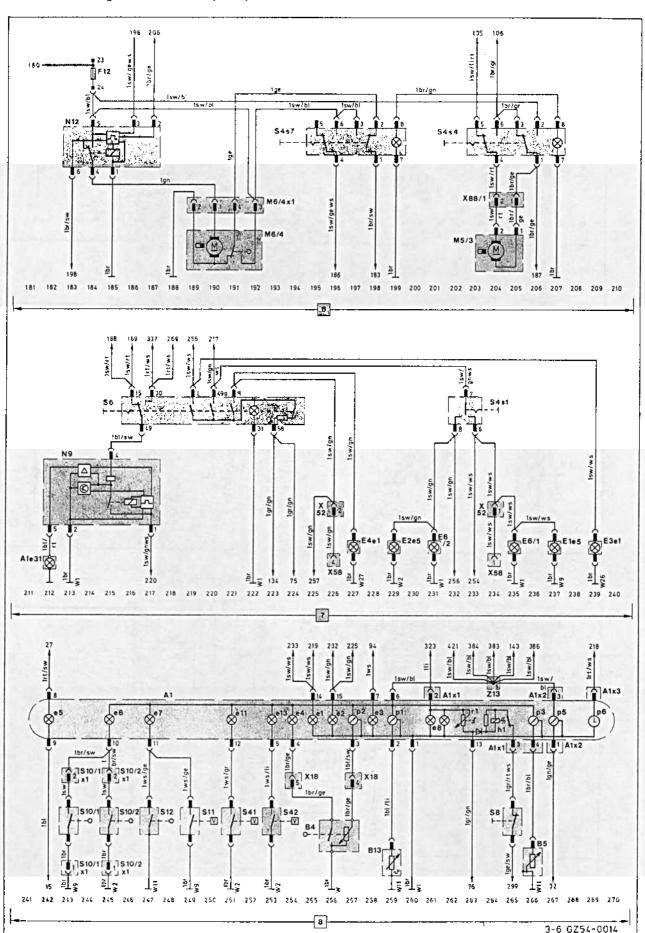
nf = natural colored

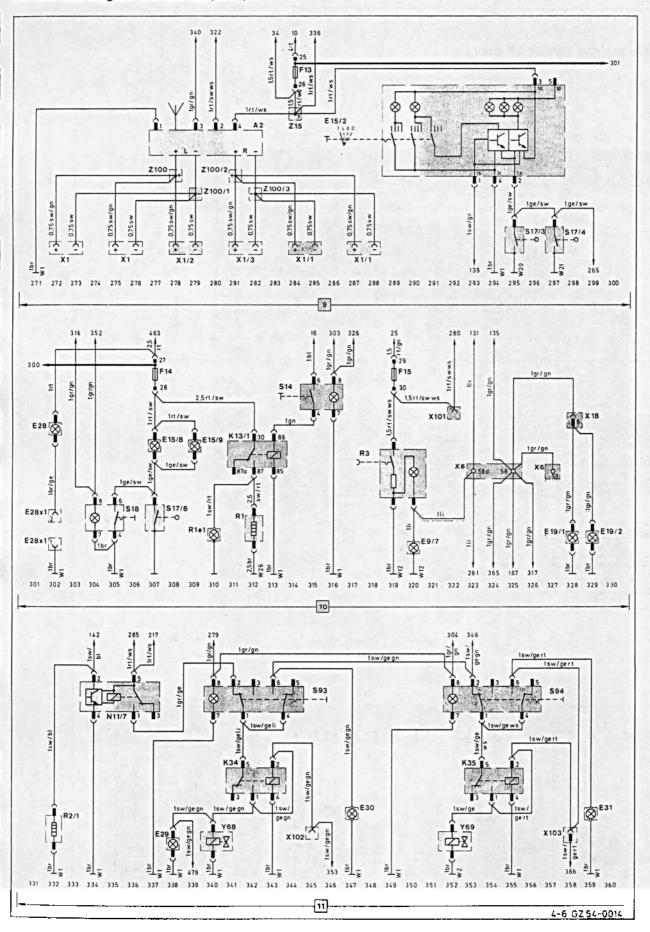
rs = pink rt = red sw = black ws = white

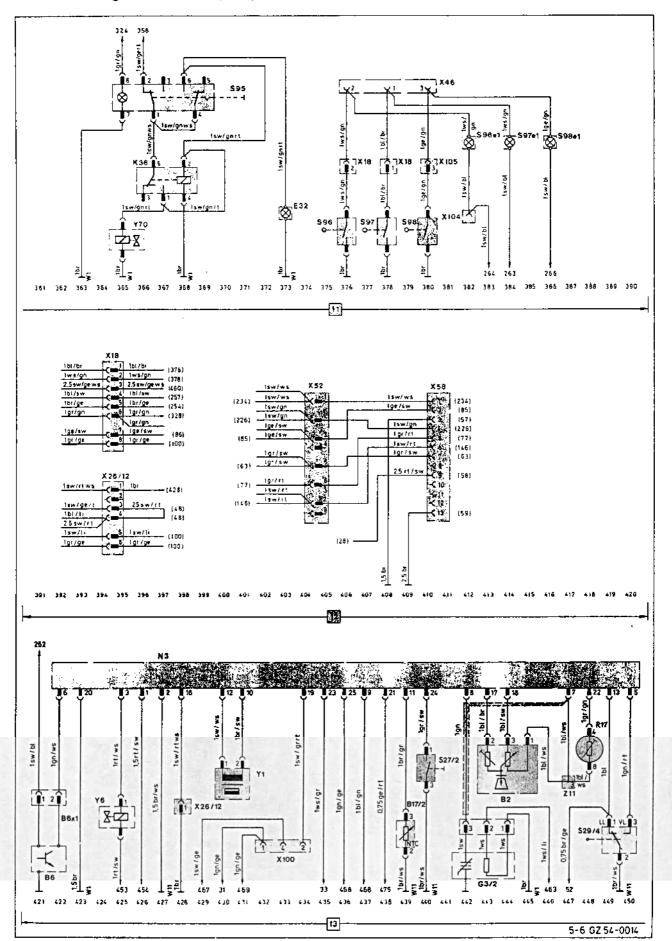
Current flow diagram 200/230 GE

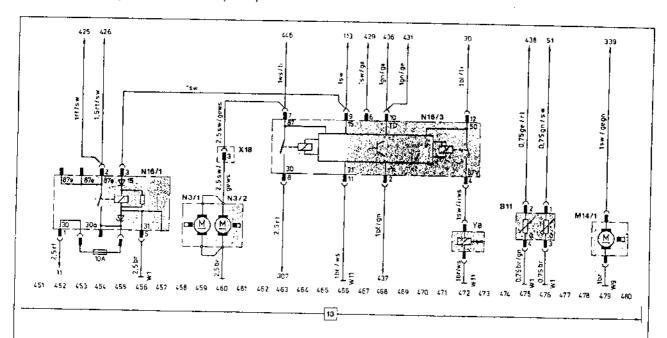










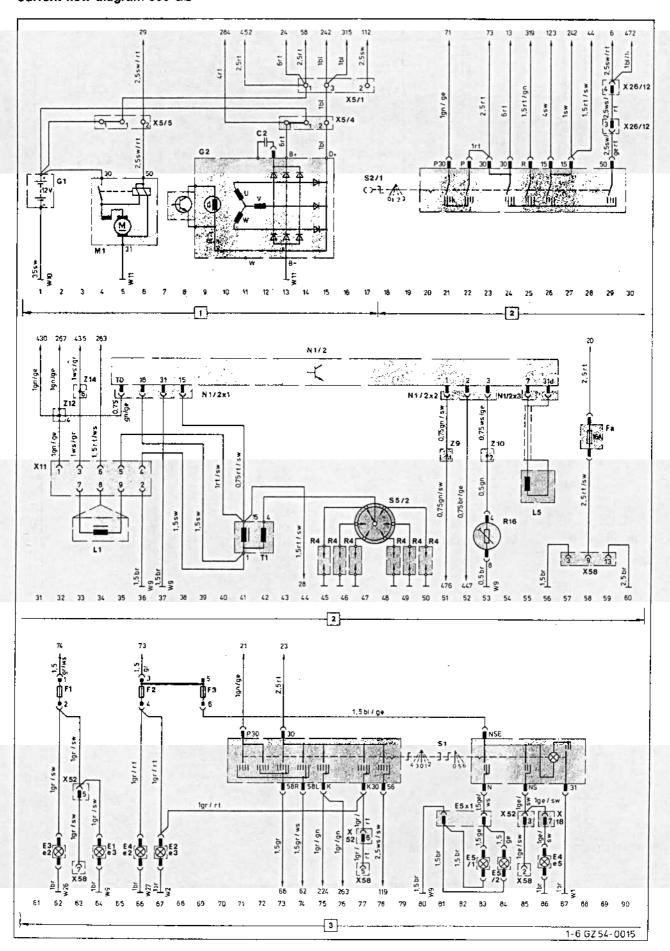


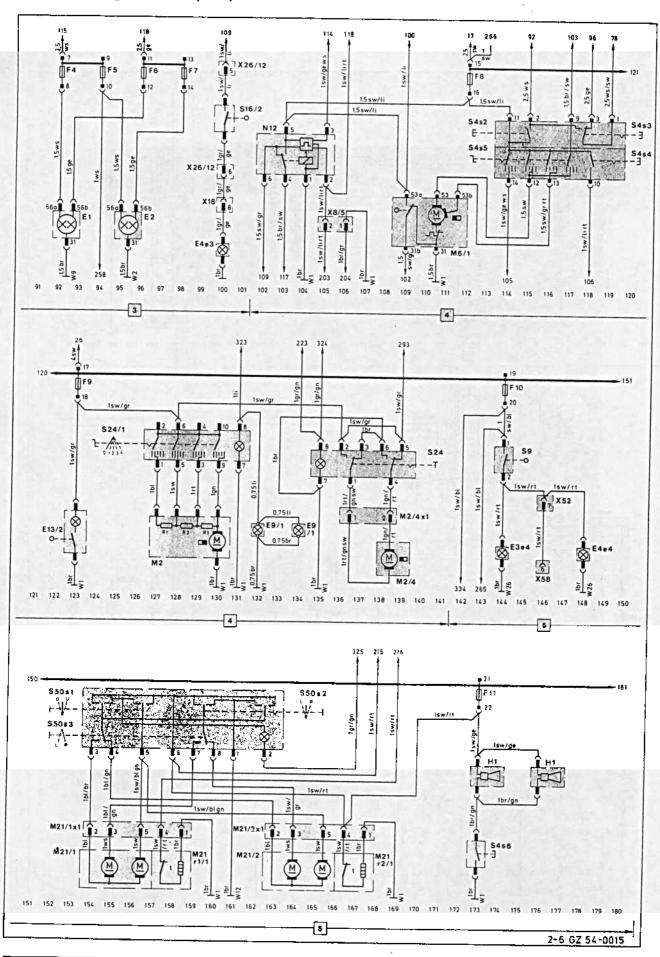
487 482 483 484 485 485 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 505 505 500 500

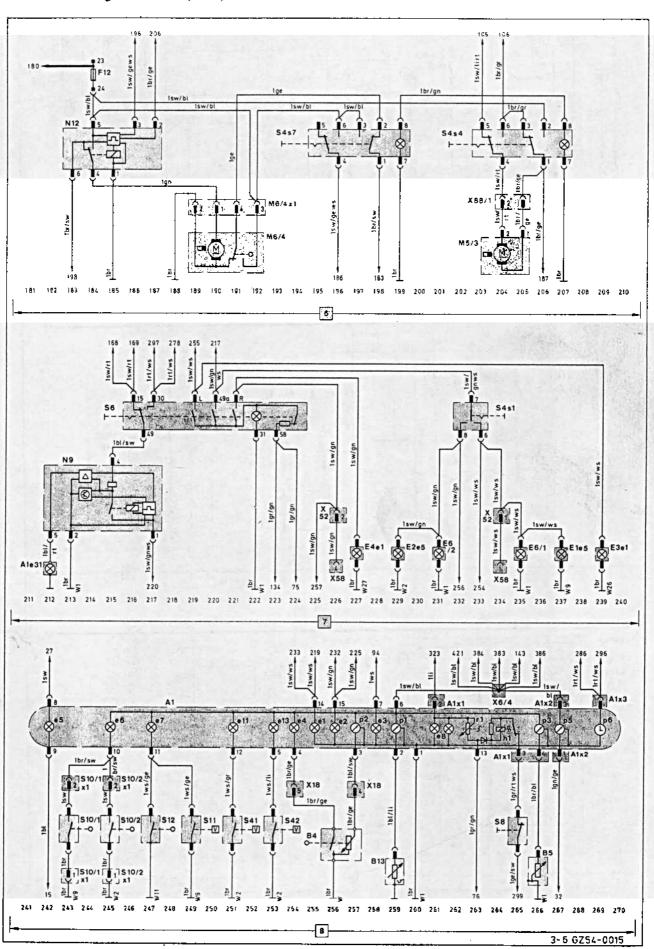
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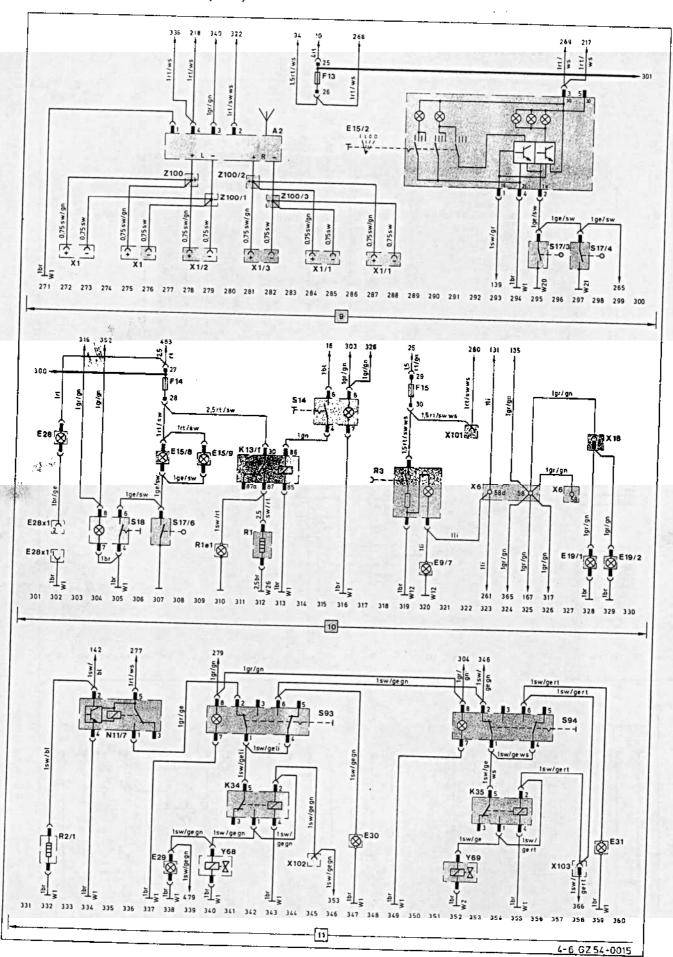
6-6 GZ 54-0014

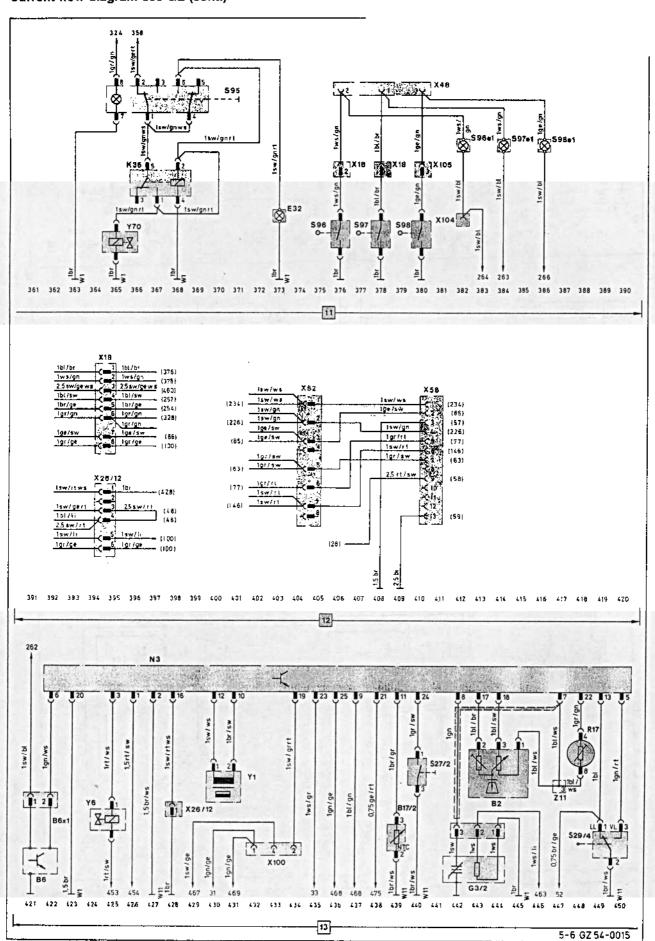
Current flow diagram 300 GE

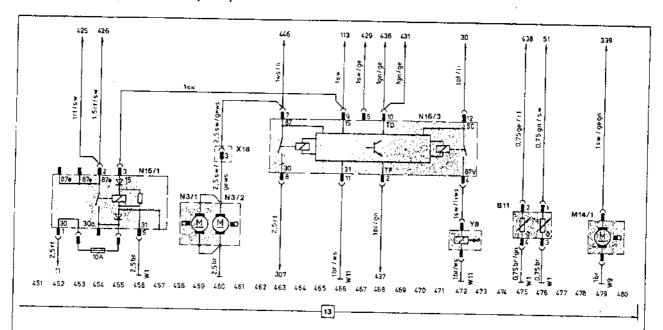












403 403 404 405 405 405 407 408 409 490 491 492 493 494 495 495 496 497 498 499 500 501 502 503 504 505 505 505 507 508 509 507

517 512 513 514 515 516 517 518 519 520 521 522 523 624 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540

6-6 GZ 54-0015

Key to current flow diagram 200/230/300 GE

1 Current supply

Identification	Designation	Place of installation	Current path
C2	Suppression capacitor	Alternator	12
G1	Battery	Engine compartment	1
G2	Alternator	Engine	9
M1	Starter	Engine	4
X5/1	Line connection, interior	Electrics compartment	14/15/17
X5/4	Line connection, alternator, 2-pole.	Engine compartment	13/15
X5/5	Line connection, front wall, 2-pole.	Engine compartment	4/5/6

2 Starting control

Identification	Designation	Place of installation	Current path
Fa	Fuse, trailer device	Electrics compartment	58
L1	TDC transmitter	Engine	34
L5	Position transmitter, crankshaft	Engine	55
N1/2	Switching unit EZL	Electrics compartment	45
R4	Spark plugs	Engine	45 - 50
R16	Adapter plug EZL	Engine compartment	53
S2/1	Ignition/starter switch	Drive switch	18
S5/2	Distributor, breakerless	Engine compartment	48
T1	Ignition coil	Engine compartment	42
X11	Diagnosis unit, 9-pole.	Engine compartment	32 – 36
X26/12	Connector, transmission, 6-pole.	Engine compartment	29
X58	Socket, trailer device	Rear end	58
Z 9	Connector sleeve 1 (solder connector in set of lines)		51
Z10	Connector sleeve 2 (solder connector in set of lines)	-	53
Z12	Connector sleeve 4 (solder connector in set of lines)	-	32
Z14	Connector sleeve 6 (solder connector in set of lines)	_	33

3 Headlight

Identification	Designation	Place of installation	Current path
E1	Light unit, left	_	93
E2	Light unit, right		96
E4e3	Reversing light, right		100
E1e3	Side light/parking light, left	_	64
E2e3	Side light/parking light, right		67
E3e2	Tail light/parking light, left		62
E4e2	Tail light/parking light, right		66
E4e5	Rear fog lamp		86
E5/1	Fog lamp, left		83
E5/2	Fog lamp, right	B. M. Waller	
≣5x1	Intermediate plug-and-socket connection, fog lamps, 2-pole.		84 81/83
1	Fuse, tail light, left, parking light, left	Electrics compartment	62
2	Fuse, tail light, right, parking light, right	Electrics compartment	66
3	Fuse, front fog light, rear fog light	Electrics compartment	No. of the last of
4	Fuse, high beam, left	Electrics compartment	69
5	Fuse, high beam, right	Electrics compartment	92
6	Fuse, low beam, left	Electrics compartment	94
7	Fuse, low beam right	Electrics compartment	96
1	Headlight rotary switch	Instrument panel	98
16/2	Reversing light	Main shift lever	81
18	Plug-and-socket connection 8-pole.	Engine compartment	100
52	Connector, trailer device, 8-pole.		86/100
58	Socket, trailer device, 13-pole. ?	Engine compartment Rear end	63/77/85
26/12	Connector, transmission, 6-pole	Engine compartment	63/77/85 100

4 Windscreen wiper, heater blower, air circulation

Identification	Designation	Place of installation	Current
E9/1 E13/2 F8 F9	Illumination, heater control Glove compartment lamp with switch Fuse, windscreen wiper, reversing light Fuse, heater blower, air circulation, Glove compartment lamp	Middle console - Electrics compartment Electrics compartment	132/134 123 112 123
M2	Blower motor	Under instrument panel	127

4 Windscreen wiper, heater fan, air circulation (continuation)

Identification	Designation	Place of installation	Current path
M2/4	Servo motor, air flap (front wall)	Engine compartment	139
M2/4x1	Connector, servo motor, air flap (front wall) 2- pole	Engine compartment	137, 138
M6/1	Wiper motor	Engine compartment	111
N 12	Interval wiper electronics	Electrics compartment	102
S4s2	Headlight flasher switch	Combination switch	112
S4s3	Dimmer switch	Combination switch	120
S4s4	Washer switch	Combination switch	120
S4s5	Switch, wiper speed	Combination switch	112
S24	Switch, fresh air/air circulation	Instrument panel	140
S24/1	Switch, warm air/cold air (heating system)	Instrument panel	125
X8/5	Connector, rear end door and windscreen wiper, 2-pole	Rear end	105/106

5 Stop light, outside mirror, horn

Identification	Designation	Place of installation	Current path
E3e4	Stop light, left		144
E4e4	Stop light, right		148
F10	Fuse, stop lights, differential lock, instrument cluster, heated washer jet	Electrics compartment	144
F11	Fuse, horn, flasher device, outside mirror adjustment, – heater	Electrics compartment	173
H1	Horn	In front of radiator	173/176
M21/1	Outside mirror, driver, electrically adjustable	- 3	155
M21/1r1	Mirror heating	AND THE PROPERTY OF THE PARTY AND	158
M21/1x1	Connector, outside mirror, driver, electrically adjustable 6-pole	-	154 – 159
M21/2	Outside mirror, passenger, electrically adjustable	-	164
M21/2r1	Mirror heating	- Contradition	167
M21/2x1	Connector, outside mirror, passenger, electrically adjustable 6-pole		163 – 168
S9	Stop light switch	Brake pedal	144
S4s6	Signal contact	Steering wheel	173
S50s1	Mirror adjustment, vertical, up/down	Middle console	152
S50s2	Mirror adjustment,horizontal, in/out	Middle console	165
S50s3	Mirror adjustment, left, right	Middle console	152
X52	Connector, trailer device, 8-pole	Engine compartment	146
X58	Socket, trailer device, 13-pole	Rear end	146

6 Rear window wiper, windscreen washer, rear

Identification	Designation	Place of installation	Current path
F12 M5/3 M6/4 M6/4x1 N12 S4s4 S4s7	Fuse, rear window wiper, windscreen washer, rear Washer pump, rear end door Wiper motor, rear end door Connector, wiper motor, rear end door Interval-after wiper electronic (rear) Washer switch (rear) Interval wiper Intermediate plug-and-socket connection, washer unit pump, rear	Electrics compartment Rear end Rear end Electrics compartment Instrument panel Instrument panel Rear end	184 204 190 189 – 192 183 202 194 204/205

7 Turn signal, hazard warning light

Identification	Designation	Place of installation	Current
A1e31 E1e5	Turn signal indicator control, trailer	Speedometer	212
E2e5	Turn signal, left Turn signal, front, right	-	237
E3e1 E4e1	Turn signal, rear, left	· -	239
E6/1	Turn signal, rear, right Turn signal, left (on the side)		227
≣6/2 No.	Turn signal, right (on the side)	-	235
N9 64s1	Turn signal, hazard warning relay Turn signal flasher switch	Electrics compartment Combination switch	213
66	Hazard warning flasher switch	Middle console	234
(52 (58	Connector, trailer device, 8-pole Socket, trailer device, 13-pole	Engine compartment Rear end	226/234 226/234

8 Instrument cluster

Identification	Designation	Place of installation	Current
A1	Instrument cluster	Instrument panel Instrument cluster	247
A1e1	Turn signal indicator control, left		
A1e2	Turn signal indicator control, right		255
A1e3	High beam indicator light	Instrument cluster Instrument cluster	256 258

8 Instrument cluster (continued)

Identification	Designation	Place of installation	Current
A1e4	Fuel reserve warning	Instrument cluster	254
A1e5	Charging indicator lamp	Instrument cluster	242
A1e6	Check, brake wear indicator	Instrument cluster	245
A1e7	Check, brake fluid and parking brake	Instrument cluster	247
A1e8	Instrument lamp	Instrument cluster	261
A1e11	Check, coolant level	Instrument cluster	251
A1e13	Check, windscreen water level	Instrument cluster	253
A1h1	Warning buzzer	Instrument cluster	264
A1p1	Temperature gauge, coolant	Instrument cluster	259
A1p2	Fuel gauge instrument	Instrument cluster	257
A1p3	Oil pressure gauge	Instrument cluster	266
A1p5	Revolution counter	Instrument cluster	267
A1p6	Clock	Instrument cluster	269
A1r1	Regulating resistor, instrument lamp	Instrument cluster	263
A1x1	Connector, instrument cluster, 4-pole	Instrument cluster	261/265 266
A1x2	Connector, revolution counter	Instrument cluster	267
A1x3	Connector, electronic clock	Instrument cluster	269
B4	Sending unit, fuel gauge	Fuel tank	256
B5	Sending unit, oil pressure gauge	Engine	266
B13	Temperature transmitter, coolant indicator	Engine	33
S8	Warning buzzer contact	Doors	265
S10/1	Pick-up, brake linings, front, left	Brake calipers	243
S10/2	Pick-up, brake linings, front, right	Brake calipers	245
S11	Switch, brake fluid gauge	Brake fluid reservoir	249
S12	Switch, parking brake check	Parking brake lever	247
S41	Switch, coolant level check	Brake fluid reservoir	251
S42	Switch, windscreen washer water level	-	253
S10/1x1	Connector, contact sensor, brake linings, front, left, 2-pole	Brake caliper	243
S10/2x2	Connector, contact sensor, brake linings, front, right, 2-pole	Brake caliper	245
X18	Connector, tail light set of lines, 8-pole	Engine compartment	254/257
Z13	Connector sleeve 5 (solder connector in set of lines)		264

9 Radio, dome light

Identification	Designation	Place of installation	Current path
A2	Radio	Middle console	282
E15/2	Dome light, front		287
F13	Fuse, radio, hazard warning system, clock, dome light, front, socket	Electrics compartment	278
S17/3	Door contact, front, left	_	295
S17/4	Door contact, front, right		297
X1	Connector, rear end, left (bass)	-	272/273
X1	Connector, rear end, left (super tone)	_	275/276
X1/1	Connector, rear end, right (bass)	_	284/285
X1/1	Connector, rear end, right (super tone)	_	287/288
X1/2	Connector, front speaker, left	-	278/279
X1/3	Connector, front speaker, right	- 10 100	281/282
Z15	Connector sleeve, 7 (solder connector in set of lines)		284

10 Dome light, rear compartment, rear window heater, cigar lighter

Identification	Designation	Place of installation	Current path
E9/7	Illumination, ashtray, front		320
E15/8	Dome light, rear compartment, left		307
E15/9	Dome light, rear compartment, right	_	309
E19/1	License plate light, left		328
E19/2	License plate light, right		329
E28	Test lamp (fuses)	Electrics compartment	302
E28x1	Connector, test lamp, 2-pole	_	302
F14	Fuse, dome light, rear compartment heated rear window	Electrics compartment	307
F15	Fuse, radio, clgar lighter	Electrics compartment	319
K13/1	Relay, heated rear window	Electrics compartment	311
R1	Heated rear window	_	312
R1e1	Indicator lamp, heated rear window	_	310
73	Cigar lighter	Ashtray	318
S14	Switch, heated rear window	Middle console	314
S17/6	Door contact, rear, right	_	307
S18	Switch, dome light, rear compartment	Middle console	305

Dome light, rear compartment, rear window heater, cigar lighter (continuation)

Identification	Designation	Place of installation	Current path
X6	Cable connector 58 d	- 1 (4 to 14 to 15	323 – 327
X18	Connector, tail light set of lines, 8-pole		328
X101	Intermediate plug-and socket connection, plug strip SA 15 R	- 120 - 120 -	322

11 Differential lock

Identification	Designation	Place of installation	Current
E29	Warning lamp, differential lock	Instrument cluster	338
E30	Switch-on monitor, differential lock, interaxle diff.	Switch LA	347
E31	Switch-on monitor, differential lock, RA	Switch HA	359
E32	Switch-on monitor, differential lock, FA	Switch VA	373
K34	Relay, differential lock, interaxle diff.	Electrics compartment	341
K35	Relay, differential lock, RA	Electrics compartment	353
K36	Relay, differential lock, FA	Electrics compartment	366
N11/7	Time relay, differential lock	Electrics compartment	335
R2/1	Heating system for water jets		332
S93	Switch, differential lock, interaxle diff.	Middle console	345
S94	Switch, differential lock, RA	Middle console	357
S95	Switch, differential lock, FA	Middle console	370
S96	Switch, functional check, interaxle diff.	Middle console	376
S97	Switch, functional check, RA	Middle console	378
S98	Switch, functional check, FA	Middle console	380
S96e1	Function monitor lamp, interaxle diff.	Switch, interaxle diff.	382
S97e1	Function monitor lamp, RA	Switch HA	384
S98e1	Function monitor lamp, FA	Switch VA	386
X18	Connector, tail light set of lines, 8-pole		376/378 380
X46	Connector, indicator lamps, ABS, 3-pole	-	376/378 380
X102	Connector, incoming supply, switch, interaxle diff., ABS	_	345
K103	Connector, differential lock, FA	_	358
X104	Connector, differential lock, FA, terminal 15	_	382
Y68	Solenoid valve, differential lock, interaxle diff.	Engine compartment	340
Y69	Solenoid valve differential lock, RA	Engine compartment	352
Y70	Solenoid valve differential lock, FA	Engine compartment	365

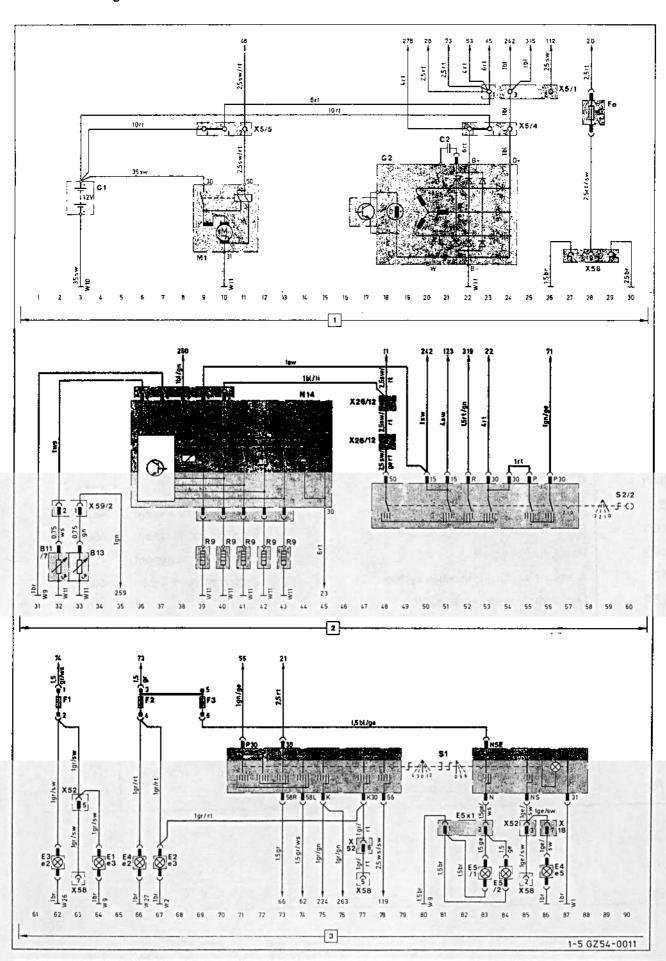
12 Plug-and-socket connections, trailer socket

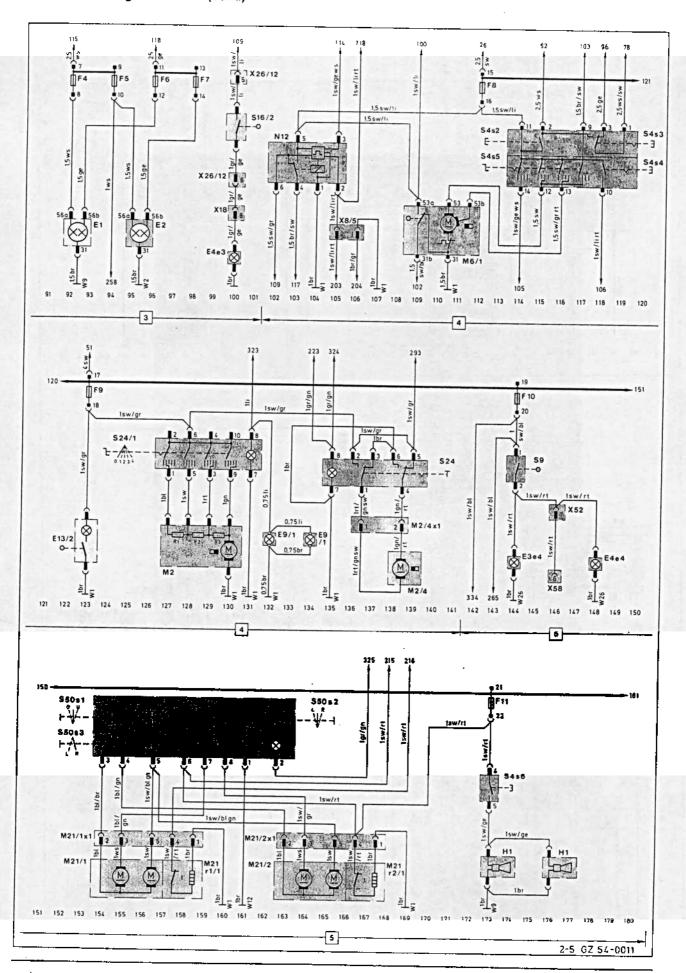
Identification	Designation	Place of installation	Current path
X18 X26/12	Connector, tail light set of lines, 8-pole Connector, transmission, 6-pole	Engine compartment	394
X52	Connector, trailer device, 8-pole	Engine compartment Engine compartment	394 404
X58	Socket, trailer device, 13-pole	Rear end	410

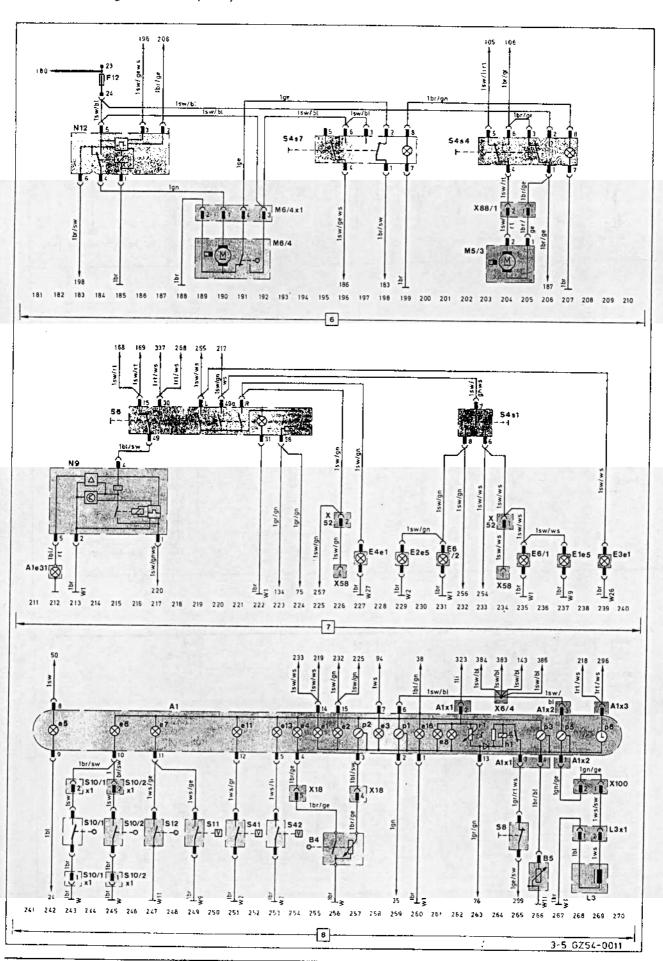
13 CIS-E Jetronic

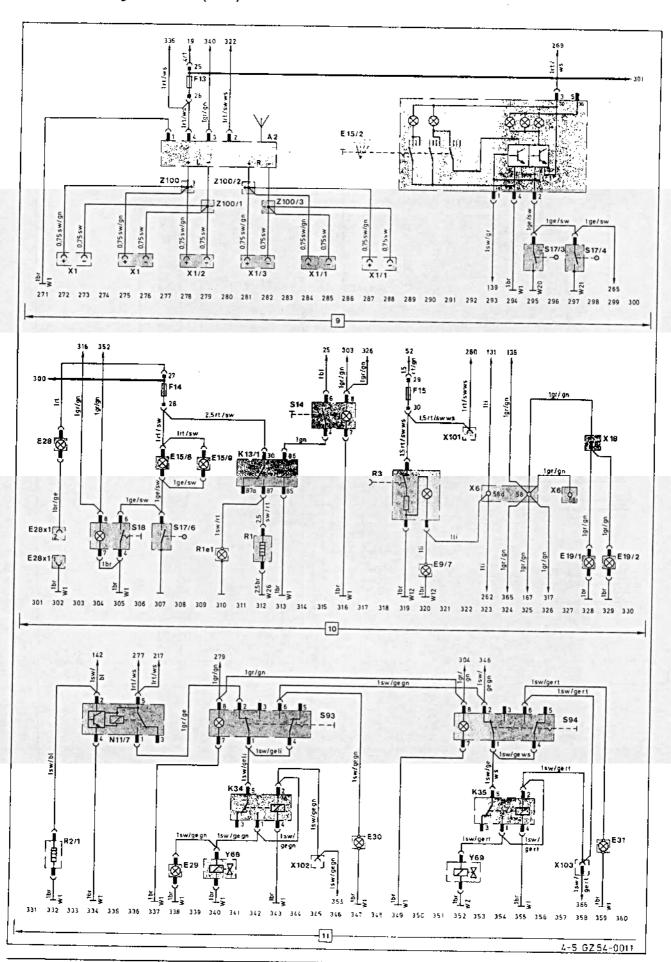
Identification	Designation	Place of installation	Current path
B2	Sending unit, air flow meter	Engine	444
B6	Hall generator, speed	behind instrument cluster	421
B6x1	Connector, half generator, 2-pole	-	421/422
B11	Temperature sensor, coolant	Engine	475/476
B17/2	Temperature sensor, intake air CIS-E injection system	Engine	439
G3/2	O₂-probe, heated	Engine	442
M3/1	Fuel pump 1	Rear end	459
M3/2	Fuel pump 2	Rear end	460
M14/1	Vacuum pump	Engine	479
N3	Control unit, CIS-E Jetronic	Electrics compartment	427
№16/1	Basic module, overvoltage suppressor	Electrics compartment	456
V16/3	Relay, fuel pump	Electrics compartment	470
R17	Adapter plug, CIS-E injection system	Engine compartment	448
527/2	Microswitch, overrun fuel cutoff	Engine	440
529/4	Throttle valve switch	Engine	449
(18	Connector, tail light set of lines, 8-pole	Engine compartment	460
26/12	Connector, transmission, 6-pole	Engine compartment	428
100	Connector, TD signal		433
4	Electrohydraulic actuator	Engine	430
6	Idle speed actuator	Engine	425
8	Start valve	Engine	472
11	Connector sleeve 3 (solder connector in set of lines)		447

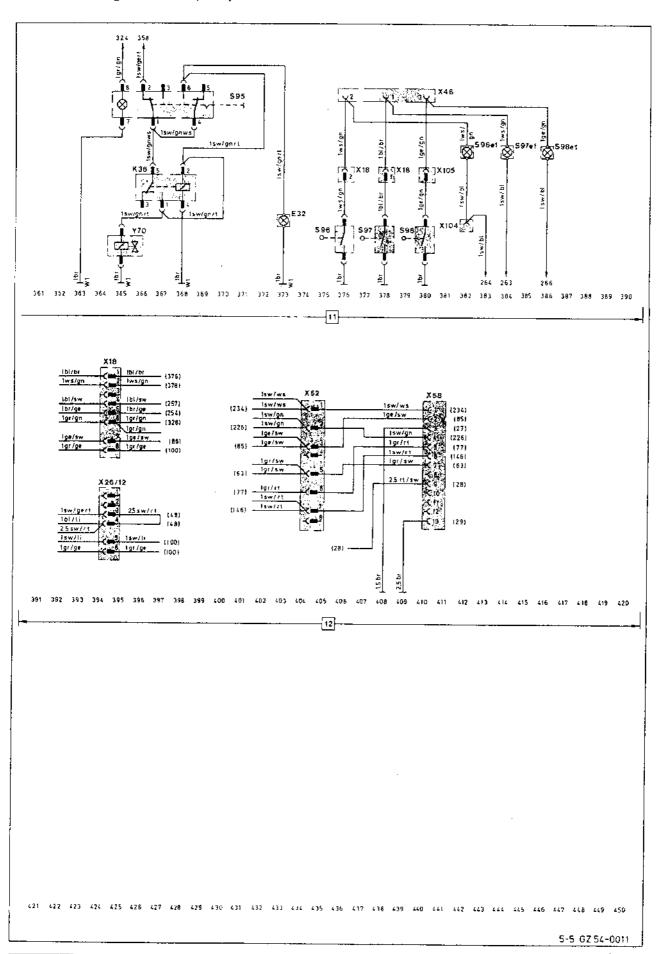
Current flow diagram 250 GD



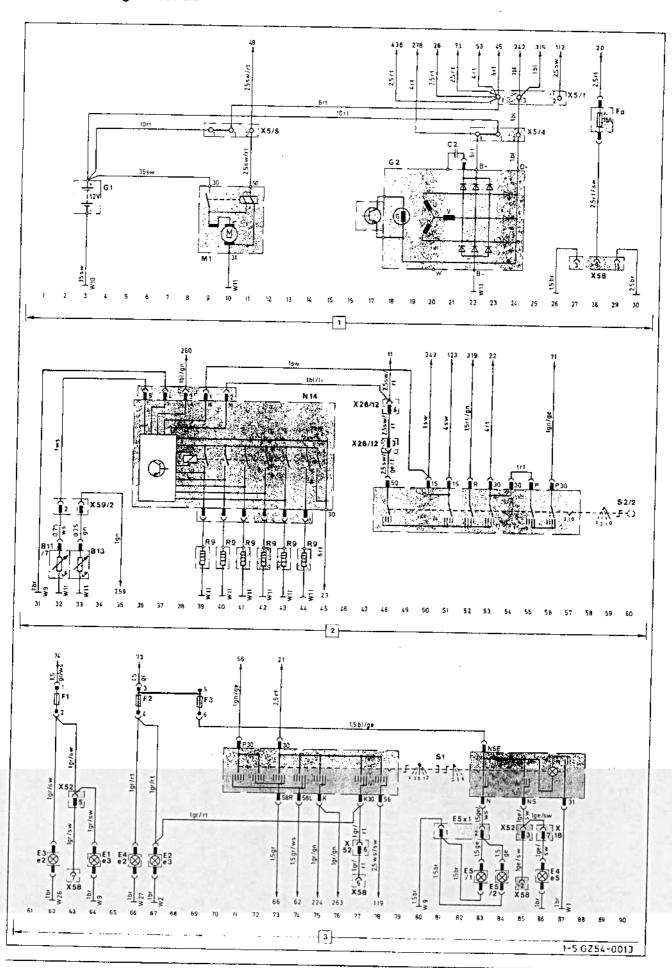


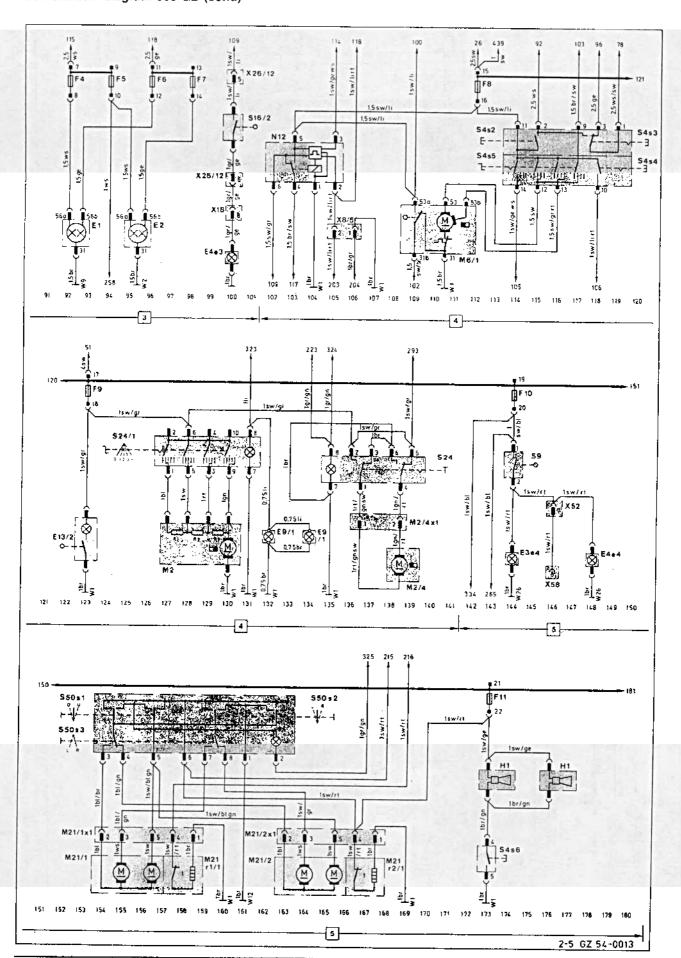


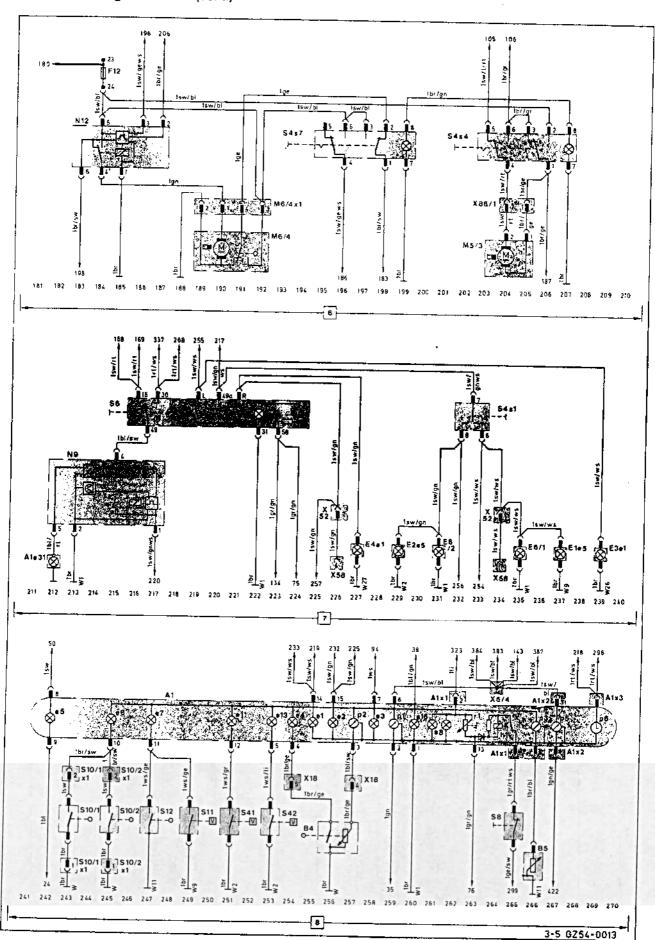


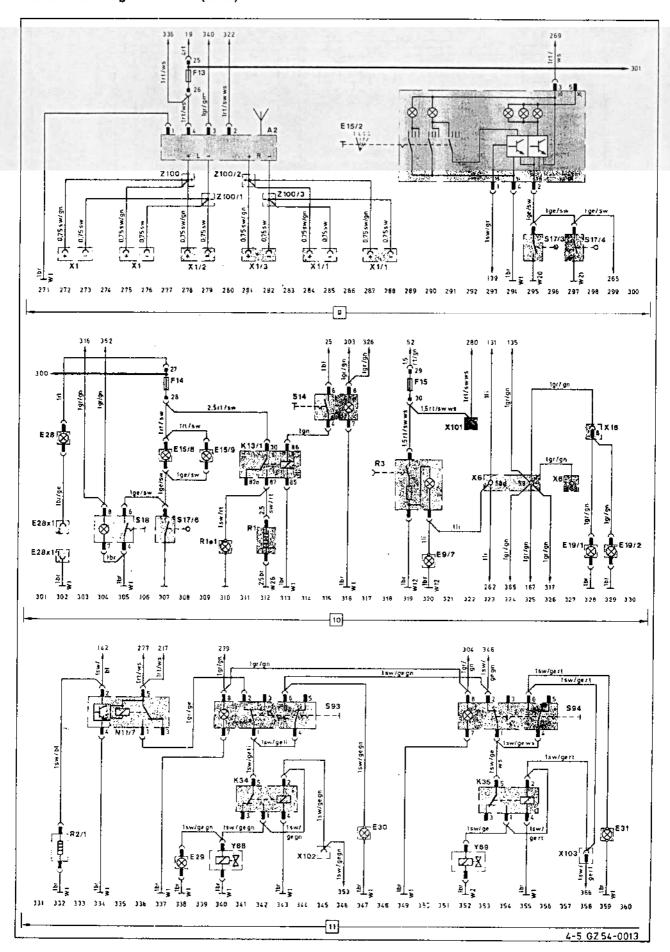


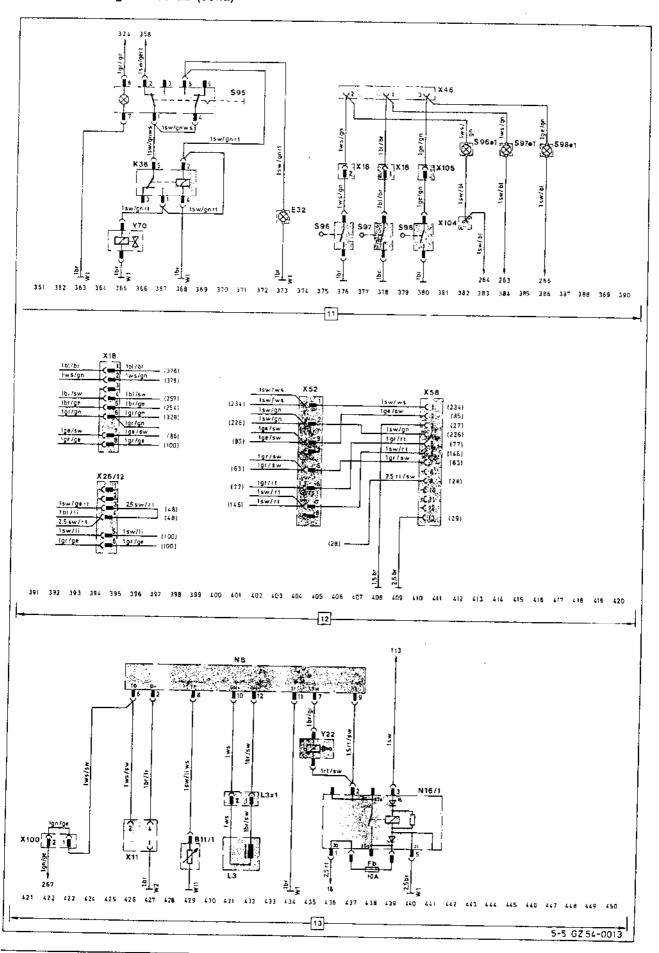
Current flow diagram 300 GD











Key to current flow diagram 250/300 GD

1 Current supply

Identification	Designation	Place of installation	Current path
C2	Suppression capacitor	Alternator	21
G1	Battery	Engine compartment	3
G2	Alternator	Engine	18
M1	Starter	Engine	10
Fa	Fuse, trailer device	Electrics compartment	28
X58	Socket, trailer device	Rear end	27/28/29
X5/1	Line connection, interior	Electrics compartment	23/24/26
X5/4	Line connection, alternator, 2-pole	Engine compartment	22/23/24
X5/5	Line connection, front wall, 2-pole	Engine compartment	9/10/11

2 Preheating and starting control

Identification	Designation	Place of installation	Current path
B11/7	Temperature transmitter (preheating)	Engine	32
B13	Temperature transmitter, coolant indicator	Engine	33
N14	Preheating time relay	Engine compartment	44
R9	Glow pługs	Engine	39 – 44
S2/2	Glow plug and starter switch	Drive switch	59
X59/2	Connector, temperature sensor, coolant	_	32/33
X26/12	Connector, transmission, 6-pole	Engine compartment	48

3 Headlight

Identification	Designation	Place of installation	Current path
E1	Light unit, left	_	93
E2	Light unit, right		96
E4e3	Reversing light, right	_	100
E1e3	Side light/parking light, left	_	64
E2e3	Side light/parking light, right	_	67
E3e2	Tail light/parking light, left	-	62
E4e2	Tail light/parking light, right	_	66
Ē4e5	Rear fog light	_	86
E5/1	Fog light, left	-	83
E5/2	Fog light, right	-	84
E5x1	Intermediate plug-and -socket connection, fog lights, 2-pole		81/83

3 Headlight (continued)

Identification	Designation	Place of installation	Current path
F1	Fuse, tail light, left, parking light, left	Electrics compartment	62
F2	Fuse, tail light, right, parking light, right	Electrics compartment	66
F3	Fuse, front fog light, rear fog light	Electrics compartment	69
F4	Fuse, high beam, left	Electrics compartment	92
F5	Fuse, high beam, right	Electrics compartment	94
F6	Fuse, low beam, left	Electrics compartment	96
F7	Fuse, low beam right	Electrica compartment	98
S1	Headlight rotary switch	Instrument panel	81
S16/2	Reversing light	Main shift lever	100
X18	Plug-and-socket connection, 8-pole	Engine compartment	86/100
X52	Connector, trailer device, 8-pole	Engine compartment	63/77/85
X58	Socket, trailer device, 13-pole	Rear end	63/77/85
K26/12	Connector, transmission, 6-pole	Engine compartment	100

4 Windscreen wiper, heater blower, air circulation

Identification	Designation	Place of installation	Current path
E9/1	Illumination, heater control	Middle console	132/134
E13/2	Glove compartment lamp with switch	-	123
F8	Fuse, windscreen wiper, reversing light	Electrics compartment	112
F9	Fuse, heater fan, air circulation, Glove compartment lamp	Electrics compartment	123
M2	Blower motor	Under instrument panel	127
M2/4	Servo motor, air flap (front wall)	Engine compartment	139
M2/4x1	Connector, servo motor, air flap (front wall) 2- pole	Engine compartment	137/138
M6/1	Wiper motor	Engine compartment	111
N 12	Interval wiper electronics	Electrics compartment	102
64s2	Headlight flasher switch	Combination switch	112
64s3	Dimmer switch	Combination switch	120
64s4	Washer unit switch	Combination switch	120
64s5	Switch, wiper speed	Combination switch	112
524	Switch, fresh air/air circulation	Instrument panel	140
24/1	Switch, warm air/cold air (heating systems)	Instrument panel	125
(8/5	Connector, rear end door and windscreen wiper, 2-pole	Rear end	105/106

Identification	Designation	Place of installation	Current path
E3e4	Stop light, left	Large and safe this	144
E4e4	Stop light, right		148
F10	Fuse, stop lights, differential lock, instrument cluster, heated water jet	Electrics compartment	144
F11	Fuse, horn, flasher device, outside mirror adjustment, -heater	Electrics compartment	173
H1	Horn	In front of radiator	173/176
M21/1	Outside mirror, driver, electrically adjustable		155
M21/1r1	Mirror heating		158
M21/1x1	Connector, outside mirror, driver, electrically adjustable, 6-pole		154 – 159
M21/2	Outside mirror, passenger, electrically adjustable	-	164
M21/2r1	Mirror heating	_	167
M21/2x1	Connector, outside mirror, passenger, electrically adjustable, 6-pole	_	163 – 168
S 9	Stop light switch	Brake pedal	144
S4s6	Signal contact	Steering wheel	173
S50s1	Mirror adjustment, vertical, up/down	Middle console	152
S50s2	Mirror adjustment, horizontal, in/out	Middle console	165
S50s3	Mirror adjustment, left, right	Middle console	152
X52	Connector, trailer device, 8-pole	Engine compartment	146
K58	Socket, trailer device, 13-pole	Rear end	146

6 Rear window wiper, windscreen washer, rear

Identification	Designation	Place of installation	Current path
F12 .	Fuse, rear window washer Windscreen washer, rear	Electrics compartment	184
M5/3	Washer unit pump, rear end door	Rear end	204
M6/4	Wiper motor, rear end door	Rear end	190
M6/4x1	Connector, wiper motor, rear end door	Rear end	189 – 192
N12	Interval after wiper electronic (rear)	Electrics compartment	183
S4s4	Washer switch (rear)	Instrument panel	202
S4s7	Interval wiping	Instrument panel	194
X88/1	Intermediate plug-and-socket connector, washer pump, rear	Rear end	204/205

7 Turn signal, hazard light

Identification	Designation	Place of installation	Current path
A1e31	Turn signal indicator control, trailer	Speedometer	212
E1e5	Turn signal, front, left	-	237
E2e5	Turn signal, front, right	- 1	229
E3e1	Turn signal, rear, left		239
E4e1	Turn signal, rear, right	-	227
E6/1	Turn signal, left (on the side)	-	235
E6/2	Turn signal, right (on the side)	_	231
N9	Turn signal, hazard warning relay	Electrics compartment	213
S4s1	Turn signal flasher switch	Combination switch	234
S6	Hazard warning flasher switch	Middle console	215
X52	Connector, trailer device, 8-pole	Engine compartment	226/234
X58	Socket, trailer device, 13-pole	Rear end	226/234

8 Instrument cluster

Identification	Designation	Place of installation	Current
A1	Instrument cluster	Instrument panel	247
A1e1	Turn signal indicator control, left	Instrument cluster	255
A1e2	Turn signal indicator control, right	Instrument cluster	256
A1e3	High beam indicator light	Instrument cluster	258
A1e4	Fuel reserve warning	Instrument cluster	254
A1e5	Charging indicator lamp	Instrument cluster	242
A1e6	Check, brake wear indicator	Instrument cluster	245
A1e7	Check, brake fluid and parking brake	Instrument cluster	247
A1e8	Instrument lamp	Instrument cluster	261
A1e11	Check, coolant level	Instrument cluster	251
A1e13	Check, washer water level	Instrument cluster	253
A1e16	Preheater indicator	Instrument cluster	260
A1h1	Warning buzzer	Instrument cluster	264
A1p1	Temperature gauge, coolant	Instrument cluster	259
A1p2	Fuel gauge instrument	Instrument cluster	257
A1p3	Oil pressure gauge	Instrument cluster	266
A1p5	Revolution counter	Instrument cluster	267

8 Instrument cluster (continued)

Identification	Designation	Place of installation	Current path
A1p6	Clock	Instrument cluster	269
A1r1	Regulating resistor, instrument lamp	Instrument cluster	263
A1x1	Connector, instrument cluster, 4-pole	Instrument cluster	262/265/266
A1x2	Connector, revolution counter	Instrument cluster	267
A1x3	Connector, electronic clock	Instrument cluster	269
B4	Sending unit, fuel gauge	Fuel tank	256
B5	Sending unit, oil pressure gauge	Engine	266
L3	Speed sensor (starter ring gear)	Engine	269
S8	Warning buzzer contact	Doors	265
S10/1	Pick-up, brake linings, front, left	Brake calipers	243
S10/2	Pick-up, brake linings, front, right	Brake calipers	245
S11	Switch, brake fluid gauge	Brake fluid reservoir	249
312	Switch, parking brake check	Parking brake lever	247
541	Switch, coolant level check	Expansion tank	251
542	Switch, windscreen water level check		253
-3x1	Connector, speed sensor		268/269
S10/1x1	Connector, contact sensor, brake linings, front, left, 2-pole	Brake caliper	243
S10/2x2	Connector, contact sensor, brake linings, front, right 2-pole	Brake caliper	245
(6/4	Connector sleeve, terminal 85 d (solder connector in set of lines)	-	264
(18	Connector, tail light set of lines, 8-pole	Engine compartment	254/257
100	Connector, TD signal		268/269

9 Radio, dome light

Identification	Designation	Place of installation	Current
A2	Radio	Middle console	282
E15/2	Dome light, front		287
F13	Fuse, radio, hazard warning system, clock Dome light, front, socket	Electrics compartment	278
S17/3	Door contact, front, left		295
S17/4	Door contact, front, right	_	297
X1	Connector, rear end, left (bass)	_	272/273
X1	Connector, rear end, left (super tone)	_	275/276
X1/1	Connector, rear end, right (bass)	_	284/285
X1/1	Connector, rear end, right (super tone)	_	287/288
K1/2	Connector, front speaker, left	_	278/279
K1/3	Connector, front speaker, right	_	281/282

10 Dome light, rear compartment, rear window heater, cigar lighter

Identification	Designation	Place of installation	Current path
E9/7	Illumination, ashtray, front		320
E15/8	Dome light, rear compartment, left	_	307
E15/9	Dome light, rear compartment, right		309
E19/1	License plate light, left		328
E19/2	License plate light, right		329
E28	Test lamp (fuses)	Electrics compartment	302
E28x1	Connector, test lamp, 2-pole	-	302
F14	Fuse, dome light, rear compartment heated rear window	Electrics compartment	307
15	Fuse, radio, cigar lighter	Electrics compartment	210
(13/1	Relay, heated rear window	Electrics compartment	319
R1	Heated rear window	_	311
Riei	Indicator lamp, heated rear window		312
13	Cigar lighter	Ashtray	310
14	Switch, heated rear window	Middle console	318
17/6	Door contact, rear, right	Wilddie Console	314
18	Switch, dome light, rear compartment	Middle console	307
6	Cable connector 58 d	_ middle collsole	305
18	Connector, tail light set of lines, 8-pole	_	323 – 327
101	Intermediate plug-and-socket connection, plug strip SA 15 R	_	328 322

Key to current flow diagram 250/300 GE (continued)

11 Differential lock

Identification	Designation	Place of installation	Current path	
E29	Warning lamp, differential lock	Instrument cluster		
E30	Switch-on monitor, differential lock, interaxle diff.	Switch LA	347	
E31	Switch-on monitor, differential lock, RA	Switch HA	359	
E32	Switch-on monitor, differential lock, FA	Switch VA	373	
K34	Relay, differential lock, interaxle diff.	Electrics compartment	341	
K35	Relay differential lock RA	Electrics compartment	-353	
K36	Relay, differential lock, FA	Electrics compartment	366	
N11/7	Time relay, differential lock	Electrics compartment	335	
R2/1	Heating systems for water jets	_ 11.101	332	
S93	Switch, differential lock, interaxle diff.	Middle console	345	
S94	Switch, differential lock, RA	Middle console	357	
S95	Switch, differential lock, FA	Middle console	370	
S96	Switch, functional check, interaxle diff.	Middle console	376	
S97	Switch, functional check, RA	Middle console	378	
S98	Switch, functional check, FA	Middle console	380	
S96e1	Function indicator lamp, interaxle diff.	Switch LA	382	
S97e1	Function indicator lamp, RA	Switch HA 38		
S98e1	Function indicator lamp, FA	Switch VA	386	
X18	Connector, tall light set, 8-pole	-	376/378/380	
X46	Connector, indicator lamps, ABS, 3-pole	-	376/378/380	
X102	Connector, incoming supply, switch, interaxle diff., ABS	_	345	
X103	Connector, differential lock, FA		358	
X104	Connector, differential lock, FA, terminal 15		382	
Y68	Solenoid valve, differential lock, interaxle diff.	Engine compartment	340	
Y69	Solenoid valve, differential lock, RA	Engine compartment	352	
Y70	Solenoid valve, differential lock, FA	Engine compartment	365	

Key to current flow diagram 250/300 GD (continued)

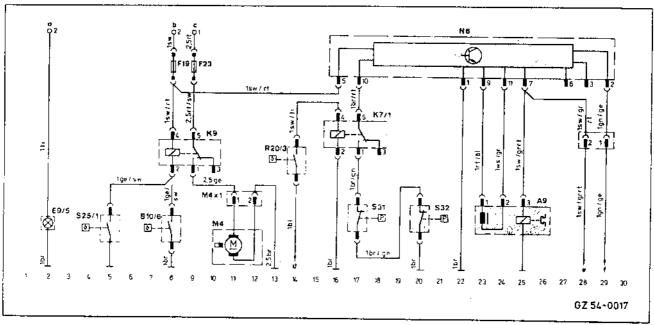
12 Plug-and-socket connections, trailer socket

Identification	Designation	Place of installation	Current
X18	Connector, tail light set of lines, 8-pole	Engine compartment	394
X26/12	Connector, transmission, 6-pole	Engine compartment	394
X52	Connector, trailer device, 8-pole	Engine compartment	404
X58	Socket, trailer device, 13-pole	Rear end	410

13 ELR electronic idle speed control (only in 300 D)

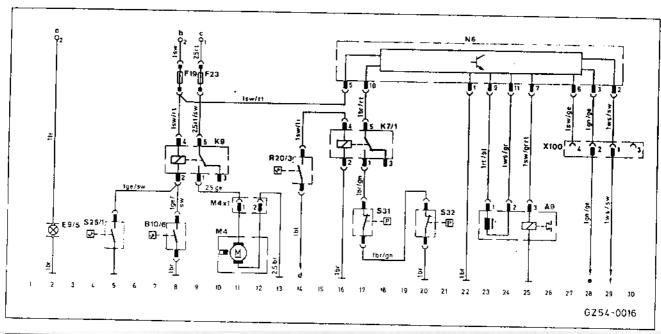
Identification	Designation	Place of installation	Current
B11/1	Temperature sensor, coolant, electronic idle regulation (ELR)	Engine	429
Fb	Fuse, overvoltage suppressor	Basic module	438
L3	Speed sensor	Engine	431
L3x1	Connector, speed sensor	_	431/432
N8	Control unit, ELR	Electrics compartment	431
N16/1	Basic module, overvoltage suppressor	Electrics compartment	440
X11	Diagnostic unit	Engine compartment	426/427
X100	Connector, TD signal	-	422/423
Y22	Regulating magnet, ELR	Engine compartment	435

Current flow diagram, air conditioner 230/300 GE



Identification	Designation	Place of installation	Current path
a	Cable connector X6/4 (58 d) Kl.2	_	2
b	Cable connector X5/1 3-pole Terminal 2	_	8
С	Cable connector X5/1 3-pole Terminal 1	-	9
d	from blower	_	14
е	to CIS-E III, terminai 15	_	28
f	TD	_	29
B10/6	Temperature sensor, evaporator	-	8
E9/5	Indicator lamp, temperature regulator	-	2
F19	Fuse,	Electrics compartment	8
F23	Fuse,	Electrics compartment	9
К9	Relay 1	Electrics compartment	10
K7/1	Relay 2	Electrics compartment	18
M4	Auxiliary fan	in front of radiator	10
M4x1	Connector, auxiliary fan	-	11/12
N6	Control unit, refrigerant compressor	Electrics compartment	22
R20/3	Temperature regulator	Middle console	14
S25/1	Temperature switch 100°C	Engine	5
S31	Low pressure switch	Expansion tank	17
S32	High pressure switch	Expansion tank	20
X100	Connector, TD signal	_ ,	28/29
Y5/1	Electr. magnetic clutch, refrigerant compressor	Engine compartment	25

Current flow diagram, air conditioner 250/300 GD

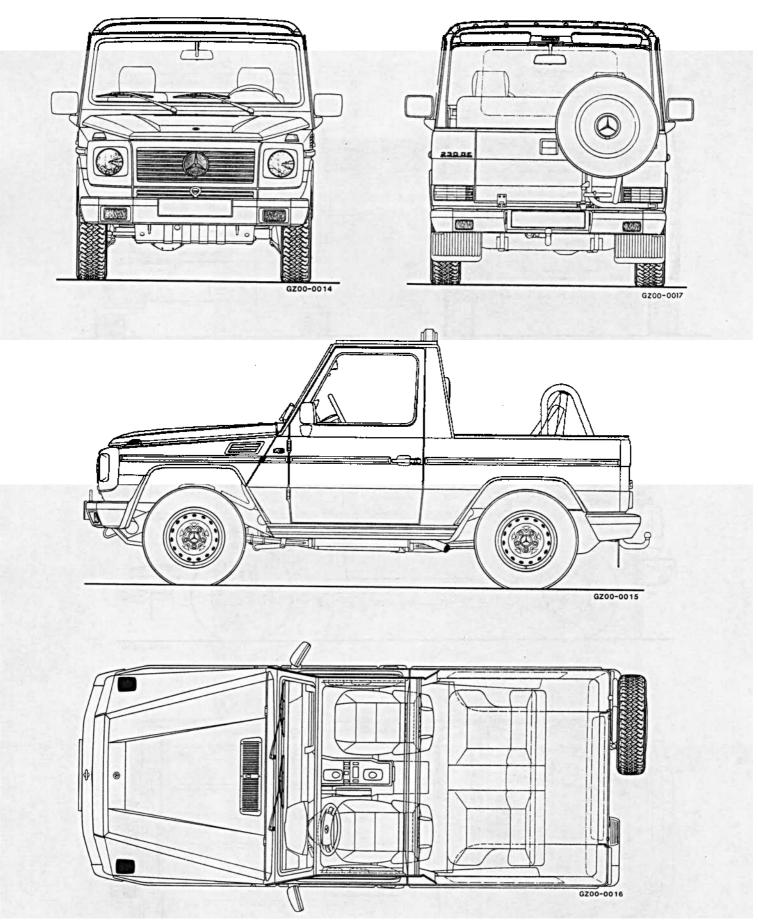


Identification	Designation	Place of installation	Current path
a	Cable connector X6/4 (58 d) Kl.2		2
b	Cable connector X5/1 3-pole, terminal 2		8
С	Cable connector X5/1 3-pole, terminal 1		9
d	from blower		14
Э	to revolution counter	_	28
	with OM 602 to connector, speed sensor, terminal 2 in OM 603 to ELR, terminal TD	_	29
310/6	Temperature sensor, evaporator	_	8
E9/5	Indicator lamp, temperature regulator	i _	2
19	Fuse,	Electrics compartment	8
23	Fuse,	Electrics compartment	9
(9	Relay 1	Electrics compartment	10
(7/1	Relay 2	Electrics compartment	18
14	Auxiliary fan	in front of radiator	10
14x1	Connector, auxiliary fan	_	11/12
16	Control unit, refrigerant compressor	Electrics compartment	22
20/3	Temperature regulator	Middle console	14
25/1	Temperature switch 100°C	Engine	5
31	Low pressure switch	Expansion tank	17
32	High pressure switch	Expansion tank	20
100	Connector, TD signal	-	28/29
5/1	Electr. magnetic clutch, refrigerant compressor	Engine compartment	25

Body Installation survey

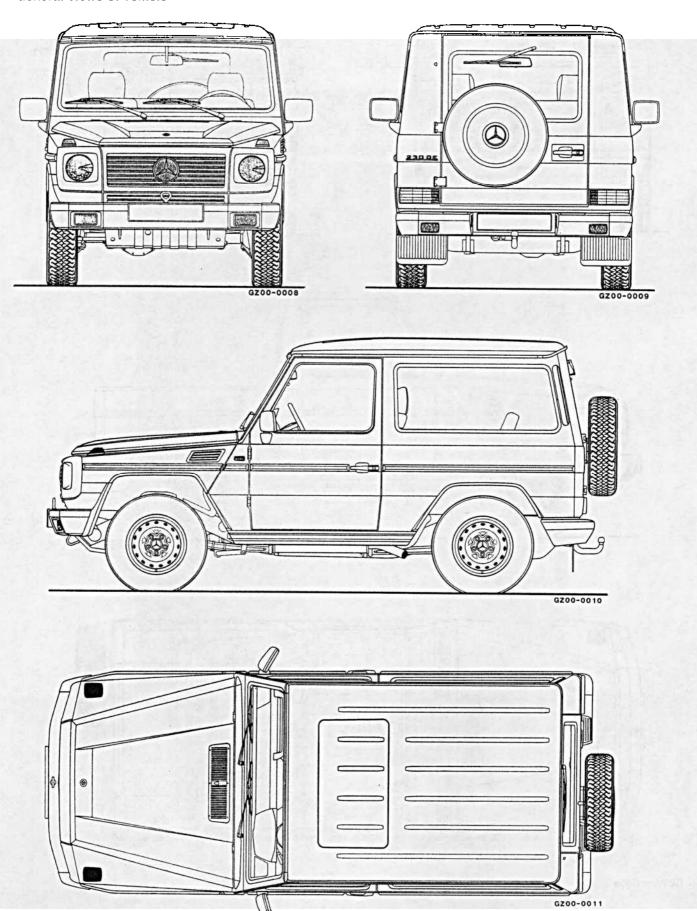
Chassis		Body		Wheelbase	
Model	Sales designation	Model	Version		Installation
463.200	200 GE 4 x 4	463.512	Convertible	2 400 mm	Standard
.220		463.532	Station wagon		
.221		463.582		2 850 mm	
463.204	230 GE 4 x 4	463.512	Convertible	2 400 mm	
.224		463.532	Station wagon	Filler et	START THE
.225		463.582		2 850 mm	See Park Toning
463.207	63.207 300 GE 4 x 4	463.518	Convertible	2 400 mm	
.227		463.538	Station wagon		
.228		463.588		2 850 mm	
463.304	250 GD 4 x 4	463.513	Convertible	2 400 mm	
.324	m yušų i įsa	463.533	Station wagon		
.325		463.583		2 850 mm	
463.307	300 GD 4 x 4	463.513 Convertible	2 400 mm		
.327		463.533	Station wagon		
.328		463.583	STATE OF THE STATE	2 850 mm	

General views of vehicle



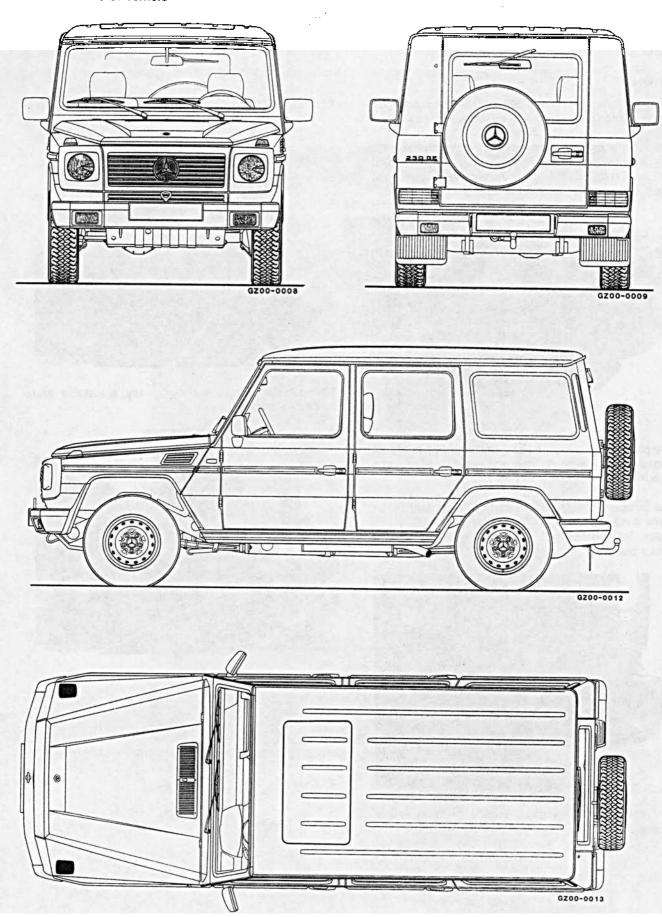
Convertible

General views of vehicle



Station wagon

General views of vehicle



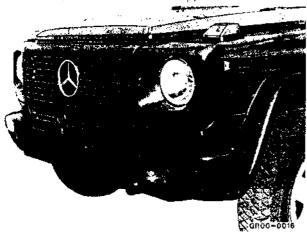
Station wagon - long wheelbase

Front end

General

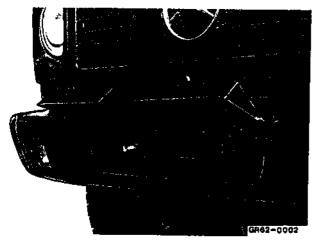
The headlight panel is of a new design as a plastic part and is painted the same colour as the rest of the vehicle.

The radiator grill including the panelling at the bottom is in a new design as a one-piece plastic part and is painted the same colour as the rest of the vehicle (plugged in at the bottom, screwed on at the top).



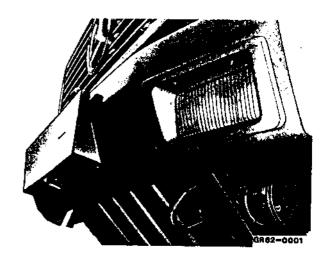
The panelling of the lower headlight panel, left and, right is designed as a plastic part and is painted the same colour as the rest of the vehicle.

The bumper, front is in three parts. The bumper center piece is made of steel, the corner parts of plastic, in two widths for vehicles with or without widened fenders, colour black.

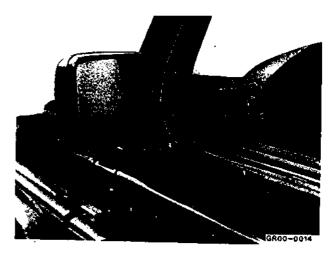


Jaw coupling as standard, licence plate mounting, folding.

Front fog lights are installed in the bumper as standard.



The outside mirrors are electrically adjustable and heated as standard.

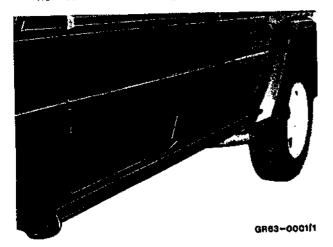


Side panel

General

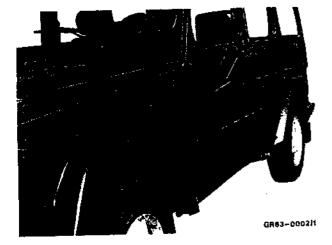
Rub rail, bottom, bonded. (step rail)

- Plastic, black
- new concealed mounting

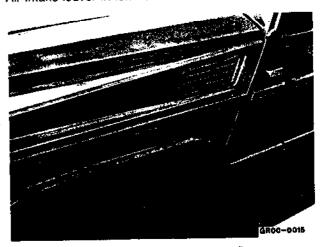


Rub rail, center, bonded.

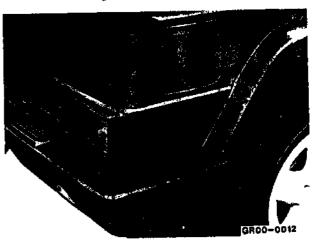
- New symmetrical profile with tapered end sections and anti-soiling surface.
- Colour black
- Concealed mounting



Air intake louver in left front fender



Tank filler neck, right, rear, under cover flap

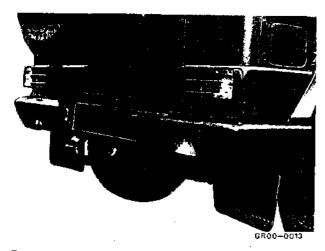


Rear panel, rear end

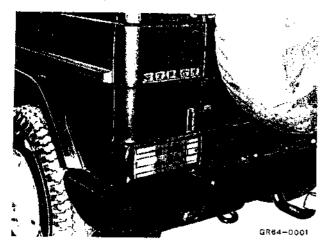
General

New bumper, rear, in plastic, in three-parts in 2 widths with area for licence plate. Integrated installation for standard rear fog light, left and standard reversing light, right. Step on rear bumper, painted black.

In SA jaw-type coupling the bumper is cut out in the center. The licence plate is attached on the left bumper half.



Rear lights with new profiled cover glass (ribbing), greater lens surface.

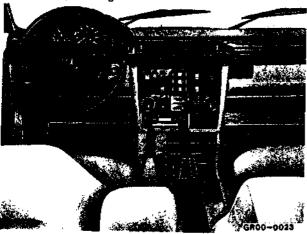


Type plate glued on over tail lamp, left.

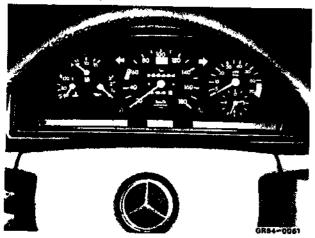
Interior fitting

General

Instrument panel, top and bottom section; rigid expanded plastic material covered with foam film; side air nozzles, rectangular.

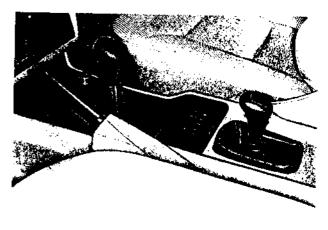


Glove compartment cover with side lock; Zebrano wooden stripping over the entire dashboard.



Instrument support W 124 with warning signal field "Differential lock"

Middle console extended down to tray; Lock actuation in the centre; control panel with horizontal electrical switches. Tray with optimally positioned shift and handbrake levers, front and rear ashtray in the tray.



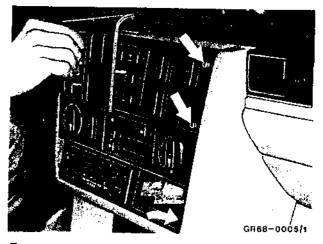
GR68-0002

Shift fields, middle console and tray in wood panelling (Zebrano)



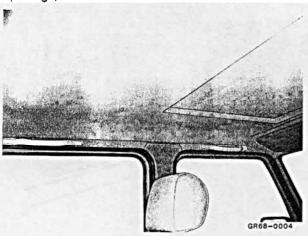
Assembly instruction:

The wood panelling is plugged on.



To remove the switches, release the support under the wood panelling.

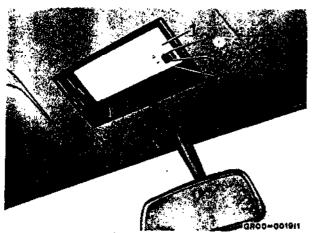
Headlining extended in one-piece down to the door openings, matched in colour.



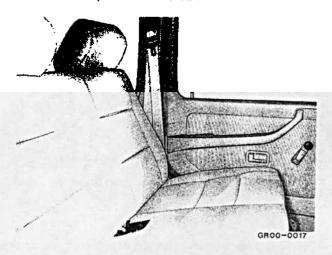
Dome light

Switch position

- 1 Dome and reading light switched on
- 2 Dome and reading light switched off
- 3 Reading light switched on
- 4 Dome light is switched on and off with delay by the door contact.



New side trim, orientated to car.



Floor
Carpeting new due to modified body contour.

Seat belt with automatic retraction.

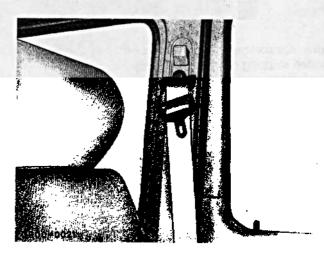
Adjustable seat belt mounting in B pillar and in station wagon, 5-door in C pillar. Seat belts in same colour as interior fittings.

Three-point seat belt

Vertical adjustment: the belt is adjustable (4 positions).

- Upward: push the belt adjuster up, the belt adjuster must audibly engage.
- Downward: pull knob and push belt adjuster downward. Let go of knob, the belt adjuster must audibly engage.

Adjust height of belt in such a way that the belt runs over the center of the shoulder.



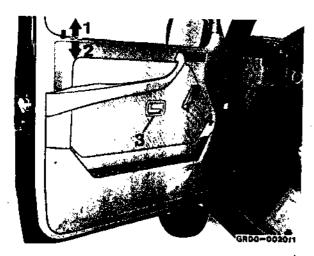
The belt warning light it to remind you to put on seat belts before moving off. It switches off automatically after brief flashing.



Doors

General

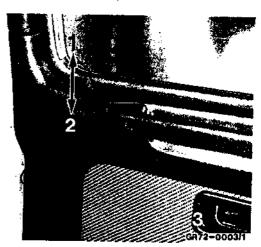
New designed door linings, new designed handle and door opener, modified door pocket. All painted areas are lined.



Door actuation, inside and window operation

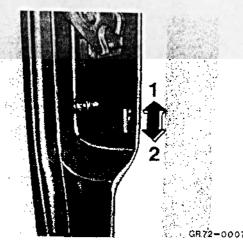
- 1 Door securing device, unlocked
- 2 Door securing device, locked
- 3 Opening lever Pull handle forward to open
- 4 Window lifter

Fully lined inside of rear door with integrated grip



Actuation, inside

- 1 Door securing device, unlocked
- 2 Door securing device, locked
- Opening lever
 Pull handle forward to open



Child lock - rear compartment doors and rear end door

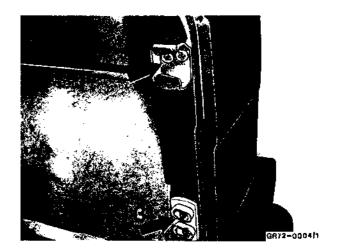
Actuating safety lever (for example with the key of the steering lock)

- 1 Released
- 2 Secured Door cannot be opened from within. The unlocked door can be opened from the outside.

Adjustment

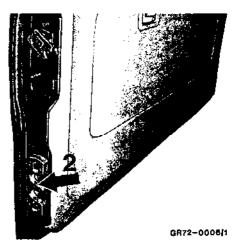
Note: The adjustment is carried out with opened side window and is basically the same for all doors.

- 1 Open door, release door lock striker (1 and 2) as well as closing plate (3) on door pillar.
- 2 Approximately adjust door lock striker (1) at door pillar.
- 3 Move closing plate (3) on the door pillar right out.
- 4 Close door, check depth adjustment with ruler (check point approx. 10 mm over the bead).
- 5 Open door, adjust door lock striker (1) at door pillar and tighten.





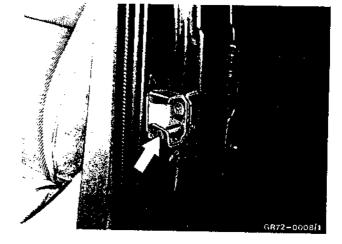
- 6 Tighten door lock striker (2) at rear end door.
- 7 Move closing plate (3) at door pillar right out.
- 8 Close door, tightened door lock striker (2) adjusts loosely mounted closing plate (3).
- 9 Open door, release closing plate (3) at door pillar.
- 10 Close door, check adjustment and ease of movement.



Adjustment

Note: The adjustment is carried out with opened side window and is basically the same for all doors.

- 1 Open door, release door lock striker 1 at door pillar.
- 2 Approximately adjust door lock striker 1 at door pillar.



- 3 Close door, check depth adjustment with ruler (check point approx. 10 mm over the bead).
- 4 Open door, adjust door lock striker 1 at door pillar and tighten.
- 5 Close door, check adjustment and ease of movement.

 $x\in \mathbb{R}$



Pop-up/sliding roof

General

The pop-up/sliding roof installed in the car type 126 is installed in the cross-country vehicle as a special version 28 739 (Code D 27).

Actuation

Insert key in steering lock and turn to drive position.

Actuate switch:

- 1 Open
- 2 Close
- 3 Raise
- 4 Lower

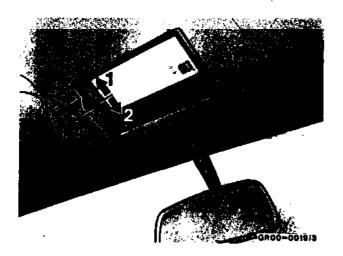
Emergency actuation

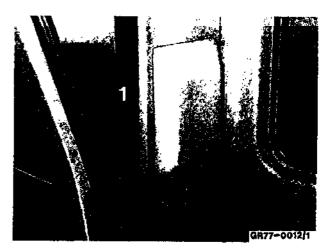
The emergency actuation is on the door pillar, rear, left.

- Remove edge protection and rear wall panelling.
- Attach box wrench size 17 on the hexagon head.

Direction of rotation:

clockwise = closing from pop-up/siding roof position. counterclockwise = closing from lifted position.





1 Edge protection2 Rear wall panelling

306

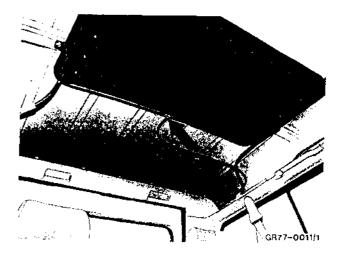
Removal and installation

1 Remove headlining.

Note: The headlining is screwed at the front and back and clipped at the sides.

2 Remove cable on pop-up/sliding roof.

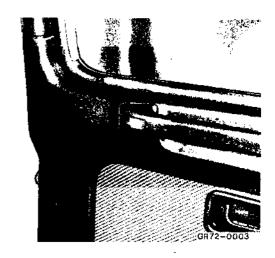
Further removal and installation is the same as with the car 126, Repair Manual, body, assembly work II.



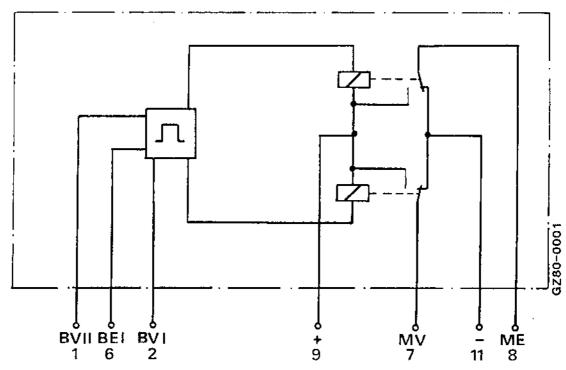
Central locking system

General

The central locking system (multi-position actuation) can be actuated at the driver, passenger, or rear end door. The locking pins in the doors serve as a checking means.



Block diagram



Assignment of terminals

BVI	Input, motor, locking
BV II	Input, motor, locking
BE I	Input, motor, unlocking
MV	Output, motor, locking

ME Output, motor, unlocking

+ Input plus- Input minus

Function

When **unlocking**, a frame potential is applied to BE, I whereupon plus potential is available via output ME for approx. 0,7 scnd.. (MV is still connected to frame)

Result → all motors unlock

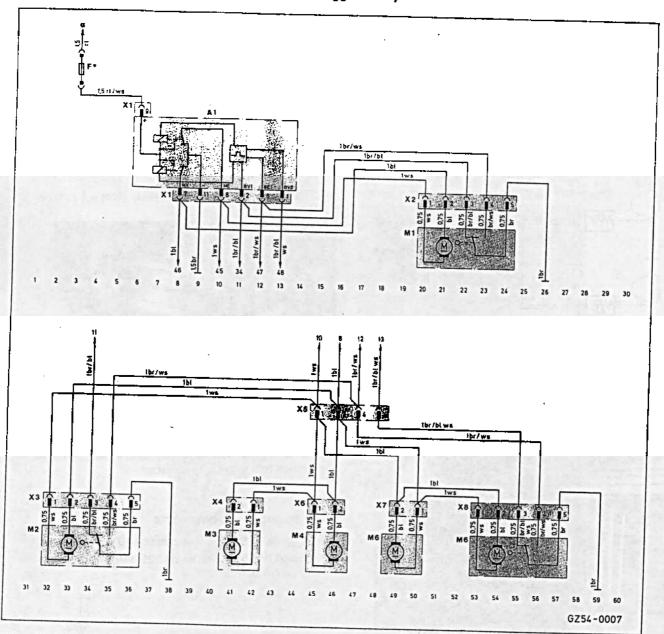
When **locking**, frame potential is applied to BV, I, whereupon plus potential is available via output MV for approx. 0,7 scnd.. (ME is still connected to frame)

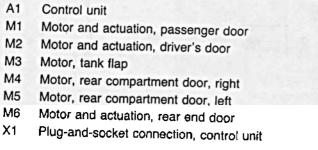
Result → all motors lock

Overload protection

After more than 15 potential changes (close, open) within 2 minutes, the system is blocked by the control electronics for approx. 20 seconds.

Circuit diagram - central locking system (station waggon 2850)





X2 Plug-and-socket connection M1
X3 Plug-and-socket connection M2
X4 Plug-and-socket connection M3
X5 Plug-and-socket connection, incoming supply, rear
X6 Plug-and-socket connection M4
X7 Plug-and-socket connection M5
X8 Plug-and-socket connection M6
a Cable connector electrics compared material and the connection M6
a

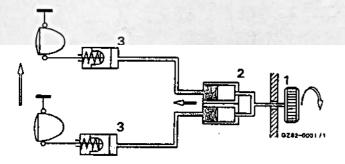
Headlight range adjustment

General

As of January 1990, in the Federal Republic of Germany, there is a specified headlight range adjustment.

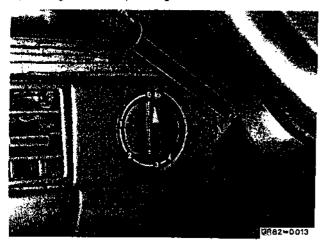
Function

By turning the operating knobs (1) to the right, the double piston (2) in the sending unit displaces fluid (Glycol-water mixture) which shifts the actuator piston (3) forward against the spring force. The actuators are secured to the headlight in such a way that the low beam light beam is raised.

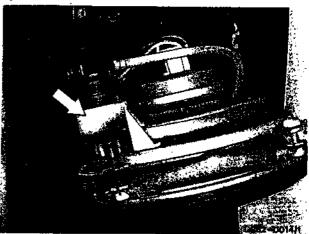


- 1 Operating knobs
- 2 Double piston
- 3 Actuator piston

The headlight range can be infinitely adjusted at the operating knobs, depending on the load



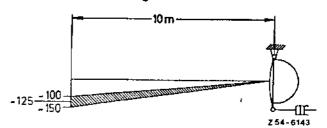
The transmission takes place in a closed hydraulic system.



Neither repair nor bleeding is possible. If there is a fault the system has to be fully replaced.

Basic setting of the headlights

- 1. Bring adjusting knob into position "0".
- Position headlight low beam 125 mm below the official centre of headlight.



Adjustment example

snort wheelbase	long wheelbase	
0	0	Driver's seat or driver and passenger seat occupied.
1	0	Driver's seat, passenger seat and rear seat bench occupied.
3	1	Driver's seat, passenger seat and rear seat bench occupied as well as 150 kg load in the rear compartment.
1	1	Driver's seat occupied and 150 kg load in the rear compartment. Driver's seat occupied and 400 kg load in the rear compartment.
4	2	Driver's seat occupied and 475 kg load in the rear compartment.

Windscreen washer

Windscreen wiper

The form and function of the wiper system have bee redesigned. There is a change in the inclination of 6°. This results in a greater contact pressure of the wiper blades. The wiper arms and blades are reinforced. The double water jet for the windscreen washer system is heated.



Radio

General

The following are available as special versions

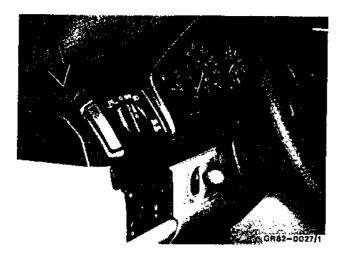
- AntennaCode E 54
- Antenna, automatic
 Code E 68
- Radio Becker
 Code E 09/60/62/64/96/97
- Rear speakers with fade control Code E 08

New feature

To improve the sound quality of the radios, in addition to the two speakers in the footwell, there are two super tones installed in the instrument panel.



Loudspeaker in footwell



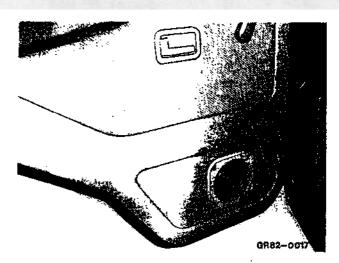
Super tones in instrument panel

Changes

The arrangement of both rear speakers in the new crosscountry vehicle models has been changed as follows:

With the convertible or the short station wagon, the loudspeakers are installed in the rear compartment side trim.

With the long station wagon, the loudspeakers are integrated in the rear side doors.



Air conditioner

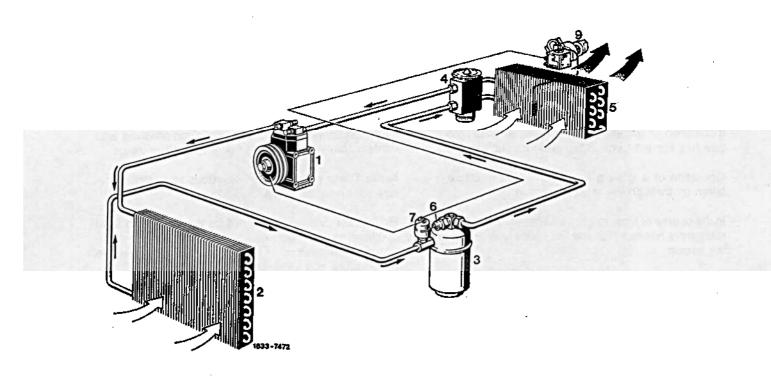
Circuit of the refrigerant

The refrigerant compressor (1) driven by the engine sucks up the heated, gaseous refrigerant R 12 which is under slight pressure and forces it to the condenser (2). The wind caused by the travelling vehicle flows through the condenser which is arranged in front of the radiator and cools the refrigerant vapour, which is under high pressure and additionally heated by the compression process, up to its liquefaction. The now liquid refrigerant enters the receiver (3). The filter-drier installed in the receiver removes any remaining water from the liquid refrigerant in order to prevent an icing up of the expansion valve (4).

A sight glass on the side of the receiver makes it possible to check that there is sufficient refrigerant in the system. With the system switched on, the refrigerant must flow through free of bubbles.

From the receiver the refrigerant flows to the expansion valve. The liquid refrigerant which is under high pressure is brought to expand and is thus reduced to low pressure by the expansion valve located on the evaporator. The evaporation heat required for this is withdrawn from the air running through the evaporator. The air is cooled.

The vaporized refrigerant is drawn in by the refrigerant compressor and is compressed again. The circuit is thus closed.



- 1 Refrigerant compressor with electro-magnetic clutch
- 2 Condenser
- 3 Receiver with filter drier and sight glass
- 4 Expansion valve

- 5 Evaporator
- 6 High pressure switch
- 7 Low pressure switch
- 9 Temperature switch (anti-icing)

Structure and function

General notes

It is to be particularly ensured that no moisture enters the cooling circuit, otherwise considerable damage can be caused.

As refrigerant and drier can absorb different percentages of water, depending on temperature and condition, there is a possibility that when the refrigerant cools down water is discharged. This water freezes at the valve seat of the expansion valve and in this way puts the system out of operation.

A frozen valve is recognized in that the intake pressure is very low and the coolant overheating very great, or if the intake line up to the compressor ices up.

It would be wrong to look for a remedy in the warming of the valve by means of a flame or by filling with alcohol.

Not only the occurrences listed are due to moisture in the circuit. As water and refrigerant form a chemical compound, e.g. highly concentrated acid, the cooling circuit is attacked from within and destroyed.

Moisture can enter into the circuit in the following ways:

- Assembly of a system in damp weather conditions, outdoors.
- Installation of unsealed components in which moisture has formed through temperature fluctuations.
- Operation of a leaking system in which moisture is taken up through the leaking position.
- In the course of time, moisture penetrates through the refrigerant hoses which are not 100% leak proof into the circuit.
- Intake of moisture when topping up refrigerants, if e.g. the air supply lines were not plugged.
- Through filling refrigerator oil out of non-sealed containers, or through filling with refrigerator oil which is not dry.

Safety precautions - refrigerant R 12

The refrigerant R 12 is a well known safety refrigerating agent. That is, this refrigerant is not inflammable or explosive, is practically non-toxic, is not an irritant and is odorless. Nevertheless the following points should be observed:

Avoid any contact with liquid refrigerant. Skin which does come into contact should be treated as in the case of frostbite. Wear safety goggles to protect eyes If nevertheless refrigerant enters the eye, contact a physician immediately.

When carrying out repairs on the air conditioner, the system must be drained. Gaseous refrigerant must not be drained in enclosed areas. As it is heavier than air, there is a risk of suffocation in installation pits.

On no account clean parts of the system inside with hot vapour. For cleaning only use nitrogen or refrigerant R 12.

Do not carry out welding jobs on parts of the closed system or in the immediate surroundings. Independent of the fact as to whether the system is filled with refrigerant or not, the heating causes a high overpressure which can lead to damage in the system or even to an explosion. Refrigerant R 12 is totally non-toxic at normal temperatures, however when coming into contact with with flames or high temperature it decomposes into hydrogen fluoride. These decomposition products also contain chlorine and phosgene among other things.

Note: These products are hazardous to health, therefore care must be taken.

Refrigerant cylinders must not be thrown and in filled condition must not be exposed to extended solar radiation or other sources of heat. The highest permissible temperature of a filled refrigerant cylinder is 40°C.

If a part of the air conditioner is damaged or leaking, e.g. through an accident of the vehicle, the system must remain switched off, otherwise the refrigerant compressor is damaged as a result of there being no cooling and lubrication.

For reasons concerning environmental protection, R 12 must always be pumped out into appropriate containers and appropriately disposed off!

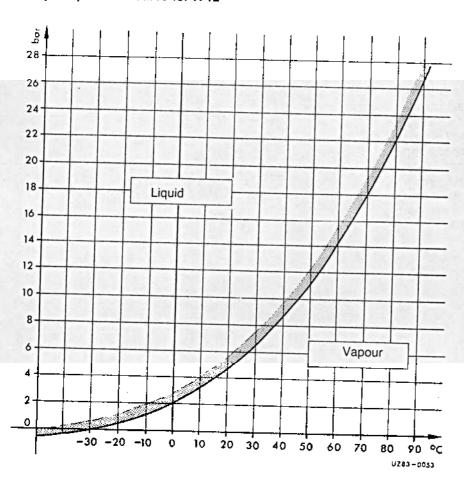
Refrigerant

The term "refrigerant" refers to the liquid used in a cooling system, which produces a low temperature by withdrawing heat from the air in the passenger compartment and fresh air. The refrigerant R 12 is used in air conditioner systems in vehicles as it is the safest available means. Under extreme temperature fluctuations refrigerant R 12 remains chemically stable.

Refrigerant R 12, based on its chemical stability, is ideal with high or low temperatures. Its behaviour towards most metals is neutral. When handled correctly it is, both in gaseous and liquid form, neither inflammable nor explosive. It is directly harmless to organic and biological life. Special disposal must be ensured.

R 12 has a boiling point of -30° C at 0 bar technical pressure, i.e a vessel filled with R 12 and placed on a block of ice would boil over. It thus has ideal properties for a refrigerant used as a heat exchanger.

Vapour-pressure curve for R 12



Temperature of R 12° C	Pressure bar
-50 -40 -30 -20 -10 0	- 0,39') - 0,64') 0,00 0,51 1,19 2,08 3,24
15 20 22 24 26 28 30	3,24 3,92 4,68 5,02 5,24 5,70 6,05 6,47
35 40 50 60 70 80 90	7,50 8,63 11,24 14,33 17,96 22,19 27,09

1) Vacuum

Based on the vapour-pressure curve for R 12 it can be seen that e.g. at a constant pressure, with a decrease in temperature the vapour changes to liquid (condenser), or e.g. through pressure reduction, the refrigerant changes from liquid form into vapour form (evaporator).

Refrigerant compressor

The compressor functions as a pump in that it draws in the refrigerant, compresses it and forces it back into the circuit. One of the separation points between high and low-pressure part of the circuit is the valve plate of the compressor.

Refrigerant compressors are only suited for compressing gas. If liquid is drawn in, the compressor is damaged.

Function

Cold low pressure gas is drawn in by the compressor from the evaporator. This gas cools the compressor. In the compressor, the gas is compressed wherein it is heated and is forced to the condenser (high pressure section).

The compressor with electromagnetic clutch is driven via V-belt directly from the vehicle engine. This type of drive results in a permanently changing compressor speed. The speed range lies between 650 and 5500/min. A well designed system enables the fast cooling down of the passenger compartment heated up in the sun. In order to achieve this, also at reduced engine speed, the compressor must be in the position to pump large amounts of refrigerant through the system. If the interior is cooled down or the compressor speed when travelling is high, the compressor output is greater than required. These operating conditions make it clear that the compressor is usually over-dimensioned.

Note

Prior to each refilling with refrigerant or following repairs, check the oil level in the refrigerant compressor and top up oil if necessary.

Only use approved refrigerants or refrigerator oil according to the Service Product Specifications.

Only store removed compressors with magnetic clutch pointing downward.

Operate refrigerant compressor also during the cold season for approx. 10 minutes every month. The crankshaft gasket may otherwise start to leak. Do not replace a leaking crankshaft gasket immediately, often after a running time of approx. 10 minutes the sealing is satisfactory again.

Always renew the receiver (drier) when carrying out repair jobs on the refrigerant system.

Refrigerator oil

The refrigerator oil is required for lubrication of the expansion valve and the refrigerant compressor.

The non-foaming refrigerator oil, developed specially for air conditioners, is filled into the refrigerant compressor.

In the refrigerant compressor a part of the refrigerator oil mixes with the refrigerant and enters the cooling circuit.

Refrigerator oil is a highly distilled mineral oil out of which all contamination such as wax, moisture and sulphur has been removed.

Handling refrigerator oil

- Only use approved refrigerator oils, see MB Service Product Specifications.
- Use oil only once.
- Always make sure that the oil container is tightly closed when not being used.
- Avoid contamination of the oil.

Checking and topping up oil level in refrigerant compressor

General notes

The oil charge of the refrigerant compressor must be checked before any refrigerant recharge or in the event of refrigerant or oil loss.

As a certain oil quantity is absorbed by the refrigerant and enters into the system, there may also be a loss of oil when there is a refrigerant loss.

The oil level in the compressor must never fall below a minimum level of 180 cm³ or exceed a maximum of 300 cm³.

Too much oil is detrimental for the operation of the system and also leads to reduction in performance of the air conditioner.

All refrigerant compressors are filled at the manufacturer's works with refrigerator oil.

When topping up refrigerant from the minimum level to the maximum level it is not required to check the oil level in the refrigerant compressor. If more than 1 kg refrigerant has to be topped up, then the oil level must be checked.

If the refrigerant compressor is removed due of leaks, the oil level in the refrigerant compressor must be adjusted by recharging.

If the refrigerant compressor is renewed, the total refrigerator oil must be drained out of the new refrigerant compressor.

Drain the refrigerator oil out of the old refrigerant compressor, gauge the capacity by litres, fill measured quantity and new refrigerator oil into the new refrigerant compressor. Refrigerator oil of the new refrigerant compressor can be used.

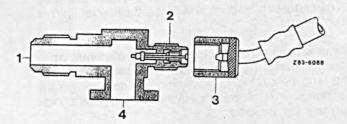
Never top up with engine or motor oil.

Service valves on the refrigerant compressor, Nippondenso

Schrader valve

Note:

The Schrader valve is opened by a thrust pin in the test hose (3) during the connecting. After disconnecting the hose the valve closes automatically. Screw on safety cap.



Function

The condenser comprises a coil pipe and plates so as to attain the largest possible cooling surface. The plates are firmly connected to the pipes in order to achieve a good heat transfer.

The hot refrigerant gas of 60 to 100°C coming from the compressor is forced into the condenser at the top.

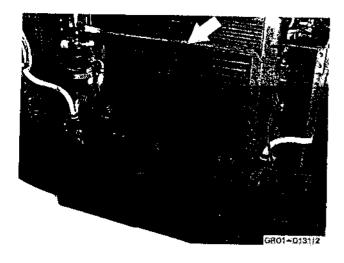
The coil pipe and plates absorb this heat very quickly. The ambient air is blown through the condenser, heats up and the refrigerant gas is cooled down at the same time. When the refrigerant cools down to a certain temperature, dependent on the pressure, the refrigerant condenses and becomes liquid. The liquid refrigerant discharges from the condenser at the bottom.

Valve on compressor housing

- 1 Hose connection
- 2 Filler and test connection
- 3 Filler and test hose with thrust pin
- 4 Compressor

Condenser

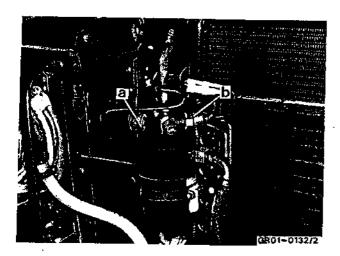
The output of the condenser is substantially influenced by air volume and air temperature. The direct ambient air has the most favourable air temperature. The ventilation is attained by the wind occurring when driving along or by wind and auxiliary blower.



Receiver with drier

The receiver with installed filter drier has the task of collecting the liquid refrigerant and if necessary bonding any moisture.

The receiver should be installed vertically at a well ventilated position.



Function

The liquid refrigerant enters the receiver at the side and collects.

In the receiver a solid drier flows through the refrigerant. This filters out dirt particles. The drier consists of silica gel and molecular sieves. These materials are agglomerated by means of resin to a solid body. Bumps and driving operations do therefore not cause any wear.

The drier can absorb 6 to 12 g moisture, depending on the version. The amount absorbed is dependent on the temperature. If for example a drier is saturated at a temperature of 40°C, at 60°C it discharges moisture again. Once the refrigerant has passed through the drier, it flows through an ascending pipe to the injection valve.

Check att the sight glass at the top that the flow is free of bubbles.

The fluid level can be seen immediately after switching off the clutch, by looking into the sight glass.

A fuse lets the refrigerant blow off, for safety reasons, at temperatures exceeding approx. 115 to 117°C.

After this the receiver is no longer usable.

On the receiver there are 2 pressure switches installed which in an emergency, e.g. in overheating or leaks in the refrigerant circuit, interrupt the mains supply to the refrigerant compressor.

a - High pressure switch 26 bar

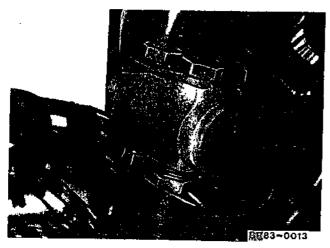
b - Low pressure switch 2 bar

Note:

Do not leave receiver unclosed. If traces of rust are to be seen, sight glass, renew receiver.

Thermostatic expansion valve

The thermostatic expansion valve has the important task of injecting so much refrigerant into the evaporator as can be optimally evaporated. This regulation must take place independent of ambient temperatures and compressor output and dependent on the evaporator pressure or the temperature at the evaporator outlet. The thermostatic expansion valve is furthermore a separation point between high and low-pressure section in the cooling circuit.

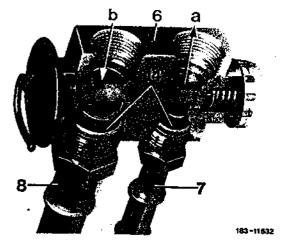


Function

The thermostatic expansion valve is installed in front of the evaporator inlet. Temperature sensor and pressure compensating line are connected to the evaporator outlet. If through drawing in refrigerant the pressure in the evaporator is reduced, the valve opens. The temperature sensor regulates the injected quantity. Only the amount of liquid refrigerant is injected into the evaporator which can be evaporated.

The adjustment of the thermostatic expansion valve guarantees the required superheating of the refrigerant of 2 to 4°C. This ensures that the entire refrigerant evaporates and only gaseous refrigerant is drawn off.

Refrigerant superheating is the temperature difference between evaporating temperature and measured temperature at the evaporator outlet.



Expansion valve (Cut)

- a to the evaporator
- b from the evaporator
- 6 Expansion valve (block valve)
- 7 O-ring fitting for hose line of receiver
- 8 O-ring fitting for hose line of expansion valve to refrigerant compressor
- 14 O-ring

Evaporator block

Task

The evaporator cools down the warm air from the inside of the vehicle or warm fresh air. Here the air to be cooled is drawn in through a fan (usually radial fan) and is injected after the cooling down through air channels and louvers at appropriate places back into the inside of the vehicle.

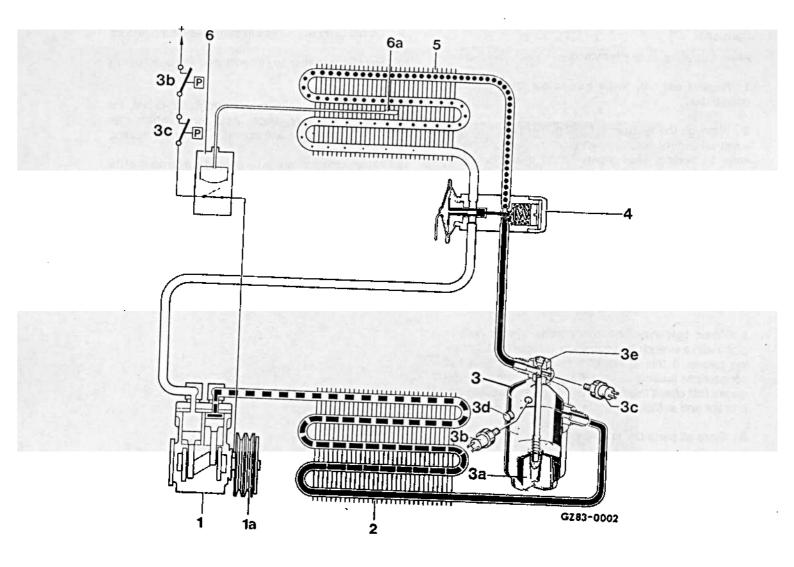
Function

The liquid refrigerant is injected several times into the evaporator block. Coil pipes and plates form the evaporator block. The heat necessary for the evaporation of the refrigerant is withdrawn from the passing air which subsequently cools down. A large evaporator surface is provided by the plates and a fast heat exchange ensured.

During the cooling down of the air, the air humidity condenses to water. The condensed water collects in the bottom section of the air conditioner box and is conducted to the open. The thus dehumidified air substantially improves the air condition in the vehicle.

An anti-icer protection switch interrupts the power supply to the refrigerant compressor at approx. + 2°C and in this way prevents an icing up of the evaporator block.

Diagram, refrigerant circuit



	Compressor Electromagnetic clutch Condenser Receiver Filter drier High pressure switch Low pressure switch	3d 3e 4 5 6	Sight glass Fuse Expansion valve Evaporator Temperature switch Temperature sensor	High pressure – liquid High pressure – gaseous Low pressure – liquid Low pressure gaseous
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Notes on repair

Caution!

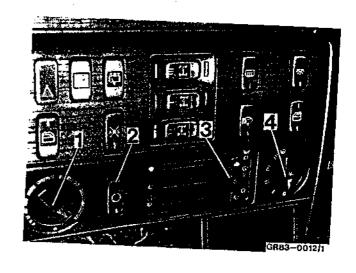
Always observe safety regulations.

- 1 Repairs are only to be carried out on drained air conditioner.
- 2 Although the system is drained, there can still be a small amount of pressure left when releasing connections. In such a case slowly let off pressure before completely releasing the connection.
- 3 When intervening in the refrigerant circuit immediately make all openings air tight with plugs.
- 4 During the assembly make particularly sure that all connections and sealing rings are satisfactory. It is recommended to always use new sealing rings. In order to prevent damage, always moisten sealing surfaces and gaskets with refrigerator oil.
- 5 When tightening the connections always hold in place with a wrench and tighten to the specified tightening torque. If this is not observed there is a risk of connections leaking. Before filling the system with refrigerant first check the oil quantity in the refrigerant compressor and sufficiently evacuate the entire system.
- 6 Store all parts dry and closed.
- 7 Blow through refrigerant hoses, pipelines, condenser and evaporator before installation with nitrogen or refrigerant R 12.
- 8 In the assembly of parts do not remove plugs until shortly before installation. Pay particular attention with the receiver with integrated drier. A drier which is not sealed is saturated with moisture after a short time and unusable.

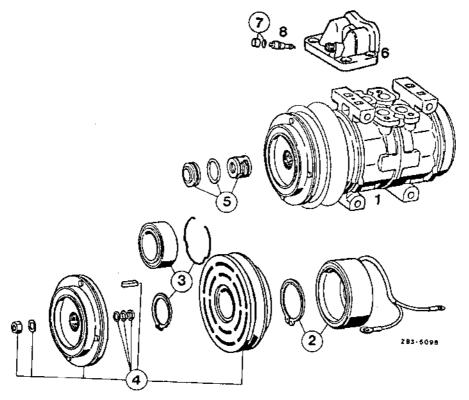
- 9 Do not carry out repairs in damp weather outdoors.
- **10** Renew drier after any intervention in the refrigerant circuit.
- 11 If there is moisture in the refrigerant circuit, the refrigerating capacity drops. Acid forms which then decomposes the drier and corrodes the entire system.
- 12 No welding jobs are to be carried out on parts of the closed refrigerant circuit or in the vicinity thereof.

Arrangement (switch)

- 1 Temperature switch
- 2 Switch, circulating air
- 3 Water regulating valve, heating system
- 4 Blower switch



Refrigerant compressor



Nippondenso 10 P 15 C

- 1 Refrigerant compressor
- 2 Solenoid coil
- 3 Cylindrical roller bearing
- 4 Pulley and pressure plate

- 5 Shaft seal
- 6 Connection fitting
- 7 Cap
- 8 Valve insert

Setting

Designation	
Gap between pressure plate and pulley	mm
	0,5 ± 0,15

Refrigerant compressor

Nippondenso 10 P 15 C

Note: The refrigerant compressor has no oil pan. In this way more refrigerator oil comes into the circuit of the air conditioner. In maintenance and repair work, the oil quantity to be topped up can be filled directly into the components.



- 1 Magnetic clutch
- 2 Service valve (low pressure)
- 3 Ground connection
- 4 Plus
- 5 Connection, high pressure
- 6 Mounting
- 7 Connection, low pressure

Oil capacities

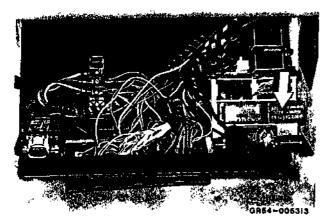
Basic charge	120 cm³	
Condenser, renewing	20 cm ³	
Evaporator, renewing	40 cm ³	
Receiver, renewing	10 cm³	
Drier, renewing	10 cm³	
Refrigerant line, renewing	10 cm ³	
Recharging system and renewing drier	20 cm³	
System suddenly drained	40 cm³*)	
Reconditioning refrigerant compressor and renewing drier	20 cm³	
Renewing refrigerant com- pressor and drier	Oil quantity of the old refrigerant compressor plus 10 cm ³	

^{*)} and oil quantity for new part

Control unit, air conditioner

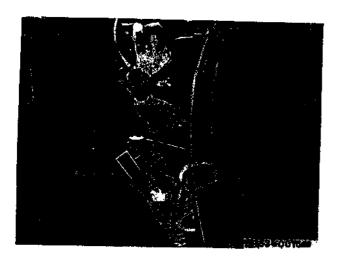
Safety cut-out

If for 0,2 scnd, there is a speed difference of \geq 30% between compressor and engine speed, the air conditioning compressor is disconnected.



Temperature switch

Controls the cut-in or cut-out of the electrical auxiliary fan



Engine 102/103

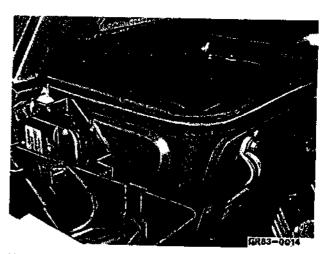


Engine 602/603

Cut-in point with increasing temperature: 100°C \pm 2 Cut-out point with decreasing temperature: > 93°C

Circulating air flap

Close air flap for faster cooling down or if there is dust or unpleasant odours.



Note: Switch over again to fresh air operation as soon as possible.

Visual inspection

The visual inspection should be carried out at least before every maintenance and repair job on the air conditioner.

In the visual inspection the following points should be checked:

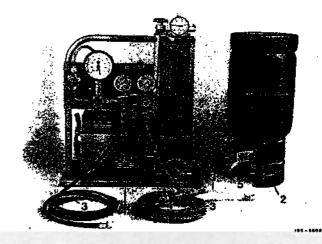
- V-belt on condition and tension
- Mounting of refrigerant compressor
- Hoses and lines for chafed marks
- Condenser on correct mounting and contamination
- Air filter and evaporator on contamination
- Air channels and air slot for leaks and passage
- Fluid level in the system.
 Shortly after connecting the refrigerant compressor there should be no bubbles visible in the sight glass.
 If there is cloudiness to be seen in the sight glass, the drier must be renewed and the air conditioner cleaned.

Service device for checking, evacuating and charging the air conditioner

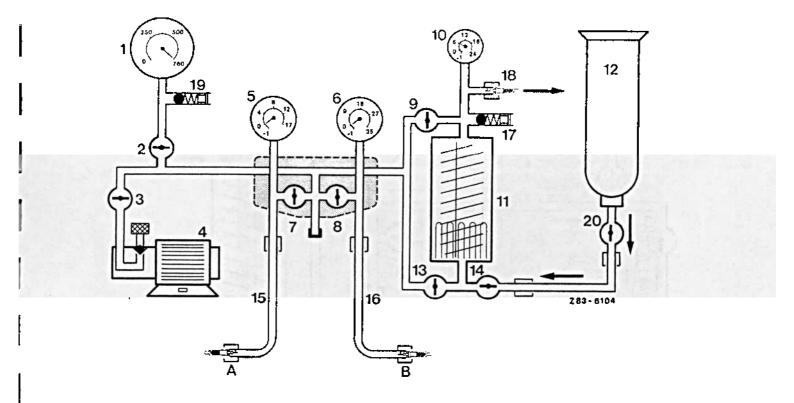
Structure

The system essentially comprises vacuum pump, charging cylinder (with electrical heating), meters and valve battery. The arrangement of the shut-offs and connecting lines make it possible to carry out all necessary steps for charging the system without having to change a connection hose.

- 1 Service device
- 2 Steel cylinder for refrigerant
- 3 Air tubes
- 4 Hansen coupling set
- 5 Cylinder connection



Filling the charging cylinder with refrigerant (liquid)



Α	Service valve (low-pressure side)	10	Pressure gauge for charging cylinder	
В	Service valve (high pressure side)	11	Charging cylinder	
1	Vacuum gauge	12	Refrigerant supply cylinder	
2	Valve for vacuum gauge	13	Filler valve for liquid refrigerant	
3	Valve for vacuum pump	14	Valve for refrigerant cylinder	
4	Vacuum pump	15	Hose line (blue), low pressure	
5	Low pressure gauge	16	Hose line (red), high pressure	
6	High pressure gauge	17	Pressure relief valve	
7	Valve for low pressure gauge	18	Pressure drain valve	
8	Valve for high pressure gauge	19	Non-return valve	
9	Filler valve for gaseous refrigerant	20	Cylinder valve	

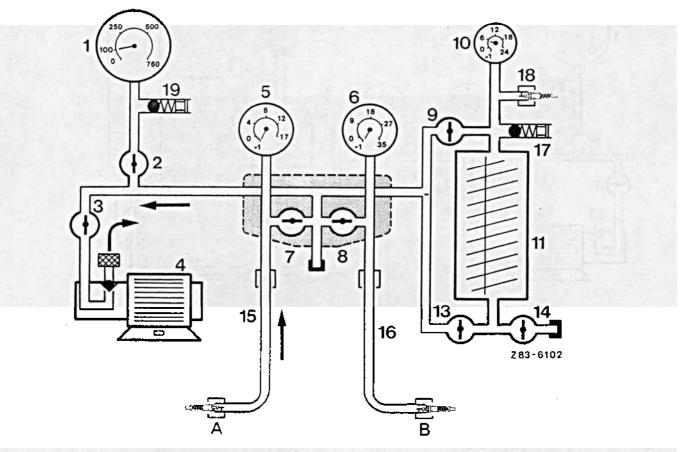
Place refrigerant cylinder (12) on its head, open cylinder valve (20) and valve (14) and let liquid refrigerant flow into the charging cylinder.

If the supply cylinder pressure is not sufficient for filling the charging cylinder, the pressure building up in the cylinder can be drawn off by opening the valve (9). Then more liquid refrigerant flows in.

When the charging cylinder is filled, the valves (9, 14 and 20) must be closed. The device is now ready for service.

If necessary switch on heater on the filling device until a pressure of 6 to 10 bar is indicated at the pressure gauge (10).

Evacuate the air conditioner

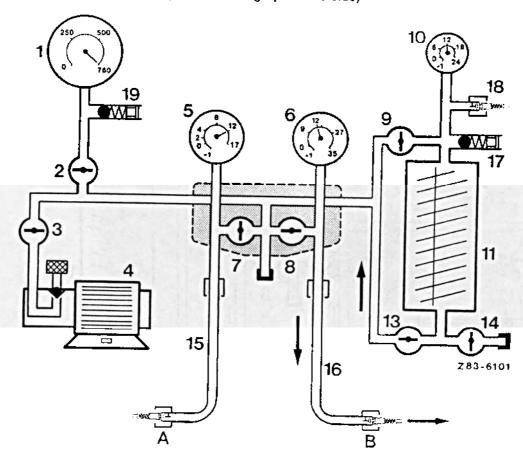


- A Service valve (low-pressure side)
- B Service valve (high pressure side)
- 1 Vacuum gauge
- 2 Valve for vacuum gauge
- 3 Valve for vacuum pump
- 4 Vacuum pump

- 5 Low pressure gauge
- 6 High pressure gauge
- 7 Valve for low pressure gauge
- 8 Valve for high pressure gauge
- 9 Filler valve for gaseous refrigerant
- 10 Pressure gauge for charging cylinder
- 11 Charging cylinder
- 13 Filler valve for liquid refrigerant
- Valve for refrigerant supply cylinder
- 15 Hose line (blue) Low pressure
- 16 Hose line (red) High pressure
- 17 Pressure relief valve
- 18 Pressure drain valve
- 19 Non-return valve

With the system pressureless connect the service device to the service valves:

- Switch on vacuum pump 4 and open the valves 3, 7 and 8.
- Do not open valve 2 to the vacuum gauge 1 until a vacuum has established in the system.
- Evacuate up to the maximum attainable vacuum, at least however one hour.
- Close valve 3, disconnect vacuum pump and read off value at the vacuum gauge 1 and adjust with fixed pointer.
- After approx. 10 minutes, read off value again at the vacuum gauge 1 and compare to the value measured before.
- If the vacuum has not dropped more than 200 mbar, close all valves on the tester.
- If there is much deviation (more than 200 mbar), check the air conditioner for leaks.



Recharging of the air conditioner (liquid, via the high pressure side)

- A Service valve (low-pressure side)
- B Service valve (high pressure side)
- 1 Vacuum gauge
- 2 Valve for vacuum gauge
- 3 Valve for vacuum pump
- 4 Vacuum pump

- 5 Low pressure gauge
- 6 High pressure gauge
- 7 Valve for low pressure gauge
- 8 Valve for high pressure gauge
- 9 Filler valve for gaseous refrigerant
- 10 Pressure gauge for charging cylinder
- 11 Charging cylinder
- 13 Filler valve for liquid refrigerant
- 4 Valve for refrigerant supply cylinder
- 15 Hose line (blue) Low pressure
- 16 Hose line (red)
- High pressure
 17 Pressure relief valve
- 18 Pressure drain valve
- 19 Non-return valve

After the air conditioner is evacuated and all valves are closed, the charging cylinder filled and preheated, proceed as follows:

- Open valves 8 and 13 and let refrigerant in liquid condition flow in over the high pressure side.

Note: Liquid refrigerant is only to be filled over the high pressure side.

- As soon as the specified quantity has flowed in, close valves 8 and 13, start vehicle engine, switch on air conditioner and check pressure level and refrigerating capacity corresponding to the technical data.
- After disconnecting the hose, the service valve closes automatically.

Topping up of the air conditioner (gaseous, over the low-pressure side)

- A Service valve (low-pressure side)
- B Service valve (high pressure side)
- 1 Vacuum gauge
- 2 Valve for vacuum gauge
- 3 Valve for vacuum pump
- 4 Vacuum pump

- 5 Low pressure gauge
- 6 High pressure gauge
- 7 Valve for low pressure gauge
- 8 Valve for high pressure gauge
- 9 Filler valve for gaseous refrigerant
- 10 Pressure gauge for charging cylinder
- 11 Charging cylinder
- 13 Filler valve for liquid refrigerant
- 14 Valve for refrigerant supply cylinder
- 15 Hose line (blue) Low pressure
- 16 Hose line (red) High pressure
- 17 Pressure relief valve
- 18 Pressure drain valve
- 19 Non-return valve

Once the service device is disconnected at the service valves, that charging cylinder is filled and preheated, proceed as follows:

The valve inserts of the service valves are opened when the hose lines (15) or (16) are connected with the angled connection (thrust pin) with the service valves.

Start vehicle engine and fully connect air conditioner.

Open valves (7) and (9) and let refrigerant flow in in gaseous form, with increased idling speed, over the **low pressure** side.

During the filling procedure observe sight glass in the receiver; as soon as the refrigerant flows free of bubbles, close valves (7) and (9).

For pressure levels and refrigerating capacity, refer to test values

Note: In the filling procedure over the low-pressure side, only gaseous refrigerant may be drawn.

Checking refrigerant charge:

- 1. Put blower switch on highest stage.
- Check at the sight glass that shortly after the connecting of the compressor there are no more bubbles visible.

Note: If there are still bubbles visible in the sight glass shortly after connecting the compressor, check the air conditioner for leaks and adjust the refrigerant level.

Check cutout temperature and air outlet temperature:

- 1. Put blower switch on stage 1.
- The air outlet temperature must, after 5 min, not be under 1° C and not over 8° C.

Note: If the compressor is disconnected under 1°C air outlet temperature, check the icing up protection switch.

If the air outlet temperature is not attained, check the connecting and disconnecting of the compressor or the pressures upstream and downstream of the compressor (low pressure/high pressure) (refer to table test values and fault diagnosis).

Test values

20 to 40°C		
1 to 8°C		
approx. 0,5 to 2,5 bar		
approx. 12 to 26 bar		

¹⁾ With ambient temperatures under 20°C the pressure levels are lower.

Fault diagnosis after the charging

Ambient temperature approx. 25°C, engine speed 2000/min

Pressure indication	Possible causes	
Low pressure too low High pressure normal or too low	Moisture in the system Expansion valve clogged Not enough refrigerant in the system Evaporator soiled Evaporator iced up Icing up protection switch defective Sieve in injection corner valve clogged	3 4 5 6 7 1 10 15 20 1 10 15 20 1 10 15 20 1 10 15 20 1 10 15 20 1 10 15 20 1 10 10 10 10 10 10 10 10 10 10 10 10
Low pressure too high	Expansion valve injects too much	
High pressure normal	Sensor of expansion valve loose or badly insulated	2 7 1 0 8- 0 1 10 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1
Low pressure too high High pressure too low	Compressor defective Valve plate seal leaking Valve plate defective Piston clearance to great or piston ring damaged	1833-9755/1
Low pressure too high	System overfilled, too much refrigerant	1633-9/33/1
High pressure too high	Condenser soiled or failed condenser blower Condenser installed too close to the radiator	5 6 7 1 10 9 5 C 20 1 30 1 1 10 9 1 1 1 10 9 1 1 1 1 1 1 1 1 1

Seats

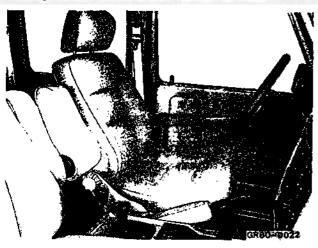
Front seat

General

New design in shape and covers: the form is of a new improved body-contoured line, the padding has been redesigned. Extension of the seat cushions by 50 mm.

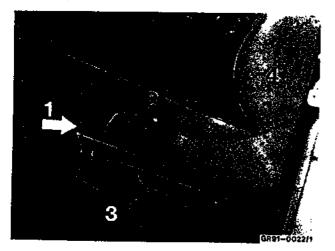
Backrest adjustment with handwheel, seat underframe in the colour of the fittings.

Folding frame with the 2-door version is lined.



Seat adjustment

- 1 forward and back
- 2 Seat height, front
- 3 Seat lock Pull lever up, swing seat forward
- 4 Seat back

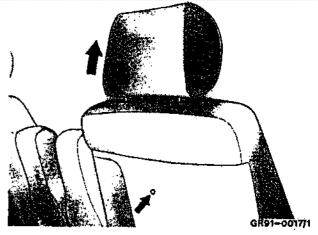


Head restraints

The head restraints are adjustable in height and inclination.

Pulling out head restraint:

- Slightly press head restraint forward and pull out as far as it will go.
- Press lock button and abruptly pull up left head restraint bracket.
- Pull out head restraint with both hands.

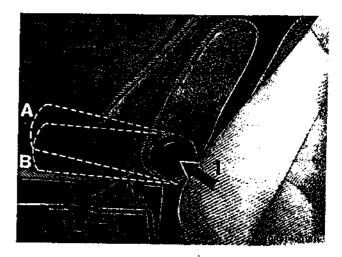


Arm rest (Front seats)

1 Lock button

Press lock button and swing arm rest down into position:

- A with normally inclined seat back.
- B with extensively inclined seat back.



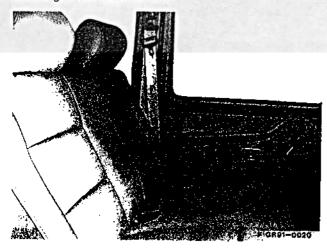
Rear seat bench

General

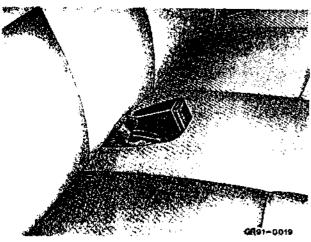
Optimized design:

The folding mechanics is easier to actuate and its functioning optimized.

Increase in height of the seat back with simultaneous lowering of the seat surface.



The seat belt buckles on the bench seat are retracted in the seat cushion in neutral position.



With the convertible and with the short station wagon, the middle arm support is available as standard, the rear bench seat in in one-piece.



With the long station wagon, bench seat and the support are divided in 1/3 and 2/3 sections which can be folded down, there is therefore no middle arm support.

Bench operation (Example)

- 1 Lever release of seat back
- 2 Lever- release of bench seat

Swinging seat back forward

Unlock seat back and swing forward until lock engages.

Swinging bench seat forward

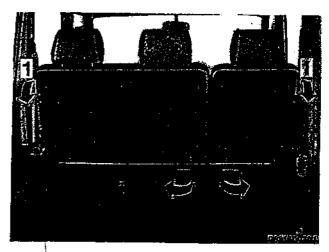
- Swing seat back forward.
- Unlock bench seat and swing forward with seat back until lock engages.

Swinging bench seat to the rear

 Unlock bench seat and swing back with seat back until lock engages.

Swinging seat back to the rear

 Unlock seat back and swing to the rear until lock engages.



The seats have a new material design in 3 different colours:

cream beige	Code V 15
grey `	Code V 26
black	Code V 18

Installation survey -

				·					
Туре	200 GE	230 GE	300 GE	250 GD	300 GD				
Engine	M 102	M 102	M 103	OM 602	OM 603				
Principle of operation	electronic	spark ignition, i ally controlled for with overrun f	Four-stroke diesel MB prechamber inclined injection						
Number of cylinders	4	4	6	5	6				
Cylinder arrangement			vertical in line	!					
Bore/stroke mm	89,0 / 80,2	95,5 / 80,2	88,5 / 80,2	87,0 / 84,0	87,0 / 84,0				
Total displacement Effective cm	1996	2298	2960	2497	2996				
Compression 8	9,1	9,0	9,2	22,0	22,0				
Ignition sequence	1-3-4-2	1-3-4-2	1-5-3-6-2-4	1-2-4-5-3	1-5-3-6-2-4				
Maximum speed 1/min	6000	6000	6200	5150	5150				
Power rating in kW in 1/min accordance with 88/195/EEC (KAT)		93/5000	125/5500	69/4600	83/4600				
Rated torque max. in Nm in 1/min accordance with to 88/195/EEC (KAT)	160/4000	190/4000	235/4500	158/2600 to 3100	191/2700 to				
Number of crankshaft bearings (compound bearing)	5	5	7	6	7				
Valve arrangement	S Comment	overhead							
Camshaft arrangement		1 over	head camshaft (OHC)					
Oil cooling	10.00	ALCUYPIE	Zambini Basi	Air oil cooler					
Cooling	Excess pres	ssure liquid cool	ling, coolant circu with short-circui	lation through	oump, ther-				
Fan St. Seller (1.18)	Silventana		with viscosity fa	0.419-227-					
Lubrication	Force-feed lubri gear-sick	cation through							
Oil filter		Main flow filter			Combined main and auxiliary flow filter				
Air cleaner	PERMIT	Dry air fi	iter with paper e	lement					

Driving performance

with tyres 205 / 82 R 16

with two persons

Vehicle type			200	GE	1844,8	230 GE			300 GE			A Court	
Transmission - Designation				5 rear GL76/27K-5		5 gear GL76/27K-5		Automatic W4A028		5 Gear GL76/27K-5		Automatic W4A028	
1st gear Transmission ratio i = 2nd gear 3rd gear 4th gear 5th gear Transfer case designation Ratio I =			2, 1,3 1,0	356 182 365 000 799	2,1 1,3 1,0	356 182 365 900 799	2,2	371 247 436 000	2, 1,0	356 182 365 000 799	2,2	371 247 436 000	
			VG Road 1,050	150 Off- road 2,158	VG Road 1,050	150 Off- road 2,158	VG Road 1,050	150 Off- road 2,158	VG Road 1,050	150 Off- road 2,158	VG Road	150 Off- road 2,158	
Rear axle transmission ratio i =			5,286		5,2	-		357	4,857		4,375		
Maximum speed Vmax./speed 1/min		140/ 5705	-	145/ 4735	_	144/ 5480	-	164/ 6130	_	162/ 5595	_		
Maximum speeds in the individual gears	1st gear 2nd gear 3rd gear 4th gear 5th gear approx	km/h km/h km/h km/h	38 67 107 140 134	18 33 52 71 89	38 67 107 144 145	18 33 52 71 89	41 70 110 144 –	20 34 53 77	43 75 121 164 160	21 37 59 80 100	3346 5080 79126 162 10 L	23 14 39 & 4 61 38 87 54	
Climbing ability	1st gear 2nd gear 3rd gear 4th gear 5th gear	% % % %	31 16 8,5 5,5 3,5	80 37 21 15 11	38 20 11 6,5 4,5	80 46 26 18 13	40 22 10 5	80 52 23 15	45 22 18 8 5,5	80 55 30 21 15	51 29 11 5,5	80 72 26 17	
Acceleration with gear change 0 to 100 km/h s 60 to 100 km/h (4th gear)¹) s 60 to 100 km/h (5th gear)²) s			20,8 20,8 34,8		17,7 16,2 26,2	1 - 1	18,4 11,9 19,5		13,5 14,3 21,5		14 9,9 17,3	-	

In automatic transmission (3rd gear)
 In automatic transmission (4th gear)

Driving performance

with tyres 205 / 82 R 16

with two persons (continued)

Vehicle type	250	GD		30	0 GD	1000		
Transmission - Designation		gear /27K-5		gear 5/27K-5	Auto	omatic A028		
1st gear 2nd gear 3rd gear 4th gear 5th gear Transfer case designation Ratio i =			2, 1,: 1,0	3,856 2,182 1,365 1,000 0,799		856 182 365 000 799	3,871 2,247 1,436 1,000	
			VG Road 1,050	150 Off-road 2,158	VG Road 1,050	150 Off-road 2,158	VG Road 1,050	150 Off-road 2,158
Rear axle transmission ra	atio	i=	5,286		5,2		4,111	
Maximum speed Vmax./ speed 1/min	DISPERSION		130/4240		141/4610	15-41	141/4570	
Maximum speeds in the individual gears	1st gear 2nd gear 3rd gear 4th gear 5th gear approx	km/h km/h km/h km/h	30 54 86 117 130	15 26 42 57 71	30 54 86 117 141	15 26 42 57 71	38 66 103 141 -	18 32 50 72
Climbing ability	1st gear 2nd gear 3rd gear 4th gear 5th gear	% % % %	32 17 9 6	80 38 22 15	40 21 12 7,5 5	80 48 27 19 14	37 19 11 4,5	80 45 25 14
Acceleration with gear ch 0 to 100 km/h 0 to 100 km/h 4th gear') 0 to 100 km/h 5th gear²)	ange	s s s	28,1 20,6 31,6	-	22,2 15,5 22,5		22 14,4 23,2	

In automatic transmission (3rd gear)
 In automatic transmission (4th gear)

Vehicle data

200 GE / 230 GE / 300 GE 250 GD / 300 GD	Convertible	Station wagon, short	Station wagon, long
Wheelbase mm	2400	2400	2850
Fording depth mm	600	600	600
Dimensions in mm Length Width Height	4215 1690 1924	4185 1690 1892	4635 1690 1925
Angle of approach Angle of departure')	800 1015	800 985	800 1015
Track width front rear	1425 1425	1425 1425	1425 1425
Turning circle Ø	11290	11290	13240

¹⁾ with spare wheel

Fuel consumption (in accordance with 80/1268 EEC)

Vehicle type		200 GE	230 GE	300 GE	250 GD	300 GD
- 5-gear transmission, manual			N DAY		44	
Town	1/100 km	15,6	16,4	18,7	13,5	14,7
90 km/h	I/100 km	11,1	12,7	13,4	10,5	10,9
120 km/h	l/100 km	15,7	17,3	17,7	15,2	16,0
- Automatic transmission			New Miles	House	(Angeles	
Town	I/100 km	-12	15,1	18,2	_	12.5
90 km/h	I/100 km	-	13,1	14,2	_907(5)	10,8
120 km/h	I/100 km		18,0	19,2	_	15,9

Trailed load

unbraked		10.21		o III Takob		h lase
Convertible	kg	750	750	750	750	750
Station wagon, short	kg	750	750	750	750	750
Station wagon, long	kg	750	750	750	750	750
braked		THE COLUMN				
Convertible	kg	2620	2620	2620	2620	2620
Station wagon, short	kg	2620	2620	2620	2620	2620
Station wagon, long	kg	2950	2950	2950	2950	2950

Axle - transmission combination

Vehicle-	Transmission	version	Axle ratio i						
Sales designation	5-gear GL76/27K-5	4-gear Automatic W4A 028	5,286	4,111	4,375	4,857	6,167		
200 GE	0		0	x	x	x	x		
230 GE	0	x	0	×	x	×	×		
300 GE	0	x			x	0			
250 GD	0		0	x	×	x	x		
300 GD	0	x	0	×	x	×	×		

o Standard version

x Special requirement

Welghts

Vehicle-							Front a	xle		Rear a	xie	·
Туре	Versio Convert-	Station wagon, short	Station wa-	Weight ready for driving curb weight and full tank kg	with max- imum equip- ment kg	Permissible gross vehi- cle weight	ready for driving curb weight and full tank	with max- imum equipment	Permissible gross vehi- cle weight	E-9000	with max- imum equipment	Permissible gross vehi- cle weight
200 GE	x	ERRICH	HISTORY	2005	2105	2620	1018	1095	1300	987	1010	1600
	4-15-1	x	Swift In	2060	2205	2620	1030	1120	1300	1030	1085	1600
			x	2195	2365	2950	1105	1200	1380	1090	1165	1800
230 GE	х			2005	2142	2620	1018	1125	1300	987	1017	1600
	!	x		2060	2240	2620	1030	1150	1300	1030	1090	1600
			×	2195	2400	2950	1105	1230	1380	1090	1170	1800
300 GE	×	<u> </u>		2030	2167	2620	1043	1150	1300	987	1017	1600
	ļ	х		2085	2265	2620	1055	1175	1300	1030	1090	1600
	ļ		×	2220	2425	2950	1130	1255	1380	1090	1170	1800
250 GD	×			2015	2115	2620	1043	1120	1300	972	995	1600
		x		2070	2210	2620	1055	1145	1300	1015	1065	1600
			×	2205	2375	2950	1130	1225	1380	1075	1150	1800
300 GD	x			2035	2175	2620	1063	1170	1300	972	1002	1600
:		x		2090	2270	2620	1075	1195	1300	1015	1075	1600
			x	2225	2430	2950	1150	1275	1380	1075	1155	1800

Testing on the roller test bench

Note: For the test install the standard tyres "205 R 16".

On the **brake test stand** the testing speed of 6 km/h must not be exceeded. The test duration per axle must not exceed 60 scnd.

Before operation on the vehicle performance tester, the propeller shaft to the front axle must be removed and in the transfer case the interaxle differential lock engaged.

The interaxle differential lock is engaged when the red indicator lamp lights up.

Functional test

The functional test is for the rough judgement of the vehicle performance. Here the engine and components are checked under full load. The driving speed is selected in such a way that 100 km/h or 120 km/h are not exceeded.

Vehicle-		Engine model	Manual transmission 3rd gear				Automatic transmission Driving position 3			
Model	Туре		km/h	Stand.	EGR kW	CAT kW	km/h	Stand.	EGR kW	CAT
463.200 .220 .221	200 GE	102.965	90	56		55 .				-
.204 .224 .225	230 GE	102.989	90	64		63	90	61		60
.207 .227 .228	300 GE	103.987	90	93		90	90	87	-	84
.304 .324 .325	250 GD	602.931	70	43	40	5	-		-	-
.307 .327 .328	300 GD	603.931	70	52		-	70	43		-

Output test

This test is only to be carried out in event of a complaint concerning the vehicle performance. The valid standard output values are minimum outputs. Observe baraometer value and intake air temperature.

Note: The specified standard output values are only attained with the respectively specified fuel and the specified ignition timing adjustment. When adapting the ignition timing adjustment to other fuels, the output values might differ.

Vehicle-		Engine model	Manual t	ransmissio	Automatic transmission Driving position 3				
Model	Туре	MIS	Speed 1/min	Stand.	EGR kW	CAT	Stand.	EGR	CAT
463.200 .220 .221	200 GE	102.965	5000	56		55	-	-	-
.204 .224 .225	230 GE	102.989	5000	64		63	61	-	60
.207 .227 .228	300 GE	103.987	5500	90	-	87	87	-	84
.304 .324 .325	250 GD	602.931	4500	46		-	-	-	1
.307 .327 .328	300 GD	603.931	4500	56	-	-	53	-	

Exhaust gas emissions test

The exhaust gas emissions test at idle speed, partial load and full load are for the evaluation of the mixture composition in the combustion chamber. They are to be carried out in event of complaints concerning the running of the engine, fuel consumption and engine output.

Exhaust gas emissions test for Standard, EGR, CAT and Diesel

Vehicle-		Engine model	Full load 3rd gear Driving position 3		upper partial load 4th gear Driving position D 120 km/h 24 kW	lower partial load 4th gear Driving position D 50 km/h 7 kW	Idle speed Automatic transmission Driving position P or N		
Model	Туре		Speed 1/min	Vol. % CO	Vol. % CO	Vol. % CO	Speed 1/min	Vol. % CO	
.220 .221	200 GE	102.965	5000	0,5 to 4,0	0,1 to 1,0	0,1 to 1,0	700 to 800	1,0 ± 0,5	
.204 .224 .225	230 GE	102.989	5000	0,5 to 4,0	0,1 to 1,0	0,1 to 1,0	700 to 800	1,0 ± 0,5	
.207 .227 .228	300 GE	103.987	5500	1,5 to 5,0	0,1 to 1,0	0,1 to 1,0	600 to 700	1,0 ± 0,5	
.304 .324 .325	250 GD	602.931	4500	max. 0,20	Land section			Ed war dig	
.307 .327 .328	300 GD	603.931	4500	max. 0,20			610 to 650		

Service products and capacities

		Model	Capacity approx.	Service product	Sheet no	
Engine with oil filte	200 GE 230 GE	102.965 102.989	max.6 ! Motor oil min. 4,5 !		226.5 227.5	
	300 GE	103.987	max. 6,5 l min. 5			
	250 GD	602.931	max. 7,51 min. 5,51	Motor oil	226.0/1/5	
	300 GD	603.931	max. 8,51 min. 6,51		228.0/1/2	
Mechanical transm	ission	717,439	1,51	Automatic transmission fluid (ATF)	236.2	
Automatic transmis	ssion	722.39.	7 1	Automatic transmission fluid (ATF-Dexron II)	236.6 236.7	
Transfer case		750.650	2,8 I	Gear oil SAE 80	235.1	
Front axle		730.3	1;1 (Hypoid-gear oil SAE 90	235	
Rear axle		741.5	1,8	Hypoid-gear oil SAE 90	235	
Power steering		765.503	1 1	Steering box oil	236.3	
Hydraulic clutch co	ntrol		0,3	Brake fluid (DOT 4 plus)	331.0	
Hydraulic brake ac	tuation		0,5 !	Brake fluid (DOT 4 plus)	331.0	
Hydraulic differentia	al lock actua	ation	0,3	Brake fluid (DOT 4 plus)	331.0	
Grease nipple lubric and body, joint hea	ating points ds of all-wh	on chassis eel front axle		Multipurpose grease	267	
Battery terminals				Bosch Ft 40 v 1	350	
Air conditioner			1,0 kg	Refrigerant	361	
Refrigerant compre	ssor		0,2 [Compressor oil	362	
Fuel tank 95 I portion for reserve 10I			200 GE/230 premium ga number/85 d gasoline, un /82.5 octano	122.2		
			200 GE/230 ter, premium number/88 c gasoline, un octane numb or unleaded, number, mo	122.2		
· · · · · · · · · · · · · · · · · · ·			250 GD/300	132.1 132.3 137		
	Engine 102 Engine 103			Coolant	310, 325.1 325.2	
	Engine 602 Engine 603			Coolant	310, 325.1	
Vindscreen washer and head- ght washer system			j	Water with MB-windscreen washer solution – Concentration S for summer or W for winter. Observe mixture ratio.		

In the Federal Republic of Germany e.g. in accordance with DIN 51 607.
 in the Federal Republic of Germany e.g. in accordance with DIN 51 600.

³⁾ In the Federal Republic of Germany e.g. in accordance with DIN 51 607. Have ignition timing adjusted in a MERCEDES-BENZ service station.