Mercedes-Benz
Unimog

Service

Workshops Manual
UNIMOG 421-411

Volume 1

wessel@buchundbild.de
www.buchundbild.de

Änderungen vorbehalten
UKD 30 402 21 03
05.89

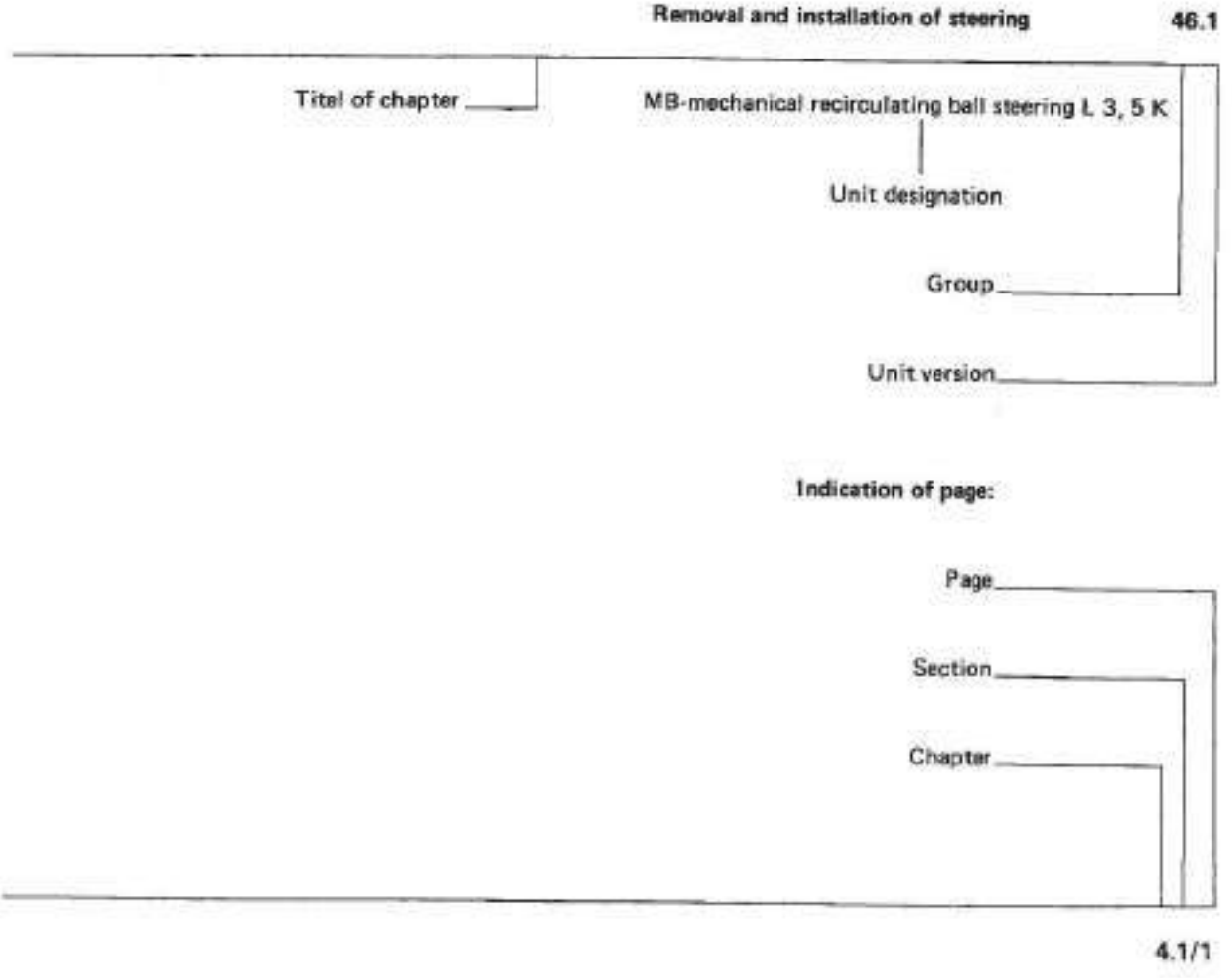
The present workshop manual comprises the descriptions of all important assembly, tuning, testing and reconditioning jobs.

The contents of the workshop manual are subdivided according to the groups known as such. The group index facilitates finding the individual groups, the list of contents of each group facilitates finding the individual jobs.

The pertinent data, adjusting values, dimensions and tolerances, as well as the special tools, are listed on the first pages of the respective groups.

The contents are divided according to unit versions and subdivided according to chapters and sections.

The contents are presented in the shape of smaller, individually complete sections. Each section begins with a new page 1 and is identified as follows (example):



Any reference to this page, at any place in entire workshop manual says: Refer to 46.1-4.1/1.

Introduction

The **unit versions** are consecutively numbered starting at 1, that is, each version has its own code number. The unit designation of each page is additionally placed under head of each page. A separating sheet and a detailed list of contents is located in front of each unit.

The sections which are valid for **all unit versions** are covered in version 0.

The data (adjusting data, tightening torques, machining dimensions, etc.) and special tools are separately listed in front of each unit version.

The numerical values expressed in SI-units based on the new international unit system have been converted and rounded off (acc. to DIN 1335).

The pressure data specified in bar are gauge pressures.

Output in kW (kilowatt)
Former unit HP (horsepower)
1 kW = 1.360 HP
1 HP = 0.735 kW

Torque in Nm (newtonmeter)
Former unit kpm (kilopondmeter)
1 Nm = 0.101 972 kpm ≈ 0.102 kpm
1 kpm = 9.806 65 Nm ≈ 9.81 Nm

Pressure in bar (Bar)
Former unit kp/cm^2
(kilopond per square centimeter)
1 bar = 1.019 716 kp/cm^2 ≈ 1.020 kp/cm^2
1 kp/cm^2 = 0.980 665 bar ≈ 0.981 bar

The specified part numbers, as well as the fig. number in exploded views are serving only for identification and better differentiation of the individual versions. When ordering spare parts, always use the part numbers from valid microfiches.

We shall do our best to keep this workshop manual continuously up to date by means of additional supplements.

Daimler-Benz Aktiengesellschaft
Werk Gaggenau
UNIMOG-Kundendienst

Contents

Installation survey (starting chassis end No. 009 854, Sept. 1974)

Vehicle	Model designation	421.124/125	421.140/141	421.128/129	421.132/133
	Sales designation	U 52	U 600	U 600 L	U 600 T
	Wheelbase	2250 mm		2605 mm	–
Engine	Model designation	616.915 [1]) 616.911		616.931[2]) 616.932/933	616.930[3]) 616.932
	Sales designation	616			
	Installation	standard		with SA 35 613	standard
Single clutch	Model designation	–			
	Sales designation	G 250 KR			
	Installation	standard			
Double clutch	Model designation	–			
	Sales designation	DT 240/225 N			
	Installation	special version SA 35 814			
Main transmission	Model designation	717.802[4])			
	Sales designation	UG 2/27-6/14.53 GA			
	Installation	standard			
Auxiliary transmission	Model designation	–			
	Sales designation	VOG 2/27-2/1.26 and VOG 2/27-3/4.67 and VOG 2/27-4/42.88			
	Installation	special version SA 35 452			
Power takeoff	Model designation	–			
	Version	shiftable			
	Installation	special version SA 35 448			
Front axle	Model designation	737.003	737.005	737.004	737.003
	Sales designation	AU 2/2S-2,5	AU 2/2ES-2.6	AU 2/2S-2.5	AU 2/2S-2.5
	Installation	standard			
Rear axle	Model designation	747.007	747.009	747.008	
	Sales designation	HU 2/2S-2.5	HU 2/2ES-2.6	HU 2/2S-2.5	–
	Installation	standard			
Steering	Model designation	–			
	Sales designation	ZF 7340 or ZF 8036			
	Installation	standard or special version SA 35 521			
Steering pump	Model designation	–			
	Sales designation	ZF 7672 or ZF 7673			
	Installation	special version SA 35 521			
PTO shaft displacement gears	Version	Input $1^3/_4$" Output $1^3/_8$"		–	
	Ratio	i = 1		–	
	Speed $n_{max.}$ 1/min	3000		–	
	Installation	special version SA 35 303		–	
Cab	Model designation	421.810 or 421.820			
	Sales designation	–			
	Installation	standard			

[1]) Up to chassis end No. 009 867
[2]) Up to chassis end No. 010 445
[3]) Up to chassis end No. 009 854
[4]) Also available with 2 x 4 shift (SA 35 451), but without auxiliary transmission

Overall view

UR00-0129

Vehicle dimensions[1]

Tire size		10.5–18
Weelbase	mm	2250
Track width	mm	1403[3]
Turning circle	m	9.1 to 9.25
Turning circle	mm	10350
Max. length	mm	4000
Max. width, all-steel driver's cab	mm	1825
Large width, Driver's cab with folding top	mm	1800
Vehicle height over driver's cab, unloaded	mm	2200
Vehicle height over tarpaulin frame, unloaded	mm	2290
Ground clearance	mm	387
Overhang angle at front	°	40
Overhang angle at rear	°	70
Ground clearance before-rear axle	mm	385
Fording depth	mm	755
Height of the trailer coupling unloaded	mm	720
No of seats in the driver's cab		2 (5)[2]

[1] all specified values with units of measurement are approx. values
[2] Dual cabin
[3] with tires 7.5–18 8 PR 1393 mm
10.5–20 8 PR 1489 mm
8 PR 1393 mm

Loading area[1]

Length inside	short platform	mm	1475
	Long platform	mm	1753
Width inside		mm	1500
Height of the sideboard		mm	360
Loading height over ground unloaded		mm	1140
Effective area	short platform	m^2	2.2
	long platform	m^2	2.63

[1] all specified values with units of measurement are approx. values

Max. speeds 6-speed gear shift

	Total axle ratio	Max. speeds km/h at engine speed 3000/min and 3500/min									
	8.3 [1]	Engine speed 1/min	Forward speeds 1	2	3	4	5	6	Reverse speeds 1	2	Tires
Main gears	Main speeds	3000	3.94	7.13	12.72	23.02	34.76	57.26	4.92	8.92	7.5–18
		3500	4.60	8.32	14.84	26.86	40.55	67.00	5.74	10.41	10.5–18
		3000	4.22	7.64	13.64	24.68	37.27	61.39	5.28	9.57	10.5–20
		3500	4.92	8.91	15.91	28.79	43.48	72.00	6.16	11.17	
		3000	4.27	7.74	13.80	24.98	37.74	62.16	5.46	9.68	10.5R20
		3500	4.99	9.03	16.10	29.15	44.03	72.52	6.24	11.29	
		3000	4.26	7.73	13.79	24.96	37.69	62.08	5.34	9.67	12.5–18
		3500	5.07	9.18	16.35	29.61	44.72	73.66	6.34	11.47	7.5–20
		3000	4.56	8.26	14.72	26.64	40.24	66.28	5.70	10.32	12.5–20
		3500	5.32	9.63	17.17	31.08	46.95	77.33	6.65	12.04	
	Additional crawler speeds [2]	3000	1.28	2.31	–	–	–	–	–	–	7.5–18
		3500	1.49	2.70	–	–	–	–	–	–	10.5–18
		3000	1.37	2.48	–	–	–	–	–	–	10.5–18
		3500	1.60	2.89	–	–	–	–	–	–	
		3000	1.38	2.50	–	–	–	–	–	–	10.5R20
		3500	1.61	2.91	–	–	–	–	–	–	
		3000	1.38	2.51	–	–	–	–	–	–	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	1.47	2.66	–	–	–	–	–	–	12.5–20
		3500	–	–	–	–	–	–	–	–	
Auxiliary gears	Intermediate speeds	3000	3.13	5.56	10.09	18.25	27.57	45.41	3.90	7.07	7.5–18
		3500	3.65	6.59	11.77	21.29	32.17	52.98	4.55	8.15	10.5–18
		3000	3.35	6.07	10.82	19.57	29.56	48.69	4.19	7.56	10.5–20
		3500	3.91	7.08	12.62	22.83	34.49	56.81	4.88	8.84	
		3000	3.39	6.14	10.95	19.81	29.93	49.30	4.24	7.68	10.5R20
		3500	3.96	7.16	12.77	23.11	34.92	57.51	4.95	8.96	
		3000	3.39	6.13	10.94	19.79	29.89	49.24	4.23	7.67	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	3.62	6.55	11.67	21.13	31.92	52.57	4.52	8.19	12.5–20
		3500	–	–	–	–	–	–	–	–	
	Crawler speeds	3000	0.844	1.528	2.724	4.932	–	–	1.055	1.910	7.5–18
		3500	0.985	1.783	3.178	5.754	–	–	1.230	2.226	10.5–18
		3000	0.906	1.639	2.921	5.289	–	–	1.132	2.048	10.5–20
		3500	1.057	1.912	3.408	6.171	–	–	1.321	2.389	
		3000	0.917	1.659	2.957	5.353	–	–	1.146	2.074	10.5R20
		3500	1.069	1.936	3.450	6.246	–	–	1.337	2.42	
		3000	0.915	1.657	2.953	5.348	–	–	1.145	2.072	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	0.977	1.769	3.153	5.708	–	–	1.22	2.212	12.5–20
		3500	–	–	–	–	–	–	–	–	
	Worm gear speeds	3000	0.092	0.167	0.297	0.537	–	–	0.115	0.208	7.5–18
		3500	0.107	0.195	0.347	0.627	–	–	0.134	0.243	10.5–18
		3000	0.099	0.178	0.318	0.576	–	–	0.123	0.223	10.5–20
		3500	0.116	0.208	0.371	0.672	–	–	0.144	0.260	
		3000	0.099	0.181	0.322	0.583	–	–	0.125	0.226	10.5R20
		3500	0.116	0.211	0.376	0.680	–	–	0.145	0.263	
		3000	0.099	0.180	0.322	0.582	–	–	0.124	0.226	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	0.106	0.193	0.343	0.621	–	–	0.133	0.241	12.5–20
		3500	–	–	–	–	–	–	–	–	

[1] Standard
[2] cannot be fitted with sleeve shift

Max. speeds 6-speed gear shift

	Total axle ratio	Max. speeds km/h at engine speed 3000/min and 3500/min									
	8.8 [1]	Engine speed 1/min	Forward speeds 1	2	3	4	5	6	Reverse speeds 1	2	Tires
Main gears	Main speeds	3000	3.71	6.72	11.99	21.70	32.77	53.98	4.64	8.41	7.5–18
		3500	4.33	7.84	14.00	24.35	38.25	63.00	5.42	9.82	10.5–18
		3000	3.98	7.21	12.86	23.27	35.14	57.88	4.98	9.02	10.5–20
		3500	4.65	8.41	15.02	27.15	41.00	67.60	5.81	10.52	
		3000	4.03	7.30	13.01	23.56	35.58	58.61	5.04	9.13	10.5R20
		3500	4.70	8.70	15.18	27.48	41.51	68.37	5.88	10.65	
		3000	4.02	7.29	13.00	23.53	35.53	58.53	5.03	9.12	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	4.39	7.94	14.15	25.62	38.70	63.75	5.48	9.91	12.5–20
		3500	–		–	–	–	–	–	–	
	Additional crawler speeds [2]	3000	1.20	2.18	–	–	–	–	–	–	7.5–18
		3500	1.41	2.54	–	–	–	–	–	–	10.5–18
		3000	1.29	2.34	–	–	–	–	–	–	10.5–20
		3500	1.51	2.73	–	–	–	–	–	–	
		3000	1.30	2.36	–	–	–	–	–	–	10.5R20
		3500	1.52	2.75	–	–	–	–	–	–	
		3000	1.30	2.37	–	–	–	–	–	–	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	1.39	2.51	–	–	–	–	–	–	12.5–20
		3500	–	–	–	–	–	–	–	–	
Auxiliary gears	Intermediate speeds	3000	2.95	5.33	9.51	17.21	25.99	42.81	3.68	6.67	7.5–18
		3500	3.45	6.22	11.10	20.01	30.31	49.90	4.31	7.78	10.5–18
		3000	3.16	5.72	10.20	18.45	27.87	45.90	3.95	7.15	10.5–20
		3500	3.70	6.68	11.91	21.53	32.61	53.60	4.62	8.34	
		3000	3.20	5.79	10.32	18.68	28.22	46.48	3.99	7.24	10.5R20
		3500	3.73	6.76	12.04	21.80	32.92	54.22	4.66	8.44	
		3000	3.20	5.78	10.31	18.66	28.18	46.42	3.99	7.23	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	3.41	6.17	11.00	19.92	30.09	49.56	4.26	7.72	12.5–20
		3500	–	–	–	–	–	–	–	–	
	Crawler speeds	3000	0.796	1.441	2.568	4.650	–	–	0.995	1.801	7.5–18
		3500	0.928	1.682	2.990	5.420	–	–	1.161	2.105	10.5–18
		3000	0.854	1.545	2.754	4.986	–	–	1.067	1.931	10.5–20
		3500	0.998	1.804	3.230	5.820	–	–	1.245	2.254	
		3000	0.864	1.564	2.788	5.048	–	–	1.080	1.956	10.5R20
		3500	1.008	1.825	3.253	5.889	–	–	1.260	2.281	
		3000	0.863	1.562	2.784	5.042	–	–	1.079	1.953	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	0.921	1.668	2.973	5.383	–	–	1.152	2.085	12.5–20
		3500	–	–	–	–	–	–	–	–	
	Worm gear speeds	3000	0.087	0.157	0.280	0.506	–	–	0.108	0.196	7.5–18
		3500	0.102	0.183	0.327	0.590	–	–	0.126	0.229	10.5–18
		3000	0.093	0.168	0.300	0.543	–	–	0.116	0.210	10.5–20
		3500	0.109	0.196	0.350	0.634	–	–	0.135	0.265	
		3000	0.094	0.170	0.303	0.549	–	–	0.118	0.213	10.5R20
		3500	0.110	0.200	0.354	0.641	–	–	0.137	0.248	
		3000	0.094	0.170	0.304	0.549	–	–	0.117	0.213	12.5–18
		3500	–	–	–	–	–	–	–	–	7.5–20
		3000	0.100	0.182	0.324	0.586	–	–	0.125	0.227	12.5–20
		3500	–	–	–	–	–	–	–	–	

[1] SA 35 555
[2] cannot be fitted with sleeve shift

Max. speed 2 x 4-speed gear shift (SA 35 451)

Total axle ratio	Max. speeds km/h at engine speed 3000/min and 3500/min													
	Engine speed	Forward speeds								Reverse speeds				Tires
8.3	1/min	1	2	3	4	5	6	7	8	1	2	3	4	
Main speeds	3000	3.94	7.13	10.78	17.75	12.72	23.02	34.76	57.26	4.92	8.92	13.47	22.18	7.5–18
	3500	4.60	8.32	12.58	20.71	14.84	26.86	40.55	66.80	5.74	10.41	15.72	25.88	10.5–18
	3000	4.22	7.64	11.55	19.03	13.64	24.68	37.27	61.39	5.26	9.57	14.45	23.78	10.5–20
	3500	4.92	8.91	13.48	22.20	15.91	28.79	43.48	71.62	6.16	11.17	16.86	27.74	
	3000	4.26	7.73	11.69	19.24	13.79	24.96	37.69	62.08	5.34	9.67	14.61	24.05	12.5–18
	3500	4.99	9.03	13.65	22.47	16.10	29.15	44.03	72.52	6.24	11.29	17.06	28.10	10.5R20 7.5–20
	3000	4.56	8.26	12.47	20.54	14.72	26.64	40.24	66.28	5.70	10.32	15.59	25.68	12.5–20
	3500	5.32	9.63	14.55	23.96	17.17	31.08	46.95	77.33	6.65	12.04	18.19	29.96	

Total axle ratio	Max. speeds km/h at engine speed 3000/min and 3500/min													
	Engine speed	Forward speeds								Reverse speeds				Tires
8.8	1/min	1	2	3	4	5	6	7	8	1	2	3	4	
Main speeds	3000	3.71	6.72	10.16	16.73	11.99	21.70	32.77	53.98	4.64	8.41	12.70	20.91	7.5–18
	3500	4.33	7.84	11.86	18.84	14.00	24.35	36.25	63.00	5.42	9.82	14.83	24.41	10.5–18
	3000	3.98	7.21	10.89	17.94	12.86	23.27	35.14	57.88	4.96	9.02	13.62	22.42	10.5–20
	3500	4.65	7.41	12.71	21.85	15.02	27.15	41.00	67.60	5.81	10.52	15.90	26.20	
	3000	4.07	7.29	11.02	18.14	13.00	23.53	35.53	58.53	5.03	9.12	13.77	22.67	12.5–18
	3500	4.70	8.51	12.86	25.70	15.17	27.48	41.51	68.37	5.88	10.65	16.08	26.49	10.5R20 7.5–20
	3000	4.30	7.78	11.76	23.51	13.88	25.12	37.94	62.49	5.38	9.73	14.70	24.21	12.5–20
	3500	5.02	9.08	13.72	27.42	16.19	29.31	44.26	72.90	6.27	11.35	17.15	28.24	

Total axle ratio	Max. speeds km/h at engine speed 3500/min													
	Forward speeds								Reverse speeds				Tires	
7.62[1])	1	2	3	4	5	6	7	8	1	2	3	4	
Main speeds	5.04	9.13	13.80	22.43	16.28	29.46	44.51	73.30	6.31	11.41	17.25	28.40	10.5–18
	5.13	9.63	14.55	23.66	17.16	31.07	46.94	77.30	6.65	12.04	18.19	29.95	10.5–20
	5.43	9.84	14.86	24.16	17.53	31.73	47.94	78.96	6.79	12.30	18.58	30.59	10.5R20
	5.52	9.99	15.09	24.54	17.81	32.23	48.69	80.20	6.90	12.50	18.87	31.07	12.5–18
	5.80	10.49	15.84	25.77	18.69	33.84	51.12	84.19	7.24	13.11	19.81	32.62	12.5–20

[1]) Applicable to vehicle model 421, 128/129

Weights and axle loads

Weights

Chassis Model	Sales designation	Version	Speed restriction to km/h	Tires Size	Type	PR	perm. axle loads FA kg	perm. axle loads RA kg	Weights Dead weight[1] kg	perm. pay-load kg	perm. gross vehicle kg
421.124 .125	U 52	Standard	none	7.5–18	MPT	8	2100 2200[2]	2100 2000[2]	2850	1250	4100
				10.5–18		6 10	2500	2500			
				10.5–20		6 8					
.140 .141	U 600			10.5–18		6 8 10	2600	2600		1350	4200
				10.5–20		8 10 14					
.124 .125	U 52			12.5–18		8 10	2500	2500		1250	4100
.140 .141	U 600						2600	2600		1350	4200
.124 .125	U 52	with heavy attach-ments max. 40 km/h	[3]	10.5–18	MPT	6	3000	3000		2000	4850
			20 km/h			10					
.140 .141	U 600		[3]			6					
			–			8 10					
.124 .125	U 52		[3]	10.5–20		6					
			20 km/h			8					
.140 .141	U 600		[3]			8					
			–			10 14					
.124 .125	U 52	with snow clearing attach-ments max. 40 km/h	[3]	10.5–18	MPT	6	3400	3400		2650	5500
			30 km/h			10					
			[3]	10.5–20		6					
			30 km/h			8					
.140 .141	U 600		[3]	10.5–18		6	3550	3550		2850	5700
			–			8 10					
			[3]	10.5–20		8					
			–			10 14					

[1] Following equipment are contained in dead weight:
cascade box, special PTO, hydraulic system, power lift, compressed air system, spare wheel, long auxiliary loading area, front and rear pto shaft and 80 kg for other equipment.
[2] 2100 kg with overall axle ratio 6.3
2200 kg with overall axle ratio 6.8
[3] heavy attachments and snow clearing attachments are not permissible.
[4] **Operating instructions:** The vehicle must be equipped with hydraulic steering and with speed plates 40 km/h.
When driving the four-wheel drive must be switched on.
It is not permissible to widen the track.

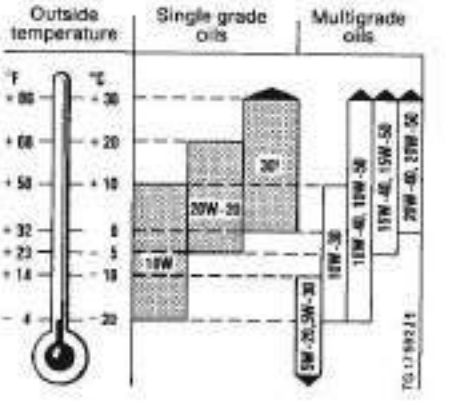
Trailer loads

Vehicle				Permissible trailer load kg		
Model	Sales designation	Version	Speed restriction kg	Trailer **unbraked**	Trailer **braked** not continuous brake system kg	Trailer **braked** continuous brake system kg
421.124 .125	U 52	Standard	–	1250	8000	13200
421.140 .141	U 600	in acc. with EEC	–	1425	8000	13100
421.124 .125	U 52	With heavy attachments four-wheel drive	20	1250	8000	12540
421.140 .141	U 600		40	1425	8000	12450
421.124 .125	U 52	With heavy snow clearing attachments four-wheel drive	30	None	None	None
421.140 .141	U 600		40			

Fluids, Filling Capacities

Group		Fluid (page no. of MB specifications for service products)	SAE Grade	Season	Capacity l
Engine	with oil filter	Engine oil (226-227.1)	[4]	[4]	max. 7.0 min 4.5
	of which in oil filter				0.8
	oil bath air filter				1.0
Transmission	Main transmission	Transmission oil (235.1)	80 [8] 80w [8] 80w/85w [8] 85w/90 [7] 90 [7]	all year	6.0
	– with auxiliary transmission and/without PTO				7.0
	– with crawler gear (below)				7.0
PTO shafts	PTO shaft bearing [1]	Transmission oil (235.1)	80	all year	0.1
	Displacement gears				1.4
Axles	Differential housing	Hypoid transmission oil (235)	90	all year	2.5
	Wheel hub drive				0.25
	Differential lock	Initial operation oil (225.3)	10 W		0.001
	Expansion tank for differential lock	Initial operation oil (225.3) or ATF [5] (236.2)	10 W –		0.3
Steering	Power steering	Engine oil (226, 227) or ATF [5] (326.2)	10 W [2] –	all year	2.0
	mechanical	Transmission oil	80		0.6
Hydraulic system	Oil reservoir, total	Engine oil (226, 227.1) or hydraulic oil (341)	10 W [3]	all year	15.0
	when changing oil				13.0
	perm. removal		–		7.0
Brake system	Total capacity	Brake fluid [4] (331.1)	–	all year	0.8
Compressed air system	without antifreeze unit	Antifreeze (325)	–	all year	as required
	with antifreeze unit	Ethyl alcohol			0.2
Clutch actuation	Expansion tank	Brake fluid (331.1 or 331.2)	–	all year	0.2
Lube nipple	Axle, universal shafts, power lift, chassis	Lubr. grease (266) or multipurpose grease (267)	–	all year	as required
DB rope winch Front	Type A	Transmission oil (235.1)	80	all year	0.75
	Type C				1.25
Rear	Type 4000 H	ATF [5] or engine oil (226/227/236.2)	– 10 W	all year	2.0

[1] Permanent filling
[2] In cold zones use SAE 5W-20/30
[3] In hot zones use SAE 30, in cold zones SAE 5W-20/30
[4] Change once a year (safety rule)
[5] ATF oils must not be mixed with other oils
[6] Optional
[7] In hot zones
[8] Viscosity ranges



[1] During continuous outside temperatures above +30 °C (86 °F) SAE 40 may be used.

Group		Fluid (page no. of MB specifications for service products)	Season	Capacity /
Battery	-Terminals	Anti-acid grease Ft40V1 (350)	all year	as required
	-Topping up	Distilled water		
Fuel tank	Standard	Diesel fuel DIN 51601	all year	90
Cooling system	with heater	Coolant [6]) (325)	all year	17.0
	without heater			15.0
	of which antifreeze protection to −25 °C	Antifreeze [7])		6.75
	and anti-corrosion protection	Treating agent (311)		0.2
Windshield washer	Windshield water bottle	MB windshield washer cleaner	all year	2.4

[6]) comprising water, antifreeze and treating agent

[7]) antifreeze prot. to °C | antifreeze approx. %

antifreeze prot. to °C	antifreeze approx. %
10	20
20	34
25	40
30	44
40	51

Chassis Type 411

Technical Data

Model	Type 411	
	shorter	longer
Chassis dimensions:	Wheelbase	
Wheelbase	1720 mm	2120 mm
Track, front	1290 mm	1290 mm
Track, rear	1295 mm	1295 mm
Track with reversed wheels, front	1538 mm	1538 mm
Track with reversed wheels, rear	1543 mm	1543 mm
Min. track circle diameter (outer track)	7,6 m	9,1 m
Max. length	3460 mm	3860 mm (3860)**
Max. width	1630 mm	1630 mm (1790)**
Max. height	2035 mm	2035 mm (2140)**
Clearance below differential	380 mm	380 mm
Clearance below axle	460 mm	460 mm
Platform length (i. l.)	1475 mm	1475 mm (1875)****
Platform width (i. w.)	1500 mm	1500 mm
Platform height (i. h.)	360 mm	360 mm
Effective loading area (1475 x 1500 mm)	2,2 m^2	2,2 m^2 (2,8)****
Loading height above ground, unloaded	1065 mm	1065 mm
Height of trailer coupling, unloaded	780 mm	780 mm
Seats in cab	1/1	1/1
Tilting angle	38°	38°
Angle of approach, front/rear	38°/47°	38°/62°
Weights:		
GVW	3200 kg	3500 kg***
Deadweight	1795 kg	1895 kg (1940)**
Payload	1000 kg	1200 kg***
Perm. front axle load	1900 kg	1900 kg
Perm. rear axle load	2000 kg	2000 kg
Recommended total trailer weight	16 t	16 t

* = In agricultural field operations weight of tractor is reduced by approx. 135 kg when windshield, roof are removed.
** = Applicable to UNIMOG Type 411 with steel cab.
*** = Applicable to German version with normal loading platform. GVW of export model with larger loading platform is 3550 kg, payload 1600 kg.
**** = Applicable to export version with larger loading platform.

I. Lifting capacity of hydraulic power lift arms

a) **Rear power lift**

The capacity of the power lift system ranges from 470–525 mkp depending on connection.

Lifting power at implement connections of 3-point linkage at 550 mm coupling height and average lifting spindle length of 100 mm clear thread:

Centre of gravity behind swivel bearings (m)	Lifting capacity (kp)		Lifting height at centre of gravity (mm)*	
	BA – front	BA – rear	BA – front	BA – rear
0	1190	1350	410	390
0,4	900	1010	555	520
0,8	750	850	710	610
1,0	690	790	775	640
1,2	630	730	825	675
1,4	580	680	850	690

Note: BA = bottom arm

* The max. stroke at centre of gravity taking into account coil springs and flattening of tire; does not take into account losses which occur in floating position.

b) **Front power lift**

Max. lifting power with largest perm. piston diameter of hydraulic cylinder 72 mm

Pressure 6000 kp
Traction 5000 kp

II. Lifting capacity of pneumatic power lift arms

a) **Rear power lift arms** with distance between centre of gravities of implement fitted as follows:

Max. lifting capacity at implement connecting points

Distance between centre of gravity (cm)	Lifting capacity (kp)	
	Type 401*	Type 411**
0	645	830
25	550	730
50	460	630
80	350	520
120	200	360
150	90	240

b) **Front power lift arms** (8.5 bar operating pressure)

Max. lifting power of 35 cm long arm (lifting cylinder connection up to pivoting axis) with distance between centre of gravities of implement fitted as follows:

Distance between centre of gravities (cm)	Lifting capacity (kp)
40	640
60	570
80	510
100	440
120	370
150	270

* = Applicable to old power lift system with 7.5 bar operating pressure (hydraulic cylinder with 1700 mm diameter).
** = Applicable to new power lift system with 8.5 bar operating pressure (hydraulic cylinder with 190 mm diameter).

Wheels

Rim size (drop base rim)	5.50 F x 18 (Press-in depth 58)	W 9 x 18 (Press-in depth 25)
Tires, front and rear	7.50–18	10.5–18

Tire pressures:

On highways	Front 2.75 kp/cm², rear 3.0 kp/cm²	Front and rear 2.0 kp/cm²
Off highways up to 20 km/h	Front and rear 1.5 kp/cm²	Front and rear 1.2 kp/cm²
In fields up to 8 km/h	Front and rear 1.25 km/cm²	Front and rear 0.8–1.2 kp/cm²

PTO rpm

Output	approx. 30 HP
PTO rpm, normal	Front and rear 540 rpm
Belt pulley drive, side	1170 rpm

Speed ranges

Max. speed in 6th gear	approx. 53 km/h
in 5th gear	approx. 35 km/h
in 4th gear	approx. 21 km/h
in 3rd gear	approx. 12 km/h
in 2nd gear	approx. 6.5 km/h
in 1st gear	approx. 3.5 km/h
in 1st reverse gear	approx. 2.6 km/h
in 2nd reverse gear	approx. 4.8 km/h
Crawler gear max. speed:	
in 1st gear	approx. 1.15 km/h
in 2nd gear	approx. 2.08 km/h
Crawler gear min. speed:	
in 1st gear	approx. 0.300 km/h
in 2nd gear	approx. 0.600 km/h
Crawler gear with intermediate gear max. speed:	
in 1st gear	approx. 2.8 km/h
in 2nd gear	approx. 5.0 km/h
Fuel consumption on level road (without trailer) at 40 km/h in 6th gear in the field	approx. 9–10 l/100 km
depending on kind of job oil	2–6 l/h
consumption of engine, normal up to	approx. 120 g/h

Capacities of coolants and lubricants

Water:	Capacity of cooling system (engine and radiator)	13 ltr.
Lubricant:	Engine (oil pan) max.	6 ltr.
Engine oil:	min.	3.5 ltr.
	Air compressor	0.14 ltr.
	Air filter	0.25 ltr.
Hydraulic system:		approx. 8.5 ltr.
Transmission oil:	Transmission	approx. 6 ltr.
	Transmission with crawler gear	approx. 7 ltr.
	Front and rear axle housing	on Type 411 approx. 3 ltr. each from Type 411b approx. 2 ltr. each
	Wheel hub drive (4)	0.3 ltr. each
	Steering housing	0.75 ltr.
Fuel:	Fuel tank	60 ltr. (prev. 40 ltr.)
Brake fluid:	Brake system	approx. 0.6 ltr.
Transmission fluid (ATF):	Differential lock	approx. 0.3 ltr.

Adjusting and Installation Instructions Type 411 (Dimensions in mm)

Position of front wheels

Toe-in (unloaded vehicle)	$0 \pm \frac{3}{1}$
Camber	1° 45'
Caster	approx. 4°
Inclination	10°

Front and rear axle

Spiral bevel gear		Klingelnberg gearing
Axle drive reduction		
a) Type 411, 411a, 411b		25 : 7 = 3.57 : 1
b) Type 411b / 411c	from front axle no 6457 from rear axle no. 6194	35 : 9 = 3.89 : 1
Reduction on wheel hub drive		32 : 15 = 2.13 : 1
Dual reduction		for a) i total = 1 : 7.62 for b) i total = 1 : 8.29
Backlash of crown and pinion		0.15–0.20
Axial play of crown gear incl. differential housing in bearing seats		+ 0.002 to 0.05
Backlash of differential bevel gears		0.15 – 0.20
clearance (axial) of double joint shift in wheel hub drive		0 + 0.02, no preload

Shock absorbers

Manufacturer	Stabilus
Type	Telescope T 40 x 130
Dimension	40 mm piston ∅, maintenance-free

Swings	Basic design	reinforced design
Front springs	2 coil springs	
Untensioned length	320 ± 3 mm	
Spring deflection per 100 kg load	15.95 mm	9.10 mm
Rear springs	2 coil springs with 2 helper springs	
Untensioned length of main spring	380 ± 3 mm	
Spring deflection per 100 kg load	17.70 mm	12.45 mm
Untensioned length of helper spring	250 ± 3 mm	
Spring deflection per 100 kg load	11.60 mm	

Brakes

Footbrake	Hydraulic brake system acting on all four wheels
Effective braking area per wheel	494 cm²
Play between thrust rod and piston of master brake cylinder	1
Free travel of brake pedal measured at running plate	10
Handbrake	Acting mechanically on rear wheels

Steering*

	Type 411
Spindle steering	"Fulmina" Type 30
Play at steering wheel	20–30
Steering wheel	Petri 450 ∅
Reduction	1 : 24.3 = 5.06 steering wheel turns = 75° turn of steering arm
Spindle	Double thread lefthand 16 mm,
* ZF power steering optional	inclination ... Stg. ∢ 9° 35'

Clutch

I. Single Clutch

Manufacturer	Fichtel & Sachs
Single plate dry clutch	Type K 225
Thrust pressure	90 kp
Clutch pedal clearance measured at running plate	20–25
Contact area of clutch plate	221 cm^2
Thickness of clutch plate incl. clutch lining	loaded 9.3 ± 0.3 mm unloaded 9.8 ± 0.3 mm

II. Double Clutch

Manufacturer	Fichtel & Sachs
Double clutch	Type Do 225/200 K
Thrust pressure	
1. First stage (drive clutch)	approx. 120 kp
2. Second stage (pto clutch)	approx. 250 kp
Clutch play	1,5 mm

Transmission

Axial play of drive for 4-wheel drive	0.20 – 0.30
Axial play of countershaft between cover and spacer ring	0.20 + 0.1
Radial play between bushing and first/third gear (counter shaft – sliding bearing)	0.13 – 0.19
All wheel sets must have a perceptible play after installation	approx. 0.1 – 0.2 mm

Remaining axial plays of individual shafts for the recesses of roller bearings and stages of the shaft are	given

Pneumatic trailer brake system

Manufacturer	Westinghouse, Hannover
Single piston air compressor	Type 411 004 120 0
Capacity	96 cm^3
Max. rpm of air compressor	2450 rpm
Operating pressure	7.5 kp/cm^2
Delivery at 7.3 kp/c^2 counterpressure and max. rpm of 2750	approx. 120 l/min
Pressure regulator with tire inflating bottle	Type 475 304 001 0
Pressure regulator set (operating pressure)	5.2 kp/cm^2
Pressure regulator with tire inflating bottle, adjustable:	Type 475 305 000 0
for trailer brake	5.2 kp/cm^2
for power lift arms	8.5 kp/cm^2

Double line brake system

Hydraulically operated brake valve	Type 470 006 001 0
Pressure regulator	Type 475 304 001 0
Brake pressure	7.2 kp/cm^2

Single piston air compressor with gear oil pump

Type/Designation**	Westinghouse / 415 701 100 0
Air compressor	Type 411 005 100 0
Air compressor rpm	2450 rpm
Capacity	96 cm^3
Operating pressure	7.35 kp/cm^2
Delivery at 7.3 kp/cm^2 counterpressure and max. rpm of 2750 rpm	approx. 120 l/min

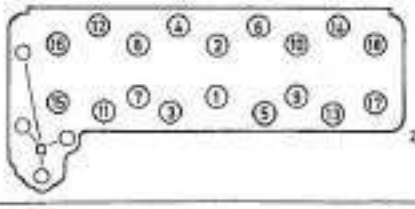
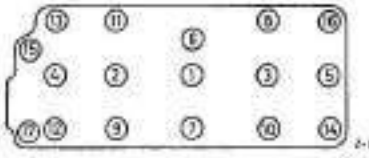
Hydraulic system

**Gear oil pump with air compressor	Westinghouse 415 701 100 0
Gear oil pump	Type 416 101 000 0
Oil pump rpm	2450 rpm
Operating pressure	150 kp/cm^2
Delivery at max. engine rpm of 2750 without counterpressure	18.5 l/min
Delivery at operating pressure	16 ltr./min
Hydraulic double valve with pressure reliev valve	Type 466 799 000 0

Tightening Torques in kpm

Engine

Type	OM 615	OM 621	OM 636
Crankshaft bearing bolts	9[1]	9	8
Piston rod bolts	5.5[1]	4.1 – 0.6	3.75
Flywheel mounting	Angle torque[2]	5.5 + 0.5	
Cylinder head bolts	9	9	8
Thrust bolt of prechamber	15 + 3	15 + 3	15
Nozzle in nozzle holder	7 + 1	7 + 1	
Nozzle holder in cylinder head	7 + 1	7 + 1	
Glow plugs	5	5	
Pressure valve carrier at injection pump	4.5 + 0.5	4.5 + 0.5	
Cap nuts of injection lines	2.5	2.5	
Rocker arm bearing bracket bolts	3.75[3]	3.75[3]	–
Nuts for ring piece on nozzle holder	7 – 1	7 – 1	5
Polit-stop nut on int. gear shaft for mounting timing device	7	7	–
Collar bolt on crankshaft, front	21 + 1	21	18
Mounting bolts for oil filter lower part	4 – 0.5	4 – 0.5	–
Oil pressure valve in cylinder crank case	4	4 + 1	–
Cylinder head cover	1.0	2.5	–
Oil filter pot	4 – 0.5	4 – 0.5	–
Front engine mounting	6	6	–

Type	Sketch for tightening sequence of cylinder head bolts	Torqueing in stages Tightening torque in mkp			
		First step	Second step	Third step	Check
OM 621		3	6	9	9
OM 615		4	6	9	9
OM 636		4	6	8	8

a = Tighten bolts with thread M8 with hand wrench.
Cylinder head bolts are slackened in the reverse order, starting from the back.

1) Connection rod and main bearing bolts are tightened without locking plates to the recommended torque. Before tightening, grease threads of bolts and nuts.
2) Tighten expansion bolts for flywheel mounting: first step 3 + 1 mkp, angle of torque 60° + 10°.
3) When tightening rocker arm mounting bolts, rocker arms should not be subjected to load by camshaft.

Transmission 421

Bolt, small bearing main shaft rear	4.7–5

Front and rear axle 421, 411b, 411c

Stabilizer	18–20
Axle drive adjustment	12 kpcm
Bolts on wheel hub drive housing and thrust tube	9–10
Bolts on axle drive housing	13,5
Clamping bolt in wheel hub drive	22
Wheel hub bolts	29
Shock absorber fastening bolts	12–14
Axle struts (bolts M16–10 K)	22 ± 2
Steering arm at steering knuckle	22

Front and rear axle 411, 411a

Fastening nut for strut on mounting bracket	7.5–8
Fastening bolts of crown gear of differential housing	7–8
Slotted nut at bevel gear shaft	14–16
Hexagon bolts for steering knuckles and connection housing at axle bridge, resp.	24
Mounting bolts of stabilizer	17
Wheel locking bolt	75–100

Steering 421, 411

Steering arm	25–30
Steering mounting on frame, bolt M24 x 1.5	40

Contents

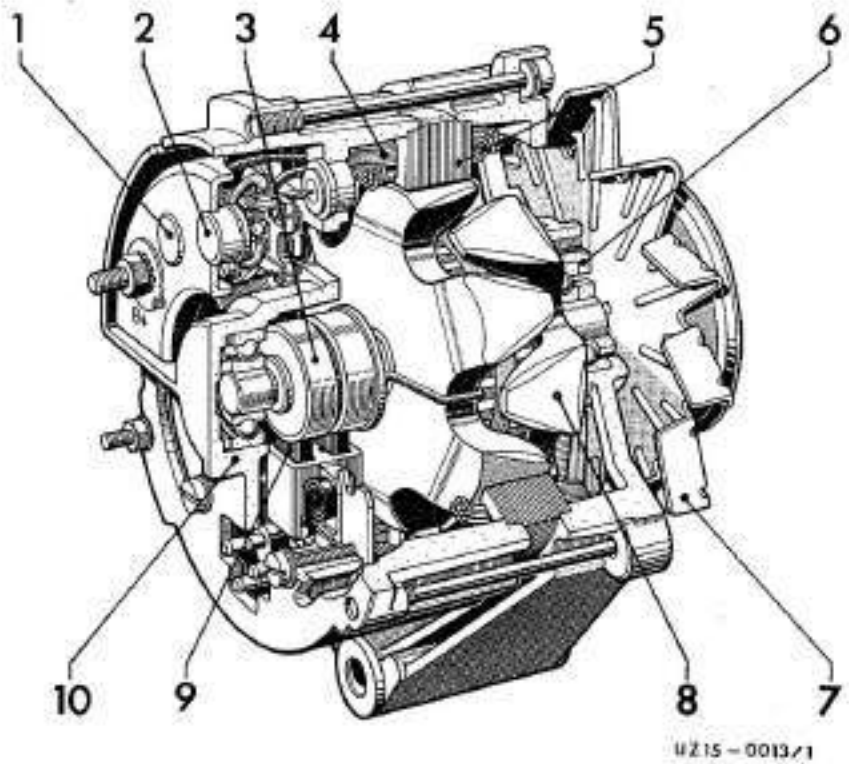
Technical data

Alternator

Electrical system		12 Volt (Series)	12 Volt (SA 35 496)	24 Volt (SA 35 613) [1]
Manufacturer		Bosch		
Design		Three-phase		
Output	W	490	770	756
Rated voltage	V	14		28
Current	A	35	55	27
Number of revolutions, max.	1/min	9000		11000
Start of charging	1/min	1000		1180
Gear ratio engine/alternator		1 : 1.80		
Inscription		K 1-14 V 35 A 20	K 1-14 V 55 A 20	K 1-28 V 27 A 23

[1] Engine-model 616.933

Sectional view



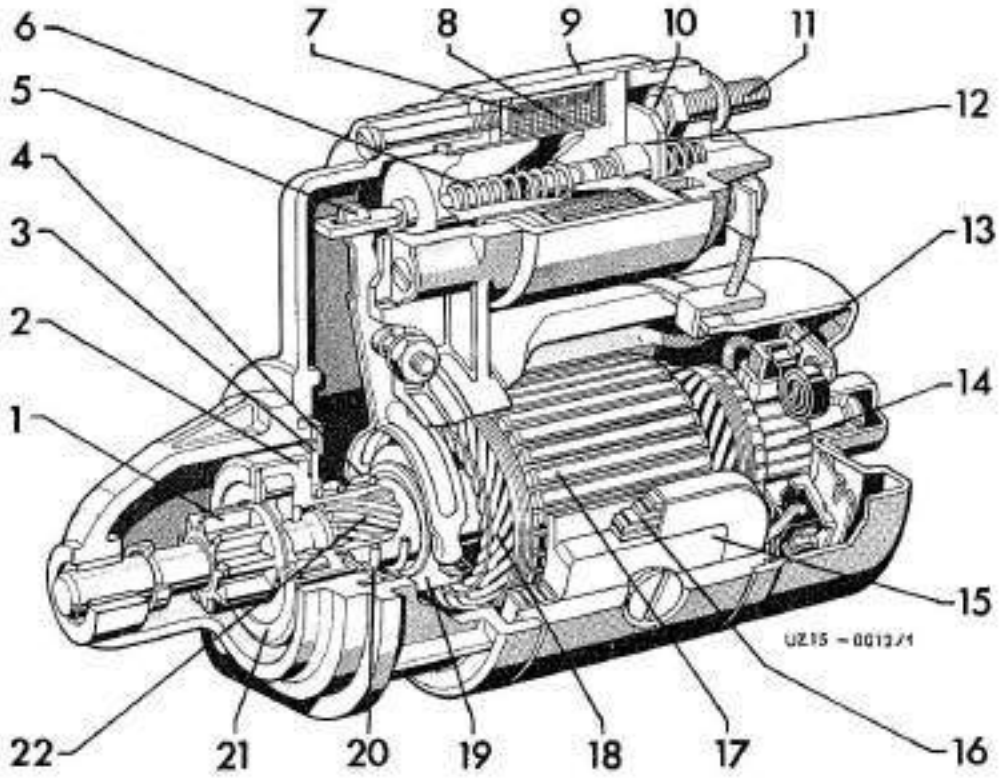
Alternator

1 Heat sink
2 Diode
3 Slip ring
4 Stator winding
5 Stator core
6 Drive bearing
7 Fan
8 Claw pole rotor
9 Carbon brush
10 Slip ring bearing

616

Starter

Installation				Standard	SA 35 613
Manufacturer				Bosch	
Construction				Pre-engaged-drive starting motor	
Type				JF → 12 V 2.3 kW	JF → 24 V 2.6 kW
Marking				→ 12 V 0001 362 600	→ 24 V 0001 363 106
Direction of rotation				to the right	
Rated voltage			V	12	24
Output			kW	2.3	2.6
Pinion gearing	No. of teeth	z		9	10
	Module	m		2.11	
	Pressure angle	$\alpha°$	°	12	
	Profile displacement factor	x		+ 0.753	



Starter

1 Pinion
2 Driver
3 Brake disk
4 Meshing spring
5 Engaging lever
6 Return spring
7 Holding winding
8 Pull-in winding
9 Solenoid relay
10 Relay contact
11 Terminal stud
12 Bridging contact member
13 Carbon brush
14 Commutator
15 Pole shoe
16 Exciter winding
17 Starter armature
18 Armature winding
19 Guide ring
20 Stop
21 Roller-type overrunning clutch
22 Armature shaft with spiral spline

Glow plugs

Installation		Series		SA 35 613	
Manufacturer		Bosch	Beru	Bosch	Beru
Type		KE 4484 B/A	182 MJ	A 250 201020	165 MJ
Type of connection		1 pole			
Operating voltage	V	9.5		18	
Operating current	A	9.1	10	5.2	
Number		4			
Length	mm	79.5	78	78.5	77
Male connector		M 18 x 1.5			

Standard installation

Engine-model	to engine-end-no.
616.911	003 345
616.932	000 380
616.933	000 204

Installation		Series	SA 35 613
Manufacturer		Beru	Beru
Type		0 100 221 107	0 100 231 101
Type of connection		1 pole	
Operating voltage	V	11.5	18
Operating current	A	14	5
Number		4	
Length	mm	68 ± 1	
Male connector		M 12 x 1.25	

Standard installation

Engine-model	from engine-end-no.
616.911	003 346
616.932	000 381
616.933	000 205

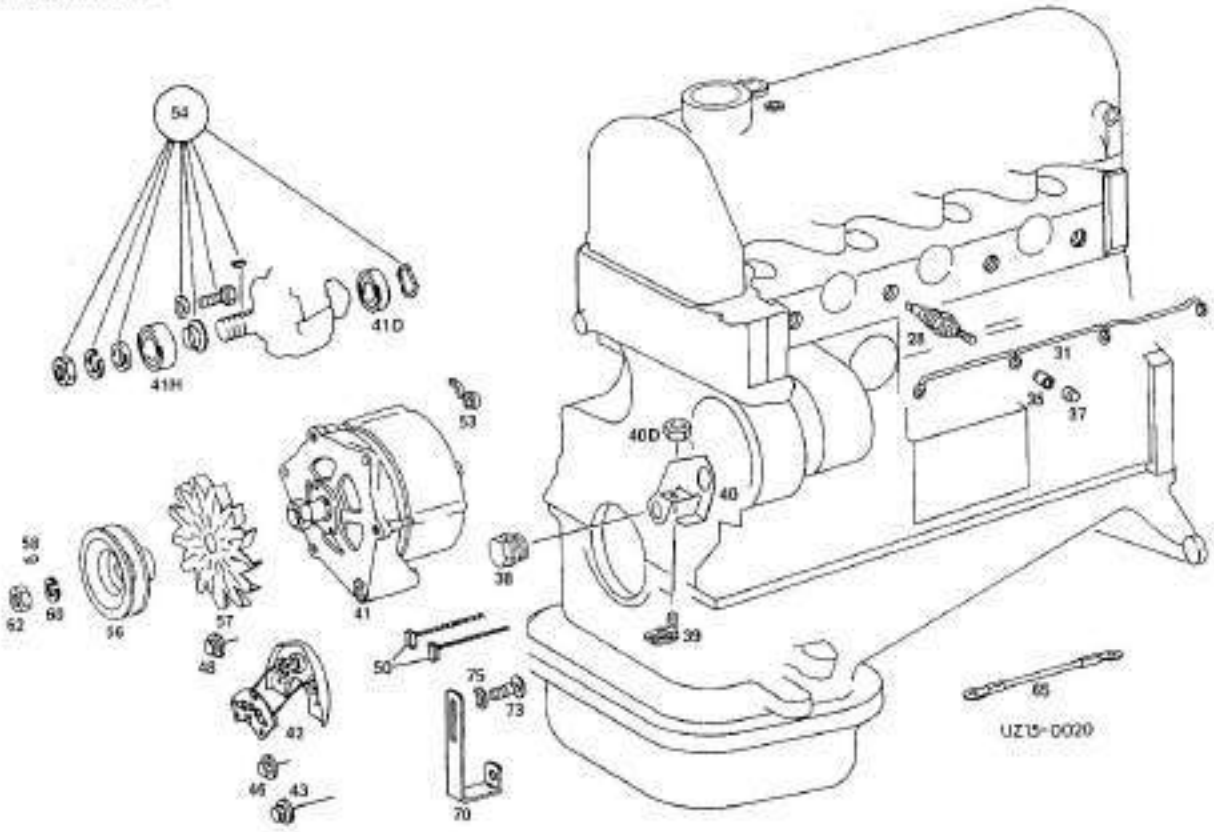
Special tool

Ser. no.	Designation	Special tool	Tool-set
1	Box wrench	000 589 30 03 00	A
2	Socket wrench for glow plugs	001 589 23 09 00	A
3	Reamer for glow plug duct	617 589 00 53 00	D

Tightening torques

Designation	Thread/ strength	Nm
Alternator at carrier	M 8/8.8	38
Clamping bolt at crankcase	M 10/10.9	50
Belt pulley at alternator	M 14	35 to 45
Glow plug in cylinder head	M 18	50
	M 12	35
Starter motor at clutch housing	M 12/8.8	55 to 65

Exploded view

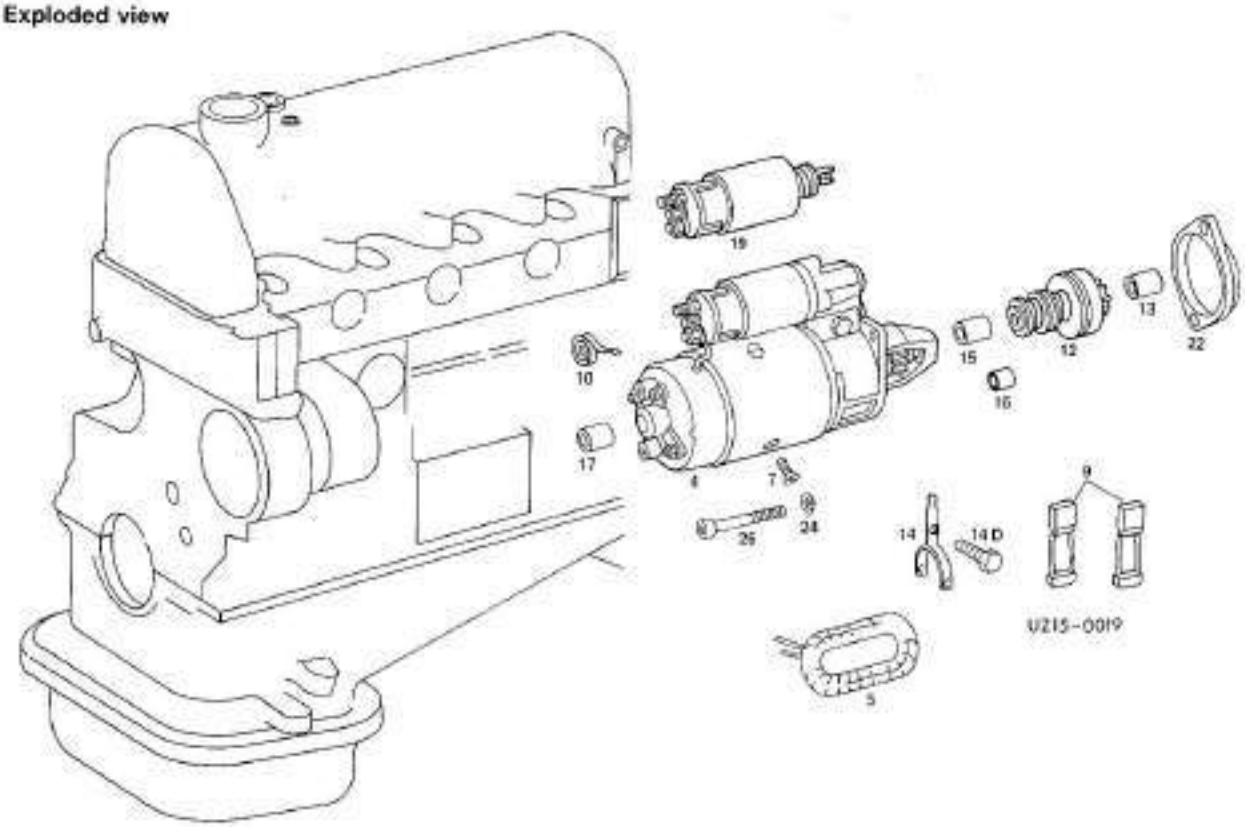


Electrical equipment on engine

28	Glow plug
31	Busbar
35	Nut
37	Cap
38	Plug
39	Bracket
40	Bracket
40D	Nut
41	Alternator
41D	Ball bearing
41H	Ball bearing
42	Rectifier
43	Plus-diode
46	Minus-diode
48	Exciter-diode
50	Set of brushes
53	Spring
54	Repair kit rotor
56	Belt pulley
57	Fan
58	Woodruff key
60	Spring washer
62	Nut
65	Earth cable
70	Angle
73	Bolt
75	Springer washer

616

Exploded view



Starter motor

4	Starter motor
5	Exciter winding
7	Bolt
9	Set of brushes
10	Spring
12	Pinion
13	Bushing
14	Shift lever
14D	Bolt
15	Bushing
16	Bushing
17	Bushing
19	Solenoid-operated switch
22	Intermediate piece
24	Spring washer
26	Bolt

II. Type 411

Starter

Bosch order no.	Type	Rotating direction	Max. Torque	Short circuit current input
0 001 354 031	ID (R) 12 V 1.8 PS	clock wise	4.1 kpm	845 Amp.

Generator

Bosch order no.	Type	Current	Max. Amp.	RPM/Min.
0 101 206 012	EG (R) 14 V 20 A 27	14 V	20 Amp.	4720

Regulator

Bosch order no.	Type	Current	Max. charging rate
0 190 309 028	VA 14 V 20 A	14 V	20 Amp.

Glow plugs

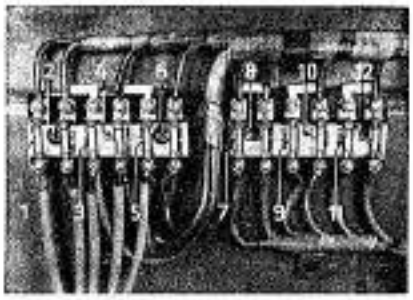
Bosch order no.	Type	Execution of glow wire	Rated voltage
0 250 002 002 0 250 001 001	Bosch KE/GA 2/2 Bosch KE/GA 1/8	coil spring like loop like	1.4 V 0.9 V
– –	Beru 202 GE Beru 214 GK	coil spring like loop like	1.4 V 0.9 V

Remark: The shaft of the Beru glow plug, of which the glow wire is comming out, is not a live one, therefore not ground sensetive.

Table of electrical circuit on engine OM 636

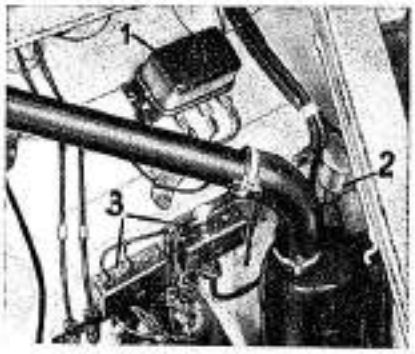
(all fuses 8 Amp. as per DIN 72581)

Fuse no.	Consumer
1	Back-up light
2	Tail light, left
3	Tail light, right, instrument panel light
4	Blinker
5	Horn and windshield wiper
6	Stop light
7	Main beam, left
8	Main beam, right
9	Dimming light, left
10	Dimming light, right
11	Parking-and position light, right
12	Parking-and position ligth, left



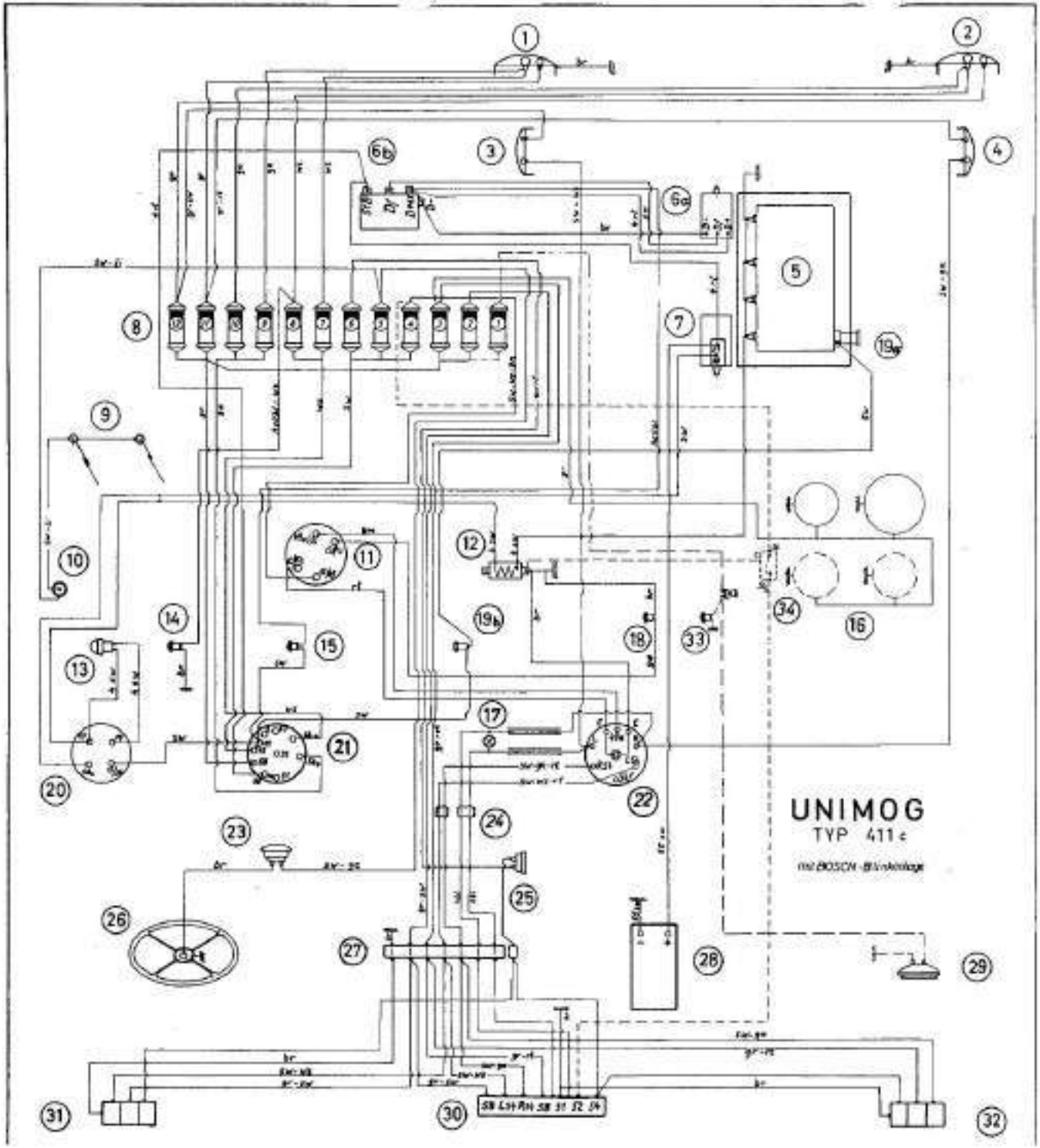
Picture 15/54-0/4

Arrangement of fuses



Picture 15/54-0/5

1 = Generator regulator
2 = Blinker sending unit
3 = Fuse boxes



Explanation for wiring diagram

Picture 15/54-0/6

1 = Head light, left
2 = Head light, right
3 = Blink-and position light, left
4 = Blink-and position light, right
5 = Engine
6 = Generator
7 = Starter
8 = Fuse boxes
9 = Windshield wiper
10 = Plug (female)
11 = Blinker sending unit
12 = Glow plug resistance
13 = Glow plug control
14 = High beam indication light
15 = Charging control light
16 = Panel instrument light
17 = Blinker control light, for 1st trailer
18 = Blinker control light, for 2nd trailer
19a = Oil pressure switch
19b = Oil pressure control light
20 = Glow plug starter switch
21 = Main switch box
22 = Switch for blinker
23 = Horn
24 = Terminal rail
25 = Stop light switch
26 = Button for horn
27 = Terminal rail
28 = Battery, 12 V
29 = Trouble lamp
30 = Trailer female plug with the connection of
= Stop-blink light, right
= Stop-blink light, left
= Ground
= Tail light, left
= Tail light, right
= Stop light
= 3rd brake
R 54 bottom
L 54 top
31
58 middle
58 outside
54
52
31 = Blink-stop-and tail light, left
32 = Blink-stop-and tail light, right
33 = Switch for control light (trouble light)
34 = Switch for 3rd brake

Picture 15/54-0/6

Electrical wiring diagram type 411

Remove, Install and Partially Repair the Starter on Type 421 15-1

The starter is operated electrical via the glowplug starter switch on the dash board. If the starter fails to start, the reason for failure may be in the electrical system or in the starter itself. Loose terminals and bad ground connections may be the reasons for malfunctioning; the usual permissible loss of tension should not exceed more then 4 % in the cable going to-and from the starter.

The reaction of the switched-on head lights tell the condition of the battery and contacts of the starter.

a) Are the head lights going off, a bad connection is on the battery, on the cable connectors of the starter, or on any ground wire.

b) Are the lights going off slowly, the battery is not charged, or damaged, or old.

c) If the lights of the head lights do not change at all, the starter needs a checking.

A. Remove and install starter

1. Remove ground cable from battery.
2. Disconnect cable from starter.
3. Remove starter from crankcase housing in forward direction.
4. Installation is done in vice-versa sequences. Coat pinion and pinion shaft with grease.

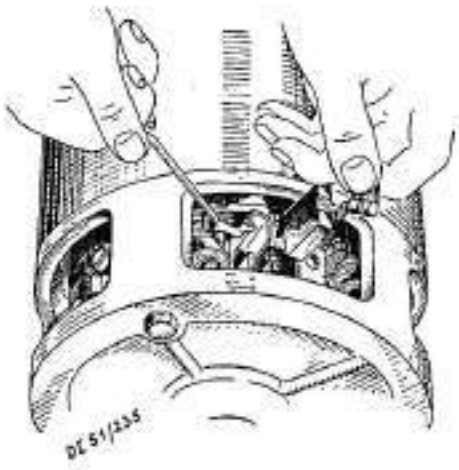
B. Repair starter partially

Remark:

If the starter fails to work, it is adviseable to have a service station check into it for to repair.

The repair instructions of the starter therefore deal only with an exchange of the carbon brushes and springs as well as changing of the starter pinion.

1. Remove collector protection ring.
2. Remove brushes. Picture 15-1/1.
3. Place starter into vise, decotter castled nut of pinion shaft, remove nut with washer.
4. Remove pinion from shaft by turning anti-clockwise.



Picture 15-1/1

5. Remove screws on starter housing cover and take off cover.

6. Remove armature out of housing.

7. Clean brushes with fuel and a clean cloth. Never touch the sparkling contact ereas with a file or sand paper, clean brush mountings with air pressure.

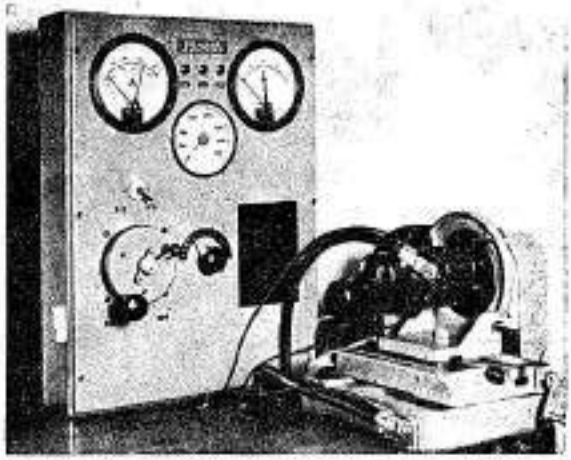
8. Clean collector, if grooves can be seen, turn off a little and polish, also clean grooves between the collector bars (otherwise short circuit).

9. Check starter pinion, if necessary, renew.

10. Check brushes and brush pressure springs, if necessary, renew.

11. Reassembly is done vice-versa.

12. Check starter on test bench. Picture 15-1/2.



Picture 15-1/2

C. Remove and install magnetic switch

Remove:

1. Remove ground cable on ground pol of battery.
2. Disconnect cable 30 and 51 on the connection of the magnetic switch. Remove the cable from the field windings to the magnetic switch.
3. Remove the control cable on the connection 50.
4. Remove the cylindrical screws on the cover flange for the drive bearing, unhook the magnetic switch on the engagement leever and remove.

Installation:

5. Check the installation measurement "a" on the magnetic switch and if necessary adjust. (See page 15/54-0/1.)

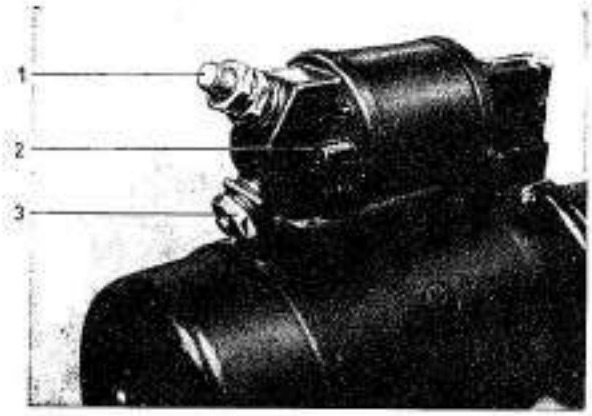
   After the adjustment, the universal fork and the counter nut must be secured with varnish FL 53 V 8.

6. The rest of the installation is done vice-versa.

Remove, Install and Partially Repair Starter on Type 411

A. Remove and install starter

1. Remove ground cable on battery.
2. Remove starter cable (30).
3. Loosen electric wire on connection 50.
4. Loosen connecting bolts of starter on crankcase housing and remove starter, use tool no. 636 589 00 01 00.
5. Installation is done vice-versa.



Picture 15–1.1/1

1 = Connection 30
2 = Connection 50
3 = Connection bolt for magnetic switch

B. Partially repair starter

Remark:

For the repair of the starter, the same rules as of the generator do apply, that means bring starter to the nearest Bosch Service Station.

The description of starter repair only goes for changing of brushes and brush springs as well as changing of the starter pinion.

1. Remove protection cover plate for collector.
2. Tightening screw (hex. nut for el. wire from magnetic switch to the starter motor) to be loosend.
3. Lift up brush pressure spring, and remove the brushes.
4. The 2 long screws to be taken out, remove bearing cover, incl. armature (before taking out, mark).
5. If the starter pinion is to be changed, remove the magnetic switch by loosening the two top counter sunk screws and the horizontal pin too.
6. Decotter castled nut in front of the starter pinion, remove same and the lock ring too.
7. Remove armature out of its front mounting bearing.
8. Pull down shifting fork. Starter pinion can now be removed.
9. Clean and check collector, if necessary use polish linnen to clean, also clean the grooves between the bars (otherwise short circuit).
10. Check starter pinion and if necessary, renew.
11. Check also and if necessary, renew the brush pressure springs and the brushes.
12. Reassembly is done vice-versa.
13. Check starter on test stand.

Remove and Install Generator on Type 421

(Three-phase generator)

I. In general

The generator is suppling the direct current, needed for the electrical system in the vehicle, converted by the silicon rectifier into direct current (diode in bridge position). Converting a.c. into d.c. By means of a two-contact-one-element regulator, the operating voltage is regulated. The generator itself regulates the max. voltage, the rectifiers are taken over the functioning of the return current switch. The generator is pre-exited by the battery and during the operation the exiting is done by an installed (3) exiting diode in the coil.

The three-phase generator needs no maintenance.

To avoid great damages, look out for the following:

1. **As long as the engine is running, do not remove ignition key or the terminals on the battery, the connection on the generator itself, or the plug of the regulator. Otherwise the diodes will be damage by the inductive voltage peak.**

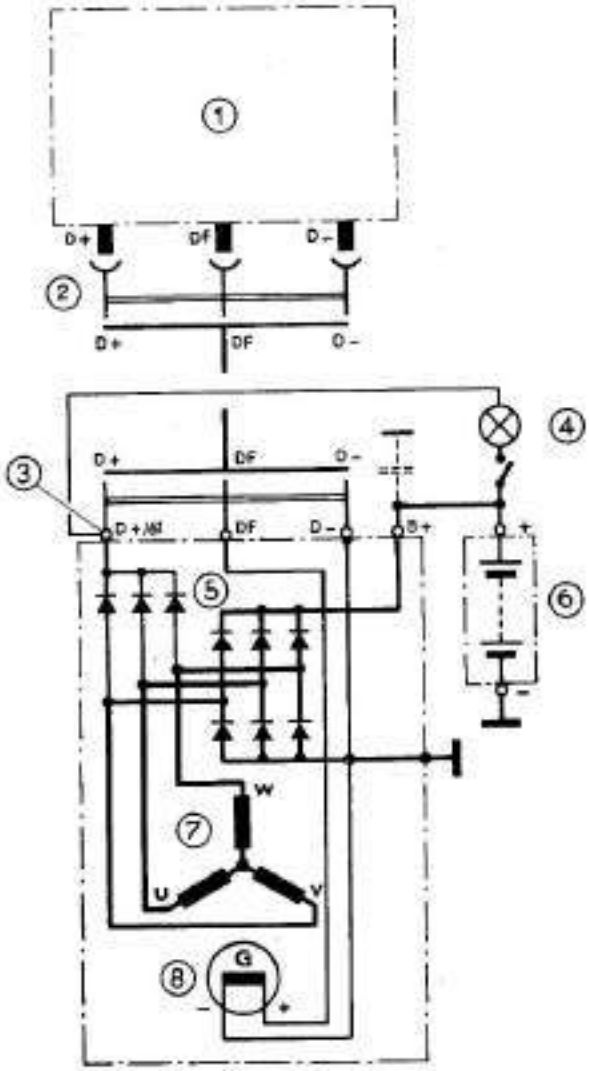
2. For the same reason it is not permissible to pull a UNIMOG as long as the cables on the battery are not connected (when loading a vehicle).

3. The three-phase generator must and should **not be** polarized. The pre-exiting is sufficient as long as the control light is on.

4. By no means mix-up the terminals or the connections on the generator, regulator or starter.

5. **Attention when quick charging.**
   When re-charging the battery with a quick charger (battery installed in the vehicle) remove the terminals. **If, in exeptional cases, the quick charger is used as a starter aid – as by where the terminals are not removed – the implement must be shut-off before disconnected.**

   Otherwise a high voltage is induced by the sudden load decrease and the diods are destroyed.



Picture 15-2/1

1 = Regulator
2 = Plug connections
3 = Screw connections
4 = Loading warning light
5 = Rectifier
6 = Battery
7 = Three-phase coil
8 = Exting coil (runner)

Attention: Implements with seperate main switch to be shut-off only, after the load voltage has been set back to 0 Amps.

A bad connection of the terminal can also lead to destruction of the diods when a starter aid is used. They are also in danger when a quick charger or a battery is connected the wrong way, with the one in the vehicle (acting as starter aid).

6. The regulator connections nor the generator should be shortened, nor should the hot wire be connected with the ground wire.

7. Generator trouble in general are mostly shown by the bright shining indication lamp for ignition. The exact malfunctioning of the generator can only be destined on a test bench. However, the generator with regulator can be tested while both of them are installed as follows:

   a) Connect voltage meter on D+ and D-. Without a switch-on consumer, the regulator voltage at engine rpm. of 1500/min., should be for various types of regulators, between 13.9 to 14.8 V.

   b) Shut-on consumer (head lights and wind shieled wiper motors) of approx. 200 W. At this consumer, the regulator voltage should be within the recommended limits.

   If the voltage is not within this limits, shut-off engine, pull regulator plug and repeat checking with new regulator. In case the regulator voltage is now correct install the new regulator. If the voltage is still out of the limit recommended, change generator.

   Pay attention for a surrounding temperatur of the regulator, app. 20° C and a load capacity of the battery of 60 %.

B. Remove and install generator

1. Disconnect battery.

2. Disconnect wires from generator.
   Remark:
   Instead of a cable shoe, a three-fold-plug connection is mounted.

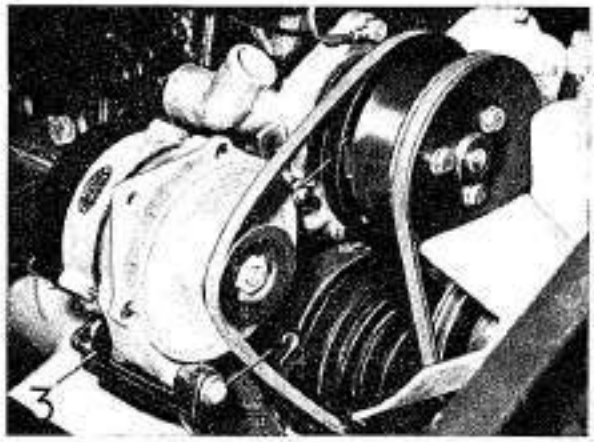
3. Remove set screw on bracket of generator, remove V-belt. Picture 15-2/2.

4. Remove screw on support of generator bracket, take off generator.

5. Installation is done vice-versa, connect cables.

6. Tension V-belt.

Remark:
Any repair of an alternator should be done in an authorized Bosch Service Station.



Picture 15-2/2

1 = Set screw for V-belt
2 = Screw of generator support
3 = Generator support bracket

Remove, Install and Partially Repair Generator on Type 411 15-2.1

The rated output of the generator is 130 W. The generator can be overloaded continously up to 50 %. The reserve is to charge the battery even when consumers are shut-on (head lights at night). Continous consumers are the ones in operation usually all night:

Head light, tail light, licens plate light etc.

A. Remove and install generator

1. Disconnect ground cable on battery.
2. Disconnect wires on generator.
3. Remove set screw on bracket of generator and take off V-belt.
4. Remove both screws on the carrier of generator mounting bracket, take off generator.
5. Installation is done vice-versa.

Remark:

It might be a good idea to have generator run as an engine for a little while, therefore connect no. 61 with 51.

Do this before V-belt is mounted.

If the generator runs in the same direction as the engine does, this is the right direction and generator has the correct polarity too. Provided the battery is connected in the right way.

B. Partially repair generator

The generator should only be repaired in the own shop if no Bosch Service Station is around. Otherwise give generator out for repair.

1. Loosen and remove collector protection strap.
2. Lift brush springs and brushes too, clamp brushes with springs to hold, don't brake brushes.
3. Remove both long screws, also the bearing cover on the drive side, including the coil. (Before pulling out, mark.)
4. Loosen mounting screw of the plus brush holder (cable shoe).
5. Remove bearing cover on collector side.
6. Remove nut on V-belt pully and pull off V-belt pully itself.
7. Check ball bearing. Remove the 3 screws in the bearing cover and pull-off the ball bearing. Use puller 000 589 20 33 00.
8. If collector shows grooves, turn down slightly.

   The isolation between the collector bars and the bars itself must be set-back by 0.6 mm. If this is not the case, use a collector saw for cut-in. Clean collector.
9. Clean brushes with clean rag. If worn out, renew.

   The brushes should glide in the brush holder easily and the springs should press them down sufficiently.
10. Reassembling of the generator is done vice-versa.
11. Check generator on a test bench or after installation into vehicle.

Remark:

To have a continous control wether or not the generator is working while the engine is running, a control light is mounted on the dash board.

This check lamp should light when the ignition key is pushed in and the engine is not running. The moment the engine starts running, the light must go off. This means the generator is working **perfect.**

Is the lamp going on during the vehicle is in operation, that would mean the generator does not work. The trouble must be looked after at once to avoid a voltage drop in the battery.

In the most cases the voltage regulator did failed. Since the regulator can only be repaired in a Bosch Service Station, change the complete regulator.

1. Disconnect ground cable from battery.
2. Disconnect cable on voltage regulator.
3. Remove regulator.

   Remark:

   The voltage regulator is located in the front engine compartment.

4. Installation is done vice-versa.

Check glow plugs

To be able to have the complete glow system under control, some is equiped with a incandescent spiral. This spiral must get cheery red when the pre-heater switch is brought into position no. 1.

If the spiral is getting glowing much brighter, the ground wire must be better connected on the glow wire, of a glow plug, on the glow plug indicator resistor or on the pre-heating resistance.

If the spiral is not glowing at all, a glow plug is out for order, mostly the glow plug wire is broken.

To check which one, proceed as follows: shorten out all glow plugs one after one (use screw driver) and at same time bring starter switch in pos. 1, the one glow plug is out of order on which the glow plug indicator is starting to glow when the plug is shortened out.

If the glow plugs are OK, check the glow plug indicator on dash board or the glow plug indicator resistor under the hood.

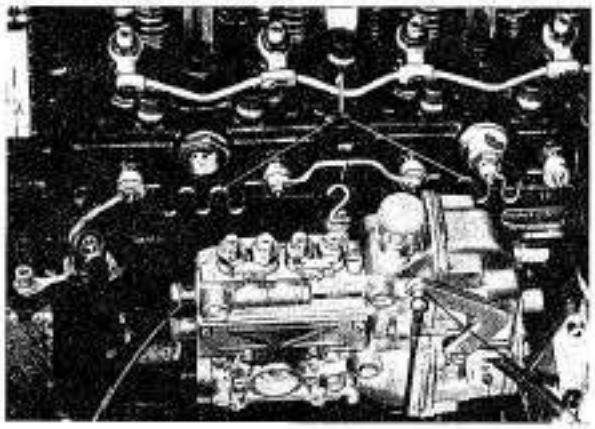
As of installation of engine OM 615 (chassis no. 421 . . . 002 229) the outer bus bars are functioning as resistors. Therefore, no resistor in drivers cab. See Picture 15-4/1.

Remove and install glow plugs

1. Remove ground cable terminal from battery.

2. Disconnect hot wire from plug no. 4 and ground cable from plug no. 1.

3. Remove nuts from plugs and also the current connecting rails with insulators. Unscrew glow plugs.



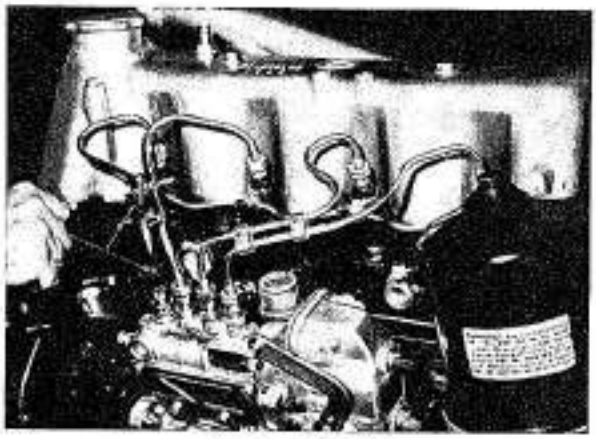
Picture 15-4/1

1 = Outer bus bar acting as resistor
2 = Inner bus bar

Remark:

Before installing glow plugs again, check the glow plug channel with tool no. 636 589 03 53 00 and if necessary clean with a reamer.

The reamer should have a dia. of 11 mm, coat same with grease and start the tool screwing into the glow plug channel to remove the carbon. After finishing, start up the engine to have carbon blown out. Picture 15-4/2.



Picture 15-4/2

1 = Check plug 636 589 03 53 00

4. Install glow plug into cylinder head.

Torque is 5 mkp.

Contents

Technical data

Engine cooling

Parallel-distance of fan from radiator block			mm	15
Distance, flange – hub		a	mm	89.2 ± 0.2
Distance, impeller – flange		b	mm	23 ± 0.2
V-belt tension	Coolant pump, alternator and crankshaft		mm	approx. 5 to 10*
	Air compressor and crankshaft		mm	approx. 10 to 15*
	Coolant pump and fan-bearing bracket		mm	approx. 10 to 15*

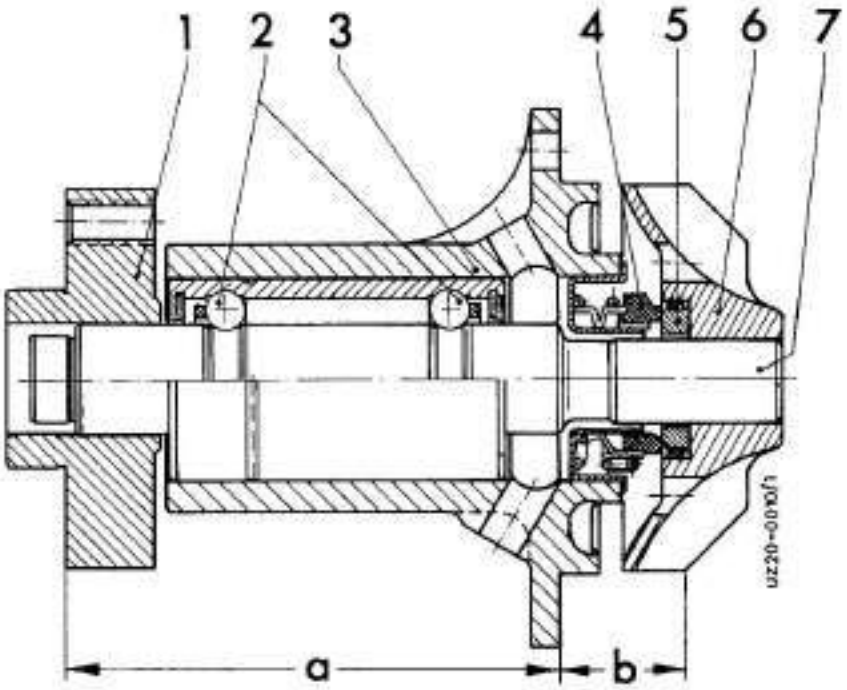
Gear ratio from crankshaft to	Coolant pump	Alternator	Fan normal tropics	
	1 : 0.9	1 : 1.95	1 : 1	1 : 1.1

* Depressing with moderate thumb pressure

Coolant pump

1 Hub
2 Deep-groove ball bearing
3 Bearing housing
4 Slide ring seal
5 Counter ring with O Ring
6 Impeller
7 Coolant shaft pump

a Reference size
b Distance impeller – flange



616

Technical data coolant regulator

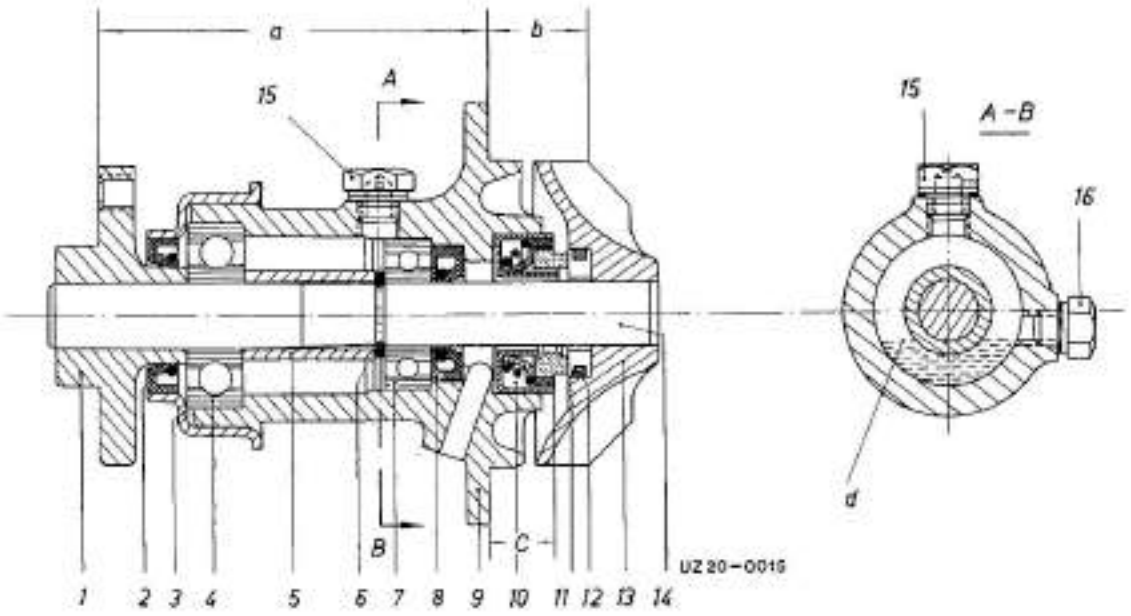
Start of opening	°C	71 ± 2
Valve lift	mm at °C	8 at 85
Pressure max. in closed valve	bar	0.8

Capacities

Assembly		Service product (sheet-no. of the MB-service product-specifications)	Season	Capacity with heating	Capacity without heating
Cooling system		Coolant	all-year	17.0	15.0
Antifreeze protection to	−10 °C +14 °F	Water Antifreeze (325)		13.5 3.5	12.0 3.0
	−20 °C − 4 °F	Water Antifreeze (325)		11.5 5.5	9.75 5.75
	−30 °C −22 °F	Water Antifreeze (325)		9.5 7.5	8.25 6.75
	−40 °C −40 °F	Water Antifreeze (325)		8.5 8.5	7.55 7.45
Corrosion protection		Treating agent (311)		20 cm^3/l Coolant	

621
636

Coolant pump



Distance a = 89–0.2; Reference size b = 23 ± 0.2; Installation dim. c = 14.7; d = Oil level

1 = Hub
2 = Radial seal
3 = Sealing ring retainer
4 = Deep-groove ball bearing
5 = Spacer sleeve
6 = Retaining ring
7 = Deep-groove ball bearing
8 = Sealing ring
9 = Bearing house
10 = Slide ring seal
11 = Counter ring
12 = O-ring
13 = Impeller
14 = Coolant shaft pump
15 = Oil filler screw with vent bore
16 = Oil level-inspection screw

Belt pulley-gear ratios

Gear ratio from crankshaft to	Coolant pump	Alternator	Fan
OM 621 – Typ 421	1 : 0.9	1 : 1.95	1 : 1
OM 636 – Typ 411	1 : 1.18	1 : 1.72	1 : 1

Engine cooling

Designation	Typ 421 / OM 621	Typ 411 / OM 636	Note
Parallel-distance of fan from radiator block	15 mm	10 mm	–
Distance of impeller from flange of coolant pump	23 ± 0.2	23 ± 0.2	–
V-belt tension at coolant pump, alternator and crankshaft	ca. 5–10 mm	ca. 6 mm	Depressing with moderate thumb pressure
V-belt tension at air compressor and crankshaft	ca. 10–15 mm	ca. 10–15 mm	Depressing with moderate thumb pressure
V-belt tension at coolant pump and fan-bearing pedestal	ca. 10–15 mm	–	Depressing with moderate thumb pressure

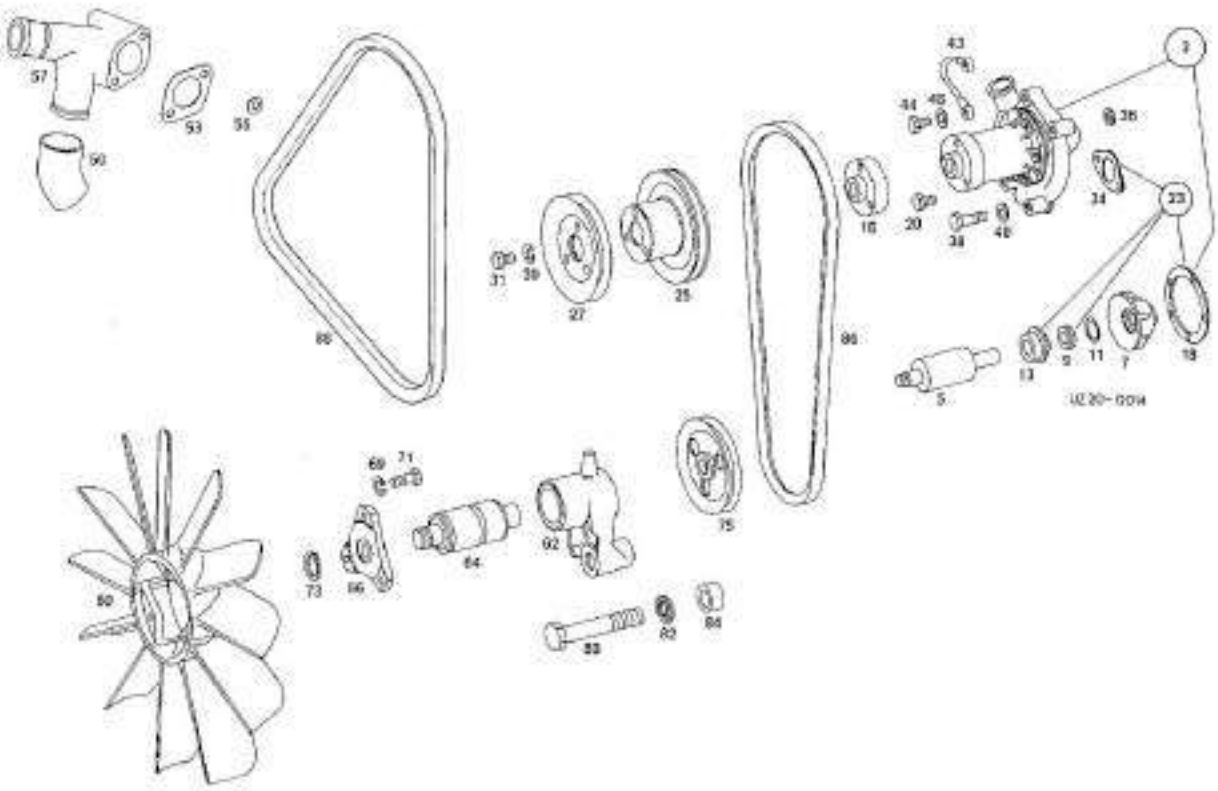
Special tools

Ser. no.	Designation	Special tools	Tool-set
1	Radiator test pump	001 589 482 100	B

Tightening torques

Designation	Thread/ strength	Nm
Coolant pump at crankcase	M 8/10.9	30
Coolant pump housing at bearing housing	M 6	10
Fan at hub	M 8/8.8	25

Exploded View

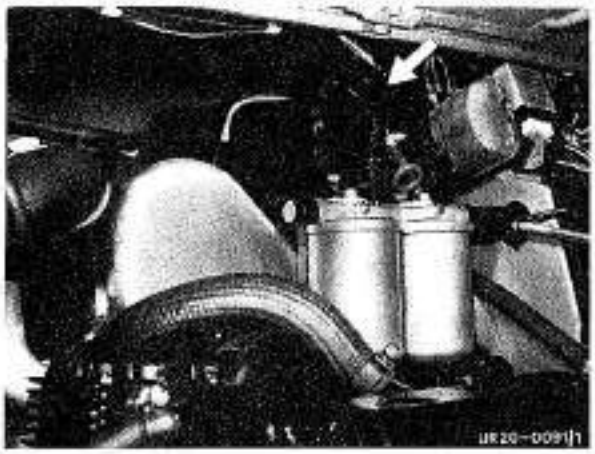


Engine Cooling

3	Coolant pump
5	Grooved ball bearing
7	Impeller
9	Thrust ring
11	Sealing ring
13	Sealing ring
16	Hub
18	Gasket
20	Bolt
23	Prepare set
25	V-belt
27	V-belt
30	Spring lock washer
31	Bolt
34	Gasket
36	Washer
38	Bolt
40	Washer
43	Vent line
44	Hollow bolt
46	Sealing ring
50	Hose
53	Gasket
55	Washer
57	Connection piece
60	Fan
62	Holder
64	Ball bearing
66	Disk
69	Spring lock washer
71	Bolt
73	Circlip
75	Belt pulley
80	Bolt
82	Washer
84	Spacer
86	V-belt
88	V-belt

Checking

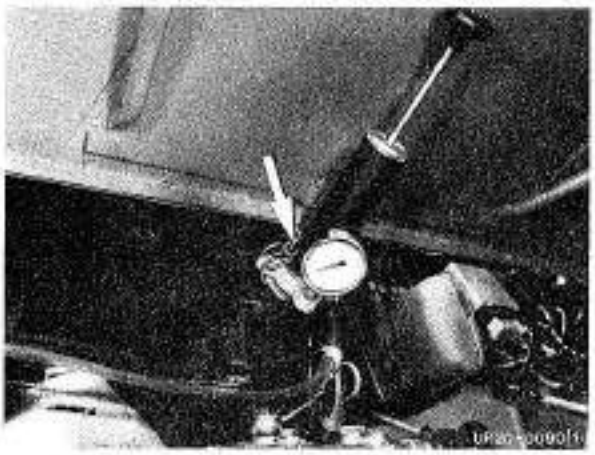
The cooling system operates at overpressure controlled by the valve in the inlet lock of the expansion tank. When the coolant is heated, the overpressure valve maintains the system under pressure up to 0.5 kp/cm² while the vacuum valve balances any harmful vacuum during cooling. The pressurized cooling system must therefore be checked for leaks when cold.



1 Unscrew closing cover from expansion tank.

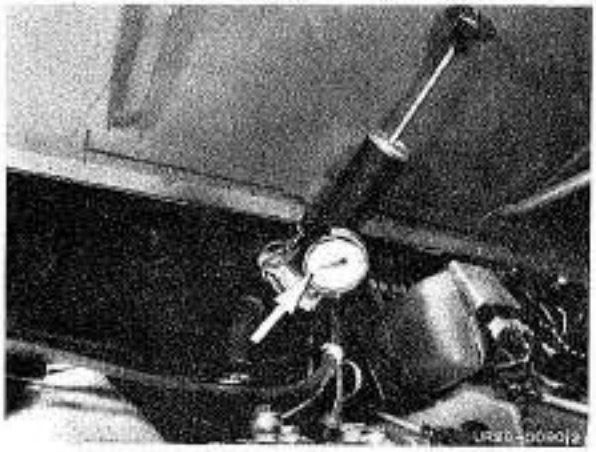
2 For checking, top up coolant to maximum level so that too much air does not require to be compressed.

3 Fit special tool No. 1.



4 Pump up to approx. 0.5 km/cm² with test pump and check whether pressure remains stationary. If there is a pressure drop, repair defect points. Even if pressure remains stationary, check hose connections for needle hole leaks (sweating).

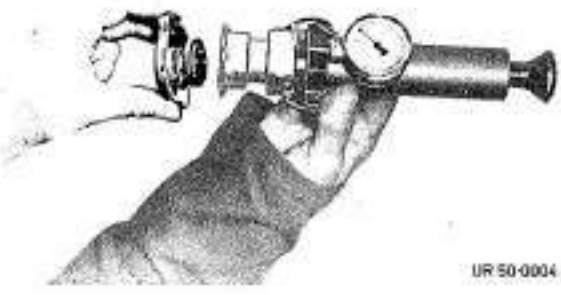
The following characteristics may occur:



5 If the pointer on the tester fluctuates, this is usually an indication that the cylinder head gasket is leaking.

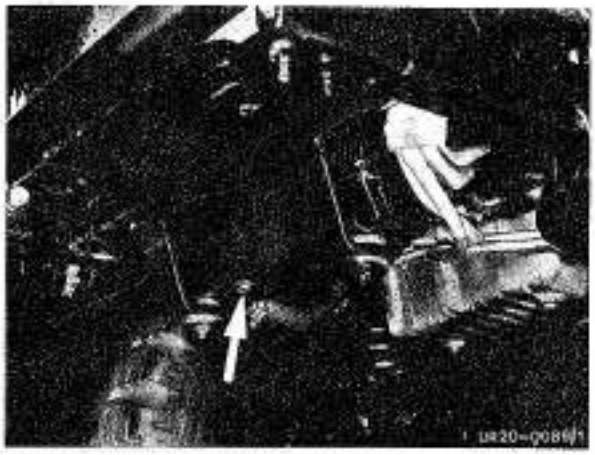
6 Loss of coolant via the overflow pipe is indicated by a sudden rise and then a drop in the test pressure. This can be caused by furring in the water jacket, caused by local hot spots which result in steam bubbles being formed and water thus being ejected. To rectify, have engine or entire cooling system defurred.

7 Test closing cover with special tool No. 1. In particular, check sealing ring for notches or cracking.

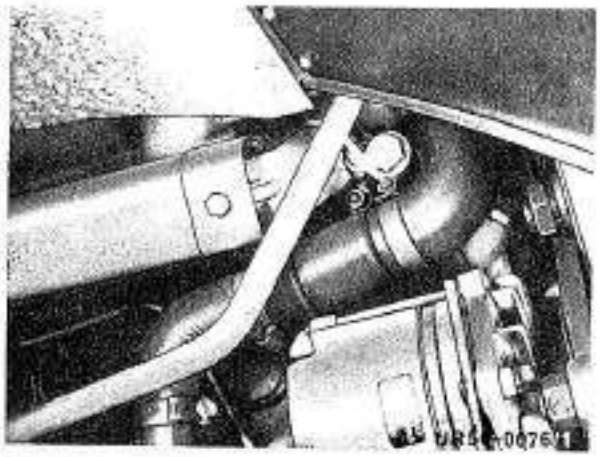


Removal

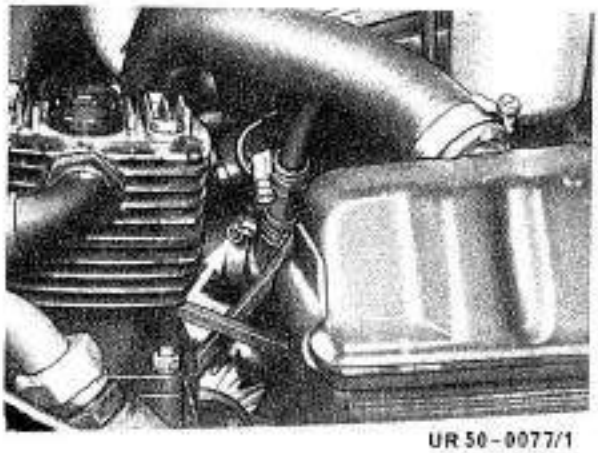
1 Drain coolant.



2 Disconnect bypass line from engine to coolant regulator.



3 Disconnect line to coolant pump.



UR 50-0077/1

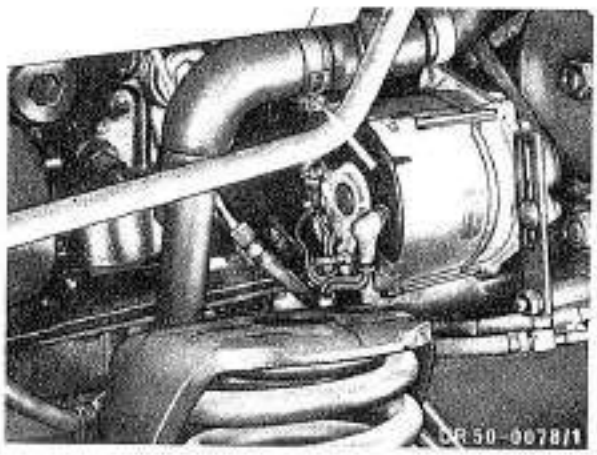
4 Disconnect line to radiator and remove coolant regulator.

5 Clean all parts, check and replace as necessary.

6 Check regulator insert for function, refer to 1.1/2.

7 Installation takes place in the reverse sequence.

8 Fill in coolant.
Refer to 1.1/2 for capacities.



Removal and installation

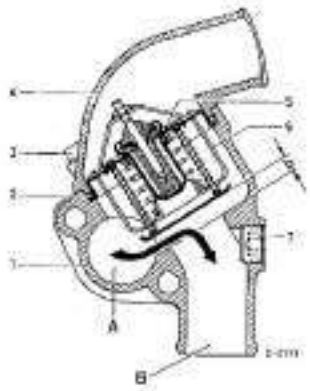
1 Drain coolant. With antifreeze collect contents. Drain plug is underneath the radiator.

2 Remove upper coolant hose of coolant regulator.

3 Unscrew pipe sockets and remove gasket.

4 Remove regulator element.

Important!
When reinstalling, the vent valve (bore) for radiator must be located on the side of the coolant connection, i. e. at the highest point.

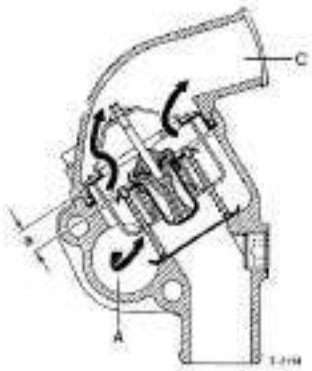


Main valve closed
By-pass valve fully opened
Stroke **b** 7.5 to 8 mm

1 Coolant regulator
2 Sealing ring
3 Hexagon socket screw
4 Cover
5 Ball valve
6 Coolant regulator element
7 Screw plug

A from engine
B to engine via by-pass line

5 Check regulator element for function and, if required, exchange. The coolant regulator is best tested in a container with hot water in which a thermometer is immersed. The regulator should begin to open at 79° + 1° C and entirely open at 91° + 3° C.



Main valve opened
Stroke **a** 8 to 9 mm at approx. 91° to 94° C.
By-pass line closed

A from engine
B to radiator

A pressure relief valve in the coolant expansion tank connection ensures an overpressure of 0.4 bar in the system. Consequently the boiling temperature is increased in sea level from 100° to 108° C.

Note:
Repairs cannot be made to the regulator element. Unusable regulator elements are to be replaced.

6 Installation takes place in reverse sequence.

7 Fill with coolant. Run engine and check hose connections for leaks. Replace hose clamp and rubber hoses, if required.

Note:
The cooling water contents in engine and original radiator is specified for the maximum load of engine (for example high outside temperatures, mountainous area).

Removal and installation

1 Drain coolant. With antifreeze collect contents. Drain cock is at the lower coolant line.

2 Release hose clamp and hose of coolant line **from reservoir to engine** and remove.

3 Release union nut (knurled nut) and remove with the coolant regulator. Pay attention to rubber gasket which is in front of the bead of the coolant regulator. The arrow embossed on the coolant regulator must always point upward when installing, i. e. toward expansion tank. Coat union nut or threaded ring before the installation with grease.

Note:
Repairs **cannot** be made to the coolant regulator (for example by exchanging the insert). Unusable coolant regulators are to be replaced, recognizable from full opening in cold condition. A coolant regulator is best tested in a container with hot water in which a thermometer is immersed, The thermostat should begin to open at 80°-3° and entirely open at 87° to 88°. At the same time the valve should rise by 8 mm. A pressure relief valve in the coolant expansion tank connection ensures an overpressure of 0.4 bar. Consequently the boiling temperature is increased at sea level from 100° to 108° C.

4 Installation takes place in reverse sequence.

5 Fill with coolant. Run engine and check hose connections for leaks. If required, replace hose clamp and rubber hoses.

615
621
636

Removal and installation

A. With engine OM 615 and OM 621

1 Drain coolant. If coolant contains additives, collect coolant.

2 Remove belt tensioner for air compressor.

3 Release upper radiator mount.

4 Unscrew bracket at the engine block.

5 Release and remove v-belt for fan drive.

6 Release tensioning device of the alternator and remove.

7 Release both hose lines at pipe socket of coolant pump housing.

8 Unscrew slide ring seal.

9 Unscrew coolant pump (three hexagon bolts).

10 Replace gasket and sealing ring between coolant pump and crankcase. Before, thoroughly clean parting surface of sealing compound residues.

11 Installation takes place in reverse sequence.

12 Install the slide ring seal free of tension and use the two new sealing rings at the connections.

13 Fill with coolant, Run engine and check hose connections as well as flange connection of pump at engine block for leaks.

Note:
In order to determine whether the pump correctly works after installation, take closing cover at coolant filter pipe off with running warm engine. The flow must already be visible when engine is idling.

B. With engine OM 636

1 Drain coolant. Collect in the case of antifreeze.

2 Remove v-belt.

3 Unscrew fastening bolts of the coolant pump at the cylinder head. Remove coolant pump. Note gasket.

4 Installation takes place in reverse sequence.

5 Set v-belt to correct tension, i. e., so that it can just be pressed with the thumb out of the straight (Values according to table on page 1.1/3).

The coolant pump version on engine OM 621 has a slide ring seal between bearing housing and impeller. The coolant pump version on engine OM 636 has a collector ring gasket. The repair in both coolant pump version is the same by analogy.

Disassembly

1 Unscrew coolant pump housing from bearing housing.

2 Pull off hub or belt pulley from coolant pump shaft with extractor 112 589 07 33 00. To do so, the coolant pumpt shaft is held in a vice with the impeller.

3 Pull the sealing ring retainer with an extractor off the bearing housing. Then press the sealing ring out of the sealing ring retainer.

4 Press the coolant pump shaft with a drift out of the bearing housing.

5 Knock out both deep-groove ball bearings, the sealing ring and if necessary, the slide ring seal out of the bearing housing with a drift.

6 Slip slip ring, collector ring cage, pressure spring and cover off coolant pump shaft with engine version OM 636.

7 In the version on engine OM 621, force out only if necessary, the counter ring with rubber O-ring with two suitable tools at the milled slot of the impeller. Then if necessary, force out coolant pump shaft out of impeller with a drift.

8 Clean and check all parts. Check particulary the coolant pump shaft and the ball bearing as well as in version OM 621 the slide ring seal and the counter ring for wear.

Note:
Sealing rings, retaining rings and in version OM 636 the slip ring are always replaced.

Assembly

9 Press coolant pump shaft into impeller, end of shaft must be flush with impeller.

10 With the version on OM 621, press counter ring into impeller with rubber O-rng after lightly oiling rubber O-ring.

Note: Lapped side of counter ring must point upward (toward slip ring gasket) and must not be damaged when pressing in.

11 Press sealing ring into bearing housing with assembly sleeve.

Beforehand, lightly coat outside of sealing ring and bore in bearing housing with oil.

12 On the version OM 621, press slip ring gasket into bearing housing with suitable installer sleeve. Coat bore of housing with oil beforehand.

13 For version on OM 636 slip compression spring, cover, slip ring cage, sealing ring and slip ring onto shaft.

After assembly, check whether the cover in properly seated on the sealing ring. If necessary push on with screwdriver.

14 Slip housing over coolant pump shaft.

Caution! Do not damage sealing lips of sealing ring in so doing.

15 When fitting coolant pump, do not damage slip ring gasket, fit bearing housing with coolant pump shaft to self-made base ring.

Fit deep-groove ball bearing onto shaft and press into bearing housing with assembly sleeve.

Lightly oil outside of bore of bearing housing and deep-groove ball bearing so that the bearing slides better when being pressed in.

After pressing in the deep-groove ball bearing, check that distande "b" = 23 ± 0.2 mm (refer to p. 1.1/3).

16 Insert circlip on coolant pump shaft and fit spacer sleeve.

17 Fit deep-groove ball bearing on coolant pump shaft and press into bearing housing with assembly sleeve.

Re-check distance from flange of bearing housing to bevel of impeller.

621
636

18 Install the sealing ring into the sealing ring retainer. Press sealing ring retainer onto bearing housing.

19 Press hub so far on coolant pump shaft until it touches the deep-groove ball bearing.

20 Bolt coolant pump housing to bearing housing. In so doing use a new gasket.

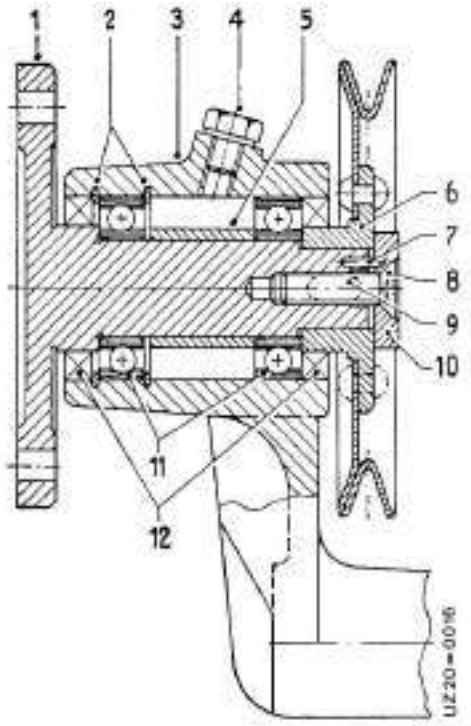
21 Screw in screw plug with new sealing ring into the bearing housing. In so doing use a new gasket. Fill the coolant pump with 10 ccm gear oil, then screw in bleed screw, which must upward in installed condition.

Note:
New or replacement coolant pumps are not filled with oil.

22 Check coolant pump on a test bench or on engine for leaks. The coolant pump must neither lose coolant nor oil.

615
621
636

Fan bearing



1 Drive shaft for fan
2 Retaining ring
3 Fan bracket
4 Oil filler screw
5 Spacer sleeve
6 Belt pulley
7 Clamping sleeve
8 Countersunk bolt with hexagon socket
9 Key
10 Washer
11 Deep-groove ball bearing
12 Shaft seal

Disassembling and assembling fan bearing

1 Remove fan bearing.

2 Unscrew countersunk bolt with hexagon socket.

3 Remove washer with clamping sleeve.

4 Force out drive shaft for fan.

5 Remove pulley and gasket.

6 Remove front retaining ring.

7 Pull out deep-groove ball bearings and unscrew spacer sleeve.

8 Check all parts and replace sealing ring.

9 Assembly takes place in reverse sequence by analogy.

10 Insert front bearing and retaining rings in fan bracket.

11 Insert front sealing ring and press in drive shaft for fan from front.

12 Slip on spacer sleeve and press on rear bearing.

13 Insert rear sealing ring and belt pulley.

14 Drive in clamping sleeve and mount washer.

15 Fasten countersunk bolt.

Note:
Before inserting countersunk bolt, the bore must be degreased and blown out dry. Insert loctite in screw hole to secure!

615
616
621
636

Cleaning

If the cooling water starts to boil, there is a fault in the cooling system, possibly too little water or contamination. In that case the cooling system must be **degreased, defurred and cleaned.**

Note:
When examining, above all, check the slide ring seal (rubber hose) from the cylinder head to the cooling water outlet, namely:

1. for cracking,
2. for contamination,
3. for lime deposits.

The free passage through the hose is checked by releasing on one side while observing the escape of water.

Degreasing:

Fill in two handfulls of soda, P 3 or IMI into the cooling system at the cooling water inlet. Drive one day with this additive, then again drain solution. Thoroughly flush through cooling system with engine running with simultaneous flow of fresh water.

Defurring:

We recommend urgently that the defurring be executed only in a customer sevice centre. Defurring is best performed by means of a hydrochrome treatment since the cleaning operation can be monitored exactly by means of a test strip supplied by the manufacturer.
Precisely observe instructions for use of the hydrochrome treatment:
Dissolve 13 cm^3 solvent in 13 l water and fill in with engine running in partial quantities of respectively 1/2 l. After a longer trip, at least after one day, shortly immerse a test strip through the filler hole into the cooling water. Read which pH-value the shade of the test strip used corresponds to the colour scale supplied together with test instructions and test strips from manufacturer. If this amounts to more than six, drain cooling water, once again thoroughly flush out cooling system and repeat the procedure. The cleaning is concluded, if after a longer trip, the pH-value remains under six. Then once again drain cooling water, thoroughly flush out cooling system and trat the filled cooling water according to instructions for use.

Cleaning:
Blow out radiator from engine side with compressed air or spray with water so that the radiator fins are thoroughly clean of foreign bodies. Check rubber hose connection between radiator and pipeline for leaks and exchange if cracked or brittle. Remove and thoroughly clean thermostat.

Under no circumstances use hydrochloric acid solution for cleaning!

Contents

Installation survey

Chassis mode	Sales designation	Brake system tractor	Trailer	Installation
421 122	U 40 U 45			Standard with SA 35 324
123				SA 35 344
124	U 52	Single circuit hydraulic system with single circuit compressed air assistance lever type handbrake		SA 35 349 SA 35 378 SA 35 379
125				SA 35 532
128	U 600 L			SA 35 563 SA 35 621 SA 35 625
129				SA 35 643
130	U 40 T U 55 T			SA 35 718 SA 35 719 SA 35 931
131				SA 36 031
132	U 600 T	[1] Dual circuit hydraulic system with single circuit compressed air assistance ALB at rear axle and 2/2 front axle lever type handbrake	Single line	with SA 35 235
133				SA 35 567
140	U 600		Dual line	with SA 35 536
141				SA 35 425 SA 35 567
162	U 60	Single circuit hydraulic system with single circuit compresaed air assistance lever type handbrake		SA 35 617
163			Single and dual line	with SA 35 348

[1] SA for models 421 122/123/124/125/128/129/162 and 163

Technical data

Drum brake (front and rear axle)

Brake linings

Chassis Model	Chassis Sales designation	Axle Model at front	Axle Model at rear	Brake lining Thickness mm	Brake lining Repair stage 1 mm	Brake lining Repair stage 2 mm	Brake lining Minimum lining thickness mm	Brake lining Lining width mm	Material
421.124 .125	U 600 (U 54)	737.003	747.007	6.0	5.4 [+0.5]	7.0	3.0	70 [+1.5]	Emero W 35 Textar PV 62
.132 .133	U 600 T								
.128 .129	U 600 L	004	008						
140 141	U 600	005	009		7.0	–			–

Brake drum

Chassis Model	Chassis Sales designation	Axle Model at front	Axle Model at rear	Repair stages inner diameter Normal mm	Repair stage 1 mm	Repair stage 2 mm	Max. wear Ø mm	Permissible ovality from fit bore to the inner diameter mm
421.124 .125	U 600 (U 54)	737.003	747.007	349.2 [+0.4]	350 [-0.3]	351 [-0.3]	352 [-0.3]	0.05
.132 .133	U 600 T							
.128 .129	U 600 L	004	008					
.140 .141	U 600	005	009	365 [-0.3]	366 [-0.3]	367 [-0.3]	368 [-0.3]	

Wheel brake cylinder

Chassis Model	Chassis Sales designation	Axle Model at front	Axle Model at rear	Wheel brake cylinder Ø Diameter front axle mm	Ø Diameter rear axle mm	permissible stroke mm	Air gap mm
421.124 125	U 600 (U 54)	737.003	747.007	34.92	20.64	20 [1])	
132 .133	U 600 T		–				
.128 .129	U 600 L	.004	008				
.140 .141	U 600	.005	009	26.99 ; 22.2 [2])	22.2		1.8 [-0.3]

[1]) For axle model 747.007/009: 17 mm
[2]) Double wheel cylinder

Faults and remedy

Hydraulic system (drum brake)

Faults	Cause	Remedy
Brake footpedal offers no resistance, but can be fully depressed further and spongy.	Air in the system	Bleed, if possible with bleeder
	Too little fluid supply in the reservoir.	Supplement and bleed brake fluid.
		Adjust wheel brake before bleeding brakes.
Braking action only after repeated depressing of the brake footpedal	Wheel brake not adjusted	Adjust wheel brake.
	Air in the system.	Bleed.
The brake weakens and the brake footpedal can be depressed fully short time after adjusting.	Leaking lines damaged or unusable sleeves in main or wheel brake cylinder	The line must be sealed, damaged sleeves are to be replaced
Brake heat up during use	Compensating bore in the master brake cylinder clogged	Clean compensating bore of the master brake cylinder
	Too little clearance between brake footpedal and master brake cylinder piston.	Adjust brake footpedal
	Brake shoes – return springs weak.	Install new return springs.
	Rubber parts swollen from use of improper fluids	Drain fluid, remove all rubber parts, flush installation through well with methylated spirits, install new rubber parts including bottom valve and valve seat ring.
Brake tightens itself.	Compensating bore in the master brake cylinder is clogged. This can happen due to swollen sleeve. Use of improper fluid or variation of the brake foot pedal stop.	Clean compensating bore with a 0.5 mm fine wire, flush brake line through well with methylated spirits, insert new sleeve, fill with brake fluid, Check and correctly adjust stop of the brake footpedal so that the compensating bore is freely in the idle condition of the brake.

Faults and remedy

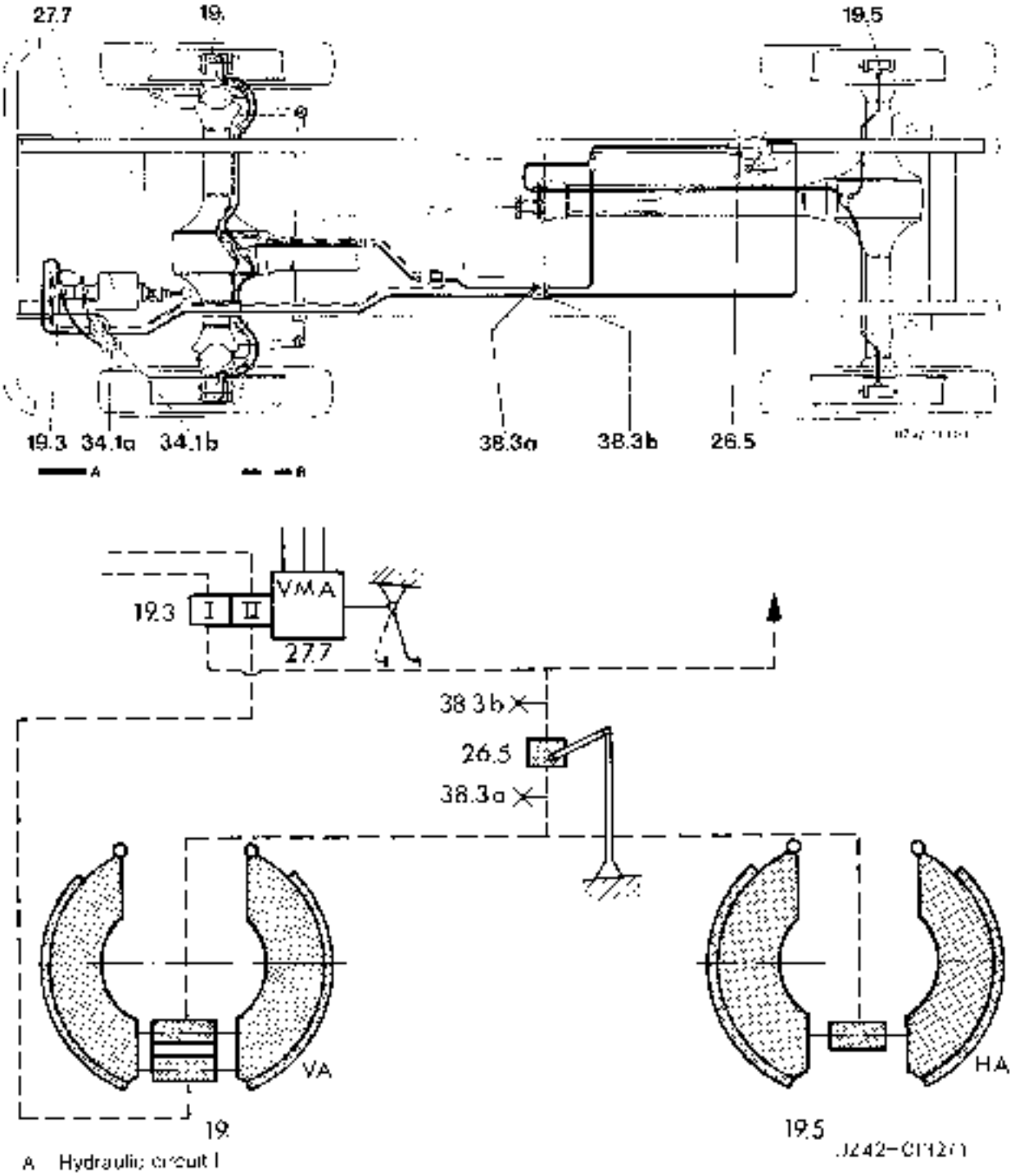
Wheel brakes (drum brake)

Faults	Cause	Remedy
Brake pedal travel is too great.	Worn brake linings.	Adjust wheel brakes (do not adjust at the brake footpedal); replace brake linings if necessary.
In spite of very high foot pressure poor braking action.	Unsuitable brake linings	Install standard specified brake linings.
	Brake linings oil stained by leaking sealing ring or wheel brake cylinder.	Reseal wheel hubs or nuts and steering knuckle as well as wheel brake cylinder, replace brake linings (washing oil-stained pads with gasoline or petroleum or the flame cleaning of oil-stained pads is no remedy and is prohibited, since lubricating material always escapes during braking from pads treated in this way
	Brake lining surface glazed.	Turn brake drums, turn brake linings with turning device.
	Brake shoes sticking	Remove brake drum, release bearing.
Brakes chatter and tend to lock.	Brake drum torn.	Replace brake drum
	Out-of-true brake drums	Turn or replace drums. *)
	Brake shoe return spring too weak	Replace return spring.
Squealing brakes.	Badly adjusted brakes	Satisfactory adjust brakes
	Dirt, dust penetrated.	Clean brakes.
	Ends of lining not bevelled	Bevel pads
	Loose lining rivet.	Re-rivet, reline as necessary.
Brakes pull unevenly.	Out-of-true brake drums	Turn or replace drums. *)
	Piston jams.	Release pistons or replace wheel brake cylinder.
	Brake shoe is located firmly in the pin.	Release brake shoes and pin Exchange line
	Brakes unilaterally oil-stained.	Replace oil-stained brake linings. Renewal must take place at all brakes, at least axlewise, so that uniform friction conditions exist.

*) Brake drums must always be machined in pairs (axle with same diameter).

Brake diagram

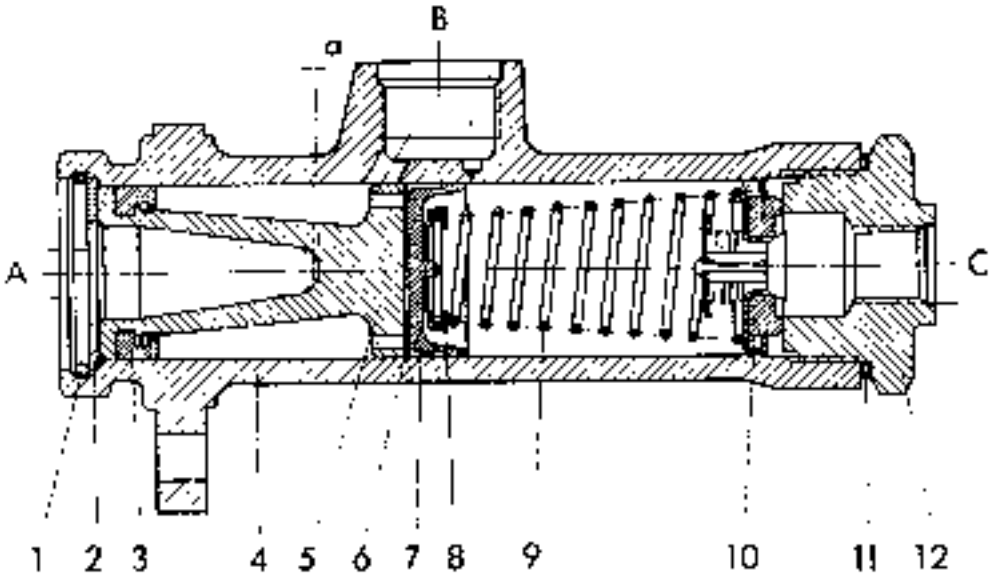
Dualcircuit hydraulic system with single circuit compressed air assistance, ALB at rear axle and 1/2 front axle



A Hydraulic circuit I
B Hydraulic circuit I

19	Double wheel cylinder
19.3	Tandem master brake cylinder
19.5	Wheel brake cylinder
26.5	ALB-regulator
27.7	Compressed air brake booster
34.1a	Brake fluid reservoir (circuit II)
34.1b	Brake fluid reservoir (circuit I)
38.3a	ALB test connection regulated
38.3b	ALB test connection unregulated

Sectional View



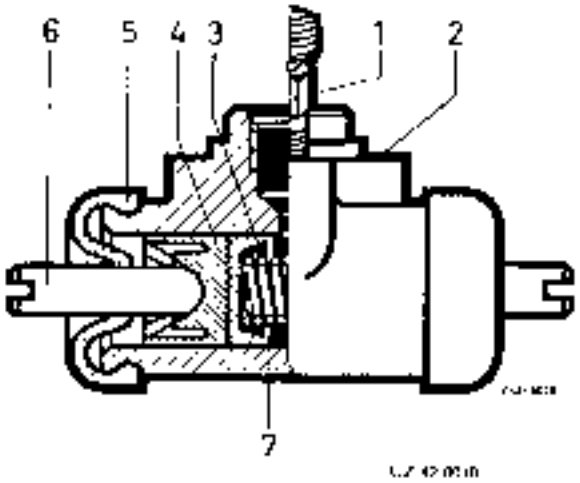
Single-Circuit Master Brake Cylinder

A Piston rod
B Connection, reservoir
C Connection, brake line

a 1 mm piston rod clearance

1 Snap ring
2 Stop plate
3 Secondary cup
4 Body
5 Piston
6 Filler
7 Primary cup
8 Spring seat
9 Compression spring
10 Bottom valve
11 Sealing ring
12 Screw plug

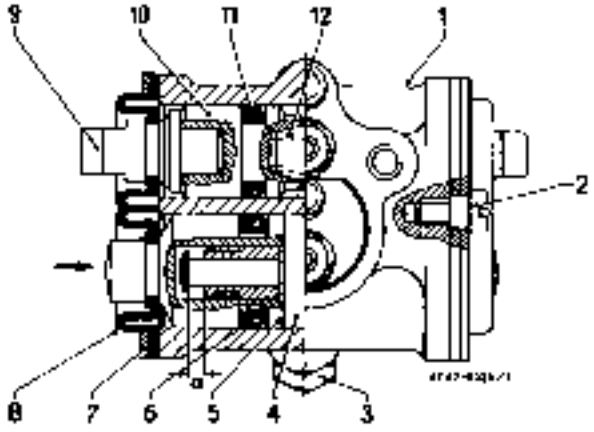
Sectional view



Wheel brake cylinder

1 Bleed screw
2 Housing
3 Sleeve
4 Piston
5 Cap
6 Thrust
7 Pressure spring

Sectional view



Double wheel brake cylinder

1 Double cylinder housing
2 Slotted-head screw
3 Stop screw
4 Adjuster
5 Piston bottom
6 Slotted sleeve
7 Retaining plate
8 Cap
9 Thrust pin
10 Piston top
11 Slotted sleeve
12 Pressure spring
a Air gap 1.8 mm

Note:
From chassis end no. 012 886 the guide groove at the lower piston (arrow) is no longer provided, face spherically rounded

Special tools

Serial no.	Designation	Special tool	Set of tools
1	Blocking device	421 589 00 21 00	B
2	Clamping device	421 589 01 21 00	B

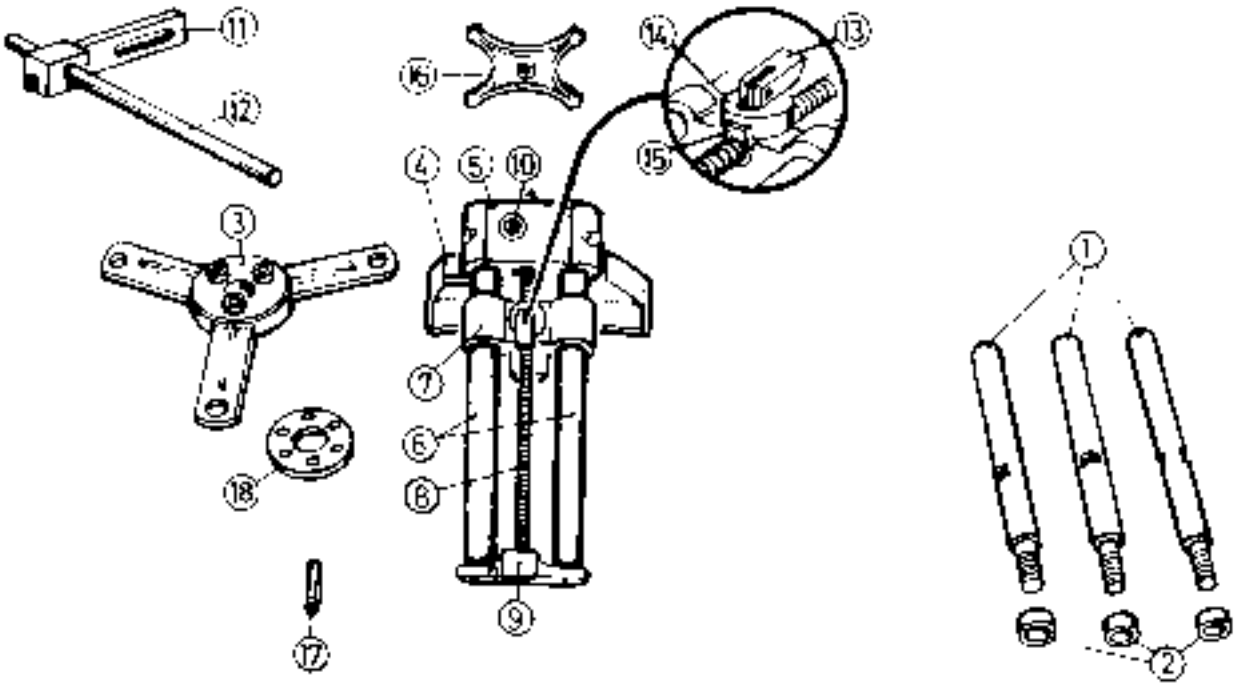
Tool Fa. Kindermann

Serial no.	Designation
1	Brake lining turning device APD 1 for Unimog-MB trac. Special-Unimog flange U 1, spicer, special steel Fa. Kindermann

Consumables

Serial no.	Designation	Part number
1	Long life grease	commercially available

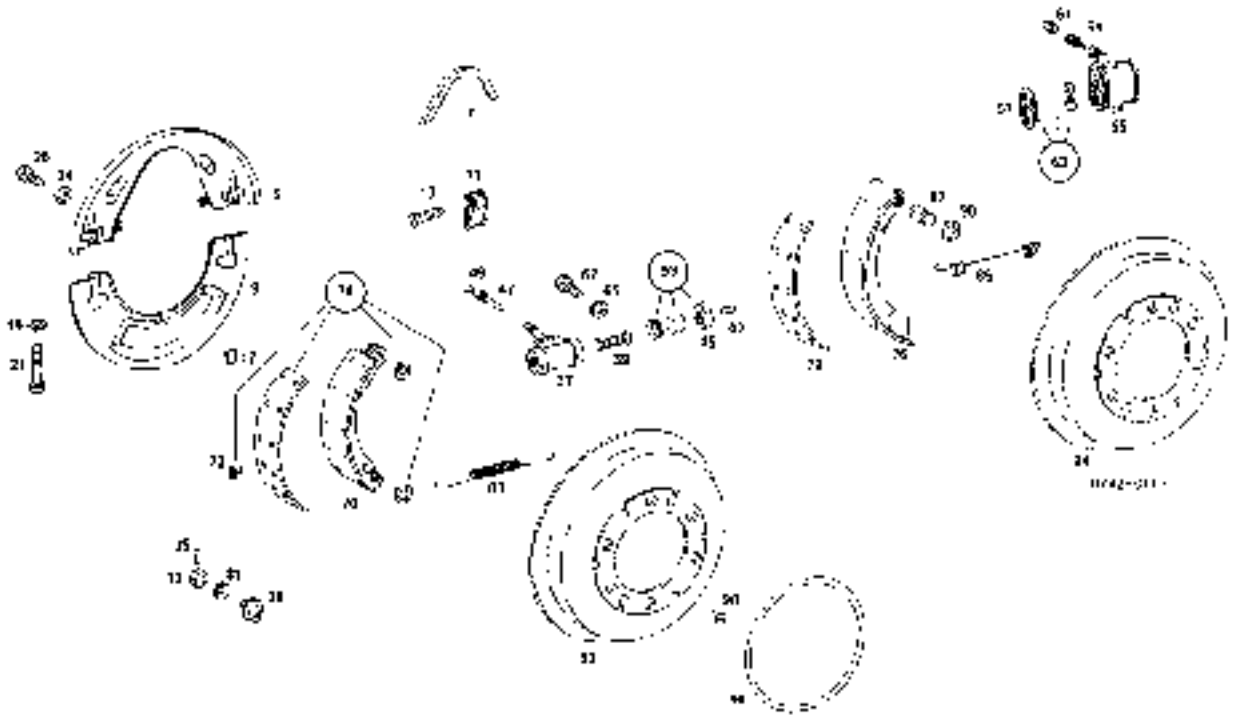
Survey diagram, brake lining turning device APD 1



0242-0000

1 Extension
2 Spacer ring
3 Spider
4 Cross arm mount
5 Guide column bearing bracket
6 Guide columns
7 Steel holder
8 Feed spindle
9 Guide column goggle
10 Setting bolt
11 Clamp guide
12 Driver rod
13 Feed selector finger
14 Half-round nut guide
15 Half-round nut
16 Spider
17 Finish turned steel
18 Flexible disk

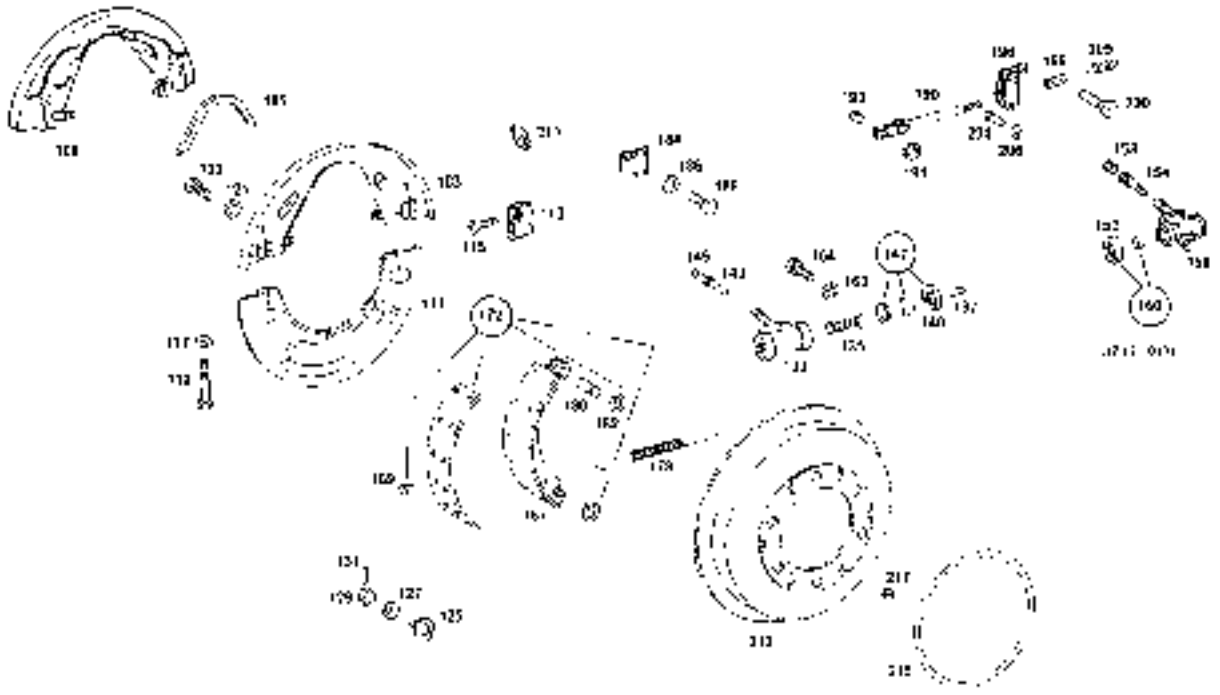
Exploded view



Brake components front axle

5 Guard
7 Sealing rubber
9 Guard
11 Cap
13 Bolt
17 Cap
19 Washer
21 Bolt
24 Washer
26 Bolt
28 Roller
31 Cup spring
33 Nut
35 Clamping sleeve
37 Wheel brake cylinder
39 Spring
42 Thrust pin
45 Cap
47 Bleed valve
49 Cap
53 Repair kit
55 Double wheel cylinder
57 Cap
59 Bleed valve
61 Cap
63 Repair kit
65 Washer
67 Bolt
70 Brake bracket
72 Rivet
74 Repair kit
76 Brake shoe
78 Brake lining
83 Spring
85 Spring
87 Pin
90 Retaining ring
92 Brake drum
94 Brake drum
96 Gasket
98 Bolt

Exploded view

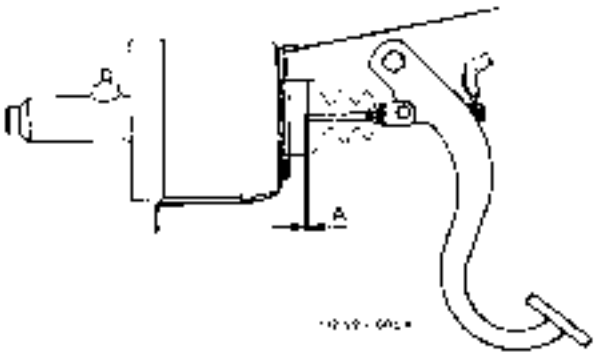


Brake components rear axle

103	Guard	140	Cap	192	Retaining ring
105	Sealing rubber	142	Bleed valve	194	Brake cable guide
106	Guard	145	Cap	196	Washer
111	Guard	147	Repair kit	198	Bolt
113	Cap	150	Wheel brake cylinder	190	Pole
115	Bolt	152		192	Pin
117	Washer	154	Bleed valve	194	Washer
119	Bolt	156	Cap	196	Strap
121	Washer	160		198	Compression strap
123	Bolt	162	Washer	200	Bolt
125	Roller	164	Bolt	204	Pin
127	Cup spring	167	Brake shoe	206	Washer
129	Nut	169	Brake lining	209	Spring
131	Clamping sleeve	172	Repair kit	211	Cap
133	Wheel brake cylinder	178	Spring	213	Brake drum
135	Spring	180	Pin	215	Gasket
137	Thrust pin			217	Bolt

Adjustment

1 With brake pedal at neutral, piston rod clearance must be about 1 mm



2 If necessary, correct clearance at adjusting screw (eccentric).

Test Specifications, Storage and Shelf Life for Brake Components

Test Specifications

Note: In the interest of road safety, it is essential to give careful attention to checking and reconditioning the brake system. The brake system should therefore be examined at regular intervals.

Scope of Inspection Work

1 Check brake shoes and brake pads/linings.
2 Check rubber dust caps on wheel and pressure cylinders as well as fixed calipers
3 Check brake drums and brake disks
4 Check lines for corrosion, chafing and pitting.
5 Check brake system for leaks (including hydraulic system)
7 Check free travel of brake pedal
8 Check handbrake
9 Check braking action

Note: When reconditioning brake system, note the shelf lives and types of storage for rubber components in brake system

Storage Rooms – Types of Storage – Shelf Life

Spares for hydraulic brake systems, whether complete assemblies or individual components, whether packed or unpacked, must be carefully stored in the interest of safety. Non-compliance with the instructions concerning

Storage rooms – types of storage – shelf life

will normally render the parts unusable.

General

Essential rubber fittings for hydraulic brake systems such as seals, sealing rings, dust caps and brake hoses, are prone to the effects of

heat – oxygen – sunlight – moisture – ozone.

If exposed to such influences when stored, these parts will deteriorate in quality and serviceability to such an extent that they will not be fit for use.

Storage Rooms

Storage rooms for hydraulic brake assemblies, boosters, rubber fittings and brake hoses must be

cool – dry – clean

Storage temperatures should be between +10°C and +35°C. On no account may brake components be stored in the direct vicinity of radiators (at least 1 m away), or in racks positioned above radiators.

Types of Storage

Packaged single parts must be left in their packaging until they are needed.

Unpackaged parts should be sealed by means of threaded stoppers at open connecting holes. Parts removed from their packaging must be properly closed again for further storage.

Brake hoses must be stored on flat surfaces, without strain or stress. This means that they must not be kinked or bent over edges. Brake hoses may be stored in their original packaging (U-shaped bend).

Rubber fittings such as seals, sealing rings and dust caps require extreme care and must not be deformed by unnecessary loads. This particularly applies to secondary cups and groove seals. These rubber parts may be stacked in layers one above the other if appropriate storage space is available.

Shelf Life

Master Cylinders, Tandem Master Cylinders, Wheel Cylinders, Input Cylinders, Output Cylinders 4½ years

Unions and bleeder valves must be tightened and all connection bores sealed with stoppers. Units must be assembled, using the specified protective (not brake fluid).

Master Cylinders and Tandem Master Cylinders for Brake Boosters

may also be stored for 4½ years, provided they are obtained as separate assemblies.

Brake Pressure Regulators 4½ years

Brake Booster T 50 2 years

Trouble may be expected if this shelf life is exceeded. Theses boosters may be reconditioned only by the manufacturer and must be returned to us for overhaul at the customer's expense.

Brake Boosters T 51/T 52 Complete with Master or Tandem Master Cylinder 4½ years

Trouble may be expected if this shelf life is exceeded. The vacuum part cannot be reconditioned and must be scrapped.

Vacuum Part for Brake Boosters T 51/T 52 5 years

These brake boosters cannot be reconditioned and must be replaced.

Brake Hoses, Clutch Hoses 4½ years

Rubber Fittings (loose, stored dry) 4½ years

Rubber Fittings in Repair Packs 4½ years

Repair Packs with Assembled Rubber Parts 4½ years

Stoplight Switches 5 years

Brake Fluid (sealed in original containers) 5 years

Re-close container properly after removing fluid.

Brake Pad/Lining Repair Sets 10 years

Brake Hoses, General

Brake hoses are the moving links in the brake system piping.

Any brake hose that is exchanged must be replaced by one of exactly the same length and positioned at exactly the same location.

Maintenance

After lubricating, ensure that no grease is left on brake hoses. All grease residues should be carefully removed. Prior to using sprays containing mineral oil, it is recommended to cover the brake hoses. This should also be done when applying underbody protection.

Brake hoses must not be painted

Stove-enamelling or treatment with radiators after painting must not exceed 80°C.

Cleaning

Dirt deposits should only be removed with water. Never use light-grade petroleum, paraffin or similar.

Installation

The end of new brake hoses must be perfectly clean for installation. Never subject to tension, kinking or torsion, nor allow to chafe. Note maximum wheel lock and spring travel.

Tighten screw fittings well. Then refill hydraulic system with fluid and vent. Make absolutely sure that front brake hoses do not touch steering knuckles and do not get pinched when steering wheel is turned.

Exchanging Brake Fluid

General

Brake fluids conforming to DOT 3 and DOT 4 are hygroscopic, i.e. they absorb moisture from the air. This lowers the boiling point of brake fluid and all containers must therefore be properly closed. Since considerable heat may be developed by braking and reliable brake operation is extremely important the water proportion must be kept as low as possible. The higher the water content the greater the risk that the brake system will fail as a result of vapour bubbles

You are therefore advised to exchange the brake fluid **once every year.**

Caution! Never re-use old brake fluid.

Filtrations also inadequate because it will only remove a certain amount of dirt, and leave all the harmful water that cannot be seen. Even traces of mineral oil, e.g. engine or gear oil, may cause rubber components to swell severely and lead to brake failure. To eliminate all risks, it is absolutely essential that brake fluid is stored in the original containers. These containers must never be filled with any other liquid or fluid. Clean tools free of oil and grease are a matter of course. Brake fluid is frequently mistakenly referred to as "brake oil". This term should always be avoided because brake fluid is not an "oil" and must not be confused with "oil" on any account

Inadvertent Consumption of Brake Fluid

Normal brake fluids, like the ATE range, chiefly contain polyglycol ether, along with special additives

The consumption of brake fluid will therefore cause signs of poisoning such as headaches, dizziness, stomach upsets, vomiting, diarrhoea and unconsciousness. Like many other liquids used for engineering purposes, brake fluids may also have **lethal consequences** if consumed inadvertently in large quantities.

Therefore, do not store brake fluids in places which are accessible to children or other persons who cannot read the marking

Automotive mechanics are frequently found to store brake fluid in beverage bottles. This is a bad habit which has repeatedly led - particularly in hot weather – to brake fluid being consumed inadvertently.

On no account pour brake fluid into bottles for beer, coca cola, mineral water etc

Medical aid is required if brake fluid is drunk despite these precautions. The doctor should immediately flush out the patient's stomach and then contact a clinic able to handle cases of poisoning

Medical Notes for Doctor:

1. Flush out stomach:
   a) Either with 50 cc glycerine added to water - or
   b) With a potassium manganate solution of 1 : 5000.
2. Intravenous: calcium gluconate 20 cc 20%.
3. Intravenous: drip infusion of 0.5 - 2 l mannite in 6 hours, with 40 mg lasix on first day.
4. Immediate peritoneal dialysis.
5. Electrolyte substitutes, e.g. sterofundin, similar to treatment of overdose of sleeping tablets

Please consult appropriate experts for further details.

Caution: Parts of the body which come into contact with brake fluid should be thoroughly rinsed with water (eyes should be rinsed out with boracic acid).

Information obtainable from following experts	Phone Dir. Dial Code	Tel. No.
a) Dr. med. H. J. Holtschmidt	06679	Ext. 71
Farbwerke Hoechst AG		Ext. 545
Werk Gendorf (Tel. Burgkirchen)		
b) Dr. H. Salvesen	06679	Ext. 71
Farbwerke Hoechst AG		Ext. 545
Werk Gendorf (Tel. Burgkirchen)		
or after office hours	06671	Ext. 0646

Instructions for Bleeding

The brake system must be bled after any repair job that has involved opening the sealed hydraulic system, or when the brake pedal feels soft and spongy. A variety of special-purpose equipment, e. g. the ARC 50 unit or the ATE filler/bleeder, are commercially available for this purpose. Follow the instructions supplied with this equipment.

Do not re-use fluid that has been pumped out when bleeding because it may contain foreign matter which will then enter the brake system. In addition, brake fluid, being highly hygroscopic, steadily absorbs moisture from the atmosphere and its boiling point drops during service life. As a result, vapour bubbles may form in the brake system under extreme conditions.

Brake fluid contains constituents which will dissolve paint. Ensure that brake fluid is kept well away from the vehicle paintwork.

When bleeding the system, ensure that the bottom of the refilling container is always covered by brake fluid. On no account may the compensating port be free of fluid because air will otherwise be drawn in when the brake pedal is pressed, rendering the entire bleeding operation futile.

Also ensure that the bleeder vessel is held high enough so that the level in the vessel is higher than the outlet from the bleeder valve.

Bleeding is completed when bubble-free brake fluid flows through the bleeder hose.

Following bleeding, top up reservoir to "Maximum" mark with brake fluid.

Note: If the system is bled by "pumping" the brake pedal, remember to close the corresponding bleed screw each time before releasing the brake pedal. This ensures that air cannot be drawn in through the bleed screw hole.

Bleeding

1 Prop up engine hood.

2 Prepare bleeder for use in accordance with manufacturer's instructions.

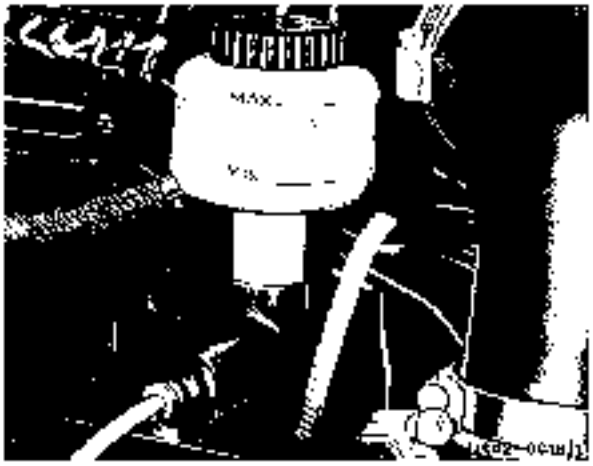
3 Unscrew cap on reservoir and connect bleeder.

4 Remove dust cap from bleed screw at master cylinder and connect bleed bottle.

5 Bleed master brake cylinder as described in 3.4/1.

6 Bleed wheel brake cylinder at rear axle by analogy to steps 4 to 6.

7 Bleed wheel brake cylinder at front axle by analogy to steps 4 to 6.



Bleeding

1 Raise bonnet

2 Make bleeder operable according to specifications of manufacturer

3 Unscrew closing cover at expansion tank from circuit I or II and connect bleeder.

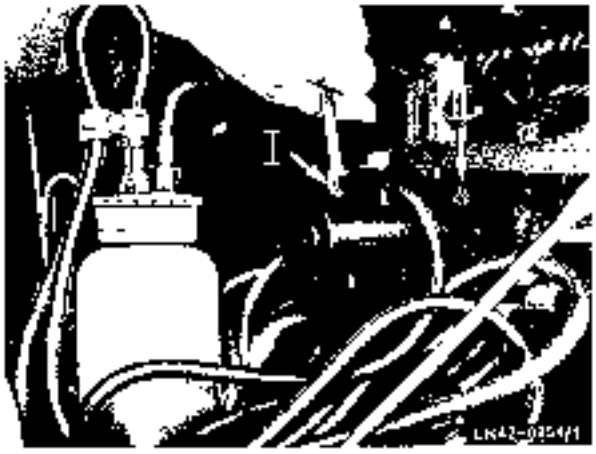
4 Remove dust cap at bleed screw and connect bleeder cylinder.

5 Bleed master brake cylinder, as described in 3.4/1.

6 Execute further bleeding in following secuence.

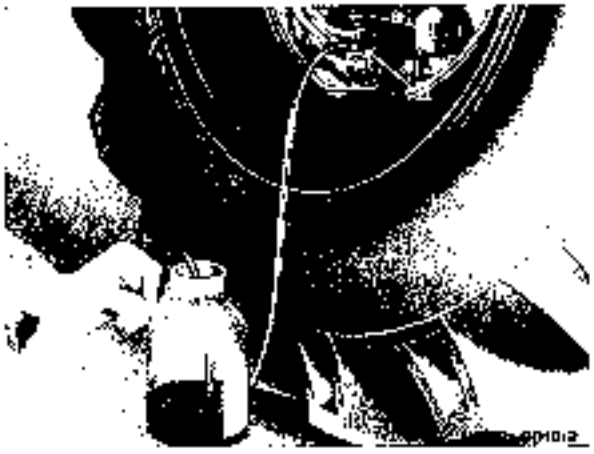
Brake circuit I

Master brake cylinder, hydropneumatic control valve ALB regulator, wheel brake cylinder, beginning at rear right, rear left, front right, front left.

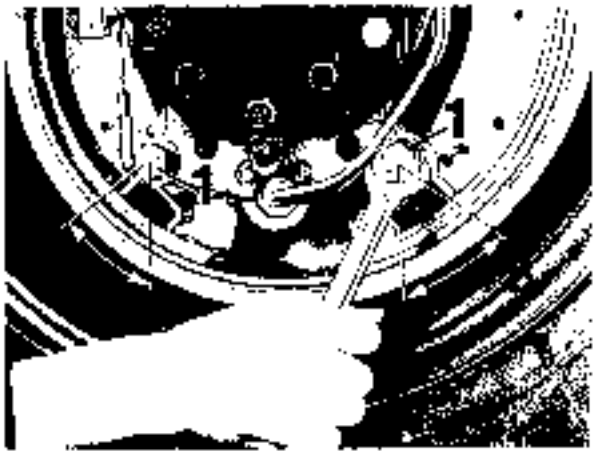


Brake circuit II

Master brake cylinder, wheel brake cylinder front right and front left below



Adjustment



Note: Adjust brakes individually at each side when brake drums are cold

1 Unscrew back plate at bottom

2 Jack up vehicle and release parking brake

3 Turn adjuster (1) outward (b) until brake shoe contacts brake drum.

4 Turn adjuster (1) back (a) so that wheel just turns freely

5 Press brake pedal several times, checking if wheels turn freely.

6 Adjust service brake at rear axle, returning to steps 2 to 5.

7 Attach back plate and lower vehicle.

8 Perform trial run

Note: Adjustment is correct if brake drums are still cool after a lengthy run without braking

Adjustment

1 Adjust service brake, refer to 4.1/1

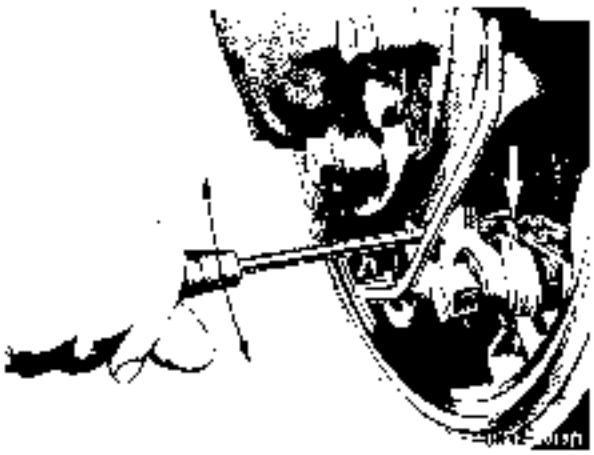
2 Turn thrust rod until brake shoe contacts brake drum

Note: Thrust rod has righthand thread

3 Turn thrust rod back until wheel just turns freely, pressing brake pedal several times while doing so

4 Apply handbrake rack to second detent. Trailer control valve must operate in this position if trailer brake system is fitted.

Note: When rack is tightened to fourth detent (brakes begin to act at third detent), both rear wheels must resist turning by hand but turn freely again when rack is released



Disassembly and Assembly

The item Nos. ( ) relate to p. 1.6/1.

1 Unscrew reservoir.

2 Remove snap ring (11) and stop plate (12). Take out piston (5) with secondary cup (3).

3 Remove compression spring (9) together with spring seat (8) and bottom valve (10).

4 Clean and check all parts, replacing if necessary.

Note: Never use anything but **spirit** to clean any part. Cleaning with gasoline, benzene or paraffin or with any mineral oil or grease will destroy rubber components or cause them to swell. Rubber components with scored surfaces or flattened edges must be replaced.

5 Assemble in reverse sequence.

Note: Prior to installing, coat o-ring seals, piston and cylinder bore with brake cylinder paste No. 2.

Disassembly and Assembly

1 Clean exterior of slave cylinder.

2 Take off dust caps (2) and remove with thrust pins (3).

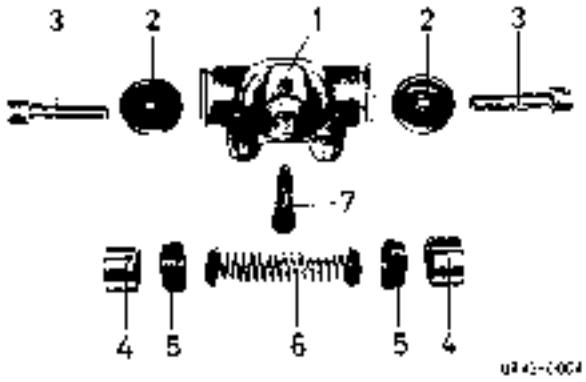
3 Remove pistons (4), cup seals (5) and compression spring (6).

4 Remove bleed screw (7).

5 Clean all parts with brake fluid or spirit and check. Replace any damaged part.

6 Assemble in reverse sequence.

Note: When dry, pistons must fit snuggly in cylinder bore. Edges of rubber seals must be sharp, running surfaces must not be scored. Prior to assembling, coat cylinder bore, pistons and seals with brake cylinder paste No. 2



Disassembly and assembly

1 Remove wheel brake cylinder.

2 Externally clean wheel brake cylinders.

3 Remove slotted head screw, remove retaining plates.

4 Remove caps of the wheel cylinder housing, remove thrust pin and piston with collared rings from upper chamber.

5 Unscrew stop screw below with sealing ring

6 Remove piston below completely from lower chamber of wheel brake cylinder

7 Remove slotted sleeves of both pistons

8 Unscrew bleed screws.

9 Clean and check all parts with brake fluid or methylated spirits. Replace damaged parts.

10 Assembly takes place in reverse sequence

Note:
The pistons must move back and forth in dry condition aspirating in the cylinder bore. The edges of the slotted sleeves must be sharp-edged, the bearing surfaces may not show any scoring. Before assembly, cylinder bore, piston and slotted rings must be provided with ATE-brake cylincer-paste

11 Install wheel brake cylinder

Removal and Installation

1 Detach wheel

2 Unscrew countersunk bolts and force off brake drum.

3 Remove brake backplates.

4 Detach brake shoe return spring

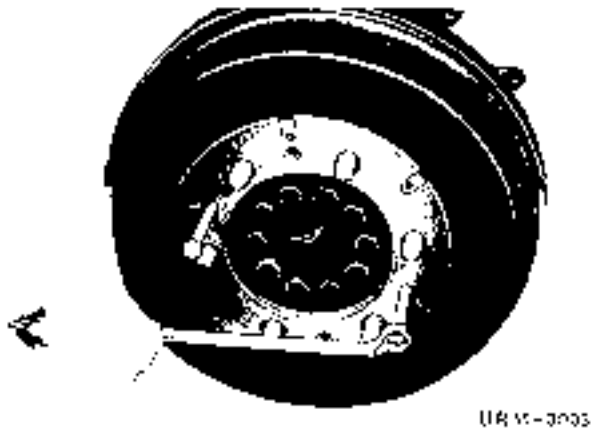
5 Release and remove brake shoe pin

Note: When removing brake shoes at rear axle, additionally detach handbrake cable and remove handbrake thrust rod.

6 Remove brake shoes.

7 Install in reverse sequence, coating brake shoe pin with grease No. 5

Note: Countersunk bolts must not project
Check sealing ring in brake drum for wear, replacing if necessary



UR-V-3003

Replacement

Note: Brake linings which are oily, brittle or worn down to minimum thickness must be replaced.

1 Remove brake shoes, refering to 11.1/1

Note: Prior to selecting new brake linings (repair stages), check brake drums for thermal cracking, scoring and wear; machining or replacing if necessary. Use a brake drum lathe in accordance with manufacturer's instructions. Refer to Table 1.3/1 for minimum lining thickness and repair stages of brake linings as well as diameters and repair stages of brake linings.
Always use brake linings of same type on any one axle.

2 Remove fastening rivets.

3 Clean, check and derust contact surfaces of brake linings on brake shoes.

4 Select brake linings to suit brake drum diameter (repair stage) and rivet in position.

Note: It is preferable to use a riveting machine and rivets approved for the purpose. Set up riveting machine according to manufacturer's instructions.
Start riveting in centre. Do not turn lining segments through 180°, thickest side of lining pointing toward centre of brake shoe. Brake lining must fit snugly across entire surface. Corners of linings must not be broken nor must linings be torn at rivets.

6 Install brake shoes, refer to 9.1/1

Note: To ensure that new brake linings provide immediate effect, they must be dressed in situ on axle, refer to 11.1/1

Dressing Brake Linings on Axle

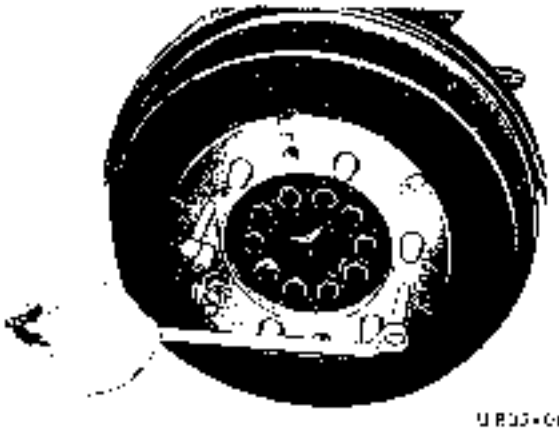
Brake shoes can be dressed in situ using brake shoe turning equipment.
Be sure never to exceed maximum brake drum diameter specified; refer to 1.3/1 for permissible brake drum diameter.
Diameters of brake drums and brake shoes must always be equal on any one axle.

Turning

Note:
The numbers in brackets refer to survey diagram of brake booster

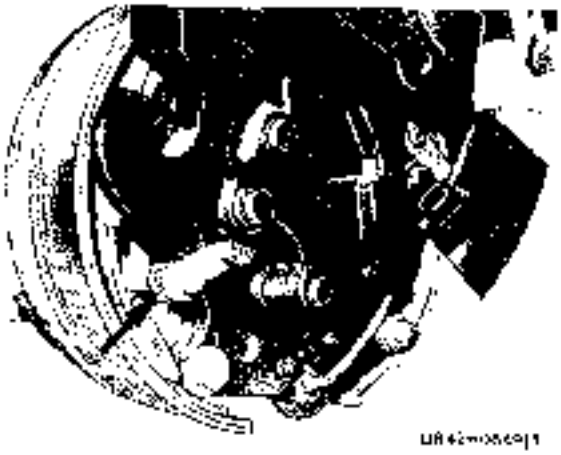
1 Switch off four-wheel drive and differential lock.

2 Raise vehicle, remove running wheels left and right at respective axle



3 Remove recessed screw and remove brake drum

4 Remove brake cover plates.

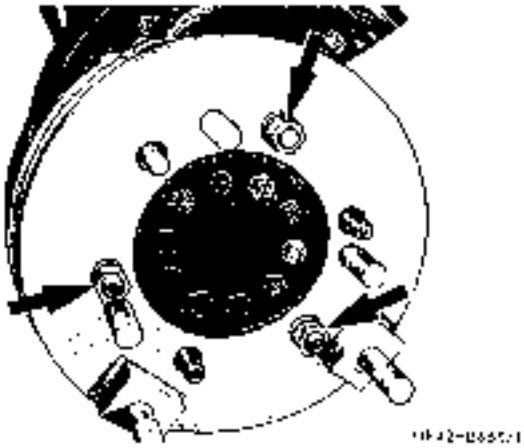


5 Unscrew bracket for handbrake cable.

6 Unscrew oil filler screws and bolt special tool no 1 for brake shoes right and left.

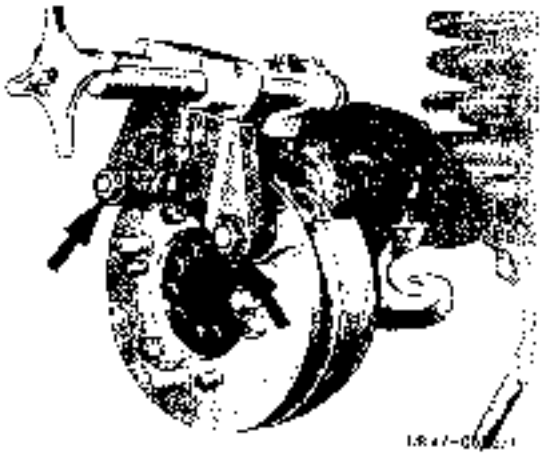
7 Align brake shoe parallel with both threaded nuts of special tool no. 1.

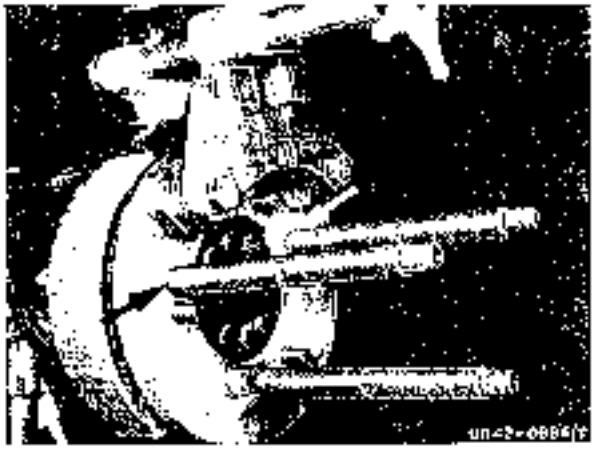
8 Install mounting plate for brake truing device at wheel hub or nut.



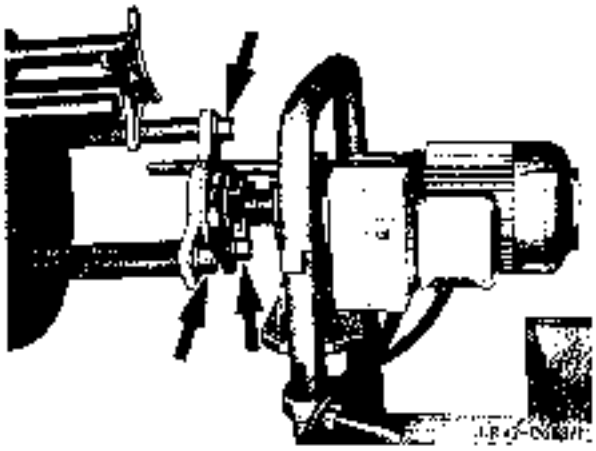
9 Bolt cross arm of brake truing device at mounting plate.

10 Introduce and clamp cutting tool (17) up to the stop in sheet holder (7)

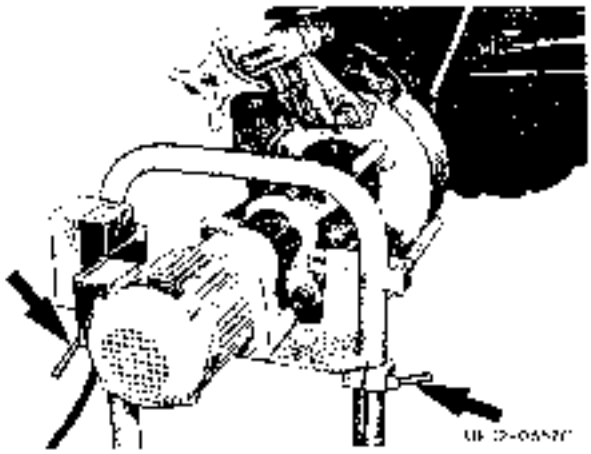




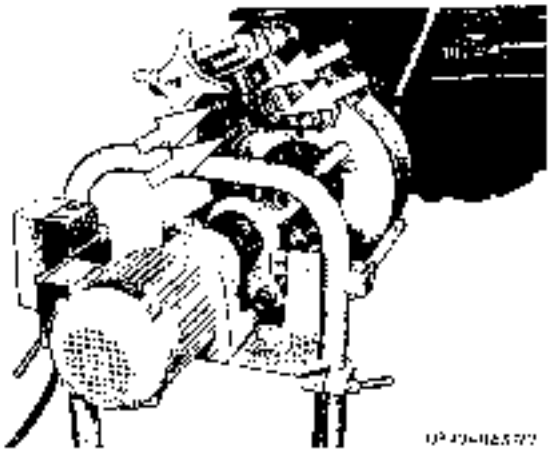
11 Fasten extensions (1) to wheel pin



12 Fasten corresponding spider (3) to extensions. Install flexible disk (16) of drive motor at spider (3)

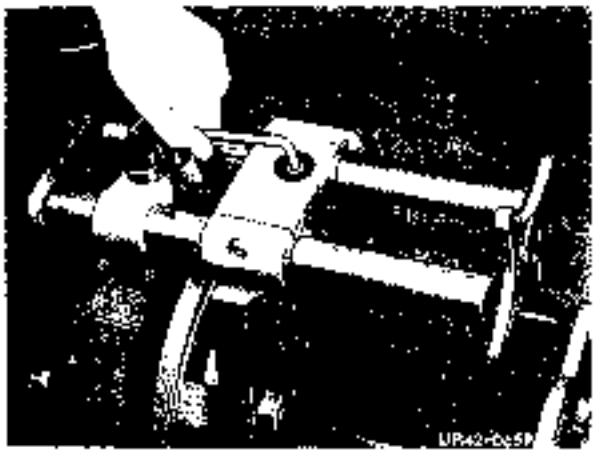


13 Release locking screw and adjust height of the centre of drive motor to the centre of wheel hub.



14 Release locking screws of cross arm mounts.

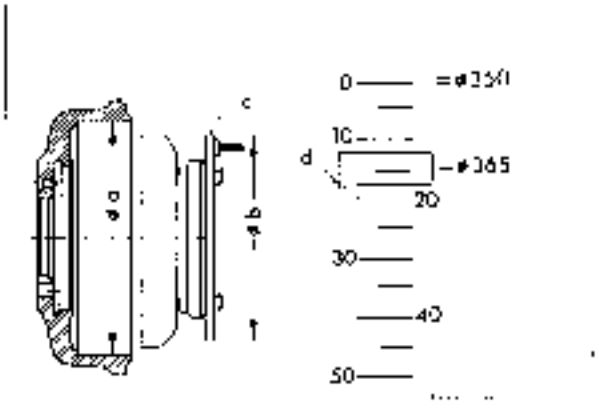
15 Adjust cutting tool by turning central setting bolt (10) to corresponding turning diameter



Note.
1 Scale graduation on side rough scale = diameter adjust of 1 mm.

1 Scale graduation on round fine scale 1 = diameter adjust of **0.1**.

for example, adjusting to drum diameter ⌀ 365 mm:



a) Diameter a = 365 drum or turning dimension for brake shoes
b) Diameter b = 320 mm mounting plate
c = mounting plate
d = setting on rough scale for turning diameter 365 mm

Fine scale must be at "0".

Drum or turning diameter 365 mm to max. 0.068 mm

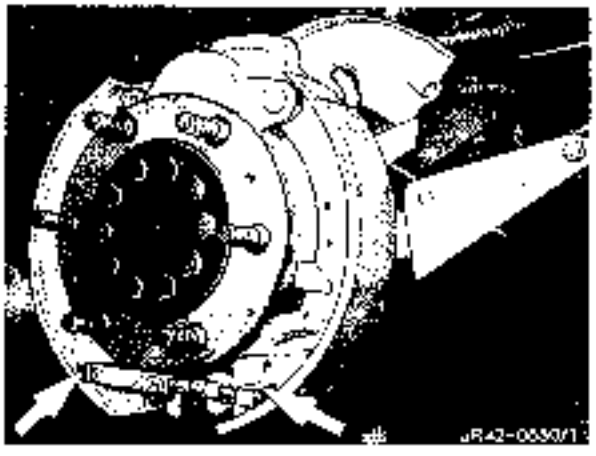
16 Tighten locking screws

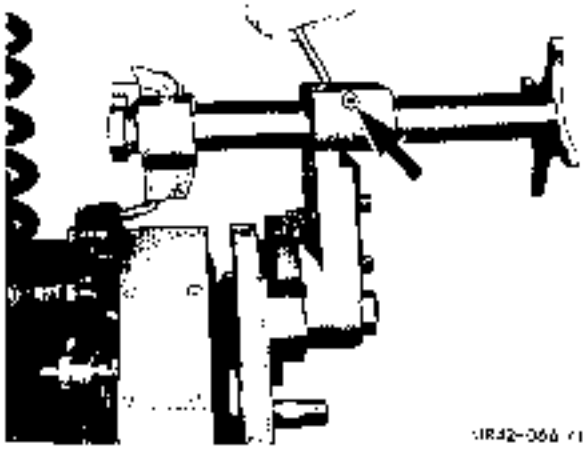
17 Using special tool no. 1, tighten brake shoe right or left.

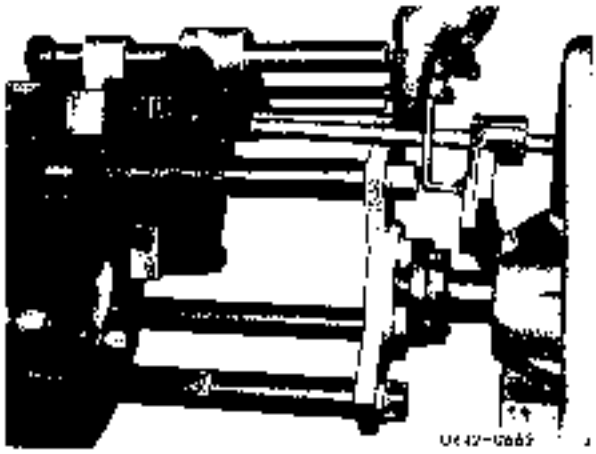
18 Insert special tool no. 2 in brake shoes.

19 Adjust opposite brake shoes by turning tension nut of special tool no. 2 so that the cutting tool uniformly turns the entire surface of the brake lining

20 Fasten special tool no. 1 and adjust second brake shoe, as described in operation 19.







21 Release locking screws in the guide column bearing bracket (5), shift guide columns (6) with feed spindle (8) and steel holder (7) until the cutting tool is some mm outside the edge of brake lining. Fasten locking screws.

22 Check emt cut-out by freely turning spider (16).

23 Raise feec selector fingers (13), push steel holder into starting position, again lower feed selector finger (13)

24 Push back guide driver rod (12) in clamp guide (11) so far that spicer (16) is still grasped

25 Release clamp guide and adjust so that a clearance of from 2 to 3 mm exists between driver rod (12) and cut out of spider (16).

26 Place spider vertically and turn once by hand to check ease of operation

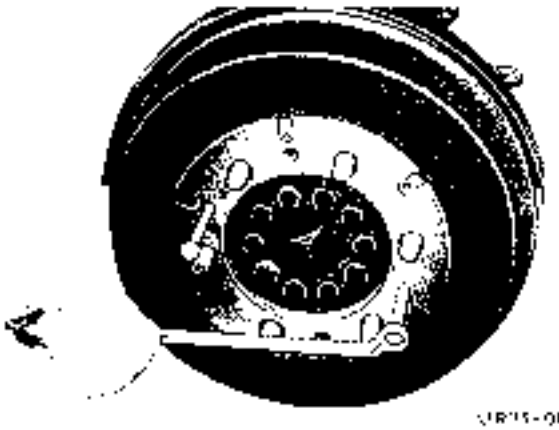
27 Install protective cover and turn brake shoes

Note:
Repeat turning if necessary until drum or turn diameter on entire brake shoe is reached and corresponding air gap is ensured.

Exchanging

1 Remove wheels

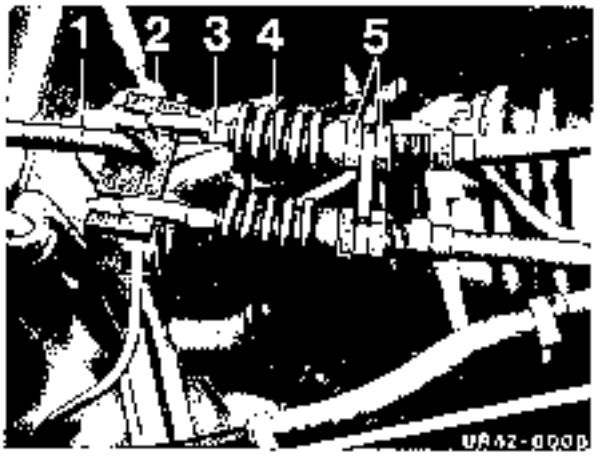
2 Remove recessed screw and remove brake drum.



3 Release adjusting nuts (1), remove handbrake cable from bracket.

4 Release fastening clips for handbrake cable at axle struts to right and left.

5 Remove brake cover plate



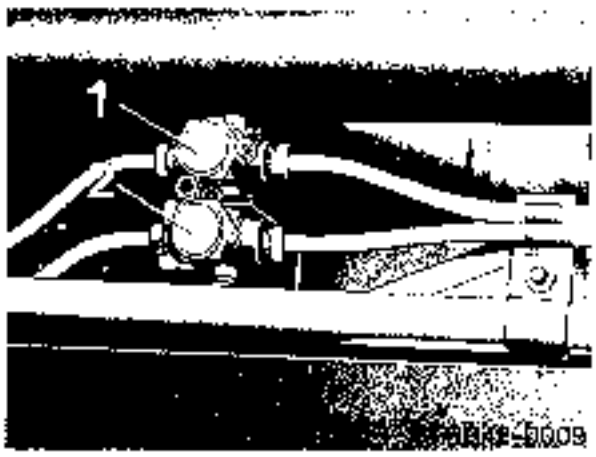
6 Detach brake cable from brake shoes, remove brake cable

7 Installation takes place in reverse sequence.

8 Adjust parking brake system, see 5.1/1.

Checking setting, adjusting to chassis end no. 013 170

The ALB-regulator must not be adjusted. Connect two manometers to respective test connections 1 and 2 of empty vehicle for hydraulic examination of the setting (brake force distribution). Actuate foot-brake pedal until overpressure indicates 100 bar (kp/cm ^{2}) on the pressure gauge (test connection 2). This value corresponds to **unregulated overpressure before** the ALB-regulator. An overpressure of 40 or 45 bar (kp/cm ^{2}) must then exist at the second pressure gauge (test connection 1). This value corresponds to the regulated overpressure after the ALB-regulator. Adjustment after lengthy driving.

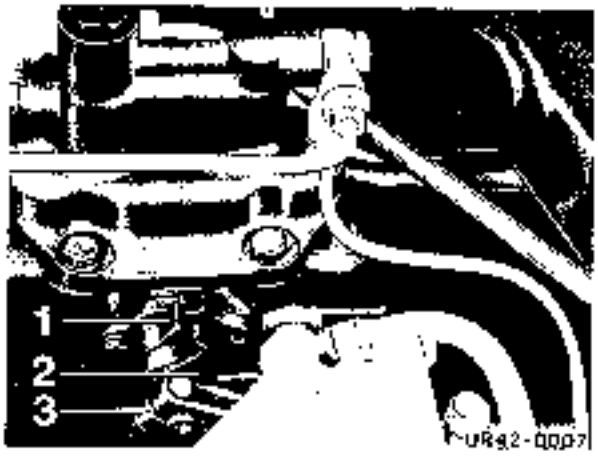


When loaded (perm. payload) the pointer must agree with the housing mark on the actuating shaft.

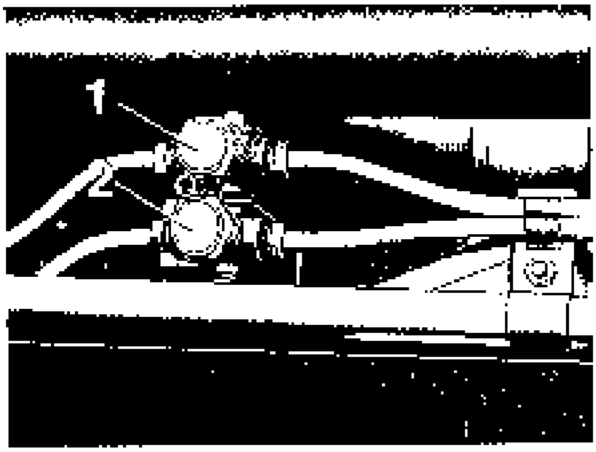
The regulator lever should be at least horizontal on the serration and if possible point even 3 to 4° upward. Due to negligible setting springs, the pointer can be offset to the left. **Remedy:** adjust control rod in its length by turning ball heads until pointer and housing mark are aligned.

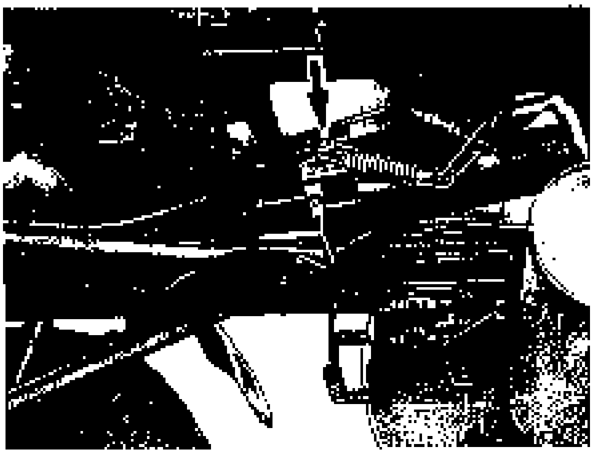
Observe sign in driver's cab for adjusting reg. valve.

Perform adjustment only at control rod. The control rod must be attached to the **correct** bore of the regulator lever. See table.



Brake force control Nominal values vehicle load bar (kp/cm²) unloaded bar (kp/cm²)	 100;100 100;40 ± 1
Regulator lever bore	Middle
Lever arm length (mm)	92
Distance (mm) after installation spacers	86
Corresponding rear axle load (kg)	approx. 2400





Checking setting, adjusting (Westinghouse regulator)

From chassis end no. 013 171

1 For checking, detach fail-safe device control spring from troques tube.

2 Connect pressure gauge of the tester to both test connections in front of and behind the ALB-regulator.

1 Test connection regulated
2 Test connection unregulated

3 Slowly depress brake footpedal fully. At the same time both pressure gauges uniformly climb up to the fail-safe pressure of 26 to 30 bar, then the pressure gauge of the regulated circuit must stop.

4 Adjust as required pressure of the regulated circle to 26 to 30 bar at adjustment screw (1).

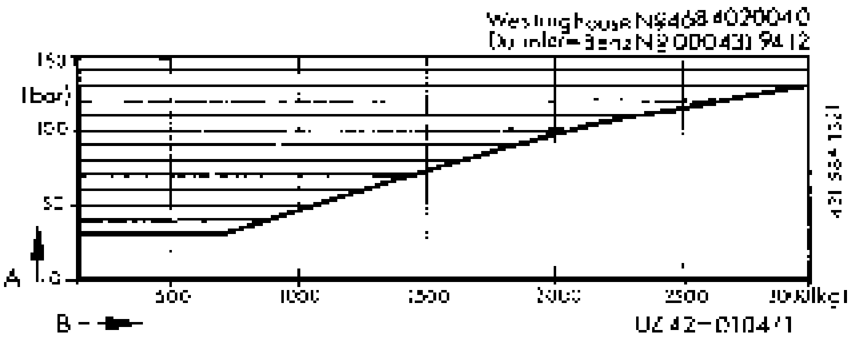
5 Attach control spring at torque tube.

6 For checking the load-dependent throttle control, determine rear axle load in vehicle ready for driving (weight).

7 Fully depress brake footpedal (until approx. 140 bar) in so doing the pressure gauge pointer of the regulated circuit must remain within the specified pressure range (see diagram).

8 If required adjust the control pressure by shifting control spring in elongated hole at torque tube.

Note:
Shorten spring travel: Control pressure is reduced.
Lengthen spring travel:
Control pressure is increased.



A Pressure in regulated circuit in bar
B Compression travel of rear axle in mm

Contents

Installation survey compressed air systems

All chassis models have hydraulic single-circuit-brakes as standard

UNIMOG		Compressed air system		Chassis	Special version SA No.	Observations
Sales designation	Chassis model	Designation	Version	end no.		
		421 030 06 42			378/2	
		421 030 21 43	E		335/3	
		421 030 23 43	E		335/4	
		421 030 25 43	Z		356/3	
		421 030 26 43	Z		356/4	
		421 030 27 43	K		348/3	
U 045/421	421 122	421 030 28 43	K		348/4	
(L 040/421)	421 123	421 030 17 43	–		378/1	French version
		421 030 18 43			378/2	French version
		421 030 22 43			335/7	Swiss version
		421 030 24 43	–		335/8	Swiss version
		421 030 19 43			340/5	Italian version
		421 030 20 43			349/6	Italian version
		421 030 06 42	–		379/4	
		421 030 30 43	F		335/9	
		421 030 39 43	E		335/11	
		421 030 32 43	Z		356/5	
		421 030 33 43	K		348/9	
U 052/421	421 124	421 030 36 42	–		378/3	French version
	421 125	421 030 37 43			378/4	French version
		421 030 31 43	–		335/10	Swiss version
		421 030 34 43			349/9	Italian version
		421 030 35 43			349/10	Italian version
		421 000 19 42	–		567/2	Italian version
U 050/421	421 126	n.a.	–			Replaced by BM 421 128
	421 127	n.a.	–		–	Replaced by BM 421 129
		421 000 01 42	–		379/1	Power head
U 055/421 T	421 130					
U 040/421 T	421 131					
		421 000 13 42			370/5	Power head
U 600/421 T	421 132					
	421 133					
U 050/421	421 162	421 000 36 42	–		378/3	French version
	421 163					
U 060/421 (Argentina)	421 310	n.a.				
U 060/421 (Argentina)	421 210	n.a.	–		–	
	421 211	n.a.	–		–	

F = Single-line compressed air control for trailer brake system
Z = Dual-line compressed air control for trailer brake system
K = Combining single and dual line air control for trailer brake system
T = Power head

Installation survey compressed air systems (EC-version)

All chassis models have hydraulic dual-circuit brakes with compressed air assistance as standard

Model	Designation	Only valid in connection with	Special version
421.140/141	Compressed air control for dual-line-trailer brake system		35.617/01
421.140/141	Compressed air control for single trailer brake system		35.617/02
421.140/141	Compressed air control for single and dual-line-trailer brake system		35.617/03
421.140/141	Compressed air control for dual-line-trailer brake system with compressed air connection		35.617/04
421.140/141	Compressed air control for single and dual-line-trailer brake system with compressed air connection		35.617/05
421.140/141	Compressed air control for dual-line-trailer brake system	ALB	35.617/07
421.140/141	Compressed air control for single and dual-line-trailer brake system	ALB	35.617/01
421.140/141	ALB-regulator		35.621/03
421.140/141	ALB-regulator	35.617/01 or 35.617/02 or 35.617/03	35.621/04
421.140/141	ALB-regulator		35.931/01
421.140/141	ALB-regulator	35.617/07 or 35.617/08	35.931/02
421.124/125	Anti-freeze pump	35.335/09 35.336/05 35.346/05 35.379/04	35.625/05
.140/141			
421.140/141	Anti-freeze pump	35.617/02 or 35.617/07 or 35.617/08	35.625/04
421.128/129	Anti-freeze pump	35.031/01	35.625/07
421.128/129	EC-brake system	35.023	35.031/01

Installation survey
Equipment

Installation survey Equipment		Single-cylinder-air compressor				Pressure regulator with air cleaner and tire inflating connection		Antifreeze	Compressed air reservoir 15 10 30 (liter)			Drain valve			Single-chamber brake booster
Sales designation ()	Chassis model MB parts number	000 131 78 01 OP	000 131 70 01 m. OP	002 131 11 01 m.A. LHP	002 131 10 01 o.A. LHP.	000 431 79 06	001 431 29 06	000 431 26 15	421 432 03 15	421 432 04 15	421 432 08 15	000 432 08 07 *	000 432 13 07 *	000 432 15 07 *	000 431 74 14
U 045/421	421.122	S	S			S			S		S				S
(U 040/421)	421 123	S	S			S			S		S	S	S	S	S
U 052/421	421 124			S	S	S		S	S		S				S
(U 052/421)	421 125			S	S	S		S	S		S				S
U 055/421 T	421 130		X			XS			S	X					X
(U 040/421 T)	421 131		X			XS			S	X					X
U 600/421 T	421 132			X		XS			X	X	X				X
U 600/421 T	421 133			X		XS			X	X	X				X
U 600/421 L	421 128				S		S	S			S	S	S	S	S
U 600/421 L	421.129				S		S	S			S	S	S	S	S
U 060/421	421 162					S					S				S
U 060/421	421 163					S					S				S
U 600/421	421 140			S	X		X	S	S		X	XS	XS	XS	X
U 600/421	421.141			S	X		X	S	S		X	XS	XS	XS	X

Installation survey Equipment		Master brake cylinder						Trailer control valve (air-controlled) with pressure limiter without tire inflating connection						Shut-off cock
Sales designation ()	Chassis model MB parts number	001 430 81 01	001 430 84 01	001 430 95 01	002 430 53 01	002 430 74 01	003 430 81 01	000 431 49 05	000 431 70 05	000 431 71 05	001 431 18 05 *	001 431 34 05 *	001 431 37 05 *	000 429 14 31
U 045/421	421.122	X	S	S	S				S	S				S
(U 040/421)	421 123	X	S	S	S				S	S				S
U 052/421	421 124	X		S	S	S			S	S				S
(U 052/421)	421 125	X		S	S	S			S	S				S
U 055/421 T	421 130			XS										
(U 040/421 T)	421 131			XS										
U 600/421 T	421 132			XS										
U 600/421 T	421 133			XS										
U 600/421 L	421 128	X					S							
U 600/421 L	421.129	X					S							
U 060/421	421 162	X		S	S									
U 060/421	421 163	X		S	S									
U 600/421	421 140						X	S	S		S	S	S	
U 600/421	421.141						X	S	S		S	S	S	

Installation survey Equipment		Coupling head															Pressure control valve
Sales designation ()	Chassis model MB parts number	000 429 01 30	000 429 27 30	000 429 28 30	000 429 37 30 *	000 429 38 30 **	000 429 39 30 ***	000 429 40 30 ****	000 429 45 30	000 429 48 30	000 429 68 30	000 429 74 30	000 429 78 30 *	000 429 79 30 **	000 429 80 30 ***	000 429 81 30 ****	001 429 66 44
U 045/421	421.122	S	S	S						S	S						S
(U 040/421)	421 123	S	S	S						S	S						S
U 052/421	421 124	S	S	S						S	S						S
(U 052/421)	421 125	S	S	S						S	S						S
U 055/421 T	421 130																
(U 040/421 T)	421 131																
U 600/421 T	421 132																
U 600/421 T	421 133																
U 600/421 L	421 128																
U 600/421 L	421.129																
U 060/421	421 162																
U 060/421	421 163																
U 600/421	421 140				S	S	S	S	S	S	S	S	S	S	S	S	
U 600/421	421.141				S	S	S	S	S	S	S	S	S	S	S	S	

Installation survey Equipment		Relay valve			Handbrake valve			Single-chamber-brake cylinder		Brake pressure regulator			Two-way valve	
Sales designation ()	Chassis model MB parts number	000 429 65 44	000 429 66 44	001 429 21 44	000 431 02 16	000 430 39 81	000 430 75 81	000 420 52 24	000 420 70 24	000 431 32 12	000 431 77 12	000 431 94 12	000 429 40 44	001 420 24 44
U 045/421	421.122	S	S		S	S		S		S			S	
(U 040/421)	421 123	S	S		S	S		S		S			S	
U 052/421	421 124	S	S	S	S			S	S					
(U 052/421)	421 125	S	S	S	S			S	S					
U 055/421 T	421 130													
(U 040/421 T)	421 131													
U 600/421 T	421 132													
U 600/421 T	421 133													
U 600/421 L	421 128											S		
U 600/421 L	421.129											S		
U 060/421	421 162													
U 060/421	421 163													
U 600/421	421 140						S				S	XS		S
U 600/421	421.141						S				S	XS		S

Installation survey Equipment		Three-way valve	Overflow valve			Pressure regulating valve			Non return valve	Directional control valve					
Sales designation ()	Chassis model MB parts number	000 429 68 44	000 429 72 44	001 429 52 44	001 429 53 44	000 429 45 44	000 429 49 44	001 429 17 44	003 429 07 44	3/2 000 434 05 01	3/2 000 434 22 01	3/2 000 434 23 01	3/2 001 429 04 44	2/2 002 429 21 44	3/2 002 429 26 44
U 045/421	421.122	S	S			S			S						
(U 040/421)	421 123	S	S			S			S						
U 052/421	421 124	S			S	S	S	S	S						
(U 052/421)	421 125	S			S	S	S	S	S						
U 055/421 T	421 130			X								X			
(U 040/421 T)	421 131			X								X			
U 600/421 T	421 132			X								X			
U 600/421 T	421 133			X								X			
U 600/421 L	421 128			S						S					
U 600/421 L	421.129			S						S					
U 060/421	421 162								S						
U 060/421	421 163								S						
U 600/421	421 140			X				S			S	X	S	S	S
U 600/421	421.141			X				S			S	X	S	S	S

() = Previous sales designation
T = power head
X = installed as standard
S = special version (SA)

* = optional
** = optional
*** = optional
**** = optional

Equipment number codes

Mercedes-Benz part number	Supplier part number		Remarks
Single cylinder air compressor			
000 131 70 01	West. 411 004 101 0	without oil pump	98 cm³
000 131 70 01	West. 415 701 100 0	with oil pump	
002 131 10 01	West. 411 040 800 0	without conn.	Power steering pump 105 cm³
002 131 11 01	West. 411 040 840 0	with conn.	
Pressure regulator with air cleaner and tire inflating connection			
000 431 79 06	West. 475 304 201 0		
Pressure regulator with air cleaner without tire inflating connection			
001 431 29 06	West. 975 300 003 0		
Antifreeze			
000 431 26 15	West. 432 199 030 0	SA 35 583 SA 35 625	
Drain valve			
000 432 08 07	West. 934 300 001 0	optional	
000 432 13 07	Technomatik 176.0-4.827		
000 432 15 07	Bosch 481 700 067		
Single-chamber-brake booster			
000 431 74 14	West. 462 007 042 0		
Control valve			
001 429 66 44	West. 470 013 000 0	hydropneumatic	

Mercedes-Benz part number	Supplier part number		Remarks
Trailer control valve with pressure limiter (air-controlled)			
000 431 49 05	West. 471 200 006 0	Single-line	
000 431 70 05	West. 471 200 112 0		
000 431 71 05	West. 471 200 113 0		
001 431 16 05	Bosch 461 061 005	Dual-line	
001 431 34 05	Knorr B 30 181		
001 431 37 05	West. 973 002 402 0		
Shut-off cock			
000 429 14 31	West. 462 002 107 0		
Coupling head			
000 429 01 30	West. 452 300 300 0		
000 429 27 30	West. 880 020 712 0		
000 429 28 30	West. 452 200 304 0		
000 429 37 30	Bosch 0 484 103 101		
000 429 38 30	Bosch 0 484 150 101		
000 429 39 30	Bosch 0 484 102 502		
000 429 40 30	Bosch 0 484 102 503		
000 429 45 30	West. 452 802 000 0		
000 429 48 30	Knorr 3 A 99 585		
000 429 68 30	West. 452 303 011 0		
000 429 74 30	West. 452 300 016 0		
000 429 78 30	West. 952 200 210 0		
000 429 79 30	West. 952 200 022 0		
000 429 80 30	West. 952 200 221 0		
000 429 81 30	West. 952 200 222 0		
Pressure control valve			
001 429 66 44	West. 473 011 000 0		

Mercedes-Benz part number	Supplier-part number	Remarks
Relay valve		
000 429 65 44	West. 973 001 010 0	
000 429 66 44	West. 473 011 000 0	
001 429 21 44	West. 473 017 000 0	
Handbrake valve		
000 421 02 15	West. 461 704 025 0	
000 430 39 61	West. 461 700 004 0	
000 430 76 61	West. 461 701 002 0	
Single-chamber-brake cylinder		
000 420 52 24	West 421 002 000 0	
000 420 70 24	West 421 021 000 0	
Brake pressure regulator		
000 431 42 12	West 475 601 014 0	
000 431 72 12	Bosch 0 481 099 009	
000 431 94 12	West 468 402 004 0	
Two-way valve		
000 429 40 44	West. 434 202 000 0	
001 429 24 44	West 434 206 000 0	
Three way valve		
000 429 68 44	West 371 020 000 0	
Overflow valve		
000 429 72 44	West. 434 100 203 0	with limited return flow
001 429 52 44	West. 434 100 124 0	without return flow
001 429 53 44	West. 434 100 122 0	

Mercedes-Benz part number	Supplier's part number	Remarks
Pressure reducing valve		
000 429 45 44	West 475 003 305 0	Swiss version
000 429 49 44	West 475 006 302 0	
001 429 17 44	West 475 010 303 0	
Non-return valve		
003 429 07 44	West 434 014 100 0	
Directional control valve		
000 434 05 01	West 463 013 310 0	
000 434 22 01	West 463 013 111 0	3/2 way valve
000 434 23 01	West 463 013 112 0	3/2 way valve
001 429 04 44	West 571 002 300 0	
002 429 21 44	West 571 004 900 0	2/2 way valve
002 429 26 44	Bosch 0 481 007 016	3/2 way valve

Subdivision of Compressed Air Brake Systems

Compressed air brake system	Hydraulic Brake System	
	Single-Circuit Brake System	Dual-Circuit Brake System
Compressed air brake booster	X	X
Compressed air control for single-circuit trailer brake system	X	-
Compressed air control for dual-circuit trailer brake system	X	X
Compressed air control for single- and dual-circuit trailer brake system	X	X

Operation

Single-Circuit Compressed Air Brake System

This brake system requires only one air line to the trailer. The trailer brake system is energized when the trailer brake line is **bled.**

During extended downhill runs, the compressed air supply in the trailer may become exhausted because no more air is supplied to the trailer during braking.

Air gauge pressure: 5.2 bar.

Dual-Circuit Compressed Air Brake System

This brake system has two air lines to the trailer. The line from the reservoir of the tractor unit to the trailer reservoir is under pressure (supply line). The second line leads to the control unit in the trailer and is pressureless (brake line).

The trailer brake is energized by **charging** the brake line **with air.** The control unit of the trailer connects the reservoir to the brake cylinders. When the trailer connection is interrupted (interruption of energized supply line), the trailer is automatically braked.

The advantage of the dual-circuit compressed air brake system is that the compressed air supply in the trailer cannot be exhausted even during very long downhill runs.

Air gauge pressure: 7.0 bar.

Compressed Air Generation System

The fresh air drawn through the oil bath air cleaner of the engine is compressed in the air compressor and flows to the pressure regulator with air cleaner and tire inflation connection. There, the compressed air supplied is drained and the operational guage pressure automatically monitored. When the supplied max. operating overpressure is attained, the air compressor is switched to idling, and when compressed air is drawn from the pressure tank, to charging. The compressed air supplied flows from the pressure regulator into the compressed air tank, in front of which a defroster unit or defroster pump is installed optionally. The dual pressure gauge (white needle) indicates the gauge pressure in the tank.

Tractor Brake System

From the compressed air tank the compressed air flows to the brake booster.

Simultaneously, compressed air flows to the air-controlled trailer control valve (connection V) and through this unit to the coupling head.

When braking, the pedal force acts on the one hand via the brake pedal on the hydraulic master brake cylinder and on the other hand on the compressed air brake booster. The function of the booster increases the mechanical force acting on the master brake cylinder by the compressed air employed. This compressed air (brake gauge pressure) is indicated by the double pressure gauge (red needle). The hydraulic brake gauge pressure flows from the master brake cylinder to the wheel brake cylinders of the front and rear axles.

Simultaneously, compressed air flows from the brake booster (connection A) to the air-controlled trailer control valve (connection Z). This bleeds the trailer control line (coupling head) and braking action in the trailer is initiated.

Troubleshooting

Compressed Air System (without EEC system)

Repairs to assemblies may only be performed by authorized workshops and brake service points.

Fault	Cause	Remedy
Pressure Regulator with Air Filter and Tire Inflating Port		
Cut-in pressure excessive or inadequate	Pressure regulator incorrectly adjusted	Adjust to cut-in pressure, refer to technical data "Pressure regulator"
Pressure regulator fails to switch air compressor over to idling	Passage choked. Control piston sticking. Grooved ring defective.	Clean passage. Check control piston and grooved ring, replacing if necessary
Pressure regulator fails to switch air compressor over to on-load operation	Vent choked, intake valve leaking, adjusting spring defective, sealing ring leaking. Cut-off piston sticking.	Clean vent, clean or replace valve. Check or replace spring. Replace sealing ring. Check cut-off piston and sealing ring
Compressed air escapes from drain socket in charging position.	Safety or no-load valve leaking.	Clean or replace valve and valve seat ring
Pressure regulator loses compressed air at vent in no-load or charging position	Intake valve leaking. Spring defective.	Clean or replace valve. Replace spring.
Pressure regulator does not admit compressed air to air tank.	Filter choked.	Clean or replace filter.
Compressed air escapes from dust cap on tire inflating port	Valve leaking.	Check or replace valve
Brief operating interval between pressure regulator cut-in and cut-out.	Heavy air consumption. Check valve leaking.	Check compressed air system for leaks. Clean or replace valve.
Defroster		
Compressed air escapes from actuating rod	Sealing ring leaking	Replace sealing ring. Check sealing surface on rod.
Compressed air escapes from mounting flange of reservoir.	O-ring leaking.	Replace O-ring.
Steady consumption of antifreeze in closed position.	Sealing ring leaking.	Replace sealing ring
Defroster does not work satisfactorily in operating position.	No antifreeze left. More water than antifreeze in reservoir.	Drain water and top up with antifreeze

Fault	Cause	Remedy
Defrosting Pump		
Thrust tappet is too loose (no counter-pressure felt) or liquid level does not drop after repeated operation.	Piston seal leaking or strainer or supply bore choked	Fit new piston seal. Clean strainer or supply bore.
Air escaping at thrust tappet guide in replenishing tank.	Valve chamber dirty or valve head damaged.	Remove valve head. Clean valve chamber. Replace or recondition valve head.
Drainage Valve		
Drainage valve leaking.	Actuating valve or valve seat dirty or defective.	Briefly operate actuating valve. Clean or replace valve or valve seat.
Brake Servo Unit		
Leaks	Rubber parts or valves defective	Replace rubber parts or valves.
Functional faults	Piston, piston liner or piston rod show signs of damage	Replace assembly.
Double Pressure Gauge		
Single-circuit air brake system: Gauge not accurate (can be checked by fully applying brakes). Tank and brake pressure pointers must agree.	Incorrectly connected Instrument defective	Connect correctly Replace instrument.
Brake Pressure Warning Light		
Warning light comes on when travelling.	Brake pressure inadequate or non-existent	Watch double pressure gauge, replenish tank pressure. Check brake system for leaks

Fault	Cause	Remedy
Trailer Control Valve, Single-Circuit		
With brakes released, compressed air escapes at vent (E) and connection (Z).	Exhaust valve leaking. Sealing ring leaking.	Clean or replace valve and valve seat. Replace sealing ring.
Compressed air escapes at vent (E) in closed position.	Intake valve leaking. Diaphragm defective.	Clean or replace valve and valve seat. Replace diaphragm.
Valve does not give satisfactory graduation.	Graduating piston sticking. Sealing ring leaking. Retainer defective.	Check or replace piston and sealing ring. Replace snap ring.
Unit does not give correct advance; refer to technical data of appropriate valve.	Graduating piston sticking. Spring broken. Diaphragm defective.	Check piston and sealing ring. Replace spring. Replace diaphragm.
Pressure rises in port (E) in braking position.	Intake valve leaking.	Check or replace valve and valve seat.
Isolating Cock		
Compressed air escapes at vent in through position.	Seal leaking.	Replace seal.
Compressed air permanently escapes at vent in isolating position.	Valve leaking.	Clean or replace valve and valve seat.
Coupling Head		
Compressed air escapes in coupled position.	Sealing surfaces defective.	Replace sealing rings.
Pressure Control Valve		
Valve leaking.	Seal worn.	Replace seal.
Relay Valve		
Compressed air escapes at vent (E) in released position.	Intake valve leaking. O-ring defective.	Check valve and valve seat. Replace O-ring.
Compressed air escapes at vent (E) in partial or full braking position.	Exhaust valve leaking.	Check valve and valve seat.
Valve does not give fine graduation.	Piston sticking. O-ring defective.	Check piston for ease of movement. Replace O-ring.
Response stage too high.	O-ring and piston sticking.	Check piston for ease of movement. Replace O-ring.
Handbrake Valve		
Compressed air escapes from closed intake valve in released position.	Intake valve leaking. O-ring defective.	Check valve and valve seat. Replace O-ring.
When handbrake is applied, compressed air escapes at closed exhaust valve.	Exhaus valve leaking.	Check valve and valve seat.

Fault	Cause	Remedy
Piston Brake Cylinder		
Leaking	Interior of cylinder shows heavy dirt deposits (because gaiter is destroyed).	Clean interior of brake cylinder and replace gaiter
	Seal worn and seal track scored.	Replace seal
Piston does not return to end position	Interior of cylinder dirty or rusty	Clean interior of brake cylinder.
Two-Way Valve/Three-Way Valve		
Valve leaking	Valve seal in body leaking	Check and clean valve seat, replace sealing ring, replace valve if necessary.
Overflow Valve		
Overflow valve too high or too low.	Incorrectly adjusted	Adjust to specified overflow pressure, refer to technical data "Overflow Valve"
Pressure Reducing Valve		
Pressure reduction incorrect.	Adjusting spring not preloaded correctly	Correct preloading
Compressed air escapes at joint between ports 1 and 2.	Intake valve leaking	Clean or replace valve and valve seat.
Check Valve		
Check valve fails to hold compressed air entering in direction of arrow	Valve leaking.	Clean or replace valve
Air Admission Valve (Actuating Valve)		
Compressed air escapes at vent (E) in released position.	Valve leaking	Clean or replace valve.
Compressed air escapes steadily at vent (E) in actuating position.	Valve or seal defective.	Clean or replace valve, replace sealing ring
Actuating tappet does not return fully to released position	Spring defective. Tappet sticking.	Replace spring, check tappet, repairing or replacing if necessary

Note: A soap solution leaving no residue should be used for testing air lines and air assemblies.

Compressed Air System (EEC System)

Repairs to assemblies must only be executed by authorized workshops and brake service points

Fault	Cause	Remedy
Air Compressor/Auxiliary Air Compressor		
Compressed air delivery inadequate or non-existent.	Suction or delivery valves leaking. Excessive play between piston and cylinder. Line or filter in pressure regulator coked up. Cylinder head gasket defective.	Overhaul or replace air compressor. Clean line or filter in pressure regulator, replace if necessary. Replace cylinder head gasket.
Air compressor overheating	Brake system leaking heavily	Rectify leakage in brake system
	Line or filter from pressure regulator coked up	Clean line or filter from pressure regulator, replacing if necessary
	Too many additional air loads.	Install auxiliary air compressor
Air compressor using too much oil	Vacuum in intake line	Clean air filter, replacing filter element if necessary
	Cylinder and piston rings heavily worn.	Overhaul or replace air compressor.
Pressure Regulator		
Compressed air escapes at outlet socket in charging position.	No-load valve leaking.	Clean or replace valve and valve seat.
Pressure regulator fails to switch air compressor over to no-load	Diaphragm piston sticking	Check or replace diaphragm piston.
Pressure regulator fails to switch air compressor over to on-load.	Adjusting spring defective, cut-off piston sticking.	Replace spring, check cut-off piston and sealing ring.
Pressure regulator loses compressed air at vent in charging position.	Intake valve leaking, spring defective	Clean or replace valve, replace spring.
Pressure regulator loses compressed air at vent in no-load position	Exhaust valve leaking, spring defective.	Clean or replace valve, replace spring.
Pressure regulator does not admit compressed air to air tank.	Filter choked.	Clean or replace filter.
Brief switching interval between pressure regulator cut-in and cut-out	Heavy air consumption, check valve leaking, sealing ring or exhaust valve leaking.	Check brake system for leaks. Check valves and seals. Replace wear parts.
Defroster		
Compressed air escapes at actuating rod.	Sealing ring leaking	Replace sealing ring at actuating rod
Steady consumption of alcohol in closed position	Sealing ring leaking	Replace sealing ring
Defroster does not work satisfactorily in operating position.	No antifreeze left. More water than antifreeze in supply tank.	Drain water and top up with Antifreeze.

Fault	Cause	Remedy
Dual-Circuit Protection Valve		
Opening pressure for one brake circuit is not reached.	Incorrectly adjusted.	Adjust to specified opening pressure.
Limited return flow is not ensured.	Valve body sticking.	Overhaul or replace valve.
Compressed air escapes at breather port in operating position.	Spring broken	Replace spring
	Diaphragm leaking.	Replace diaphragm or valve.
Tank Pressure		
Is not reached or not reached quickly enough	Air compressor not delivering sufficient compressed air.	Check air compressor, overhauling or replacing if necessary
		Clean pressure regulator, replacing if necessary.
Drainage Valve.		
Valve leaking.	Pressure regulator steadily discharging air.	Briefly operate actuating valve Replace if valve still leaks.
Overflow Valve W/O Return		
Overflow valve cannot be exactly adjusted.	Actuating valve seat dirty or defective	Clean diaphragm or replace with spring.
Valve does not hold back compressed air	Diaphragm leaking, spring defective.	Clean or replace check valve
Double Pressure Gauge		
The two pointers do not agree at full braking position; out of tolerance ± 0.2 bar	Check valve leaking	Replace double pressure gauge
Air escapes at double pressure gauge.	Wear in transmission mechanism	Replace double pressure gauge.
Incorrect indication	Solder leaking	The two pointers must agree when brakes are fully applied at standstill. Replace gauge if necessary.
	Assembly defective.	

Fault	Cause	Remedy
Warning Light		
Comes on while travelling. **Important: Stop immediately.**	Tank pressure inadequate or non-existent.	Watch double brake pressure gauge until tank pressure is reached. Check compressed air system for leaks, sealing if necessary.
	Leakage in hydraulic brake circuit	Rectify leaks, bleeding brake system if necessary. Check fluid level, correcting if necessary
	Brake pad lining wear	Replace brake pads/linings. Check fluid level, correcting if necessary
Warning light does not come on when pressure drops below warning level	Bulb defective. Fault in electrical system	Replace bulb. Rectify electrical fault
Air Brake Servo Unit		
Compressed air escapes at vent in released position.	Intake valve leaking.	Replace intake valve
Compressed air escapes at vent in partial and full braking positions.	Exhaust valve, sealing rings and seals leaking	Replace exhaust valve, sealing rings and seals, exchanging servo unit if necessary.
Wheel brakes are slow to release after braking.	No pedal play.	Adjust pedal play
	Inner stiffness between piston and cylinder bore. Compression spring weak	Check brake servo unit, replacing if necessary
	Control piston sticking in 3/2-way valve (changeover valve for trailer working).	Check 3/2-way valve, replacing if necessary
Brake graduation not fine enough	Pedal system stiff.	Check brake servo unit, replacing if necessary.
	Inner stiffness between piston and cylinder bore	Check brake servo unit, replacing if necessary.
Handbrake Valve		
Compressed air escapes at vent in released position.	Exhaust valve or sealing ring leaking	Replace exhaust valve and sealing ring.
Compressed air escapes at vent in partial and full braking positions.	Intake valve leaking	Clean or replace intake valve
Valve does not give satisfactory graduation.	Vent dirty	Clean vent

Fault	Cause	Remedy
Trailer Control Valve, Single-Circuit		
Compressed air escapes at vent and control port with brakes released.	Exhaust valve leaking, sealing rings leaking	Clean or replace valve and valve seat. Replace sealing ring
Compressed air escapes at vent in closed position.	Exhaust valve leaking, diaphragm defective.	Clean or replace valve and valve seat. Replace diaphragm.
Valve does not provide satisfactory graduation.	Graduation piston sticking. Sealing ring leaking. Snap ring defective.	Check piston and sealing ring replacing if necessary. Replace snap ring.
Assembly does not provide correct advance.	Graduating piston sticking. Spring broken. Diaphragm defective.	Check piston and sealing ring. Replace spring. Replace diaphragm
Pressure in trailer control line rises above 5.4 bar in released position.	Pressure reducting piston or spring defective. Intake valve may be leaking	Check or replace piston and sealing ring. Replace spring. Check or replace valve and valve seat
Pressure rises in trailer control line in braking position.	Intake valve leaking	Check or replace valve and valve seat
Hydropneumatic Control Valve		
Compressed air escapes at vent with brakes released.	Intake valve leaking.	Clean or replace intake valve.
	Control valve of dual-line system leaking between pressure chamber port 43 and control chamber port 42, allowing air to pass through connecting line to hydropneumatic control valve and escape at vent.	Replace dual-line control valve.
Compressed air escapes at vent in closed position	Exhaust valve or sealing ring leaking	Clean exhaust valve, replacing if necessary. Replace sealing ring.
Valve does not provide satisfactory graduation.	Control piston stiff.	Release control piston, replacing valve if necessary
	Air in hydraulic control chamber.	Vent valve.
Residual pressure left in brake line (2-line) to trailer when brakes released	Control piston stiff or sticking, leaving residual pressure in connecting line to control chamber port 42 of control valve (2-line) and preventing brake line from being fully exhausted	Replace hydropneumatic control valve

Fault	Cause	Remedy
Trailer Control Valve, Dual-Line		
With service and parking brakes released, compressed air escapes at vent	Intake valve or sealing rings leaking	Clean or exchange intake valve. Exchange sealing rings
With service and parking brakes released, compressed air escapes at vent of hydropneumatic control valve.	Diaphragm piston leaking.	Exchange control valve.
Operating stage of valve is excessive or graduation is not satisfactory. Residual pressure left in trailer brake line	Inner stiffness at valve (pistons sticking).	Check control valve, exchanging if necessary
At partial and full braking positions, compressed air escapes at vent	Exhaust valve or sealing ring leaking.	Clean or exchange exhaust valve. Exchange sealing rings.
Trailer Control Valve, Dual-Line		
With service and parking brakes released, residual pressure left in trailer control line	Air brake servo unit is not exhausting fully.	Check and adjust pedal play. Check air brake servo unit, exchanging if necessary
	Hydropneumatic control valve is not exhausting fully.	Check hydropneumatic control valve, exchanging if necessary.
	Handbrake valve is not providing full admission.	Check and adjust handbrake valve setting. Check handbrake valve, exchanging if necessary.
With parking brake applied, compressed air escapes at vent,	Exhaust valve or sealing ring leaking	Clean or exchange exhaust valve. Exchange sealing rings.
	Control valve of single-line brake system is leaking toward control port.	Check single-line trailer control valve, exchanging if necessary.
Two-Way Valve		
Compressed air escapes at uncontrolled delivery port line	Piston slide leaking.	Exchange piston slide

Fault	Cause	Remedy
Coupling head, single line		
Compressed air escapes at coupled position	Sealing surfaces defective	Exchange sealing rings
At uncoupled position, compressed air escapes at coupling head.	Valve leaking	Check valves and valve seats, exchanging if necessary
Not enough compressed air is reaching trailer.	Pin of opposite coupling head is not pressing fully on valve.	Exchanging coupling head with pin.
	Strainer is choked	Clean strainer.
At coupling head (special version) compressed air escapes from valve hole at disconnected position.	Valve body leaking	Clean valve or exchange coupling head
Coupling heads, dual-line		
After coupling up, compressed air escapes at sealing surfaces during full brake application.	Sealing surfaces defective.	Exchange sealing rings
Coupling heads lock unsatisfactorily.	Retainer worn out.	Exchange retainers on both coupling heads
After disconnecting, compressed air escapes at supply head.	Valve leaking Strainer choked	Clean or exchange valve. Clean strainer.
2/2-way valve (break-away valve)		
Compressed air escapes at breather hole.	Valve leaking	Exchange valve.
When brakes are fully applied pressure in supply line does not drop to 1.5 bar within 2 seconds	Restrictor orifice, in valve too large, or piston stiff.	Check valve, exchanging if necessary.
3/2-way valve (changeover valve)		
With tractor unit working alone, compressed air escapes at breather hole throughout full brake application	Valve leaking	Exchange valve.
With tractor unit working alone, brakes release too slowly or residual pressure left in air brake servo unit.	3/2-way valve is stiff or piston sticking. The M-chamber of air brake servo unit is therefore exhausting too slowly or incompletely	Check valve, exchanging if necessary.

Fault	Cause	Remedy
3/2-Way Valve (actuating valve)		
At released position compressed air escapes at vent	Valve leaking	Clean or exchange valve
At actuating position, compressed air steadily escapes at vent	Valves or sealing rings defective	Clean valves, exchanging if necessary.
Actuating tappet does not fully return to released position	Spring defective, tappet sticking	Check valves exchanging if necessary.
3/2-Way Valve (testing valve)		
With handbrake released, compressed air escapes at rotary knob.	Sealing ring on tappet at top is leaking	Exchange sealing ring or valve
Handbrake exhausts. Testing valve admits. At the same time, compressed air steadily escapes at handbrake valve vent	Seal on tappet in centre is leaking	Exchange seal or valve.
Handbrake exhausts. At same time, compressed air steadily escapes at handbrake valve vent.	Sealing ring on tappet at bottom is leaking	Exchange sealing ring or valve

Technical Data

Minimum Bending Dia. for Plastic Pipes

Pipe dimension OD x wall thickness	Minimum permissible bending radius in mm
4 x 1	20
6 x 1	30
6 x 0.5	40
8 x 1	40
8 x 2	40
11 x 1.5	55
12 x 1.5	60
13 x 1.5	65

Safe Working Pressure

The safe pressures (see Table) must not be exceeded

Pipe dimension OD x wall thickness	Safe working pressure in bar at +20° C
4 x 1	50
6 x 1	30
6 x 0.5	13
8 x 1	21
8 x 2	50
11 x 1.5	24
12 x 1.5	21
13 x 1.5	16

The safe maximum working pressure gives rough orientation values for the burst pressure

Special Tools

Cons. No	Designation	Tool No.	Tool set
1	Pipe clamp	352 589 00 37 01	B

Instructions for Laying and Fabricating Metal Piping:

Piping when laid must not be subject to stresses of chafing and must be fixed at the same mounting points as the line removed.
A pipe bender should be used for bending purposes. Refer to line removed for shape. On no account must pipeline be heated for bending because surface protection will be destroyed and oxidation will cause brake-up trouble.
Each pipe end must be cut off at right angles and deburred. Slide cap nut, cutting and thrust rings onto pipe end and couple to union while pressing pipe into position. Pipe must not be allowed to turn. Then release cap nut again to check whether cutting edge of cutting ring has penetrated pipe surface and whether visible bead has been produced by the cutting edge. Prior to final installation, the piping must be cleaned with compressed air.

Instructions for Installing Plastic Piping:

1 **Material.**

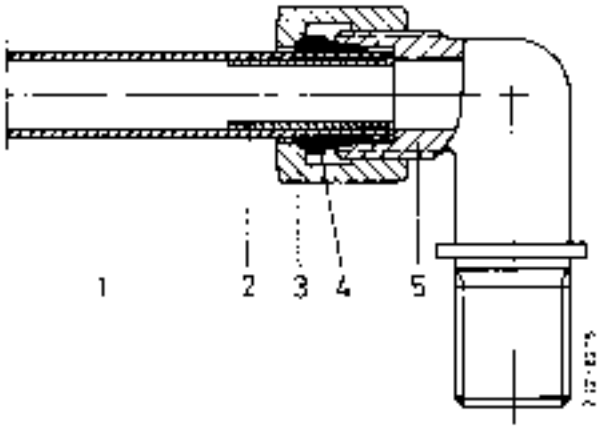
Plastic piping is made of polyamide 11 - 12 w.T. Polyamide is flexible and resists all fluids, oils and greases used in motor vehicles. In addition, plastic piping is also resistant to bases, unchlorinated solvents, organic and inorganic acids and diluted oxidants. The melting point of plastic piping is + 186° C, temperature between – 40° and + 100° C being perfectly safe.

When performing drilling and welding operations, protect or remove plastic piping.

2 **Coupling and Fitting:**

Plastic pipe (1) should be cut off at right angles for each new joint. Then slip sleeve insert (2) fully home into pipe end and position cap nut (3) and cutting ring (4) on plastic pipe. Now hand-tighten cap nut until appreciable resistance is felt at union (5). Tighten 1 1/2 to 1 3/4 more turns using wrench. Release cap nut and check whether cutting ring is seated firmly in plastic pipe and also whether a slight bulge has appeared in front of cutting ring. Then tighten cap nut in the normal manner.

To fit a pipe union hold plastic piping in special tool No. 1.



DR 47 - 0056

Damage to plastic piping does not necessitate replacing the unit in full. The damaged section can be cut out and repaired with the aid of a double union.

1 Double union
2 Nut
3 Sleeve nut
4 Corrugating

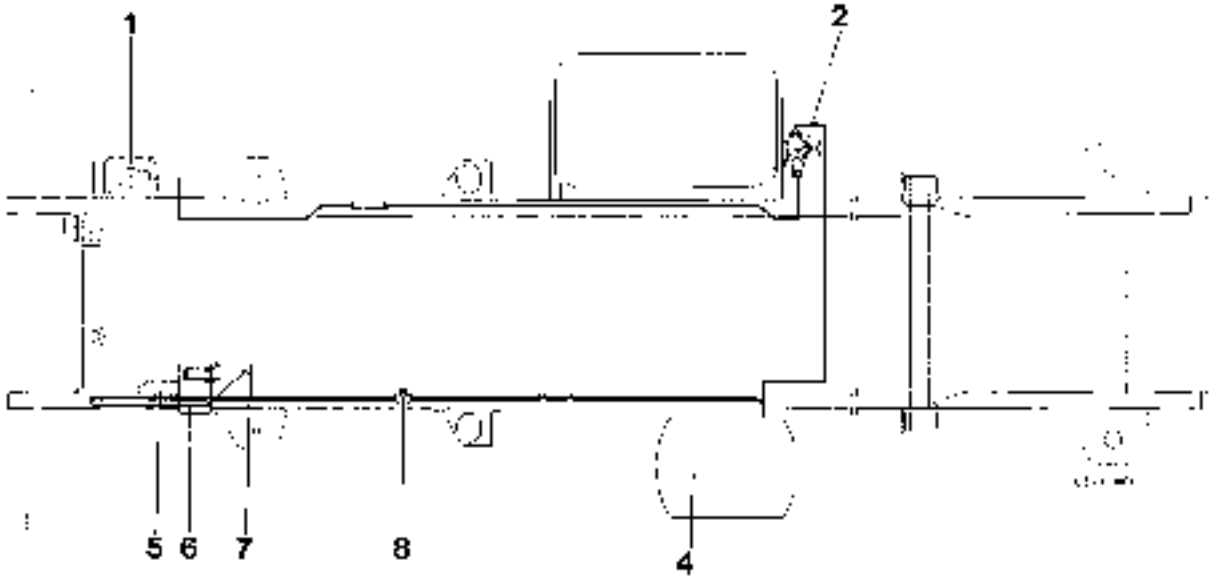
3 Laying

Plastic piping when laid must not be subject to chafing and must be fastened by cable clips at intervals of 50 cm. When tightened cable clips must still allow plastic piping to move.
Plastic piping must not be bent below a minimum radius (refer to 1.1/11) because it may otherwise buckle.

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421.122/123
Acc. to Drawing No.:	421 000 06 42
Special Version:	035.379/2 Ccce 710 035.324/1/2 Ccce 780/781 Air compressor with/without oil pump
Pressure Layout:	Cut-out pressure = 7.3 ± 0.2 bar Control range – 0.6 ± 0.4 bar

Installation Diagram:



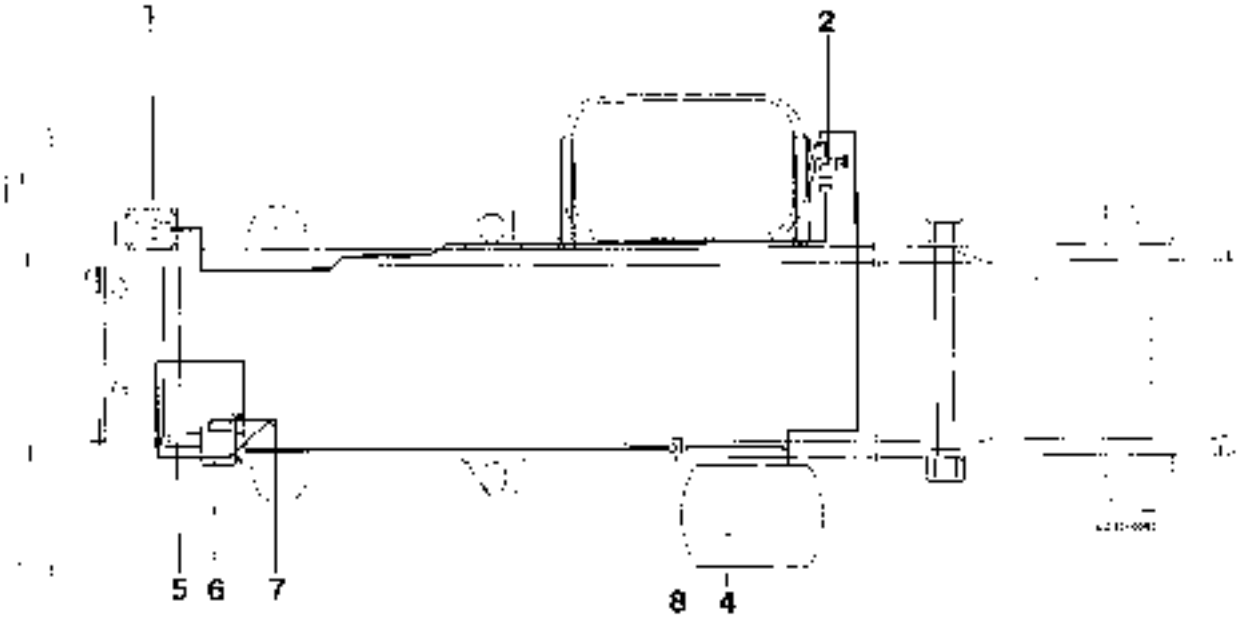
Explanations re 1.9/1

Item	Designation of Unit		Part No	
			Mercedes-Benz	Westinghouse
1	Air compressor		000 131 78 01	411 004 101 0
1a	Suppl. air compressor		–	–
2	Pressure regulator with filter and tire inflation connection		000 431 79 06	475 304 201 0
2a	Pressure regulator		–	–
2b	Air cleaner with tire inflation connection		–	–
2c	Tire inflation cylinder		–	–
3	Antifreeze device or antifreeze pump			–
4	Compressed air tank (30 l)		421 432 09 15	–
4a	Suppl. compressed air tank			–
5	Master brake cylinder	optional	001 430 35 01 002 430 59 01	–
6	Compressed air brake booster		000 431 74 14	462 007 042 0
7	Brake double pressure gauge		no data	–
8	Connection for actuating differential lock		M 22 x 1.5	DIN 74 302
9	Trailer control valve		–	–
10	Changeover valve (green lever) / shutoff valve		–	–
11	Coupling head (black) for brake hose		–	–
12	Pressure control valve		–	–
13	Relay valve		–	–
14	Coupling head (red) for supply hose		–	–
15	Coupling head (yellow) for brake hose		–	–
16	Handbrake valve		–	–
17	Brake cylinder		–	
18	Brake force regulator		–	–
19	Two-way valve		–	–
20	Three-way valve			–
21	Overflow valve		–	–
22	Pressure reduction valve		–	–
23	Check valve			–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421 124/125
Acc. to Drawing No.:	421 000 08 42
Special Version:	035.379/04 Code 710/8 15 035.324/07 Code 780/M 30 with connection for power steering pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range ~ 0.8 + 0.4 bar

Installation Diagram:



Explanations re 1.9/3

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	002 131 11 01	411 040 840 0
1a	Suppl. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection		–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (30 l)	421 432 08 15	–
4a	Suppl. compressed air tank	–	–
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	– –
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	–	–
10	Changeover valve (green lever) / shutoff valve	–	–
11	Coupling head (black) for brake hose		–
12	Pressure control valve	–	–
13	Relay valve	–	–
14	Coupling head (red) for supply hose	–	–
15	Coupling head (yellow) for brake hose	–	–
16	Handbrake valve	–	–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve		–
20	Three-way valve	–	–
21	Overflow valve	–	–
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System: Hydraulic single circuit brake system with compressed air assistance and compressed air control for single line trailer brake system.

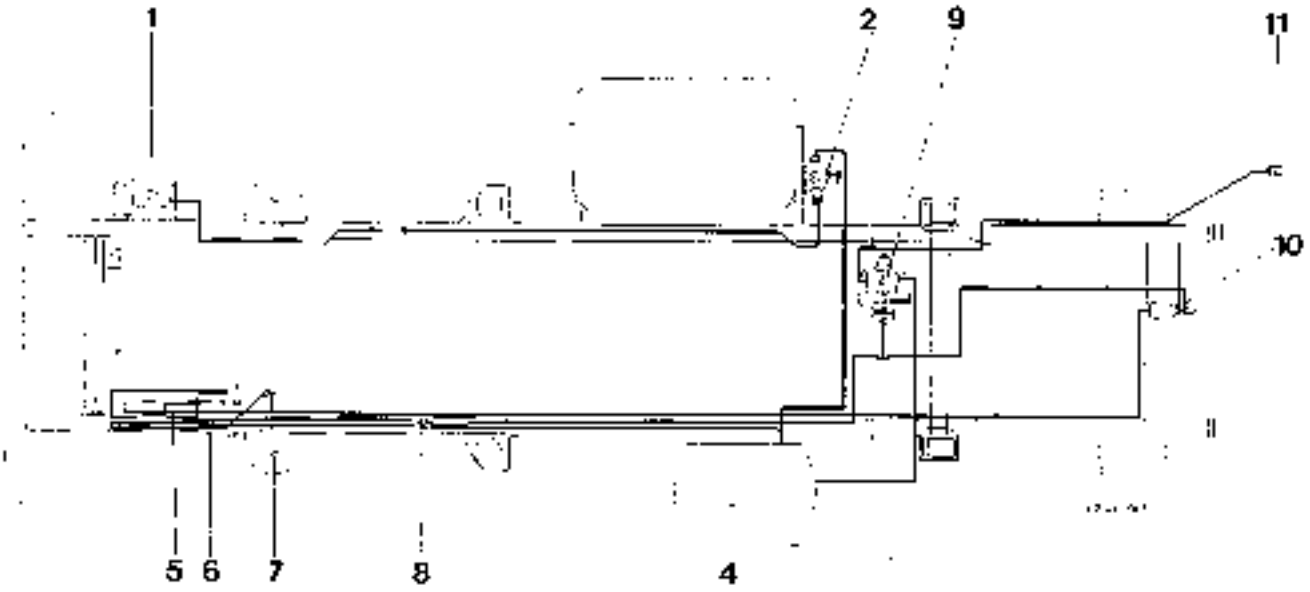
Installed in Model: 421 172/123

Acc. to Drawing No.: 421 000 21 43

Special Version: 035 335/03 Code 720
035 324/01 Code 780 air compressor without oil pump

Pressure Layout: Cutout pressure = 8.3 - 0.3 bar
Control range 0.5 bar

Installation Diagram:



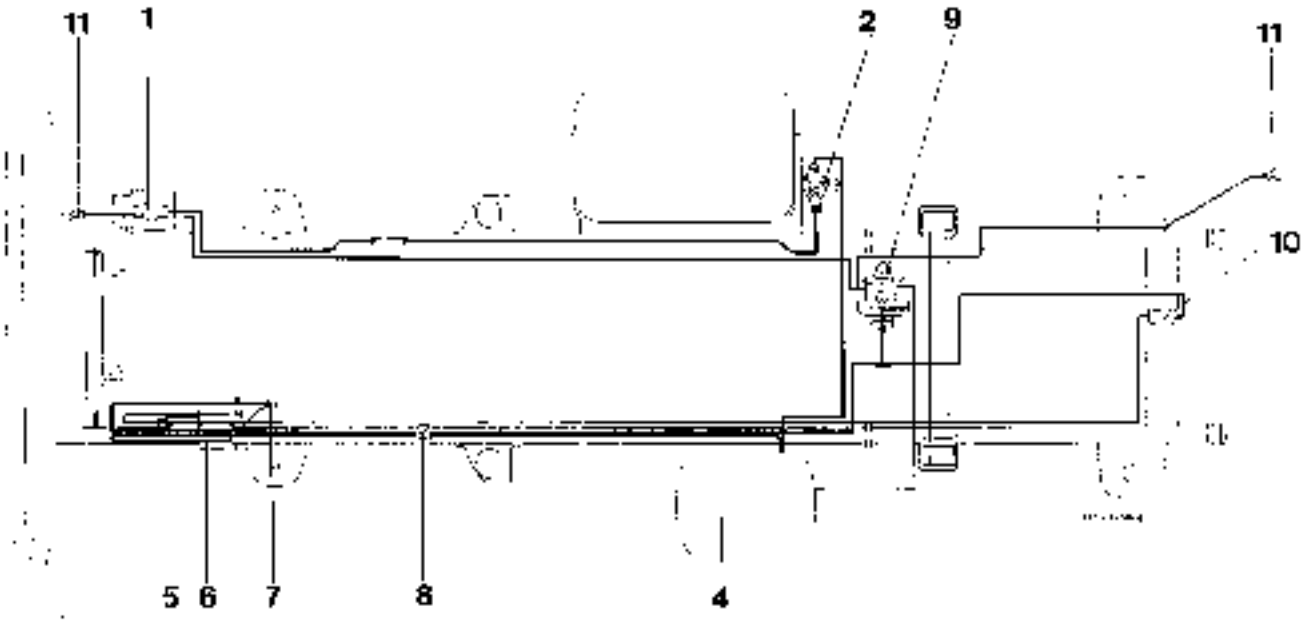
Explanations re 1.9/5

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	000 131 78 01	411 004 101 0
1a	Supp. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	–	
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	
4	Compressed air tank (30 l)	421 432 08 15	–
4a	Suppl. compressed air tank	–	–
5	Master brake cylinder optional	001 430 05 01 002 430 53 01	– –
6	Compressed Air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	000 431 71 05	471 200 113 0
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	000 429 48 30	–
12	Pressure control valve	–	
13	Relay valve	–	–
14	Coupling head (red) for supply hose	–	–
15	Coupling head (yellow) for brake hose	–	
16	Handbrake valve	–	–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve		–
20	Three-way valve		
21	Overflow valve	–	–
22	Pressure reduction valve		–
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for single-line trailer brake system
Installed in Model:	421.122/123
Acc. to Drawing No.:	421 300 22 49
Special Version:	035.335/03 Code 720 035.324/01 Corle 780 air compressor without oil pump
Pressure Layout:	Cutout pressure = 5.3 ± 0.3 bar Control range ≥ 0.5 bar

Installation Diagram:



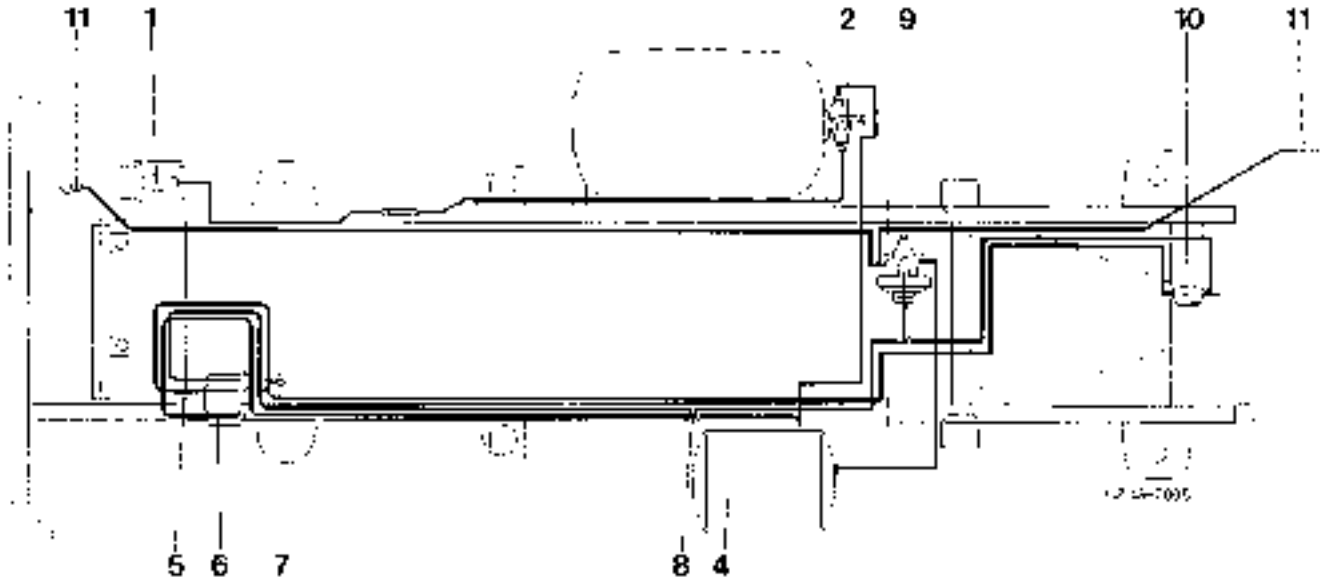
Explanations re 1.9/7

Item	Designation of Unit	Part No	
		Mercedes-Benz	Westinghouse
1	Air compressor	000 131 78 01	411 004 101 0
1a	Suppl. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Preasure regulator	–	–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylincer	–	–
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (30 l)	421 432 08 15	
4a	Suppl. compreased air tank	–	–
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	– –
6	Compreased air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	000 431 71 05	471 200 113 0
10	Changeover valve (green lever) / shuttle valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	000 429 48 30	–
12	Preasure control valve	–	–
13	Relay valve	–	–
14	Coupling head (red) for supply hose	–	–
15	Coupling head (yellow) for brake hose	–	–
16	Handbrake valve	–	–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	–
21	Overflow valve	–	–
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for single-line trailer brake system
Installed in Model:	421 124/125
Acc. to Drawing No.:	421 000 30 43 without front compressed air port 421 000 39 43 with front compressed air port
Special Version:	035.335/09 Code 720/B 40 035.335/11 Code 723 035 324/36/07 Code 780/M 30 without/with port for power steering pump
Pressure Layout:	Cut-out pressure - 5.3 + 0.3 bar Control range – 0.5 bar

Installation Diagram:



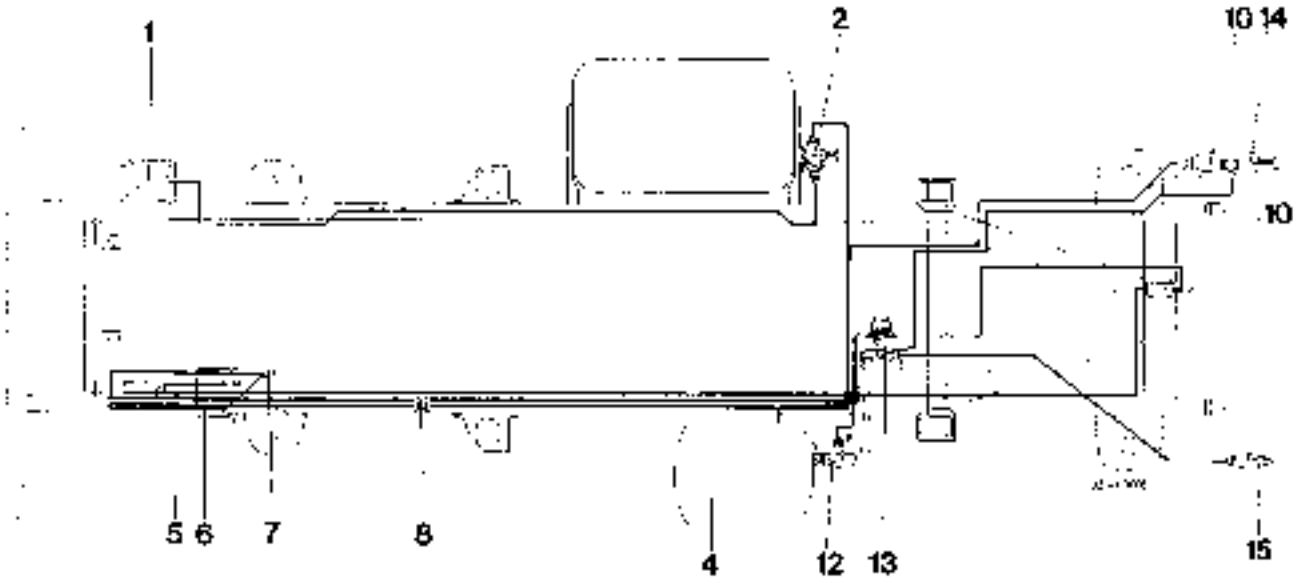
Explanations re 1.9/9

Item	Designation of Unit		Part No. Mercedes-Benz	Part No. Westinghouse
1	Air compressor	optional	002 131 10 01 002 131 11 01	411 040 600 0 411 040 640 0
1a	Suppl. air compressor			-
2	Pressure regulator with filter and tire inflation connection		000 431 79 08	475 304 201 0
2a	Pressure regulator		-	-
2b	Air cleaner with tire inflation connection		-	-
2c	Tire inflation cylinder		-	-
3	Antifreeze device or antifreeze pump		-	-
4	Compressed air tank (30 l)		421 432 08 15	-
4a	Suppl. compressed air tank			-
5	Master brake cylinder	optional	001 430 85 01 002 430 53 01	- -
6	Compressed air brake booster		000 431 74 14	482 007 042 0
7	Brake double pressure gauge		no data	-
8	Connection for actuating differential lock		BM 22 x 1,5	DIN 74 302
9	Trailer control valve		000 431 71 05	471 200 113 0
10	Changeover valve (green lever) / shutoff valve		000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose		000 429 48 30	-
12	Pressure control valve		-	-
13	Relay valve		-	-
14	Coupling head (red) for supply hose		-	-
15	Coupling head (yellow) for brake hose			-
16	Handbrake valve		-	-
17	Brake cylinder		-	-
18	Brake force regulator			-
19	Two-way valve		-	-
20	Three-way valve			-
21	Overflow valve		-	-
22	Pressure reduction valve		-	-
23	Check valve		-	-

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed control for dual-line trailer brake system.
Installed in Model:	421 122/123
Acc. to Drawing No.:	421 000 25 43
Special Version:	035 336/03 Code 730 035 324/01 Code 780 air compressor without oil pump
Pressure Layout:	Cutout pressure = 7.3 + 0.2 bar Control range = 0.6 + 0.4 bar

Installation Diagram:



Explanations re ▷ 9/11

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	000 131 78 01	411 004 101 0
1a	Suppl. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 08	475 304 201 0
2a	Pressure regulator		–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Anti freeze device or antifreeze pump		–
4	Compressed air tank (30 l)	421 432 02 15	–
4a	Suppl. compressed air tank		–
5	Master brake cylinder optional	001 430 95 01 002 430 53 01	–
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	–	–
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	–	–
12	Pressure control valve	001 429 66 44	434 403 000 0
13	Relay valve	000 429 86 44	473 011 000 0
14	Coupling head (red) for supply hose	000 429 28 30	452 200 004 0
15	Coupling head (yellow) for brake hose	000 429 28 30	452 200 004 0
16	Handbrake valve	–	–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	–
21	Overflow valve	–	–
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System: Hydraulic single-circuit brake system with compressed air assistance and compressed control for dual-line trailer brake system.

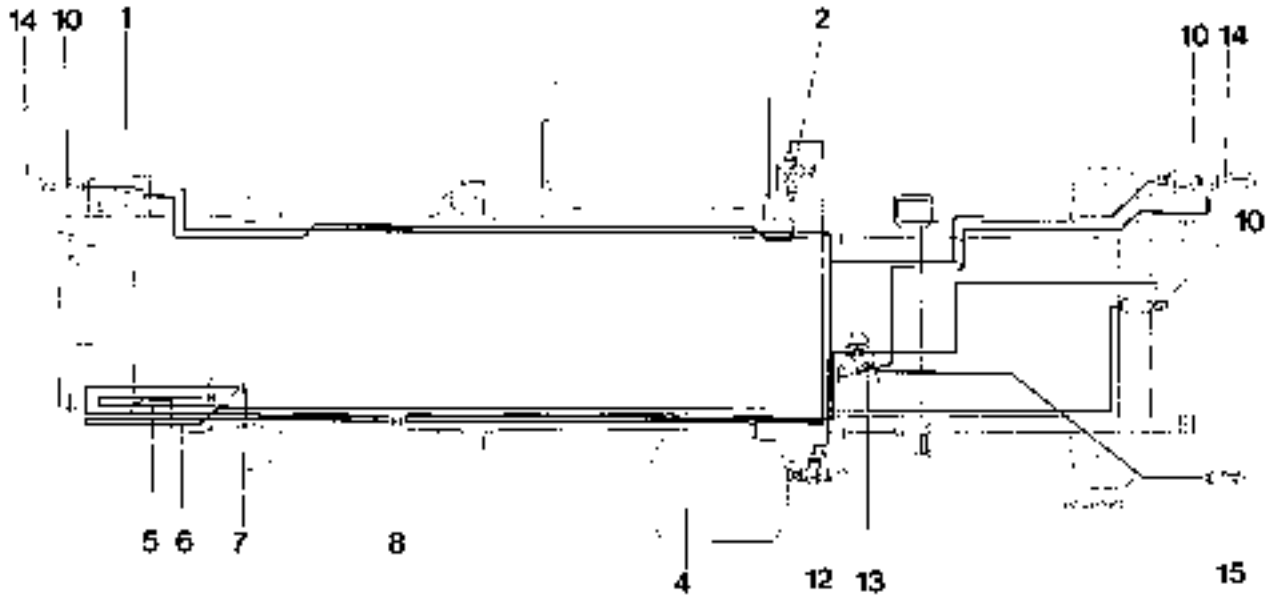
Installed in Model: 421 122/123

Acc. to Drawing No.: 421 000 26 43

Special Version:
035.336/04 Code 730
035.324/01/02 Code 780/781 air compressor without/with oil pump

Pressure Layout:
Cutout pressure = 7.3 + 0.2 bar
Control range - 0.6 + 0.4 bar

Installation Diagram:



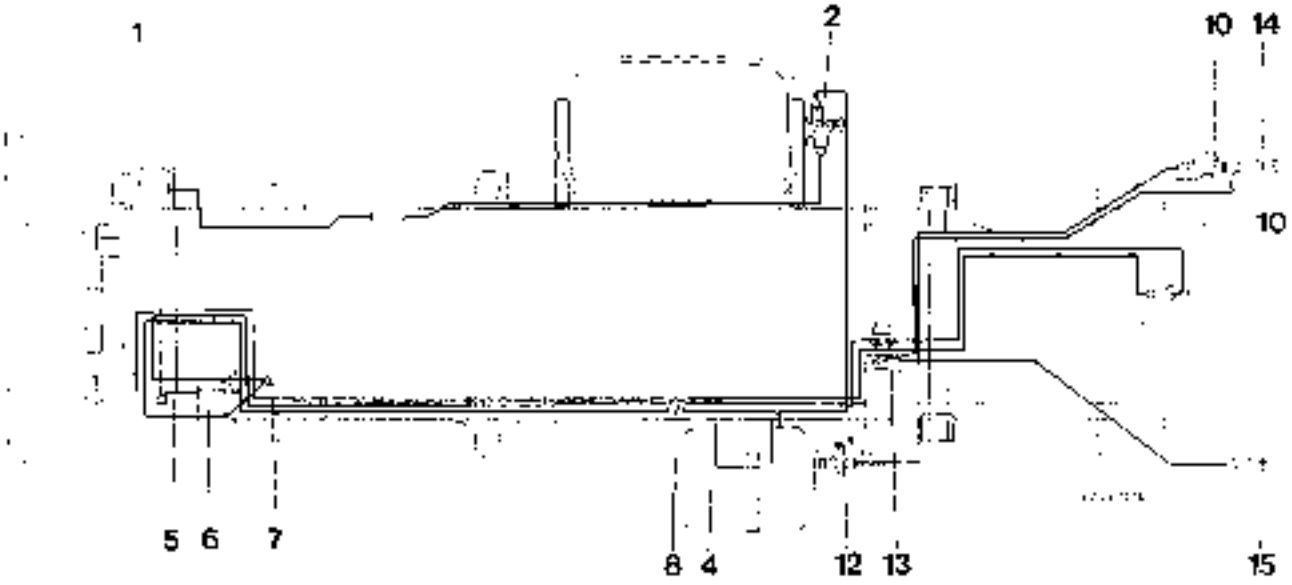
Explanations re 1.9/13

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	000 131 70 01	416 701 100 0
1a	Suppl. air compressor	–	
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection	–	
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (30 l)	421 432 06 15	–
4a	Suppl. compressed air tank	–	
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	– –
6	Compressed air brake booster	000 421 74 14	462 007 042 0
7	Brake double pressure gauge	on data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve		–
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose		–
12	Pressure control valve	001 420 68 44	434 403 000 0
13	Relay valve	000 429 66 44	473 011 000 0
14	Coupling head (red) for supply hose	000 429 28 30	452 200 004 0
15	Coupling head (yellow) for brake hose	000 429 28 30	452 200 004 0
16	Handbrake valve	–	–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	–
21	Overflow valve	–	–
22	Pressure reduction valve	–	–
23	Check valve		–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for dual-line trailer brake system
Installed in Model:	421 124/125
Acc. to Drawing No.:	421 000 32 43
Special Version:	035.336/06 Code 730/B 42 035.324/06/07 Code 780/M 30 without/with port for power steering pump
Pressure Layout:	Cutout pressure – 7.3 ± 0.2 bar Control range – 0.6 + 0.4 bar

Installation Diagram:



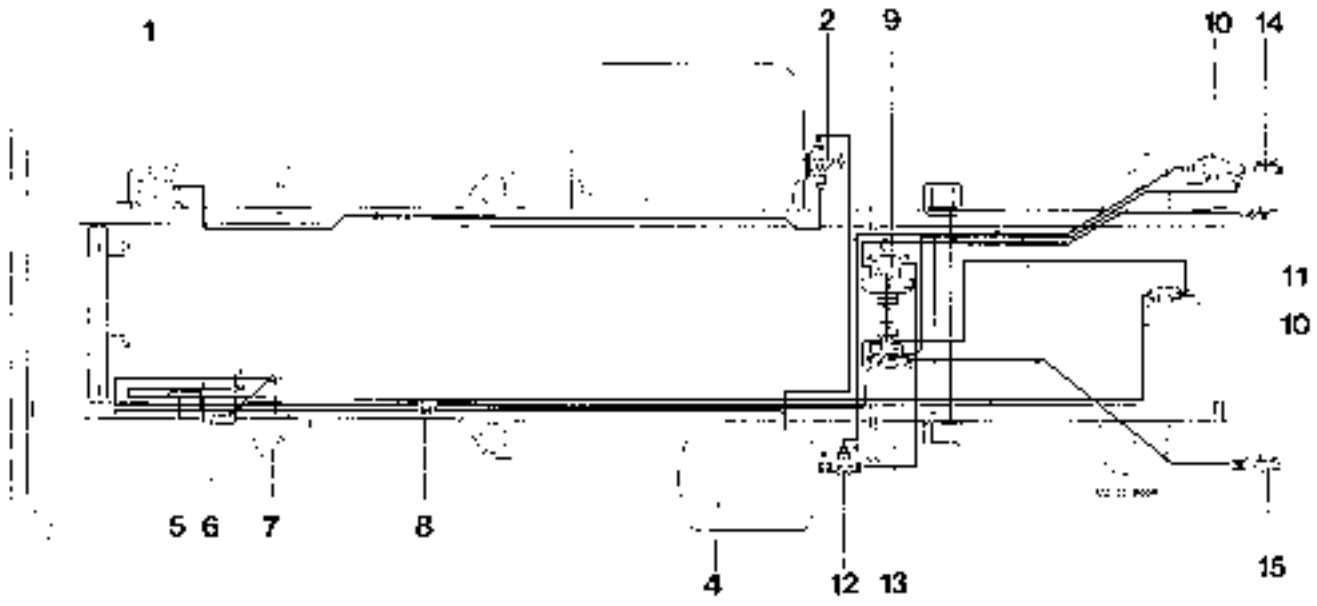
Explanations re 1.9/15

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	002 131 11 01	411 040 840 0
1a	Suppl. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 05	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (30 l)	421 432 08 15	–
4a	Suppl. compressed air tank	–	–
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	– –
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	–	–
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	–	–
12	Pressure control valve	001 429 66 44	434 403 000 0
13	Relay valve	000 429 66 44	473 011 000 0
14	Coupling head (red) for supply hose	000 429 28 30	452 200 004 0
15	Coupling head (yellow) for brake hose	000 429 22 30	452 200 304 0
16	Handbrake valve	–	–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	–
21	Overflow valve		–
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System.	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for combined single- and dual-line trailer brake system
Installed in Model:	421.122/123
Acc. to Drawing No.:	421 000 27 43
Special Version:	035.348/03 Code 725 035.324/01/02 Code 780/781 air compressor with/without oil pump
Pressure Layout:	Cutout pressure - 7.3 ± 0.2 bar Control range 0.6 + 0.4 bar

Installation Diagram:



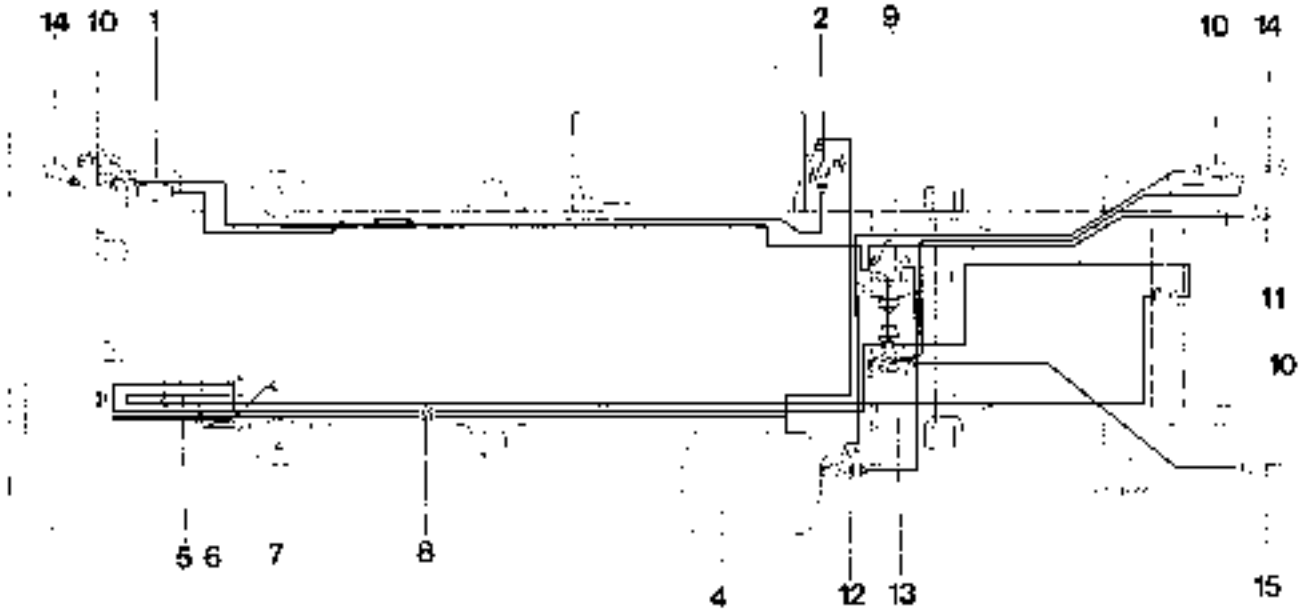
Explanations re 1.9/17

Item	Designation of Unit	Part No. Mercedes-Benz	Part No. Westinghouse
1	Air compressor	000 131 79 01	415 701 100 0
1a	Suppl. air compressor		
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	-	-
2b	Air cleaner with tire inflation connection	-	
2c	Tire inflation cylinder	-	-
3	Antifreeze device or antifreeze pump	-	
4	Compressed air tank (30 l)	421 432 08 15	-
4a	Suppl. compressed air tank	-	
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	- -
6	Compressed air brake booster	000 431 74 14	462 307 042 0
7	Brake double pressure gauge	no data	-
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	000 431 71 05	471 200 113 0
10	Changeover valve (green-over) / shutoff valve	000 429 14 31	452 002 197 0
11	Coupling head (black) for brake hose	000 429 40 30	-
12	Pressure control valve	001 429 66 44	434 403 000 0
13	Relay valve	000 429 56 44	473 011 000 0
14	Coupling head (red) for supply hose	000 429 28 30	452 200 004 0
15	Coupling head (yellow) for brake hose	000 429 28 30	452 200 004 0
16	Handbrake valve		
17	Brake cylinder	-	-
18	Brake force regulator	-	
19	Two-way valve	-	-
20	Three-way valve	-	-
21	Overflow valve		
22	Pressure reduction valve	-	-
23	Check valve	-	

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for combined single- and dual-line trailer brake system
Installed in Model:	421 122/123
Acc. to Drawing No.:	421 000 28 40
Special Version	036 349/04 Code 728 036 324/01/02 Code 780/781 air compressor with/without oil pump
Pressure Layout:	Cut-out pressure = 7.3 ± 0.2 bar Control range = 0.6 ± 0.4 bar

Installation Diagram.



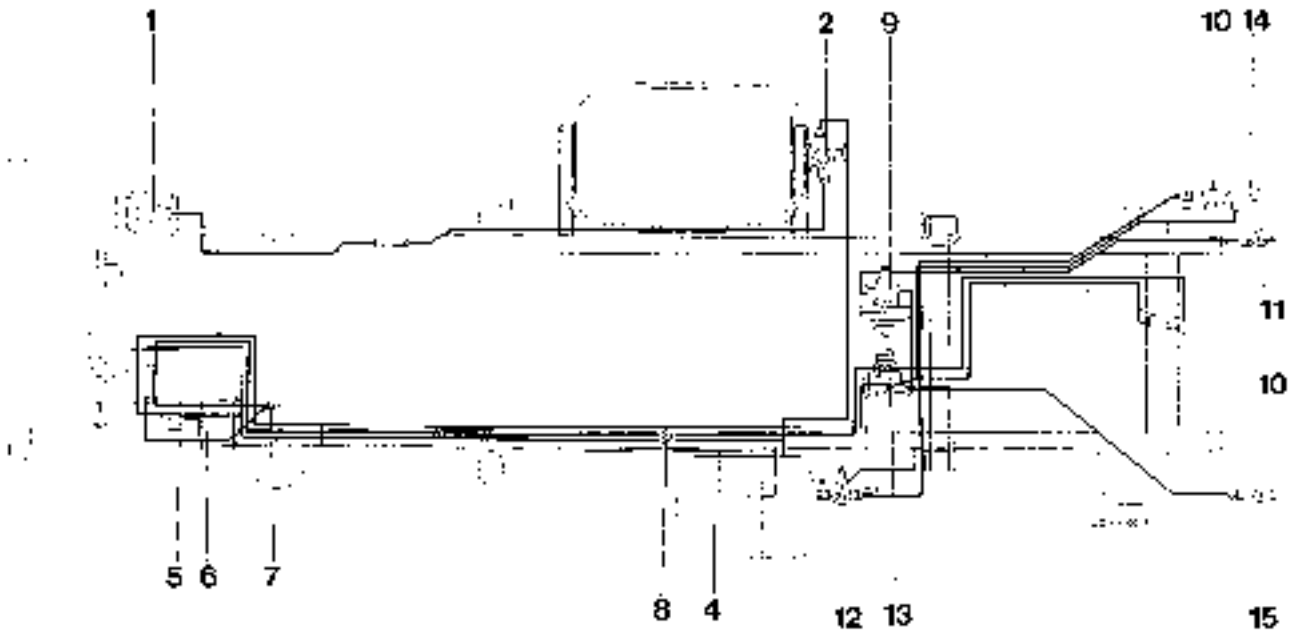
Explanations re 1.9/19

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	000 131 70 01	415 701 100 0
1a	Suppl. air compressor		–
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (30 l)	421 432 02 15	–
4a	Suppl. compressed air tank		–
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	– –
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	000 431 71 05	471 200 113 0
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	000 429 48 30	
12	Pressure control valve	001 429 66 44	434 403 000 0
13	Relay valve	000 429 68 44	475 011 000 0
14	Coupling head (red) for supply hose	000 429 28 30	452 200 004 0
15	Coupling head (yellow) for brake hose	000 429 28 30	452 200 004 0
16	Handbrake valve	–	
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	–
21	Overflow valve	–	–
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for combined single- and dual-line trailer brake system
Installed in Model:	421 124/125
Acc. to Drawing No.:	421 000 38 43
Special Version:	005 348/05 Code 725/B 45 005 324/06/07 Code 750/M 30 with/without port for power steering pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range = 0.6 – 3.4 bar

Installation Diagram:



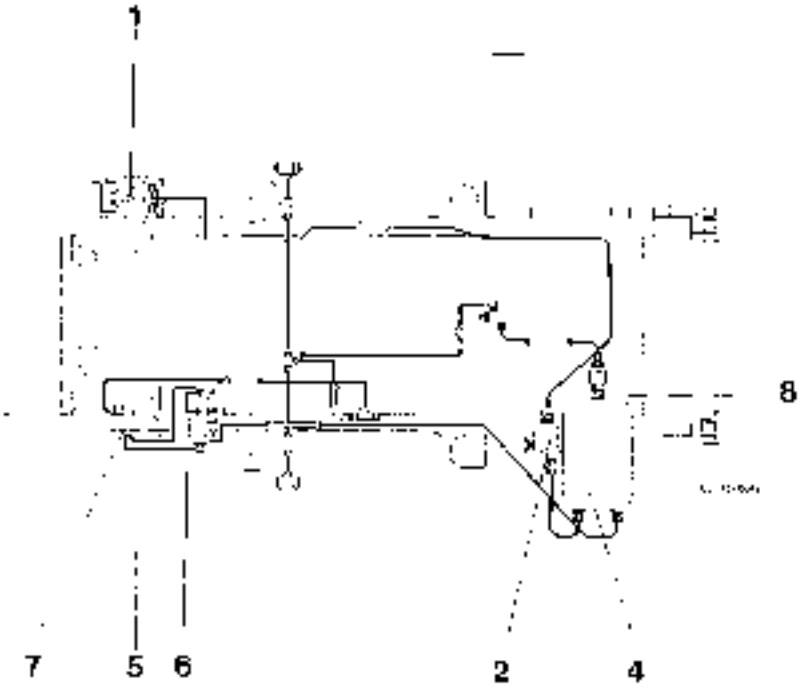
Explanations re 1.9/21

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	002 131 11 01	411 040 840 0
1a	Suppl. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	
4	Compressed air tank (30 l)	421 432 08 15	–
4a	Suppl. compressed air tank	–	–
5	Master brake cylinder optional	001 430 85 01 –	–
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	M 22 x 1.5	DIN 74 302
9	Trailer control valve	000 431 71 05	471 200 113 0
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	000 429 48 30	–
12	Pressure control valve	001 429 66 44	434 403 000 0
13	Relay valve	000 429 66 44	473 011 000 0
14	Coupling head (red) for supply hose	000 429 28 30	452 200 004 0
15	Coupling head (yellow) for brake hose	000 429 28 30	452 200 004 0
16	Handbrake valve	–	–
17	Brake cylinder		–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	
21	Overflow valve	–	–
22	Pressure reduction valve	–	
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421.130/131
Acc. to Drawing No.:	421 000 01 42
Special Version:	035.379/01 Code 710 035.324/05 Code 781 air compressor with oil pump
Pressure Layout:	Cutout pressure = 7.3 – 0.2 bar Control range = 0.6 ± 0.4 bar

Installation Diagram.



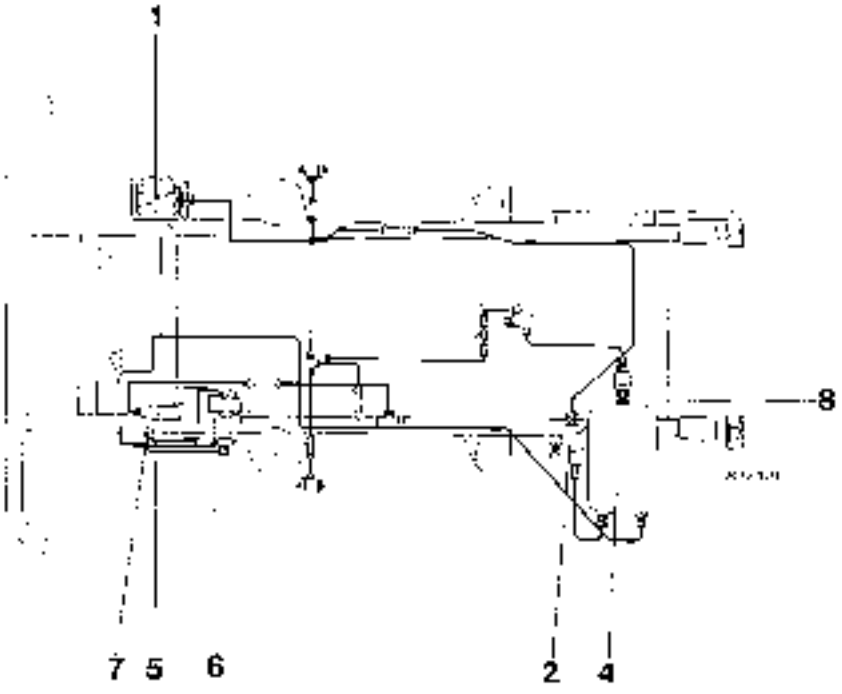
Explanations re 1.9/23

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor	000 131 70 01	415 701 100 0
1a	Suppl. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (30 l)	421 432 04 15	–
4a	Suppl. compressed air tank	–	–
5	Master brake cylinder	001 430 85 01	–
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 299
9	Trailer control valve		–
10	Changeover valve (green lever) / shutoff valve	–	–
11	Coupling head (black) for brake hose	–	–
12	Pressure control valve	–	–
13	Relay valve	–	–
14	Coupling head (red) for supply hose	–	–
15	Coupling head (yellow) for brake hose	–	–
16	Handbrake valve	–	–
17	Brake cylinder		–
18	Brake force regulator	–	–
19	Two-way valve	–	
20	Three-way valve	–	–
21	Overflow valve	–	–
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421.132/133
Acc. to Drawing No.:	431 000 13 42
Special Version:	035 379/08 Code 710 035 324/06/07 Code 780/M 30 with/without port for power steering pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range = 0.6 + 0.4 bar

Installation Diagram:



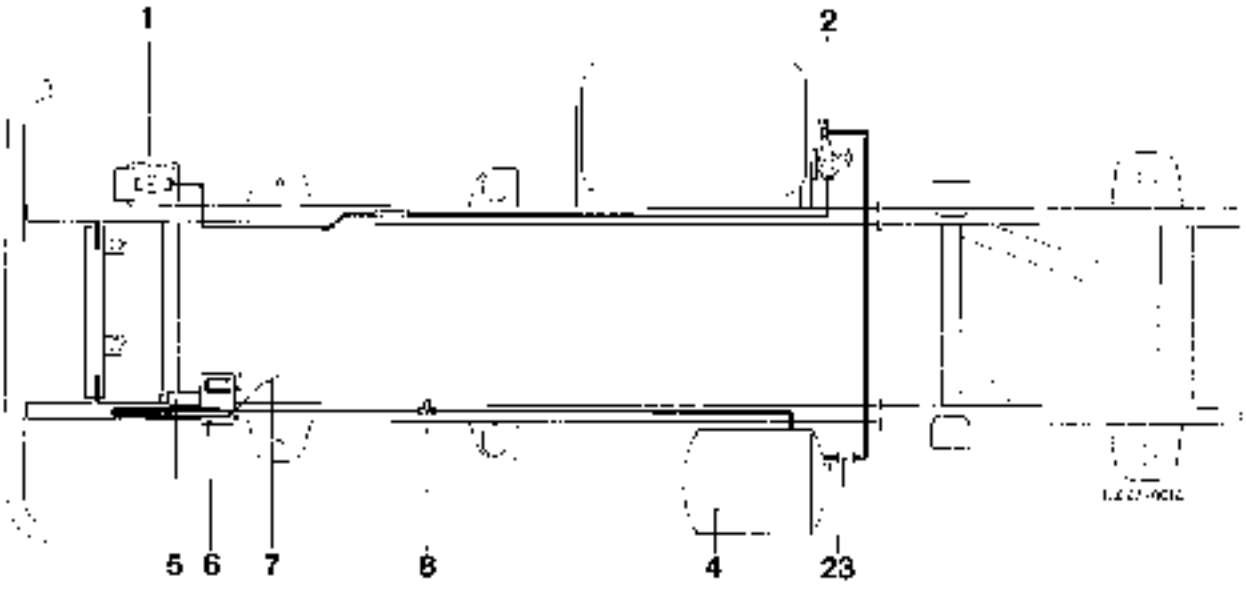
Explanations re ' 9/25

Item	Designation of Unit	Part No	
		Mercedes-Benz	Westinghouse
1	Air compressor optional	002 131 10 01 002 131 11 01	41 ' 040 800 0 41 ' 040 840 0
1a	Suppl. air compressor	-	
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	-	
2b	Air cleaner with tire inflation connection	-	-
2c	Tire inflation cylinder	-	-
3	Antifreeze device or antifreeze pump		-
4	Compressed air tank (30 l)	421 432 04 15	-
4a	Suppl. compressed air tank	-	-
5	Master brake cylinder optional	001 430 85 01 002 430 53 01	-
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	-
8	Connection for actuating differential lock	BM 22 x 1 5	DIN 74 290
9	Trailer control valve	-	-
10	Changeover valve (green lever) / shutoff valve		
11	Coupling head (black) for brake hose	-	-
12	Pressure control valve	-	
13	Relay valve	-	-
14	Coupling head (red) for supply hose	-	-
15	Coupling head (yellow) for brake hose	-	-
16	Handbrake valve	-	-
17	Brake cylinder	-	-
18	Brake force regulator	-	
19	Two-way valve	-	-
20	Three-way valve	-	-
21	Overflow valve		-
22	Pressure reduction valve		-
23	Check valve	-	-

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421.122/123
Acc. to Drawing No.:	421 008 17 43 (French version)
Special Version:	035.378/01 Code 727 035.324/01/02 Code 780/781 air compressor with/without oil pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range = 0.6 + 0.4 bar

Installation Diagram:



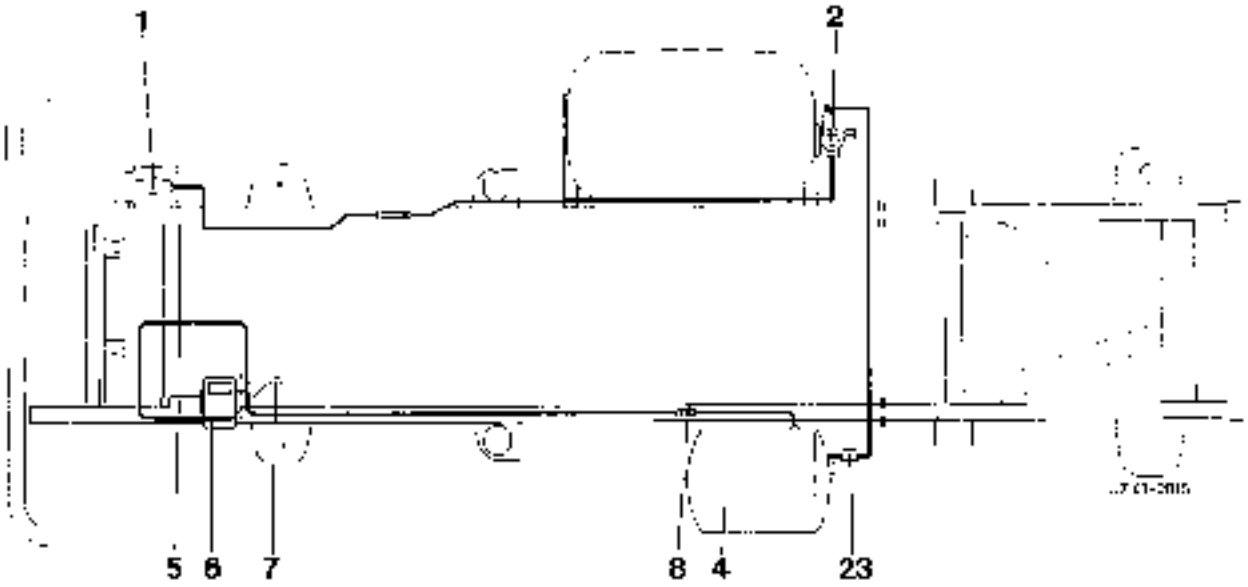
Explanations re 1.9/27

Item	Designation of Unit		Part No	
			Mercedes-Benz	Westinghouse
1	Air compressor	optional	001 131 78 01 000 131 70 01	411 004 301 0 415 701 100 0
1a	Suppl. air compressor		–	–
2	Pressure regulator with filter and tire inflation connection		000 431 79 06	475 304 201 0
2a	Pressure regulator		–	–
2b	Air cleaner with tire inflation connection		–	–
2c	Tire inflation cylinder		–	–
3	Antifreeze device or antifreeze pump			
4	Compressed air tank (30 l)		421 432 08 15	–
4a	Suppl. compressed air tank		–	
5	Master brake cylinder	optional	001 430 85 01 002 430 53 01	– –
6	Compressed air brake booster		000 431 74 14	462 007 042 0
7	Brake double pressure gauge		no data	–
8	Connection for actuating differential lock		BM 22 x 1.5	DIN 74 302
9	Trailer control valve		–	–
10	Changeover valve (green lever) / shutoff valve		–	–
11	Coupling head (black) for brake hose		–	–
12	Pressure control valve			–
13	Relay valve		–	–
14	Coupling head (red) for supply hose		–	–
15	Coupling head (yellow) for brake hose		–	–
16	Handbrake valve		–	
17	Brake cylinder		–	–
18	Brake force regulator		–	–
19	Two-way valve		–	–
20	Three-way valve		–	–
21	Overflow valve		–	–
22	Pressure reduction valve		–	–
23	Check valve		003 429 07 44	434 014 100 0

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	471 124/125/162/163
Acc. to Drawing No.:	421 000 36 43 (French version)
Special Version:	030.378/03 Code /27 030.324/06/07 Code 780/M 30 with/without port for power steering pump
Pressure Layout:	Cutout pressure – 7.3 ± 0.2 bar Control range – 0.6 ± 0.4 bar

Installation Diagram:



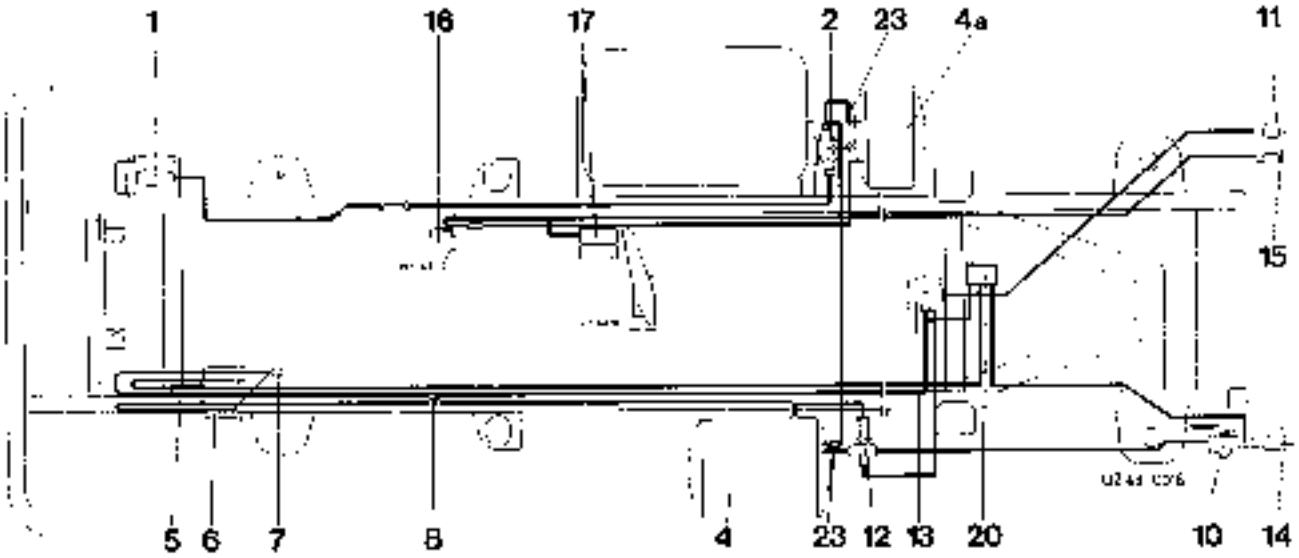
Explanations re 1.9/29

Item	Designation of Unit		Part No	
			Mercedes-Benz	Westinghouse
1	Air compressor	optional	002 131 80 01 002 131 11 01	411 040 900 0 411 040 840 0
1a	Suppl. air compressor		–	–
2	Pressure regulator with filter and tire inflation connection		000 431 79 06	475 334 201 0
2a	Pressure regulator		–	–
2b	Air cleaner with tire inflation connection		–	–
2c	Tire inflation cylinder		–	–
3	Antifreeze device or antifreeze pump		–	–
4	Compressed air tank (30 l)		421 432 08 15	–
4a	Suppl. compressed air tank		–	
5	Master brake cylinder	optional	001 430 35 01 002 430 53 01	– –
6	Compressed air brake booster		000 431 74 14	467 007 042 0
7	Brake double pressure gauge		no data	–
8	Connection for actuating differential lock		BM 22 x 1.5	DIN 74 302
9	Trailer control valve			–
10	Changeover valve (green lever) / shutoff valve		–	–
11	Coupling head (black) for brake hose		–	–
12	Pressure control valve		–	
13	Relay valve		–	–
14	Coupling head (red) for supply hose			–
15	Coupling head (yellow) for brake hose		–	
16	Handbrake valve		–	–
17	Brake cylinder			
18	Brake force regulator		–	–
19	Two-way valve		–	
20	Three-way valve		–	–
21	Overflow valve		–	–
22	Pressure reduction valve			
23	Check valve		003 429 07 44	434 014 10 00

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for dual-line trailer brake system as well as separate booster brake.
Installed in Model:	421 122/123
Acc. to Drawing No.:	421 000 16 43 (French version)
Special Version:	035.378/02 Code 727 035.324/01/02 Code 780/781 air compressor with/without oil pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range = 0.6 + 0.1 bar

Installation Diagram:



Explanations re 1.9/31

Item	Designation of Unit		Part No	
			Mercedes Benz	Westinghouse
1	Air compressor	optional	000 131 78 01 000 131 70 01	411 004 101 0 415 701 100 0
1a	Suppl. air compressor		-	-
2	Pressure regulator with filter and tire inflation connection		000 431 79 06	475 304 201 0
2a	Pressure regulator		-	
2b	Air cleaner with tire inflation connection		-	-
2c	Tire inflation cylinder		-	-
3	Antifreeze device or antifreeze pump		-	-
4	Compressed air tank (30 l)		421 432 08 15	
4a	Suppl. compressed air tank		421 432 03 15	-
5	Master brake cylinder	optional	001 430 85 01 002 430 53 01	- -
6	Compressed air brake booster		000 431 74 14	462 007 042 0
7	Brake double pressure gauge		no data	-
8	Connection for actuating differential lock		BM 22 x 1.5	DIN 74 302
9	Trailer control valve		-	-
10	Changeover valve (green lever) / shutoff valve		000 429 14 31	452 302 137 0
11	Coupling head (black) for brake hose		000 429 27 30	890 020 012 0
12	Pressure control valve		001 429 66 44	434 403 030 0
13	Relay valve		000 429 65 44	473 010 000 0
14	Coupling head (red) for supply hose		000 429 01 30	452 300 000 0
15	Coupling head (yellow) for brake hose		000 429 27 30	890 020 012 0
16	Handbrake valve		000 431 02 16	461 704 025 0
17	Brake cylinder		000 420 52 24	421 002 000 0
18	Brake force regulator		-	
19	Two-way valve		-	-
20	Three-way valve		000 429 68 44	371 020 000 0
21	Overflow valve			-
22	Pressure reduction valve			-
23	Check valve		003 429 07 44	434 014 10 00

Description of Compressed Air System

Brake System: Hydraulic single-circuit brake system with compressed air assistance and compressed air control for dual-line trailer brake system as well as separate booster brake

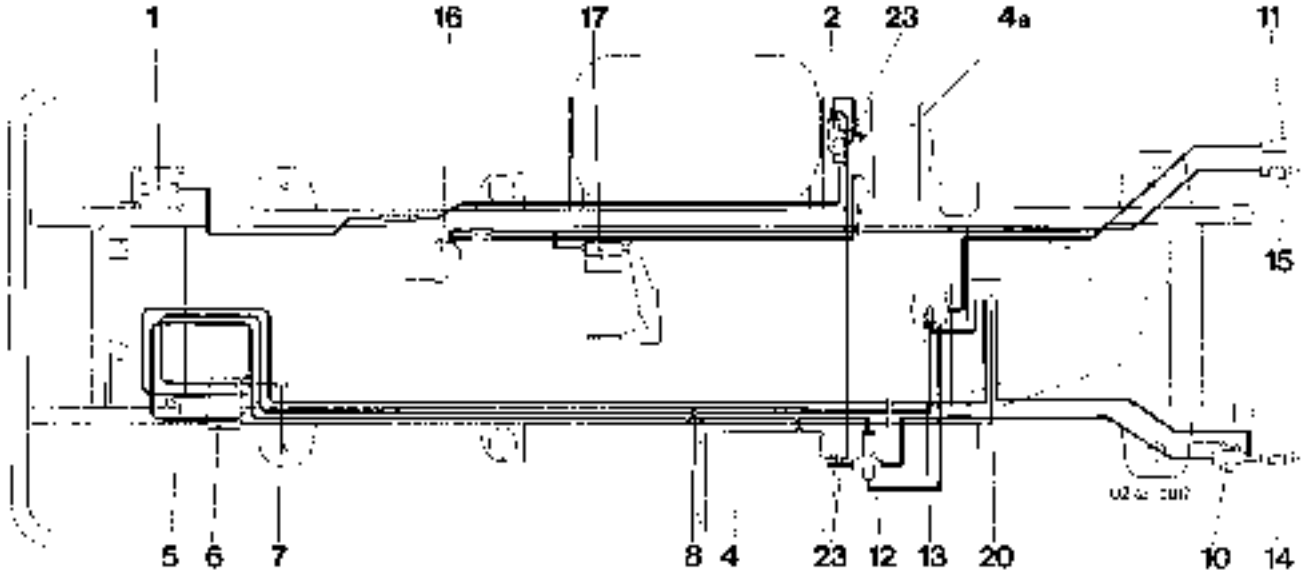
Installed in Model: 421.124/126

Acc. to **Drawing No.:** 421 000 37 43 (French version)

Special Version:
035.378/04 Code 727
035.324/06/07 Code 780/M 30 with/without port for power steering pump

Pressure Layout:
Cutout pressure = 7.0 ± 0.2 bar
Control range = 0.8 ± 0.4 bar

Installation Diagram:



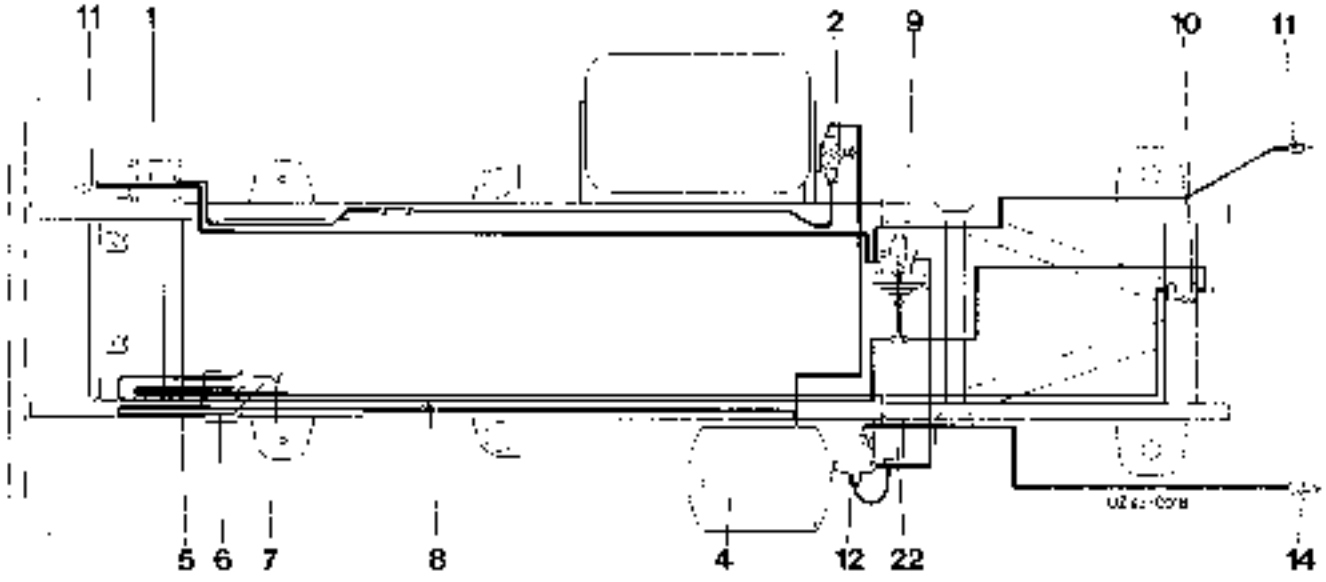
Explanations re 1.9/33

Item	Designation of Unit		Part No	
			Mercedes-Benz	Westinghouse
1	Air compressor	optional	002 131 10 01 002 131 11 01	411 040 900 0 411 040 840 0
1a	Suppl. air compressor		-	-
2	Pressure regulator with filter and tire inflation connection		000 431 79 06	475 304 201 0
2a	Pressure regulator		-	-
2b	Air cleaner with tire inflation connection			
2c	Tire inflation cylinder		-	-
3	Antifreeze device or antifreeze pump		-	-
4	Compressed air tank (30 l)		421 432 09 15	
4a	Suppl. compressed air tank		421 432 03 15	-
5	Master brake cylinder	optional	001 430 85 01 002 430 53 01	- -
6	Compressed air brake booster		000 431 74 14	462 007 042 0
7	Brake double pressure gauge		no data	-
8	Connection for actuating differential lock		M 22 x 1.5	DIN 74 302
9	Trailer control valve		-	-
10	Changeover valve (green lever) / shutoff valve		000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose		000 428 27 35	890 020 012 0
12	Pressure control valve		001 429 68 44	434 403 000 0
13	Relay valve		000 429 60 44	473 010 000 0
14	Coupling head (red) for supply hose		000 429 01 35	452 300 000 0
15	Coupling head (yellow) for brake hose		000 429 27 35	890 020 012 0
16	Handbrake valve		000 431 02 18	461 704 025 0
17	Brake cylinder		000 420 52 24	421 002 000 0
19	Brake force regulator		-	
19	Two-way valve			-
20	Three-way valve		000 429 68 44	371 020 003 0
21	Overflow valve			-
22	Pressure reduction valve		-	-
23	Check valve		003 429 07 44	434 014 100 0

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for single-line trailer brake system as well as separate supply line.
Installed in Model:	421.122/123
Acc. to **Drawing No.:**	421 000 23 48 without front compressed air port 421 000 24 48 with front compressed air support Swiss version
Special Version:	035.335/07/08 Code 722 035 324/01 or /02 Code 780/781 air compressor with/w thrust oil pump
Pressure Layout:	Cutout pressure = 5.3 + 0.3 bar Control range = 0.5 bar

Installation Diagram:



Explanations re 1.9/35

Item	Designation of Unit		Part No	
			Mercedes-Benz	Westinghouse
1	Air compressor	optional	000 131 78 01 000 131 75 01	411 004 102 0 415 701 100 0
1a	Suppl. air compressor		–	–
2	Pressure regulator with filter and tire inflation connection		000 431 79 06	475 304 201 0
2a	Pressure regulator		–	–
2b	Air cleaner with tire inflation connection			
2c	Tire inflation cylinder		–	–
3	Antifreeze device or antifreeze pump		–	–
4	Compressed air tank (30 l)		421 432 08 15	
4a	Suppl. compressed air tank		–	–
5	Master brake cylinder		001 430 84 01	–
6	Compressed air brake booster		000 431 74 14	462 007 042 0
7	Brake double pressure gauge		no data	–
8	Connection for actuating differential lock		BM 22 x 1.5	DIN 74 302
9	Trailer control valve		000 431 70 05	471 200 112 0
10	Changeover valve (green lever) / shutoff valve		000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose		000 429 48 30	–
12	Pressure control valve		001 429 68 44	434 403 080 0
13	Relay valve		–	–
14	Coupling head (red) for supply hose		000 429 68 30	452 303 011 0
15	Coupling head (yellow) for brake hose		–	–
16	Handbrake valve		–	
17	Brake cylinder		–	–
18	Brake force regulator		–	–
19	Two-way valve		–	
20	Three-way valve		–	–
21	Overflow valve		–	–
22	Pressure reduction valve		000 429 45 44	475 003 005 0
23	Check valve		–	–

Description of Compressed Air System

Brake System: Hydraulic single-circuit brake system with compressed air assistance and compressed air control for single-line trailer brake system as well as separate supply line

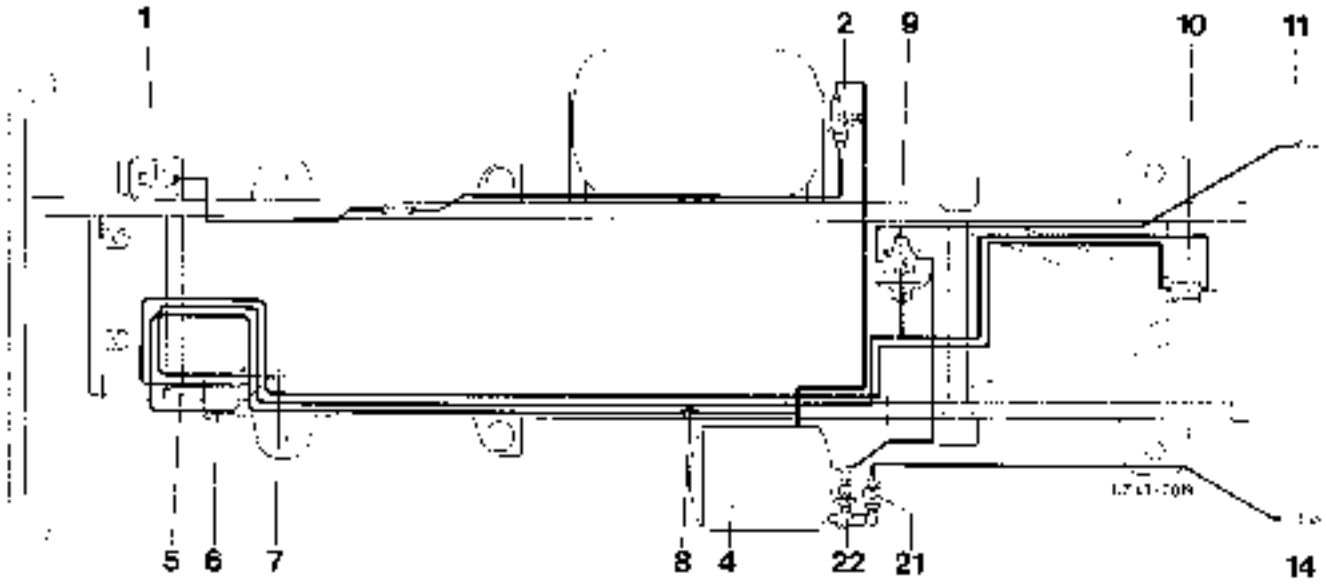
Installed in Model: 421 124/125

Acc. to Drawing No.: 421 000 3? 43 (Swiss version)

Special Version: 035 335/10 Code 722
035 324/06/07 Code 760/M 30 with/without port for power steering pump

Pressure Layout: Cutout pressure = 5.3 +0.3 bar
Control range = 0.5 bar

Installation Diagram:



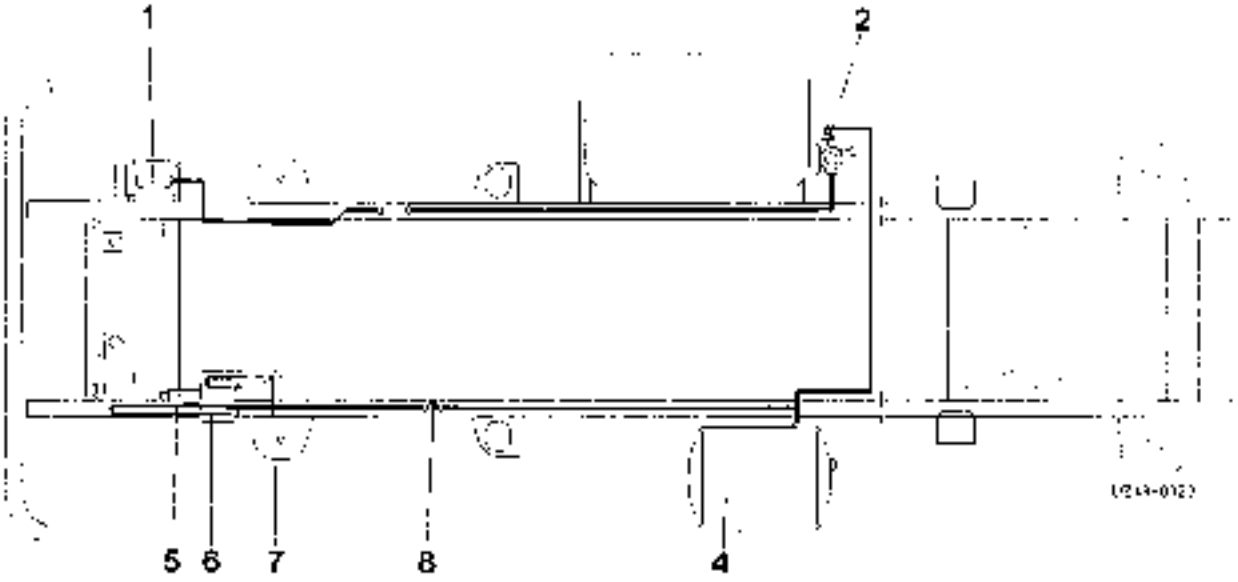
Explanations ⇒ 1.9/37

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor optional	002 131 13 01 002 131 11 01	411 043 800 0 411 043 640 0
1a	Suppl. air compressor	–	
2	Pressure regulator with filter and tire inflation connection	000 431 79 08	475 304 201 0
2a	Pressure regulator	–	
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump	–	–
4	Compressed air tank (20 l)	421 432 08 15	–
4a	Suppl. compressed air tank	–	–
5	Master brake cylinder	002 430 74 01	
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	000 431 70 05	471 200 112 0
10	Changeover valve (green lever) / shutoff valve	000 429 14 31	452 002 107 0
11	Coupling head (black) for brake hose	000 429 49 30	–
12	Pressure control valve		–
13	Relay valve	–	
14	Coupling head (red) for supply hose	000 429 58 30	452 202 011 0
15	Coupling head (yellow) for brake hose	–	
16	Handbrake valve	–	–
17	Brake cylinder		–
18	Brake force regulator	–	
19	Two-way valve	–	–
20	Three-way valve	–	
21	Overflow valve	000 429 72 44	434 100 203 0
22	Pressure reduction valve	001 429 17 44	475 010 003 0
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421.122/123
Acc. to Drawing No.:	421 000 19 43 (Italian version)
Special Version:	035 349/05 Code 715 035 324/01/02 Code 780/781 air compressor with/without oil pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range = 0.6 + 0.4 bar

Installation Diagram:



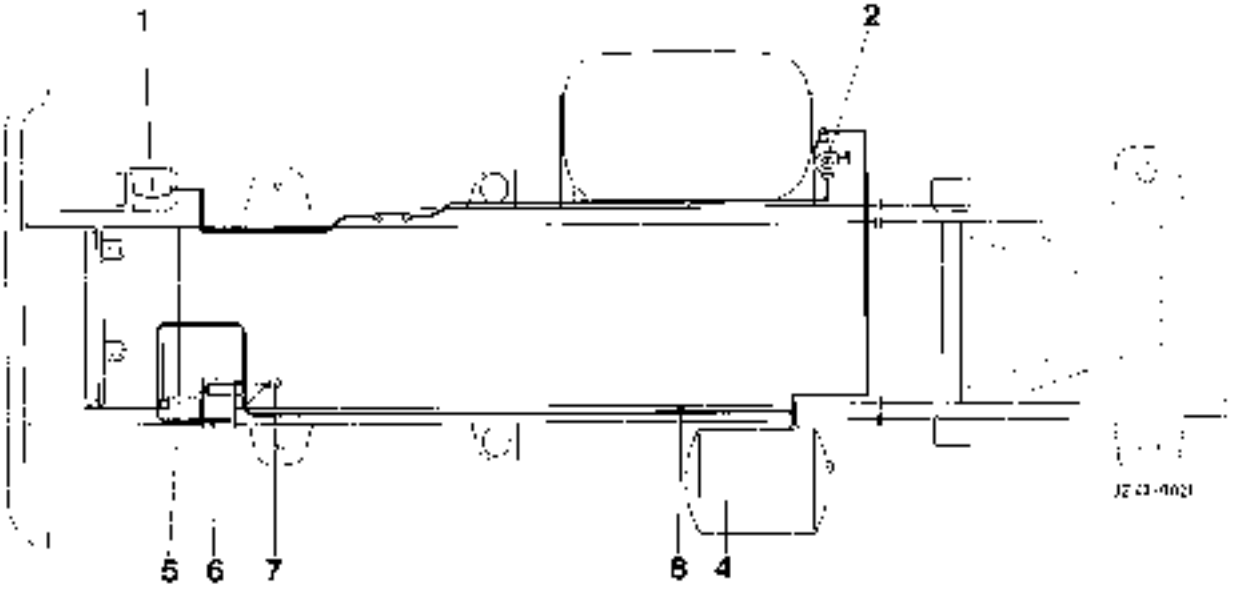
Explanations re 1.9/39

Item	Designation of Unit	Part No	
		Mercedes-Benz	Westinghouse
1	Air compressor optional	000 131 70 01 000 131 70 01	411 604 101 0 415 701 100 0
1a	Supply air compressor		–
2	Pressure regulator with filter and tire inflation connection	000 431 78 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection		–
2c	Tire inflation cylinder	–	–
3	Antifreeze device or antifreeze pump		–
4	Compressed air tank (30 l)	421 432 08 [illegible]6	
4a	Supply compressed air tank	–	–
5	Master brake cylinder	001 430 84 01	–
6	Compressed air brake booster	000 431 74 [illegible]4	462 007 042 0
7	Brake double pressure gauge	no data	
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve		–
10	Changeover valve (green lever) / shutoff valve	–	–
11	Coupling head (black) for brake hose		–
12	Pressure control valve	–	–
13	Relay valve		–
14	Coupling head (red) for supply hose	–	–
15	Coupling head (yellow) for brake hose	–	–
16	Handbrake valve		–
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	
20	Three-way valve	–	–
21	Overflow valve		
22	Pressure reduction valve	–	–
23	Check valve		

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance
Installed in Model:	421.124/125
Acc. to Drawing No.:	421 000 19 43 (Italian version)
Special Version:	035.349/09 Code 726 035.324/06/07 Code 780/M 30 with/without port for power steering pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range – 0.6 + 0.4 bar

Installation Diagram:



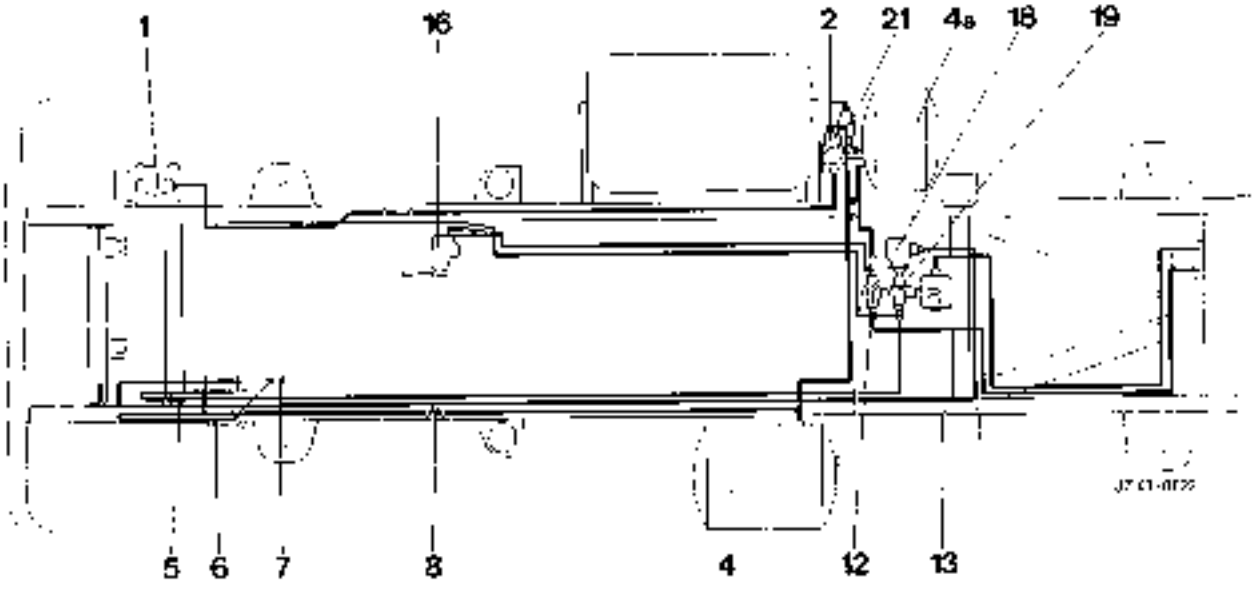
Explanations re 1.9/41

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compressor optional	002 131 10 01 002 131 11 01	411 040 600 0 411 040 640 0
1a	Supp. air compressor	–	–
2	Pressure regulator with filter and tire inflation connection	000 401 79 06	475 304 201 0
2a	Pressure regulator	–	–
2b	Air cleaner with tire inflation connection	–	–
2c	Tire inflation cylinder	–	–
3	Air/freeze device or antifreeze pump	–	–
4	Compressed air tank 60 l	421 432 06 15	–
4a	Supp. compressed air tank	–	–
5	Master brake cylinder	002 430 74 01	–
6	Compressed air brake booster	000 401 74 14	462 007 042 0
7	Brake double pressure gauge	no data	–
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	–	–
10	Changeover valve (green lever) / shuttle valve	–	–
11	Coupling head (black) for brake hose		
12	Pressure control valve	–	–
13	Relay valve		
14	Coupling head (red) for supply hose	–	–
15	Coupling head (yellow) for brake hose	–	–
16	Handbrake valve	–	
17	Brake cylinder	–	–
18	Brake force regulator	–	–
19	Two-way valve	–	–
20	Three-way valve	–	
21	Overflow valve		
22	Pressure reduction valve	–	–
23	Check valve	–	–

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for dual-line trailer brake system as well as separate booster brake
Installed in Model:	421.122/123
Acc. to Drawing No.:	421 030 20 06 (Italian version)
Special Version:	035 349/06 Code 729 035 024/01/02 Code 780/781 air compressor with/without oil pump
Pressure Layout:	Cut-out pressure = 7.3 ± 0.2 bar Control range = – 0.6 + 0.4 bar

Installation Diagram:



WKD 30.402.21.03-06

Explanations re 1.9/43

Item	Designation of Unit		Part No.	
			Mercedes-Benz	Westinghouse
1	Air compressor	optional	000 131 78 01 000 131 79 01	411 004 101 0 415 701 100 0
1a	Suppl. air compressor		-	-
2	Pressure regulator with filter and tire inflation connection		001 431 79 06	475 304 201 0
2a	Pressure regulator			-
2b	Air cleaner with tire inflation connection		-	-
2c	Tire inflation cylinder			-
3	Antifreeze device or antifreeze pump		-	-
4	Compressed air tank 30 l		421 432 08 15	-
4a	Suppl. compressed air tank		421 432 03 15	
5	Master brake cylinder		001 430 64 01	-
6	Compressed air brake booster		000 431 74 14	462 007 042 0
7	Brake double pressure gauge		no data	
8	Connection for actuating differential lock		BM 22 x 1.5	DIN 74 302
9	Trailer control valve		-	-
10	Changeover valve (green lever) / shutoff valve		-	-
11	Coupling head (black) for brake hose		-	
12	Pressure control valve		001 429 66 44	434 403 000 0
13	Relay valve		000 429 65 44	472 010 000 0
14	Coupling head (red) for supply hose			
15	Coupling head (yellow) for brake hose		-	-
16	Handbrake valve		000 431 02 10	461 704 025 0
17	Brake cylinder		-	-
18	Brake force regulator		000 431 32 12	475 601 014 0
19	Two-way valve		000 429 40 44	434 202 000 0
20	Three-way valve		-	-
21	Overflow valve		000 429 76 22	434 100 103 0
22	Pressure reduction valve		-	-
23	Check valve		-	-

Description of Compressed Air System

Brake System: Hydraulic single-circuit brake system with compressed air assistance and compressed air control for dual-line trailer brake system as well as separate booster brake

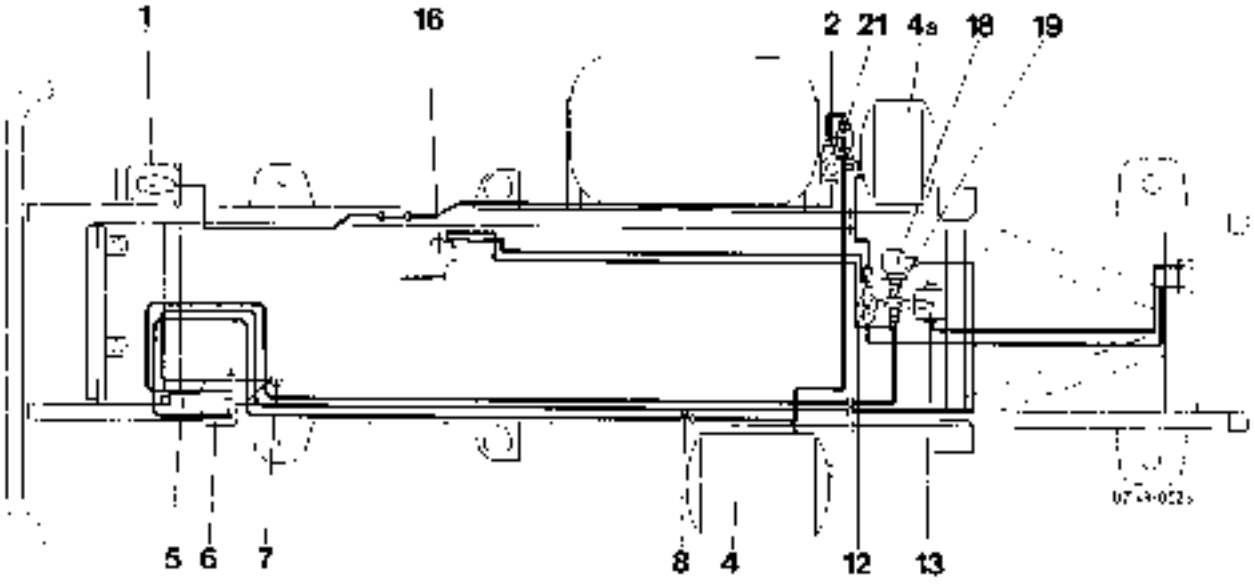
Installed in Model: 421 124/125

Acc. to Drawing No.: 421 800 19 43 (Italian version)

Special Version:
035 349/10 Code 729
035 324/06/07 Code 780/M 30 with/without port for power steering pump

Pressure Layout:
Cutout pressure = 7.3 ± 0.2 bar
Control range = 0.6 ± 0.4 bar

Installation Diagram:



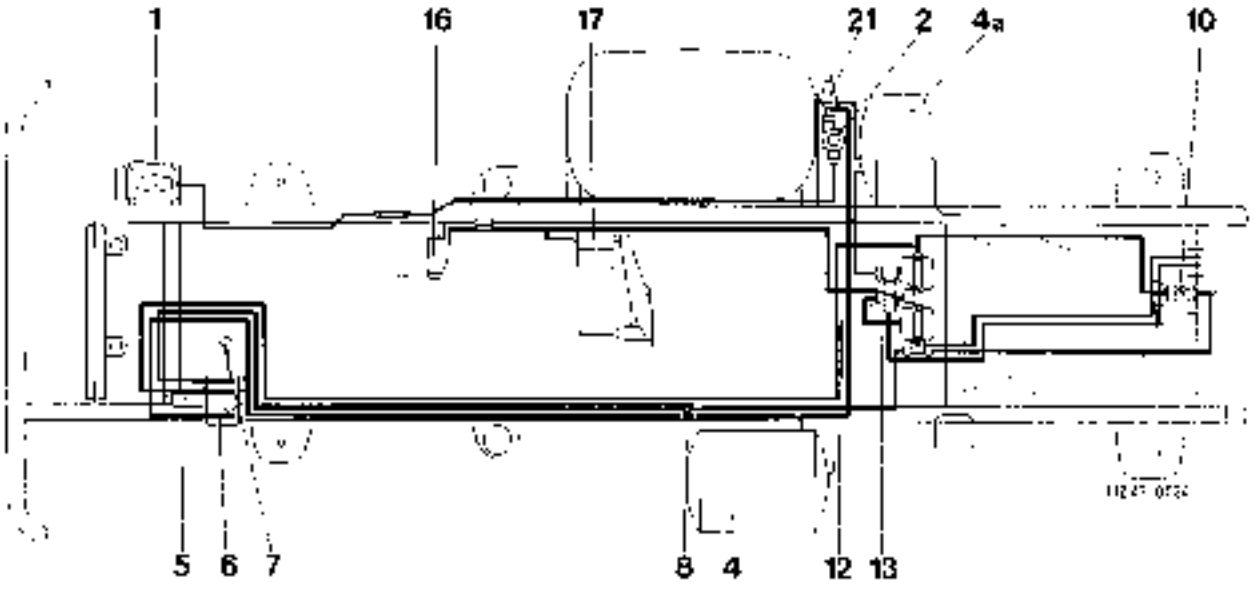
Explanations re 1.9/45

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compresser optional	002 131 10 01 002 131 11 01	411 040 600 0 411 040 640 0
1a	Supp. air compressor	-	-
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 204 201 0
2a	Pressure regulator	-	-
2b	Air cleaner with tire inflation connection	-	
2c	Tire inflation cylinder	-	-
3	Antifreeze device or antifreeze pump		
4	Compressed air tank (30 l)	421 432 00 15	-
4a	Suppl. compressed air tank	421 432 03 15	-
5	Master brake cylinder	002 430 74 01	
6	Compressed air brake booster	000 431 74 14	4E2 007 042 0
7	Brake double pressure gauge	no data	-
8	Connection for actuating differential lock	BM 22 x 1.5	DIN 74 302
9	Trailer control valve	-	-
10	Changeover valve (green lever) / shutoff valve	-	
11	Coupling head (black) for brake hose	-	
12	Pressure control valve	001 429 68 44	434 403 000 0
13	Relay valve	000 429 65 44	473 010 000 0
14	Coupling head (red) for supply hose		-
15	Coupling head (yellow) for brake hose	-	-
16	Handbrake valve	000 431 02 16	461 704 025 0
17	Brake cylinder	-	-
18	Brake force regulator	000 431 32 12	475 601 014 0
19	Two-way valve	000 429 40 44	434 202 000 0
20	Three-way valve	-	
21	Overflow valve	000 429 76 44	434 100 103 0
22	Pressure reduction valve	-	-
23	Check valve	-	-

Description of Compressed Air System

Brake System:	Hydraulic single-circuit brake system with compressed air assistance and compressed air control for dual-line trailer brake system as well as separate booster brake
Installed in Model:	421 124/125
Acc. to Drawing No.:	421 000 19 42 (Italian version)
Special Version:	035 567/02 Code 729 035 324/06/07 Code 780/M 30 with/without port for power steering pump
Pressure Layout:	Cutout pressure = 7.3 ± 0.2 bar Control range = 0.6 + 0.4 bar

Installation Diagram:



Explanations re 1.9/47

Item	Designation of Unit	Part No.	
		Mercedes-Benz	Westinghouse
1	Air compresser optional	002 131 10 01 002 131 11 01	411 040 800 0 411 040 640 0
1a	Suppl. air compressor	-	
2	Pressure regulator with filter and tire inflation connection	000 431 79 06	475 304 201 0
2a	Pressure regulator	-	-
2b	Air cleaner with tire inflation connection	-	-
2c	Tire inflation cylinder	-	
3	Antifreeze device or antifreeze pump	-	-
4	Compressed air tank (30 l)	421 432 06 15	
4a	Suppl. compressed air tank	421 432 03 15	-
5	Master brake cylinder	002 430 74 01	-
6	Compressed air brake booster	000 431 74 14	462 007 042 0
7	Brake couble pressure gauge	no data	-
8	Connection for actuating differential lock	000 990 14 70	-
9	Trailer control valve	-	-
10	Changeover valve (green lever) / shutoff valve	000 429 15 31	952 002 000 0
11	Coupling head (black) for brake hose	-	-
12	Pressure control valve	001 429 66 44	434 403 000 0
13	Relay valve	001 429 21 44	473 017 000 0
14	Coupling head (red) for supply hose	-	-
15	Coupling head (yellow) for brake hose		-
16	Handbrake valve	000 431 02 16	467 704 025 0
17	Brake cylinder	000 420 70 24	421 021 009 0
18	Brake force regulator	-	
19	Two-way valve	-	-
20	Three-way valve	-	
21	Overflow valve	001 429 53 44	434 100 122 0
22	Pressure reduction valve	-	-
23	Check valve	-	-

acc. to DIN 24300 and with unit connection designations acc. to DIN 74254
– Provisional Edition

Unit Connection Designations According to DIN 74354 (draft)

Scope

This standard applies to air brakes on motor vehicles (including systems with hydraulic power transmission) and their trailers.

The designations should be provided both on the actual units next to the connection and in the brake diagrams next to the line connections shown there.

Designation

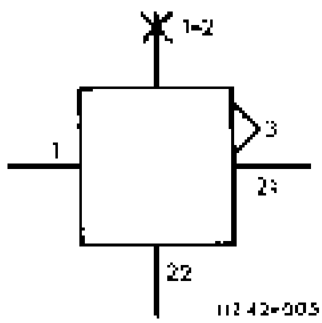
The designations consist of one or two digits. The meanings of the **first digit** are:

0 Intake connection
1 Power inflow
2 Power outflow (not for outflow to atmosphere)
3 Connection to atmosphere (for bleeding and venting)
4 Control connection (input to unit)

A second digit must be used whenever several similar connections, e.g. for several circuits, are possible or provided. It is good practice to start the **second digit** at 1, e.g. **21, 22, 23** etc. Several similar connections from one chamber should be given one and the same designation.

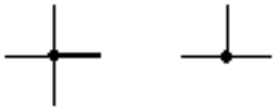
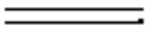
If a connection is able to perform several functions, it requires to be identified by two (first) digits, separated by a dash. Refer to example.

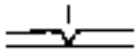
Example



Pressure regulator with charging and switching connections

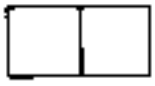
1 Power inflow from compressor
1-2 Power inflow for valve used to charge air brake system, or optionally power outflow for valve used to inflate tires.
3 Connection to atmosphere (for bleeding and venting)
21 Power outflow to accumulator (air tank)
22 Power outflow (switching connection)

Designation	Symbol
Pressure source	
Power line	
Control line	
Hose	
Electric line	
Line connection	
Line crossing	
Lever, rod, shaft	
Spring	
Muscular actuation	
a) General	
b) Button	
c) Lever	
d) Pedal	
Mechanical actuation	
a) Spring	
b) Button	

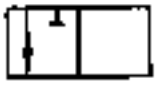
Designation	Symbo
Electrical actuation	
Pneumatic actuation	
a) Pressure rise	
b) Pressure drop	
Detent	
Pressure fluid designation	
a) Pneumatic	
b) Hydraulic	
Direction of flow	

Valves with several fixed service positions (directional control valves)
e.g. 2/2-way valve, 3/2-way valve etc.

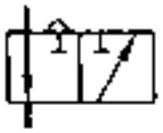
The number of squares corresponds to the number of service positions



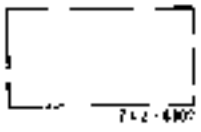
Within the squares, the lines indicate the actual flow and the arrows the directions of flow. Shutoffs are identified by means of crossing lines within the squares



All other service positions are obtained by shifting the squares until the lines are aligned with the connections of the next square.



A rectangle surrounded by a thin dash-dot line indicates several parts forming a block or assembly



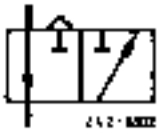
Valves without fixed service positions

Valves which, for a particular setting, are required to assume a number of intermediate positions between two end functions are represented by a plain square.

If, during a change in position, the inflow or outflow remains linked to a connection, the end of the arrow is provided with a crossing line which is left attached to the arrow when the square is relocated. The change in position is depicted in the same manner as for valves with several fixed positions so that the square, together with lines and arrow, is relocated at right angles to the connections.

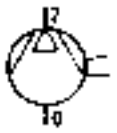
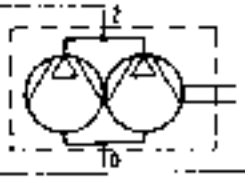
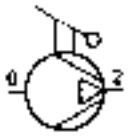
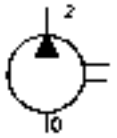
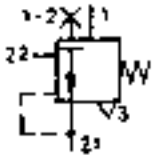
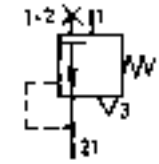
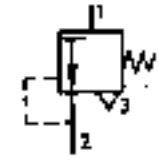
Broken line = internal control path
(not an air line)

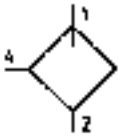
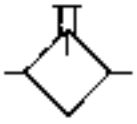
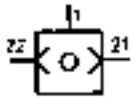
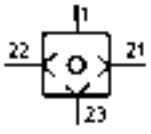
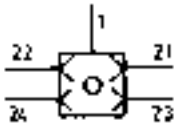
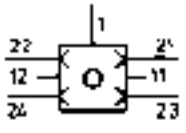
3/2-way valve means:
3 controlled ports
2 service positions

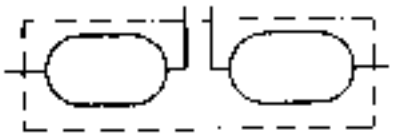
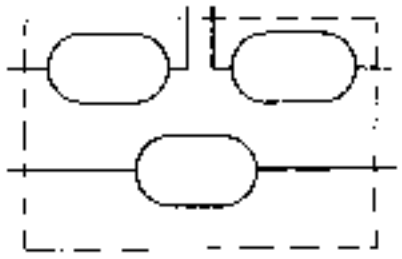
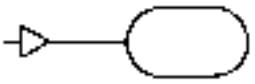


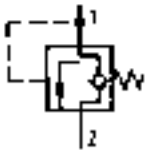
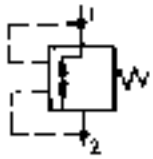
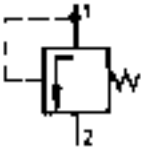
Survey

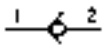
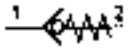
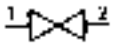
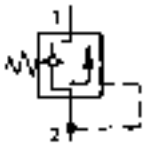
No	Designation
1	Compressor, pump and vacuum pump
2	Pressure regulator
3	Defroster
4	Protection valve
5	Power accumulator
6	Water separator and drier
7	Overflow valve
8	Check and shutoff valve
9	Warning light
10	Pressure switch, electric
11	Pressure gauge
12	Warning device, acoustic
13	Service brake valve
14	Parking brake valve
15	Brake valve, hand-operated
16	Relay valve
17	Trailer control valve for single-line brake system
18	Trailer control valve for dual-line brake system
19	Single-acting cylinder (hydraulic)
20	Single-acting cylinder (pneumatic)
21	Double-acting cylinder (pneumatic and hydraulic)
22	Double brake cylinder (pneumatic)
23	Brake booster
24	Pressure ratio valve
25	Pressure control valve
26	Brake pressure modulator, automatic
27	Brake servo unit
28	Non-return valve
29	Pressure reducing valve
30	Pressure limiting valve
31	(not yet specified)
32	Directional control valve with three positions
33	Directional control valve with two positions
34	Reservoir (hydraulic)
35	Coupling head
36	Filter
37	Throttle valve
38	Pressure connection point
39	Bleed point
40	One-way restrictor
41	Directional control valve with three positions
42	Directional control valve with four positions
43	Air spring bellows
44	(not yet specified)
45	Directional control valve with two positions
46	Linkage

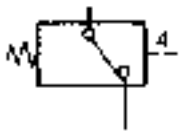
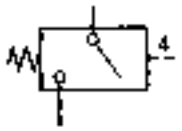
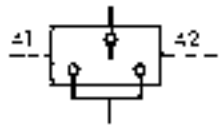
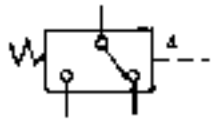
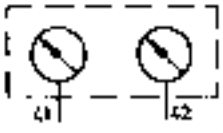
No.	Designation	Symbol
1	**Compressor-pump and vacuum pump**	
1.1	Single-cylinder-compressor	
1.2	Two cylinder-compressor	
1.3	Vacuum pump	
1.4	Compressor hand operated	
1.5	Hydraulic pump (with 1 delivery direction)	
2	**Pressure regulator**	
2.1	– with combined filling and withdrawal connection and with switch connection	
2.2	– with combined filling and withdrawal connection	
2.3	– without additional connections	

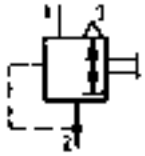
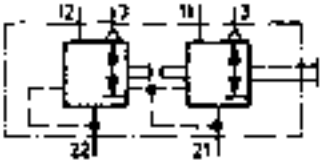
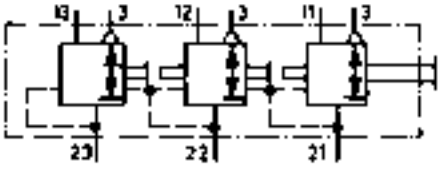
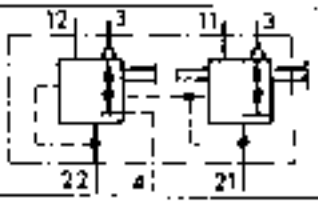
No	Designation	Symbo
3	**Antifreeze pump**	
3.1	with wick	
3.2	–, automatic with control connection	
3.3	–, hand operated	
4	**Safety valve**	
4.1	Dual-circuit –	
4.2	Three-circuit	
4.3	Four circuit - with 5 connections	
4.4	Four circuit - with 7 connections	

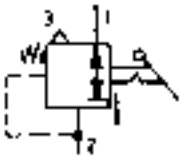
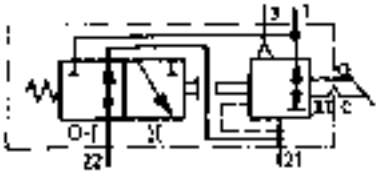
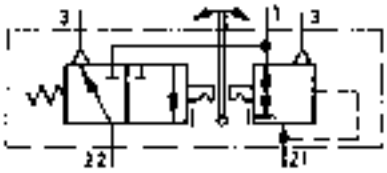
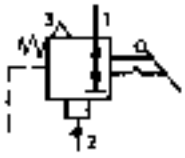
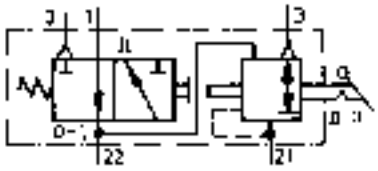
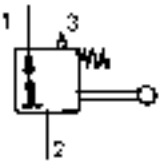
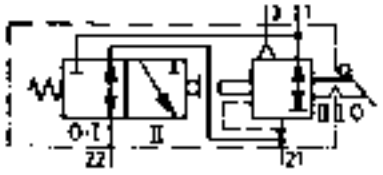
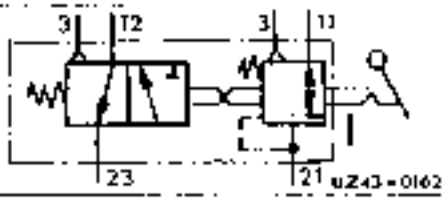
No	Designation	Symbol
5	**Energy collector**	
5.1	Single-chamber-compressed air reservoir (DIN 74 291)	
5.2	Double-chamber-compressed air reservoir (DIN 74 291)	
5.3	Triple-chamber-compressed air reservoir (DIN 74 291)	 Vessels may be arranged at random
5.4	Single-chamber-vacuum reservoir	
5.5	Hydraulic reservoir	

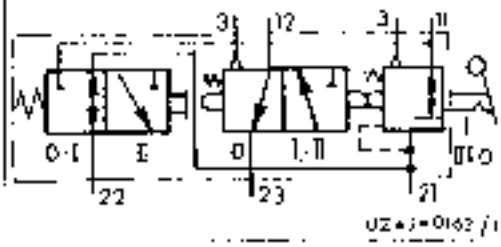
No	Designation	Symbol
6	**Water separator and drier**	
6.1	Water separator hand operated	
6.2	Water separator with automatic drainage and control connection	
6.3	Water separator with automatic drainage	
6.4	Drier	
7	**Overflow valve**	
7.1	with return flow (DIN 74 279)	
7.2	with limit return flow (DIN 74 279)	
7.3	without return flow (DIN 74 279)	

No.	Designation	Symbol
8	**Non return and shut-off valve**	
8.1	Non return valve	
8.2	Non return valve with counter pressure-spring	
8.3	Shut-off valve (DIN 74 203)	
8.4	Non return valve with limited return flow	
9	**Signal lamps** (DIN 40 700)	
9.1	– red	
9.2	– white	
9.3	– brake light	
9.4	– green	
9.5	– yellow	

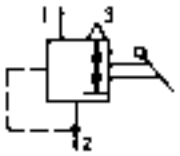
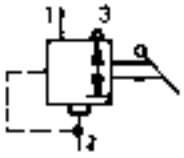
No.	Designation	Symbol
10	**Pressure switch electric**	
10.1	Off switch	
10.2	On switch	
10.3	Differential pressure switch	
10.4	Selector switch	
11	**Pressure gauge**	
11.1	Single	
11.2	Double	

No.	Designation	Symbol
12	**Signal generator, acoustic**	
12.1	Buzzer (DIN 40 708)	
12.2	Horn (DIN 40 717)	
13	**Service brake valve**	
13.1	Single circuit	
13.2	Dual circuit	
13.3	Three-circuit	
13.4	Dual-circuit with ALB-regulation	

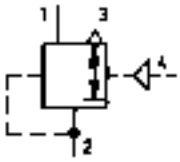
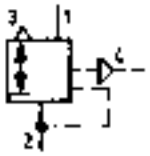
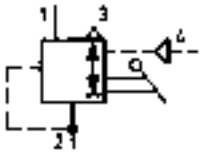
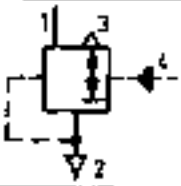
No.	Designation	Symbol
14	**Parking brake valve**	
14.1	– for spring type (stepped)	
14.2	– for spring type (stepped) and trailer control valve (EC)	
14.3	– for spring type (stepped) and bus stop brake	
14.4	– for spring type (stepped) with pressure limiter at outlet	
14.5	– for spring type, not stepped auxiliary brake stepped	
14.6	– for spring type with linkage actuation	
14.7	– for spring type (stepped) and additional valve (UK)	
14.8	– for spring type (stepped) and additional valve	

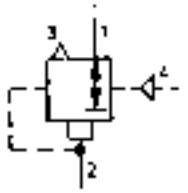
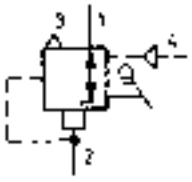
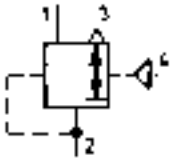
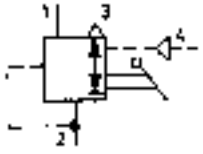
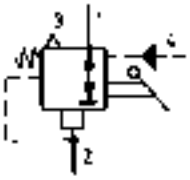
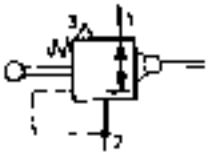
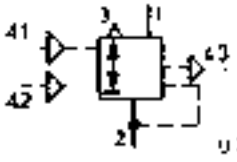
No.	Designation	Symbol
14.3	– for spring type (stepped) and trailer control and additional valve	

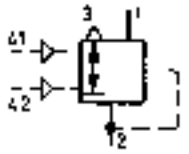
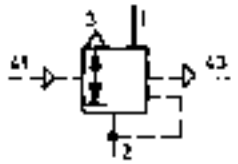
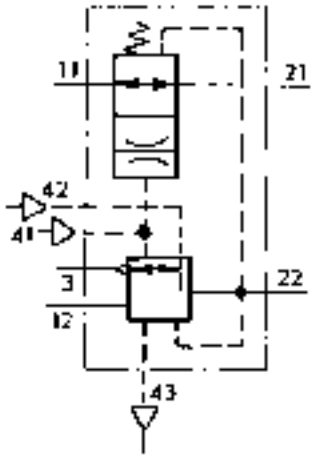
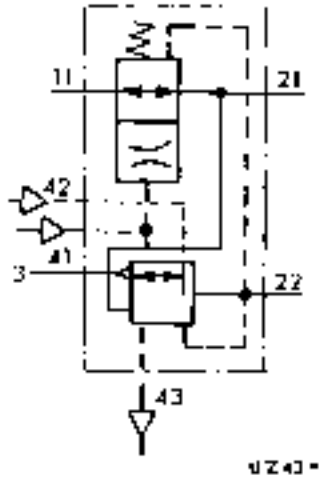
15 Stop brake valve

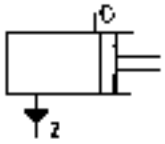
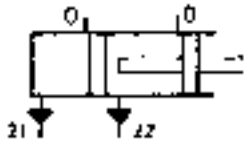
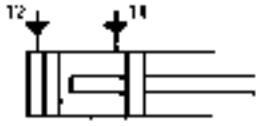
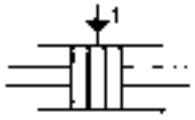
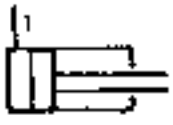
15.1	Stop brake valve	
15.2	Stop brake valve with pressure limiter at the exit	

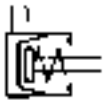
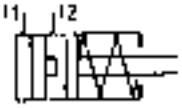
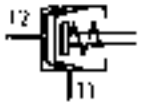
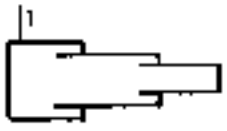
16 Relay valve

16.1	, admitting	
16.2	, exhausting (control valve France)	
16.3	– admitting and with additional lever actuation	
16.4	–, admitting and hydraulically controlled	

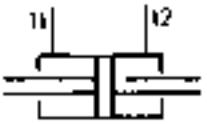
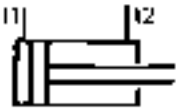
No	Designation	Symbol
	17 Trailer control valve for single-line-brake system	
17.1	–, controlled with pressure limiter at outlet	
17.2	– controlled with pressure limiter at outlet and additional lever actuation	
17.3	–, controlled, without pressure limiter at outlet	
17.4	– controlled without pressure limiter at outlet and additional lever actuation	
17.5	–, hydraulically controlled with pressure limiter at outlet and additional lever actuation	
17.6	–, power controlled, without pressure limiter at outlet, pull actuated	
	18 Trailer control valve for dual-line-brake system	
18.1	–, three-circuit actuated (admitting and exhausting)	

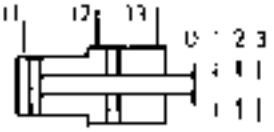
No	Designation	Symbo
18.2	–, dual circuit actuated (admitting)	
18.3	, dual-c ruit actuated (admitting)	
18.4	– Three-circuit actuated for truck [EC] (with breakaway device)	
18.5	–, three circuit actuated for articulated tractor unit [EC] (with breakaway device)	

No	Designation	Symbol
19	**Single-acting cylinder (hydraulic system)**	
19.1	Master cylinder single-circuit	
19.2	Slave cylinder single-circuit	
19.3	Master cylinder dual-circuit	
19.4	Slave cylinder dual-circuit	
19.5	Wheel brake cylinder	
19.6	Telescopic cylinder	
20	**Single-acting cylinder (pneumatic system)**	
20.1	Single-circuit piston cylinder	

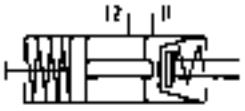
No.	Designation	Symbol
20.2	Single-circuit diaphragm cylinder	
20.3	Dual-circuit piston cylinder	
20.4	Spring-type brake cylinder, pressing	
20.5	Spring-type brake cylinder, pulling	
20.6	Dual-circuit diaphragm cylinder	
20.7	Telescopic cylinder	 OZ43-0168/1

21 Dual-acting cylinder (pneumatic and hydraulic system)

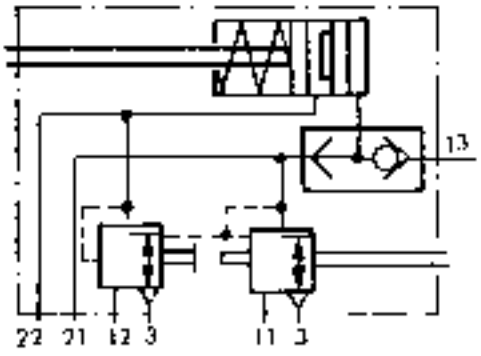
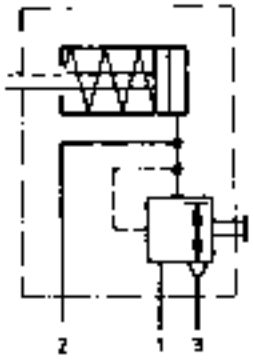
21.1	with piston rod on both sides	
21.2	– with piston rod on one side	 OZ43-0169

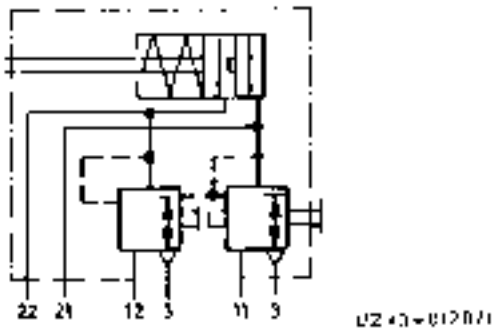
Nr	Designation	Symbol
21.3	4-position cylinder	

22 Combined cylinder (pneumatics)

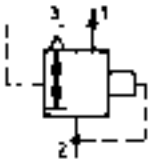
22.1	Diaphragm-spring type brake cylinder with mechanical release device	

23 Brake booster (power brake)

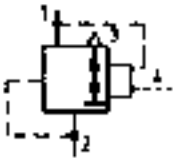
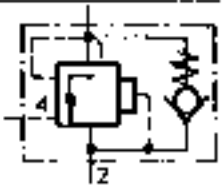
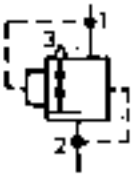
23.1	–, dual-circuit with shuttle valve	
23.2	–, single-circuit	

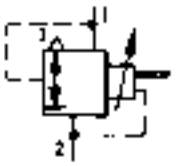
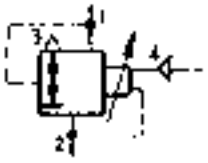
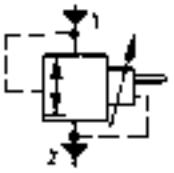
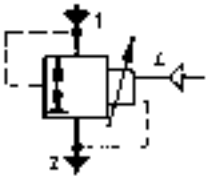
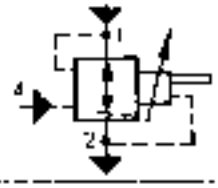
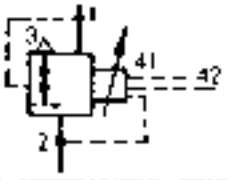
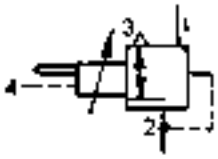
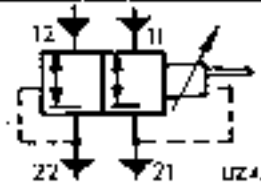
No	Designation	Symbol
23.3	dual circuit	

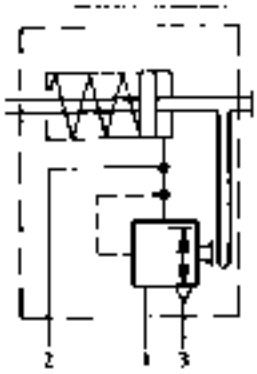
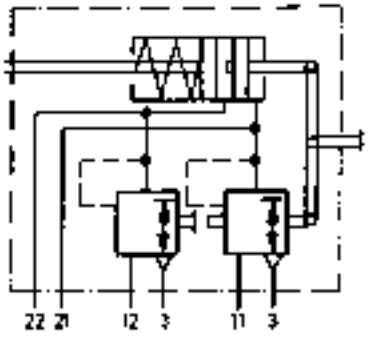
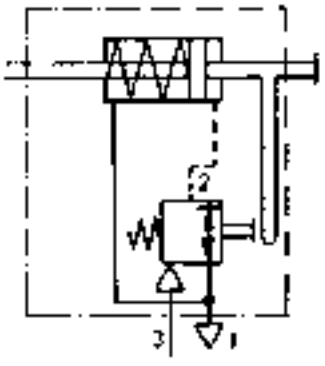
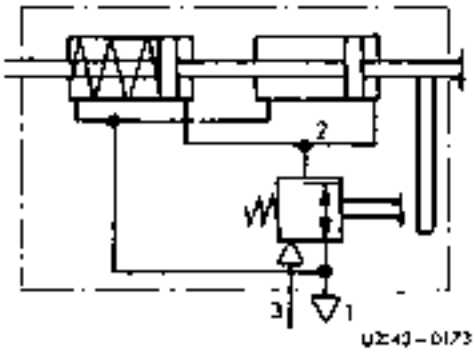
24 Pressure ratio valve

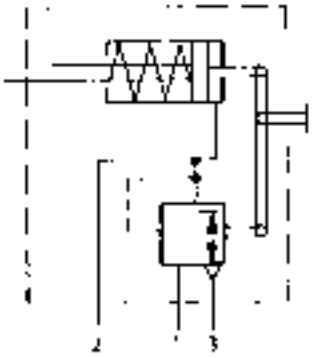
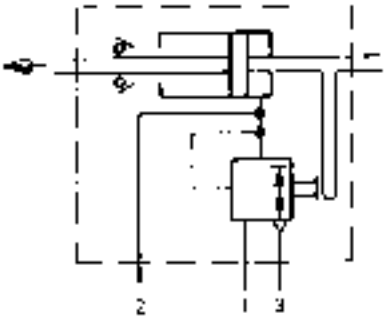
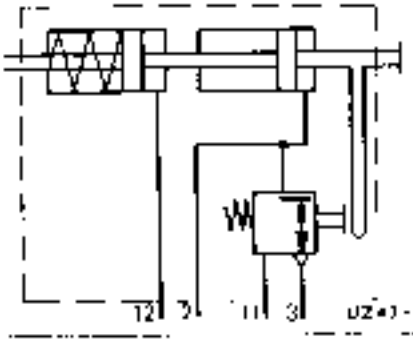
24.1	with special characteristic curve and bleed point	
24.2	– with special characteristic curve or bleed point	

25 Pressure control valve

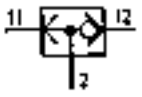
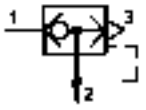
25.1	pneumatic	
25.2	–, with return flow	
25.3	–, Reduction valve	

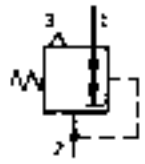
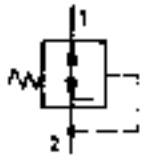
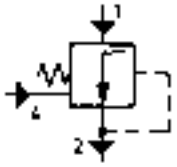
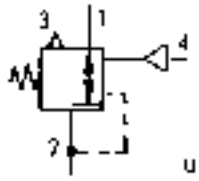
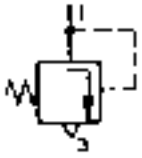
No.	Designation	Symbol
26	**Brake pressure regulator, automatic**	
26.1	–, mechanically actuated for compressed-air brake	
26.2	, pneumatically actuated for compressed-air brake	
26.3	–, mechanically actuated for hydraulic system	
26.4	–, pneumatically actuated for hydraulic system	
26.5	–, mechanically actuated with hydraulic control connection for pressure control	
26.6	–, pneumatically actuated for continuous operating brake with 2 control connections (averaged pressure is modulated)	
26.7	– with relay valve	
26.8	, mechanically actuated for hydraulic system (tandem version)	 UZ43-3172

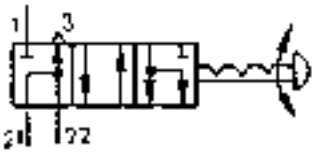
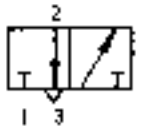
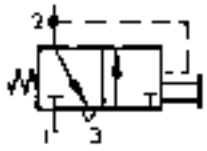
No	Designation	Symbol
27	**Brake booster**	
27.1	–, single-circuit (for auxiliary power brake, foot pressure fully applied)	
27.2	–, dual-circuit (for auxiliary power brake, foot pressure partially applied)	
27.3	– Vacuum single-circuit (for auxiliary power brake, foot pressure fully applied)	
27.4	–, Vacuum single-circuit with additional cylinder (for auxiliary power brake, foot pressure fully applied)	

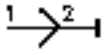
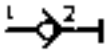
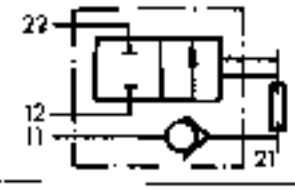
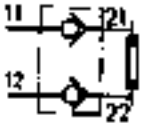
No.	Designation	Symbol
27.5	–, single circuit (for auxiliary power brake, foot pressure partially applied)	
27.6	Handbrake pusher (for parking brake)	
27.7	– single circuit with switchable additional cylinder (for auxiliary power brake, foot pressure fully applied)	

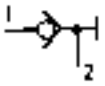
28 Non return valve

28.1	Shuttle valve	
28.2	Quick venting valve	

No	Designation	Symbol
29	**Pressure regulating valve**	
29.1	with bleed point	
29.2	– without bleed point (separator)	
29.3	– with control connection without cover opening	
29.4	– with control connection and bleed port	
30	**Pressure relief valve**	
30.1	Safety valve	
30.2	Pressure relief valve	

No.	Designation	Symbol
32	**Directional control valve with 3 switch positions**	
32.1	4/3 way valve, mechanically actuated	
33	**Directional control valve with 2 switch positions**	
33.1	3/2-way valve	
33.2	Safety valve (Sweden)	
34	**Reservoir (hydraulic system)**	
34.1	with connection below	

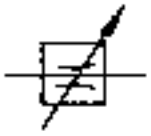
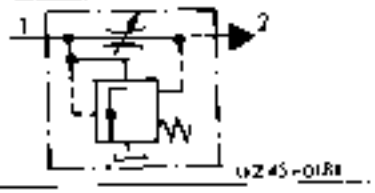
No	Designation	Symbol
35	**Coupling head**	
35.1	– for truck brake (EC) (polarized without shut-off valve)	
35.6	– for 2-line brake (Pam-type) (brake and supply, without shut-off valve)	
35.2	– for articulated tractor unit supply (EC) (polarized with shut-off valve)	
35.3	– for articulated tractor unit brake (EC) (polarized with shut-off valve)	
35.5	– for 1-line brake (with shut-off valve)	
35.7	– for special version pneumatics, hydraulics (for tipper body, quick coupling)	
35.9	– for 1-line brake (with shut-off valve an 2/2-way valve)	
35.8	– Duplicate for 2 line brake (i.e., Italy, Sweden, Norway)	

No.	Designation	Symbol
35.4	– for truck supply (EC) (polarized, with shut-off valve)	

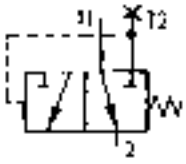
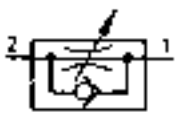
36 Filter

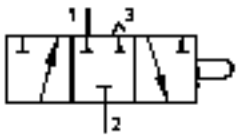
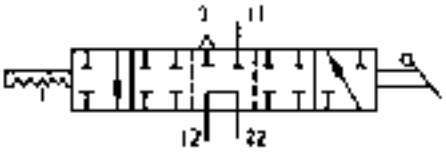
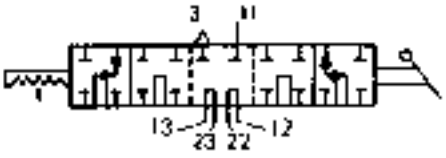
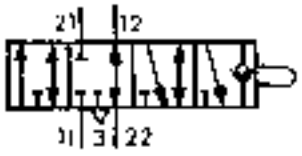
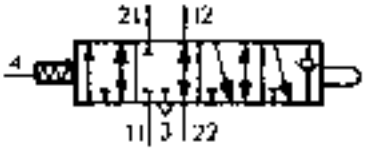
36.1	1 Line filter	

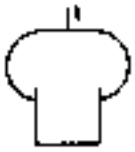
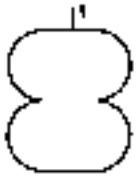
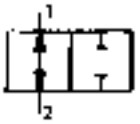
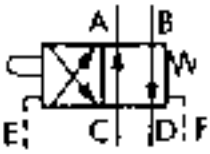
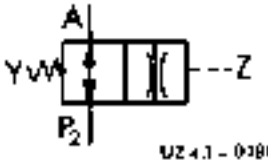
37 Throttle valve

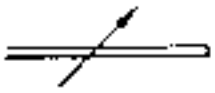
37.1	Throttle valve	
37.2	–, adjustable	
37.3	Control valve (connected in parallel)	

UKH 30 402 31 03-05

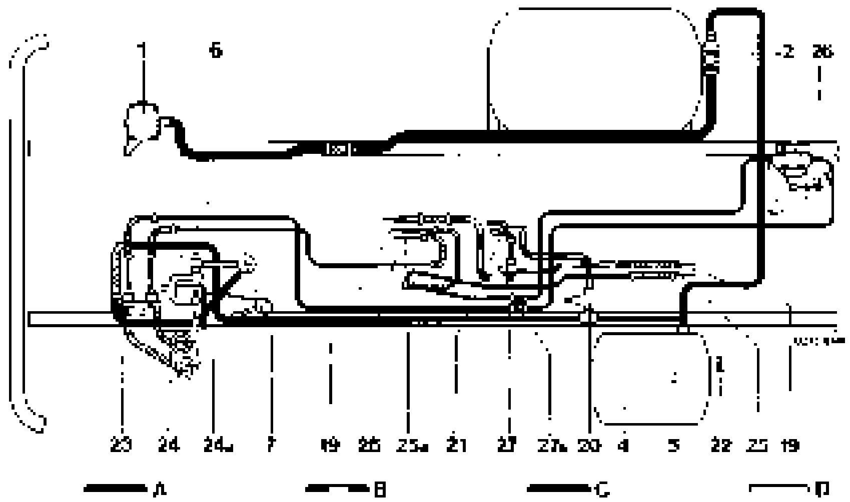
No.	Designation	Symbol
38	**Pressure connection point**	
38.1	Test connection Vg 8 (for pneumatics DIN 74 326)	
38.2	Test connection m 10 x 1.5 (for pneumatics DIN 74 326)	
38.3	Test connection m 18 x 1.5 (for hydraulics DIN 72 237)	
38.4	Test valve for pressure controlled ALB	
39	**Bleeder point**	
39.1	Bleeder point for hydraulics	
40	**One-way restrictor**	
40.1	One-way restrictor	
40.2	– adjustable	

Nr	Designation	Symbol
41	**Directional control valve with 3 switch positions**	
41.1	Height control valve	
42	**Directional control valve with 4 switch positions**	
42.1	Relay valve single circuit for interchangeable bodies (4/4-way valve)	
42.2	Relay valve dual-circuit for interchangeable bodies (6/4-way valve)	
42.3	Height control valve with height limiter (4/4-way valve)	
42.4	Height control valve with height limiter and zero position adjustment (4/4-way valve)	
42.5	5/4-way valve	
42.6	6/4-way valve, hydraulic	

No	Designation	Symbol
43	**Pneumatic suspension bellows**	
43.1	Tubular bellows	
43.2	Pleated bellows	
45	**Directional control valve with 2 switch positions**	
45.1	2/2-way valve	
45.2	4/2-way valve	
45.3	2/2-way valve with throttle	

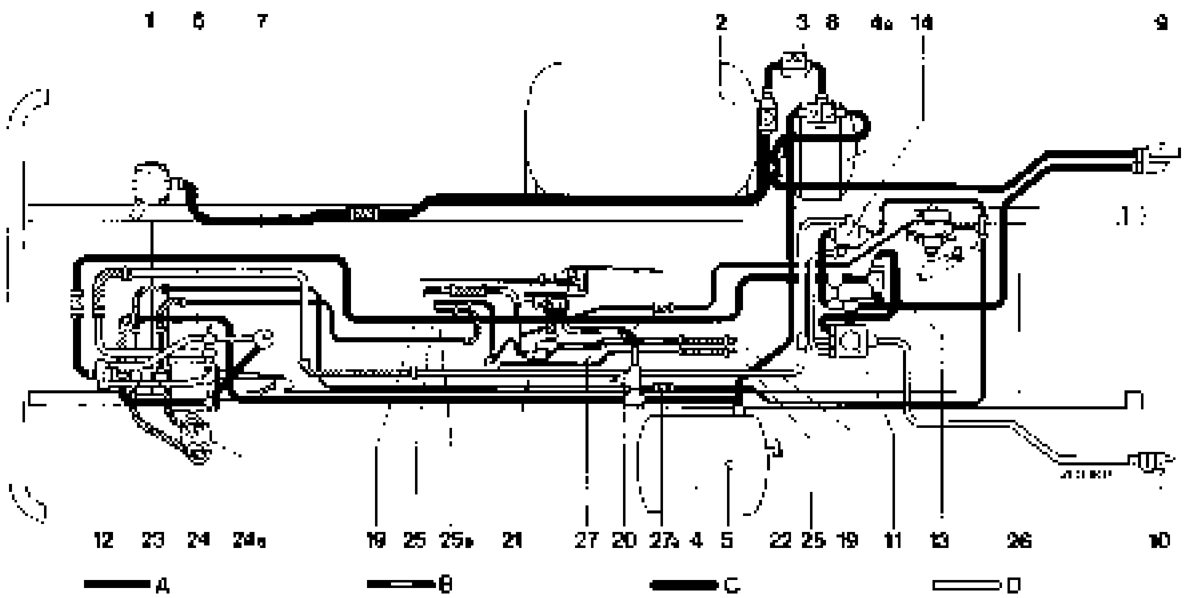
No	Designation	Symbol
46	**Linkages**	
46.1	, adjustable (divided)	
46.2	–, adjustable (undivided)	

Brake Diagram



Dual-Circuit Hydraulic Brake Systems with Air Assistance

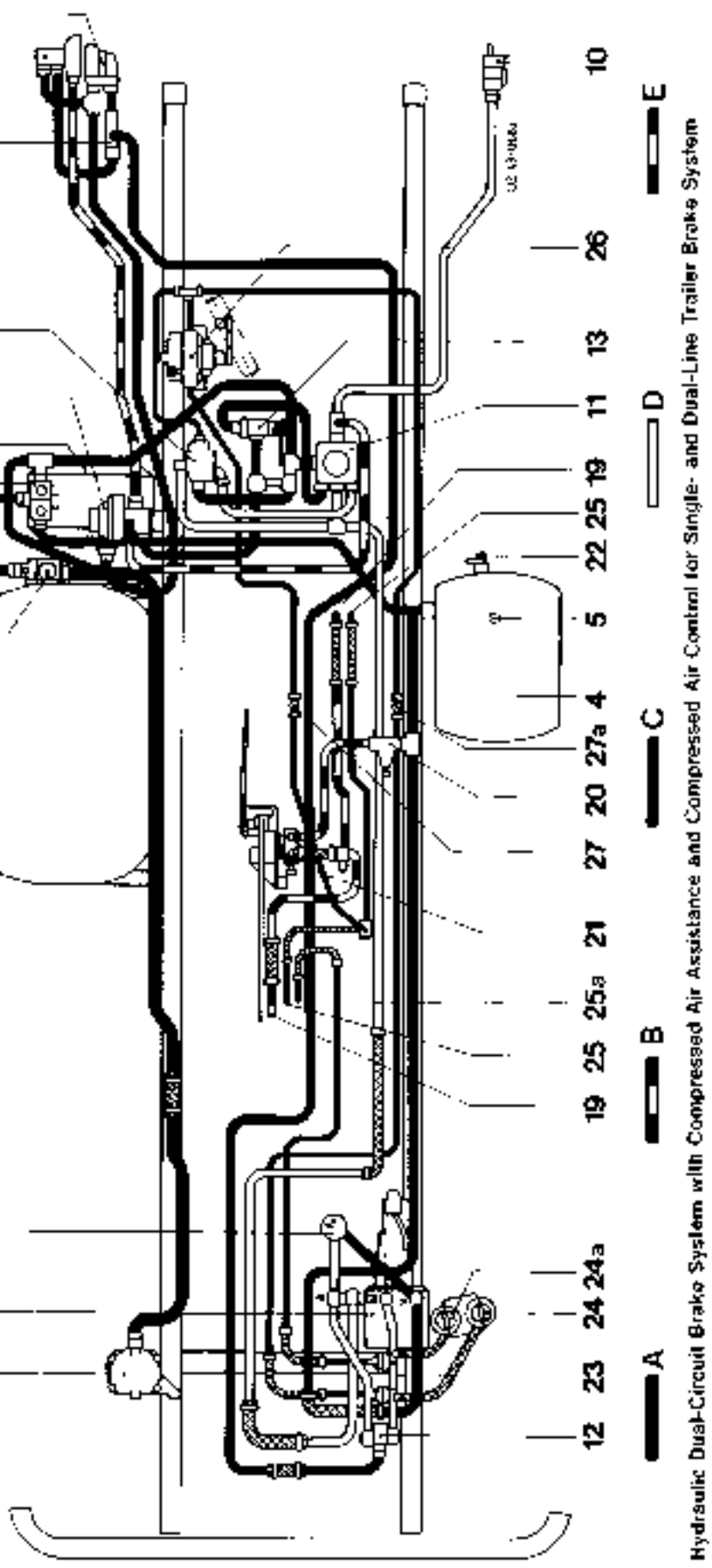
- A Hydraulic brake line
- B Air line, differential locks
- C Air supply line
- D Air brake line
- 1 Air compressor
- 2 Pressure regulator
- 4 Air tank
- 5 Drainage valve
- 6 Air brake servo unit
- 7 Double brake pressure gauge
- 19 Connection for differential locks
- 20 Overflow valve
- 21 Actuating valve for differential locks
- 22 Tire inflator/test connection
- 23 Tandem master brake cylinder
- 24 Brake fluid reservoir (circuit I)
- 24a Brake fluid reservoir (circuit II)
- 25 Hydraulic brake line (circuit I)
- 25a Hydraulic brake line (circuit II)
- 26 ALB modulator
- 27 Test connection for ALB modulator
- 27a Test connection for ALB modulator



Dual-Circuit Hydraulic Brake System with Air Assistance and Air Control for Dual Line Trailer Brake System

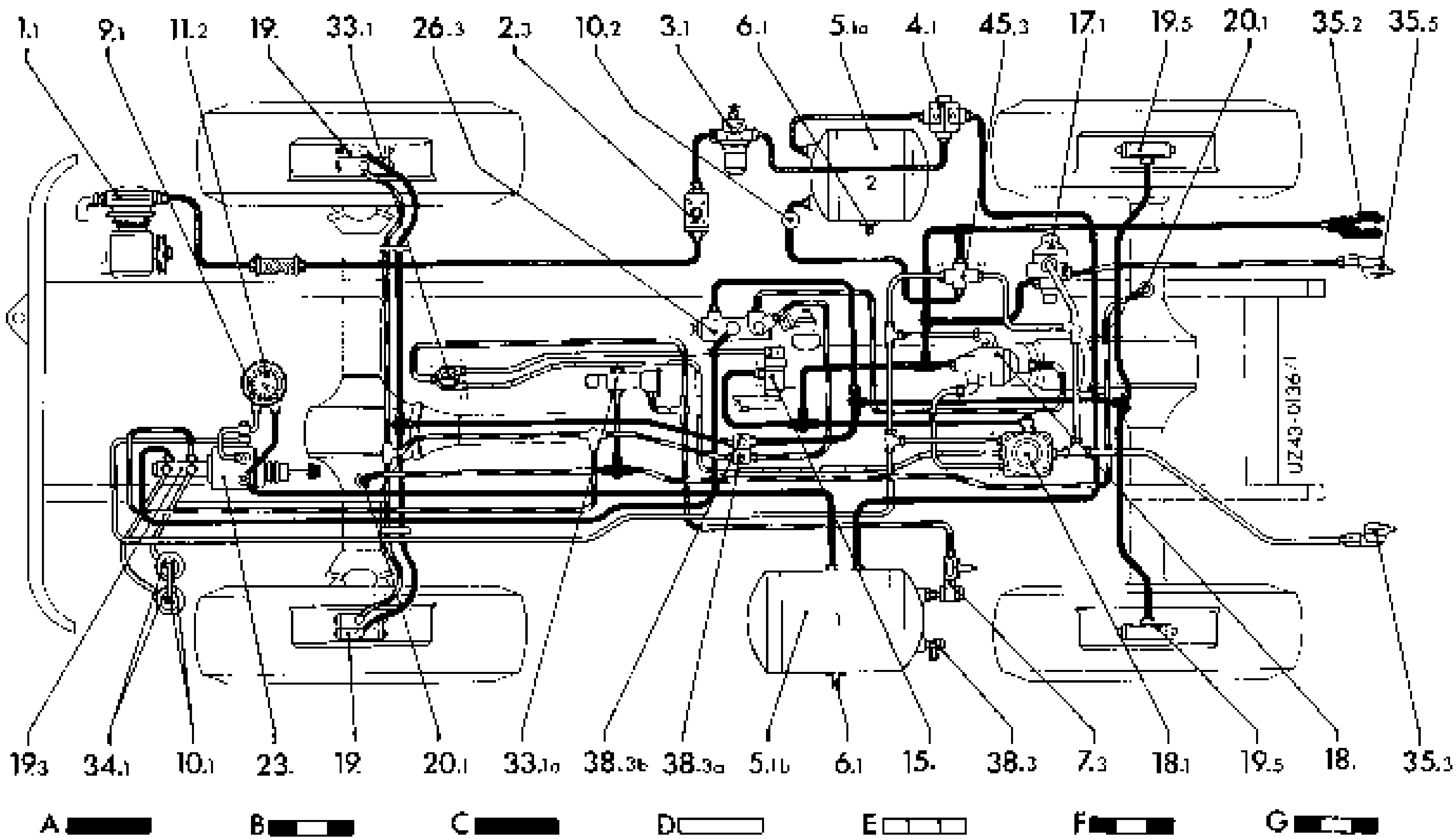
- A Hydraulic brake line
- B Air line, differential locks
- C Air supply line
- D Air brake line
- 1 Air compressor
- 2 Pressure regulator
- 3 Defroster
- 4 Air tank
- 4a Auxiliary air tank
- 5 Drainage valve
- 6 Air brake servo unit
- 7 Double brake pressure gauge
- 8 Three-circuit protection valve
- 9 Coupling head for supply line (red line)
- 10 Coupling head for brake line (yellow line)
- 11 Trailer control valve (dual-line)
- 12 2/2-way valve
- 13 Handbrake valve
- 14 Hydropneumatic control valve
- 15 Connection (differential lock actuation front and rear axles)
- 20 Overflow valve
- 21 Actuating valve for differential locks
- 22 Tire inflator/test connection
- 23 Tandem master brake cylinder
- 24 Brake fluid reservoir (circuit I)
- 24a Brake fluid reservoir (circuit II)
- 25 Hydraulic brake line (circuit I)
- 25a Hydraulic brake line (circuit II)
- 26 ALB modulator
- 27 Test connection for ALB modulator
- 27a Test connection for ALB modulator

Brake Diagram



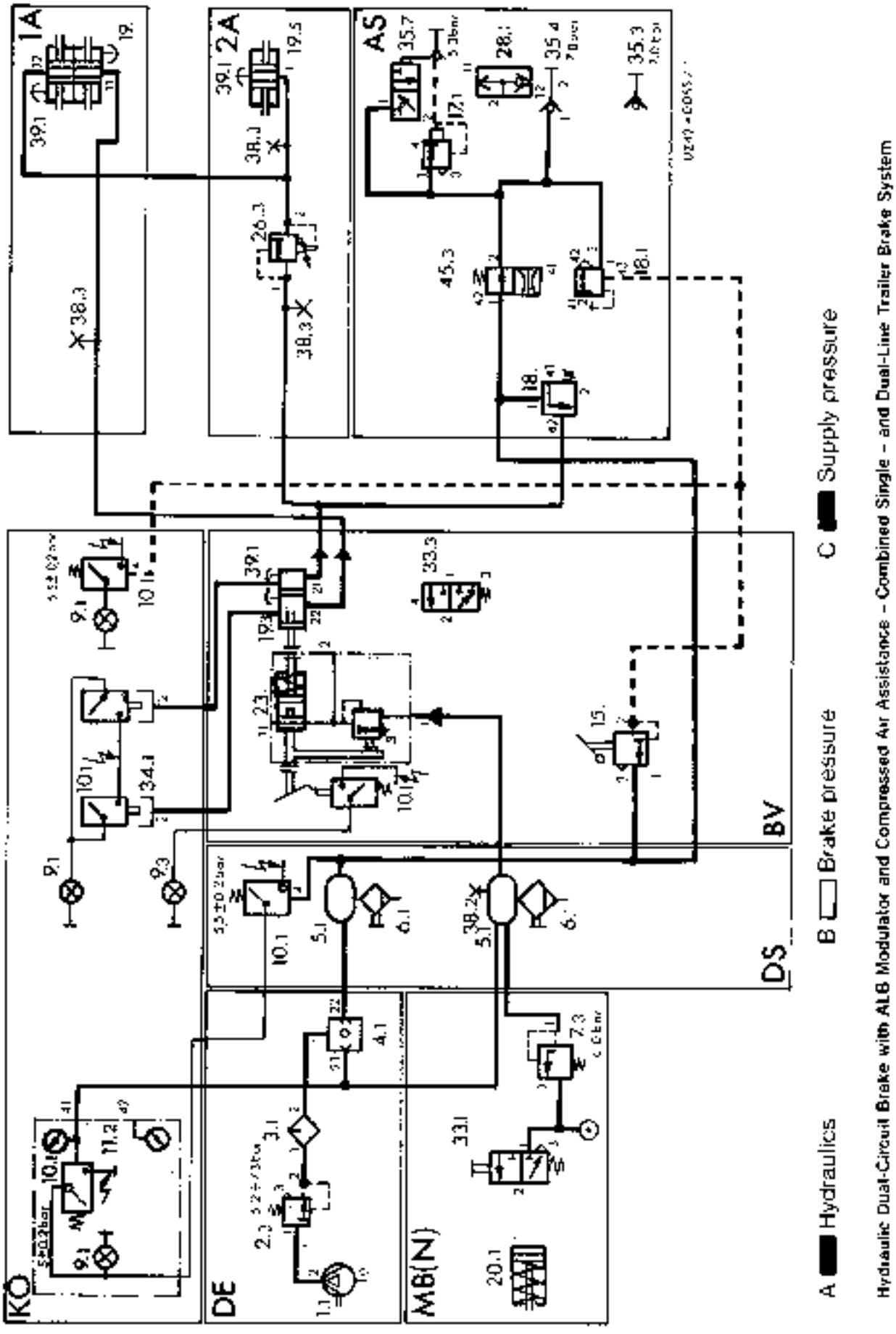
Hydraulic Dual-Circuit Brake System with Compressed Air Assistance and Compressed Air Control for Single- and Dual-Line Trailer Brake System

Brake Diagram



Hydraulic Dual-Circuit Brake with ALB Modulator and Compressed Air Assistance – Combined Single- and Dual-Line Trailer Brake System

A Hydraulic brake circuit I
B Hydraulic brake circuit II
C Supply pressure
D [illegible]
E Brake test pressure
F Brake single-line
G Auxiliary consumers
1.1 Air compressor
2.3 Pressure regulator
3.1 Defroster
4.1 Dual-circuit protection valve
5.1a Compressed air tank II
5.1b Compressed air tank I
6.1 Water separator
7.3 Overflow valve
9.1 Warning light, supply pressure
10.1 Warning switch, brake fluid
10.2 Pressure switch, supply pressure
11.2 Double pressure gauge
15 Handbrake valve
17.1 Trailer control valve (single-line)
18 Hydropneumatic control valve
18.1 Trailer control valve (dual-line)
19 Twin wheel brake cylinder
19.3 Tandem master brake cylinder
19.5 Wheel brake cylinder
20.1 Piston cylinder, differential lock
23 Compressed air brake booster
26.3 ALB modulator
33.1 Rotary knob valve, brake check
33.1a Control valve, differential lock
34.1 Brake fluid reservoir I and II
35.2 Coupling head, supply (dual-line)
35.3 Coupling head, brake (dual-line)
35.5 Coupling head, single-line
38.3 Tire inflation/test connection
38.3a ALB test connection, uncontrolled circuit
38.3b ALB test connection, controlled circuit
45.3 Breakaway valve, trailer brake



Hydraulic Dual-Circuit Brake with ALB Modulator and Compressed Air Assistance – Combined Single – and Dual-Line Trailer Brake System

Circuit Diagram

SA 35 617

Key to 1.13/1

A Hydraulics

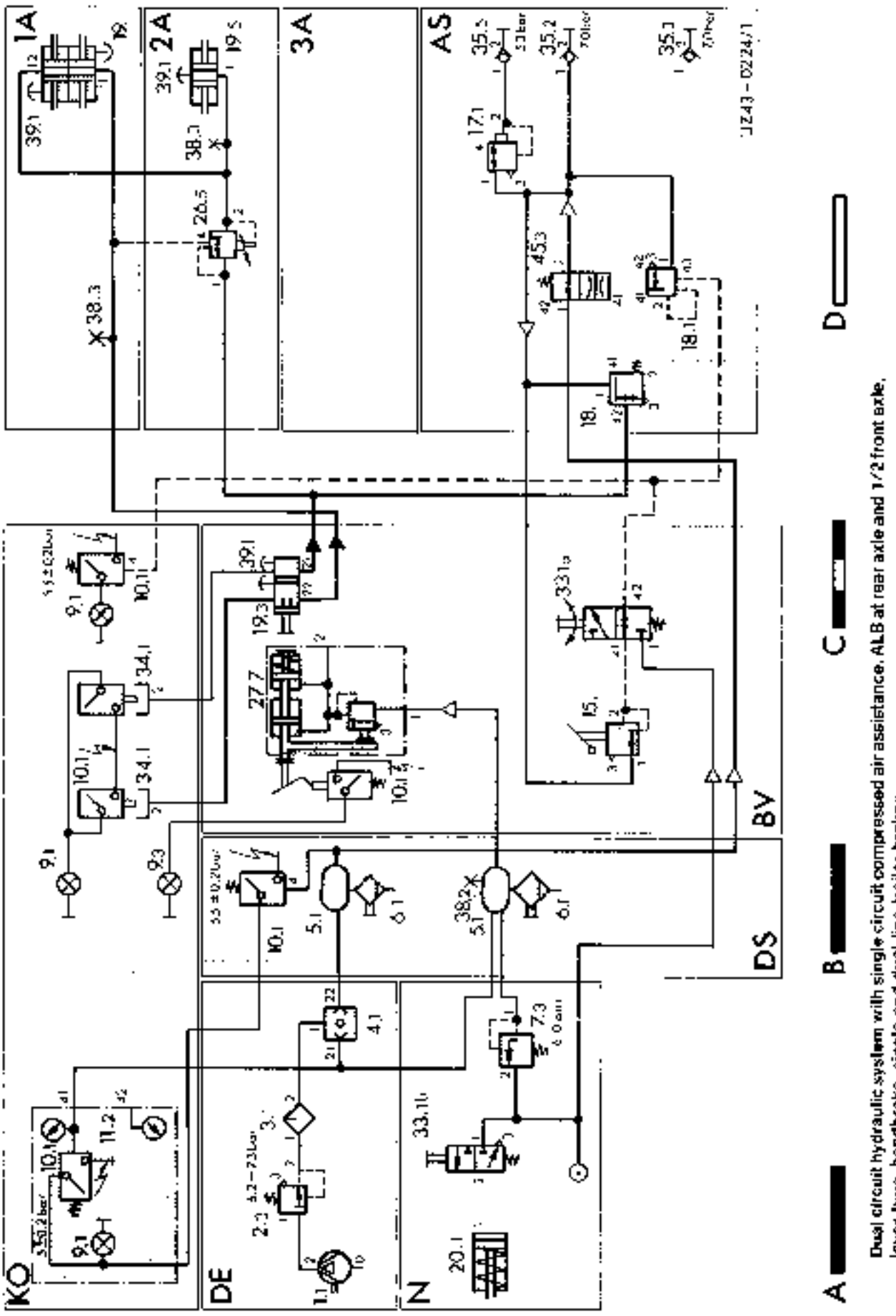
B Brake pressure

C Supply pressure

1. A = 1st axle
2. A = 2nd axle
AS = Trailer control
BV = Actuating valves
DS = Pressure reservoir
MB (N) = Engine brake
DR = Pressure generation
KO = Control switch

1.1 Air compressor
2.3 Pressure regulator
3.1 Defroster
4.1 Dual-circuit protection valve
5.1 Compressed air tank
6.1 Water separator
7.3 Overflow valve
9.1 Warning light, supply pressure
9.3 Brake light
10.3 Warning switch, brake fluid
11.2 Double pressure gauge
15 Handbrake valve
17.1 Trailer control valve (single-line)
18. Hydropneumatic control valve
18.1 Trailer control valve (dual-line)
19. Twin wheel brake cylinder
19.3 Tandem master brake cylinder
19.5 Wheel brake cylinder
20.1 Piston cylinder, differential lock
23. Compressed air brake booster
25.3 ALB modulator
28.1 Two-way valve
33.3 Control valve, differential lock
34.1 Brake fluid reservoir I and II
35.3 Coupling head, brake (dual-line)
35.4 Coupling head, supply (dual-line)
35.7 Coupling head (single-line)
35.2 Tire inflation/test connection
35.3 Test connection
39.1 Vent for hydraulic system
45.3 Breakaway valve, trailer brake

Function drawing



Dual circuit hydraulic system with single circuit compressed air assistance, ALB at rear axle and 1/2 front axle, lever-type handbrake, single and dual-line trailer brakes.

Key to 1.13/3

A	Hydraulic system
B	Supply pressure
C	Supply-control pressure
D	Brake pressure

1 A	First axle
2 A	Second axle
AS	Trailer control
BV	Actuating valve
DS	Accumulator
N	Auxiliary consumer
DE	Pressure generator
KO	Inspection device

1.1	Air compressor
2.3	Pressure regulator
3.1	Air/antifreeze pump
4.1	Dual circuit safety valve
5.1	Compressed air reservoir
6.1	Water separator
7.3	Overflow valve
9.1	Warning lamp
9.3	Braking light
10.3	Warning switch
11.2	Double pressure gauge
15.	Handbrake valve
17.1	Trailer control valve (1-line)
18.	Hydropneumatic control valve
18.1	Trailer control valve (2-line)
19.	Twin-wheel brake cylinder
19.3	Tandem-master brake cylinder
19.5	Wheel brake cylinder
20.1	Piston cylinder, differential lock
27.7	Compressed air brake servo unit
28.5	ALB-regulator
33.1a	Rotary knob valve, brake check
33.1b	Switch valve, differential lock
34.1b	Brake fluid reservoir circuit 1
34.1a	Brake fluid reservoir circuit 2
35.2	Coupling head, supply (2-line)
35.3	Coupling head, brake (2-line)
35.5	Coupling head (1-line)
36.2	Tire inflation/test connection
36.2	ALB-test connection
39.1	Bleed point for hydraulic system
45.3	Breakaway valve, trailer brake

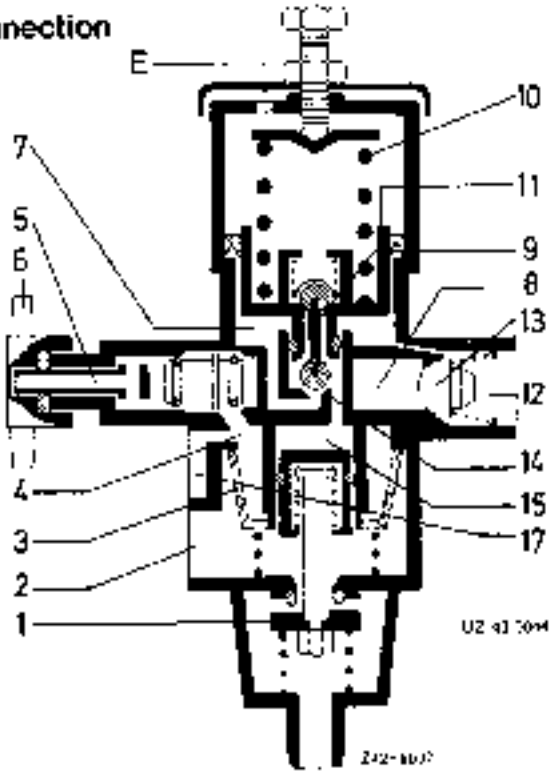
Pressure Regulator with Tire Inflation Connection

Operation

Air coming from the compressor is forced via connection (2) through filter (3), inlet (4) via chamber (7) past check valve (13) into the line to the air tank. When the cut-out pressure is attained, piston (11) is moved against spring (10). Breather (9) for chamber (15) is closed and intake (12) is opened. The pressure entering chamber (15) energizes the shut-off piston to open safety valve (1). The air compressor operates at no-load until pressure in chamber (8) drops below cut-in pressure. If this is the case, piston (11) returns, intake (12) is closed and chamber (15) evacuated. Safety valve (1) is closed and the air tank is filled.

To use tire inflation connection, unscrew cap (6). Valve (5) is opened when tire inflation hose is screwed on.

Note: For inflating tires, supply pressure must be below cut-in pressure 6.2 bar of pressure regulator.



1 Safety valve
2 Connection for air compressor
3 Filter
4 Inlet
5 Valve
6 Protective cap
7 Chamber
8 Chamber
9 Breather
10 Spring
11 Piston
12 Connection, air tank
13 Check valve
14 Inlet
15 Chamber
16 Connection, tire valve
E Breather

Removal and Installation

1 Make system pressureless prior to starting.

2 Loosen pipe connections of supply lines.

3 Unscrew fastening bolts on bracket for pressure regulator.

4 Remove pressure regulator.

5 Reassembly takes place in the reverse sequence.

Note: When reconnecting piping, use new sealing rings (fibre).

6 Check system for leaks (dab test points with soapy water).

Disassembly, Inspection and Assembly

1 Clean unit externally (P3 solution, compressed air).

2 Unscrew hose connection or filter housing after removing locking ring.

3 Remove filter element, carefully clean in Nitro M7 and re-install only when dry.

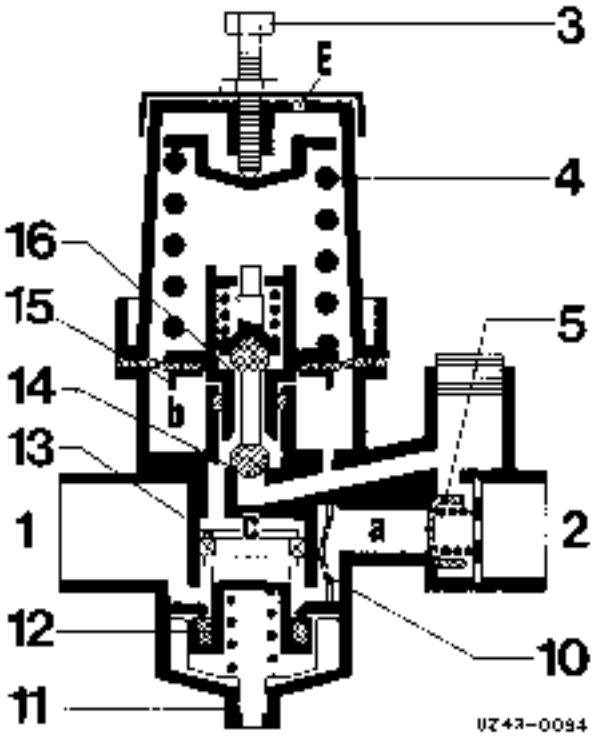
Note: Apart from removing filter housing, further disassembly of pressure regulator is not required for cleaning filter element.
Unit should be replaced in preference to reconditioning in the event of any functional trouble or damage.

Technical Data

Operating pressure			Thread connection	
Cut-out pressure	Cut-in pressure	Safety valve operates at	Air compressor	Compressed air tank
psi	bar	bar	mm	mm
7.3 ± 0.2	6.2 (ex. 6.8)*	10 ± 1	M 22 x 1.5	M 22 x 1.5

* Pressure regulator without tire inflation connection

Pressure Regulator without Tire Inflation Connection



1 Connection
(to compressor)
2 Connection to air tank
3 Adjusting screw
4 Compression spring
5 Check valve
10 Filter
11 Idle speed connection
12 Idle speed valve
13 Piston
15 Inlet
16 Diaphragm piston
10 Outlet
E Breather opening

Outlet (10) then closes and inlet (14) opens so that the compressed air in chamber b also flows into chamber c above piston (13). The subsequent downward movement of piston (13) opens idle speed valve (12). The air continuously supplied by the compressor can escape through the idle speed connection directly into the atmosphere. Piston (13) keeps idle speed valve (12) open due to the pressure still acting on the upper end in chamber c.

The air compressor continues operating at idle speed until the pressure in chamber b drops below the cut-in pressure of the pressure regulator due to the air consumption in the system. Diaphragm piston (16) is then pushed down again by compression spring (4). Inlet (14) closes and chamber c is evacuated via outlet (10) which opens as well as via breather opening E. The resulting relief of piston (13) closes idle-speed valve (12) and the air tank is then filled up again to cut-out pressure.

Note: Tire inflation connection 000 431 14 37 is at the same time the test connection and is located on the compressed air tank.

Operation

Compressed air coming from compressor is forced via connection (1) through filter (10) into chamber a and check valve (5), past connection (2) into line to air tank.

Simultaneously, the pressure is built up in chamber b below diaphragm piston (16), which is moved upward against compression spring (4) when the cut-out pressure is reached.

Maintenance

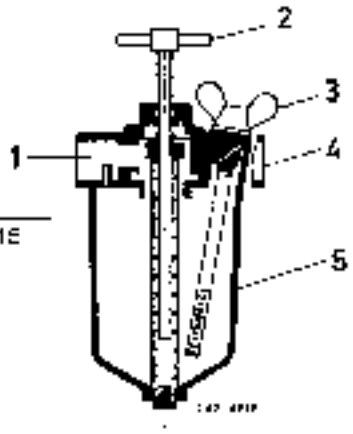
Depending on operating conditions – normally every three months – remove filter (10) after taking off bottom of housing, carefully clean in Nitro N7 and re-install only when dry. If the setting of the pressure regulator has changed, reset correct cut-out pressure 7.3 bar at adjusting screw (3).

Defroster

Part No.	Westinghouse Designation
000 431 21 15	432 199 010 0
000 431 26 15	432 199 030 0

Technical Data

	000 431 21 15	000 431 26 15
Defroster		
Oper. pressure max	10.0 bar	20.0 bar
Temperature range	– 30° C to + 70° C	– 40° C to + 90° C
Approved antifreeze	Ethyl alcohol (fuel alcohol) or denaturalized alcohol	
Container capacity	200 cc	



Defroster 00 431 21 15

1 Connection (pressure regulator)
2 Tommy handle
3 Dipstick
4 Connection connected to tank
5 Housing

Maintenance

For adding antifreeze and for checking the quantity of antifreeze still available – and in months free of frost – the rod is pushed with the Tommy handle against the throttle stop in housing and locked by turning 90°. The closing plug with dipstick is released and the antifreeze ethyl alcohol (fuel alcohol) is filled in. With the closing plug removed, a slight blowing-off caused by the pressure compensation bore is noticed. It is therefore recommended to use a funnel for filling, which should be slightly raised so that air can escape from the container. The filler hole is then closed again, the rod is unlocked with the Tommy handle and moved into the antifreeze position. When in operation, the fluid level must be checked with the dipstick which has a mark to indicate the maximum permissible level. Completely drain contents at least once a year during the autumn inspection and renew. Check regularly after specified service intervals and top up, if necessary. Prior to start of frosty weather clean inner parts of antifreeze unit.

Compressed Air Tank

Removal and Installation

1 Make system pressureless.

2 Unscrew pipeline from pressure regulator to tank.

3 Unscrew line to double pressure gauge and control valve.

4 Loosen exhaust pipe at rear on pipe clip and clamp at front and remove exhaust pipe.

5 Loosen clamps.

6 Remove compressed air tank downward.

7 Re-install in the reverse sequence.

Note: When reconnecting piping, use new seals (fibre).

8 Check system for leaks (dab test points with soapy water).

Inspection

Inspection essentially covers the following points:

1 General leak test (test pressure 9.0 bar in acc. with DIN 7428*).

2 No paint peeling off inside.

3 No welding spots on tank.

4 Rating plate fitted.

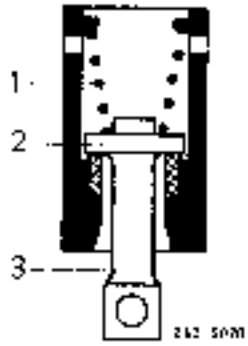
5 No dents or other external damage.

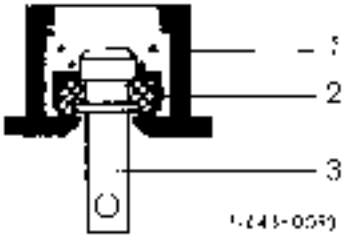
Note: A strict inspection should be made to eliminate any possibility of accidents caused by air brake failure. Do not exceed operating pressure of 7.3 bar.

Maintenance

Drain water from air tanks daily. The use of water drain valves is recommended, such valves are available for manual and for automatic operation.

Water Drain Valve





Technical data	Fig. 1	Fig. 2
Part No.	0004320207	0004320807
Westinghouse Designation	434307 0000	0343000010
Operating pressure in bar	6	20
Thread connection	M 22 x 1.5	

Installation Instruction

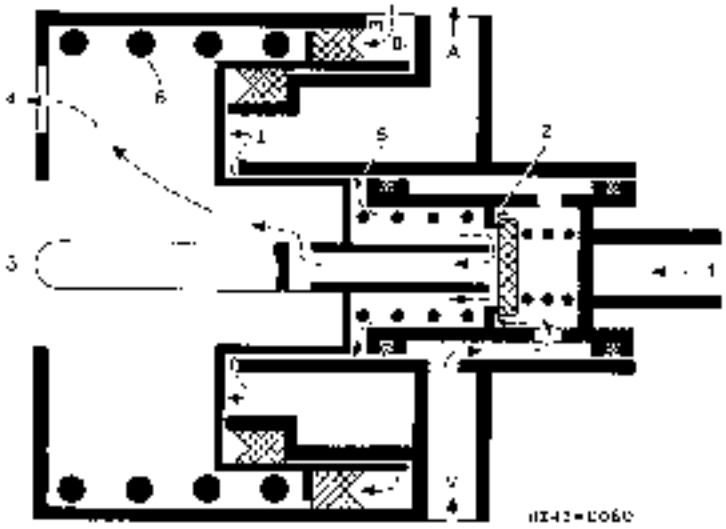
Water drain valve is screwed directly into bottom connection of tank and sealed by a compression and O-ring. To avoid risk of contamination from condensate, no equipment should be fitted below water drain valve.

Maintenance

The water drain valve does not require any special maintenance. In the event of contamination, unscrew from tank and clean.

Brake Booster

Part No.	Westinghouse Designation	
000 431 46 14	462 007 012 0	optic-
000 431 74 14	462 007 042 0	nal



Brake Booster Diagram

Technical Data

Operating pressure max	0.8 bar
Response pressure	0.4 bar
Volume of chambers I and II at max. stroke	0.6 l
Piston stroke	42 mm
Piston dia	145 mm
Thread connection	M 18 x 1.5 15 deep

Operation

If brake pedal pressure becomes effective at (1), the piston is displaced. After the piston has travelled 2.0–3 mm, valve (2) opens and permits compressed air coming from inlet connection V to enter chamber of stage 1. Previously, this valve had kept the passage toward breather (4) closed. This path becomes free only after the pedal pressure is released.

The pressure increase in chamber of stage 1 continues toward outlet A where the control line to changeover valve is connected to the end of the trailer (more recently 3/2-way valve). If valve is closed, second stage M does not receive any overpressure via return line and remains ineffective, i.e. the pulling vehicle is braked with less overpressure than the trailer.

If the valve is not closed, the overpressure increase will also energize the second stage.

When the brake pedal pressure reduces, spring (6) pushes both piston members back into no-load position and the compressed air escapes from stage 2 via control line M-A and gap at (5) and (2) via breather bore (4) into the atmosphere.

If for any reason the compressed air vacuum does not operate, a slight increase in pedal pressure will actuate plunger (3) to the master brake cylinder as soon as piston (1) comes to rest at gap (5). Increased pedal pressure is required to overcome spring force (6).

Installation Instructions

Brake pedal travel should always be long enough to ensure the minimum push-rod travel is achieved so that in event of damage to hydraulic brake circuit the compressed air trailer line can be fully utilized. In the released position the clearance between

Brake Booster

the piston of the master hydraulic brake cylinder and the piston rod of the single-chamber brake booster **must be at least** 1 mm so that the compensating bore in the master cylinder is definitely open. The stroke of the master brake cylinder should never be less than that of the brake booster since otherwise damage would result to the inner parts of the master brake cylinder. When the brake is correctly adjusted, the piston stroke is approx. 1/3 of the specified total stroke.

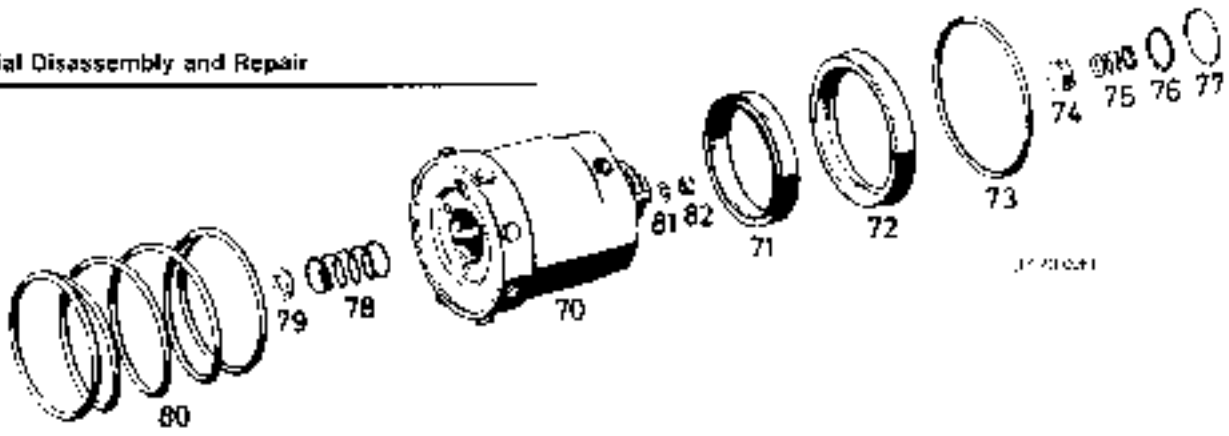
Removal and Installation

1 Remove master brake cylinder

2 Loosen compressed air connections on brake booster

3 Booster is removed without disassembling brake pedal. The three fastening nuts are accessible from pedal end (pay attention to snap rings)

Partial Disassembly and Repair



Spare parts for brake booster

1 Unscrew the eight fastening bolts M 8 for the cylinder base. (First mark position relative to housing)
Proceed carefully, since base is under spring pressure. If required, replace protective strainer in venting hole

2 Pull out entire piston group including plunger sleeve and sealing rings

3 Sleeve (71) can be pulled off and replaced

Clean internal parts only with ethyl alcohol!

4 Pull off large sleeve (72).
When assembling, this sleeve is introduced alone into housing which has previously been cleaned and slightly greased

5 Remove locking ring of control piston and pull thrust piece out of control piston
(Pay attention to cord sealing ring)

6 Remove spring and valve disk or replace. No further disassembly is required. Return units with major damage to manufacturer for repairs

7 Assembly is performed in the reverse sequence after checking individual components. First grease sliding surfaces of sleeves with special grease.

Note: Ensure that inside paint coat is **not** damaged.

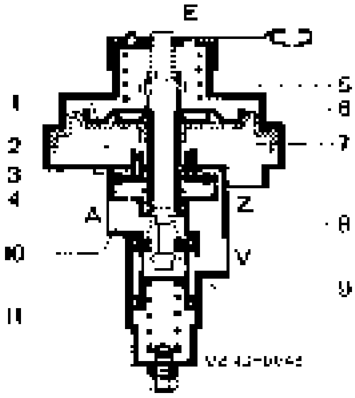
Regular bleeding of brake system is necessary to ensure that the brake booster operates properly

Trailer Control Valve, Air-Controlled

Part No.	Westinghouse Designation
000 431 70 05	471 200 112 0
000 431 71 05	471 200 113 0

Technical Data

Pressure drop in trailer control line at 1 bar in tractor brake system	2.0 – 2.5 bar
Trailer control line fully bled at tractor brake system pressure of	5.0 – 6.5 bar
Operating pressure max	7.35 bar



1 Chamber
2 Chamber
3 Graduating piston
4 Chamber
5 Compression spring
6 Diaphragm piston
7 Valve sleeve
8 Piston
9 Inlet
10 Outlet
11 Compression spring
A Connection trailer line
V Connection reservoir
Z Connection trailer control valve
E Breather

Trailer Control Valve

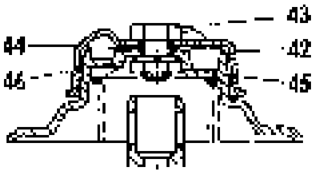
Removal and Installation

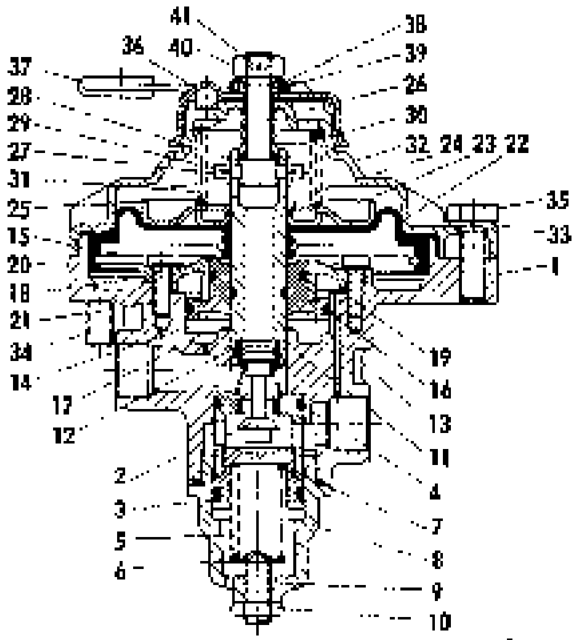
1 Make compressed air system pressureless.

2 Unscrew lines (3 off).

3 Force off actuating rod for handbrake at ball head after loosening locking clip.

4 Unscrew valve on bracket and remove.





Air-Controlled Trailer Control Valve

1 Housing
2, 3 Valve (compl.)*
3 Cap
4 O-ring 29.2 x 3*
5 Compression spring**
6 Cup spring
7 Sealing ring*
8 Cap
9 Stud M 10 x 30
10 Hexagon nut BM 10
11-12 Valve tappet, compl.**
12 Valve ring*
13 O-ring 17 x 2.5*
14 Piston
15 O-ring 29.2 x 3*
16 O-ring 44.2 x 3*
17 Locking ring 22 x 1.2
18 Support
19 Sealing ring*
20 Spring washer B 8
21 Cyl. bolt M 8 x 15
22 Cup sleeve*
23 Diaphragm disk
24 Locking ring 21 x 1.2
25 Diaphragm disk
26 Cap screw
27 Bolt M 11 x 34 x 27
28 Washer 4.4
29 Cotter pin 1 x 8
30 Compression spring**
31 Compression spring**
32 Cap
33 Sealing ring 10
34 Hexagon bolt M 10 x 50
35 Hexagon bolt M 10 x 35
36 Ball 11
37 Lever, compl.**
38 Bolt 4 H7
39 Running ring*
40 Castle nut M 10 x 1
41 Cotter pin 2 x 22
42 Cap**
43 Hexagon bolt M 10 x 15
44 Washer 10.5
45 Hexagon nut BM 10
46 Snap ring 20

* Wear parts
** These parts should be lubricated during repair

5 Reassembly is performed in the reverse sequence.

Note: Bleed trailer control line when handbrake reaches fourth detent. Adjustment is made by shortening or extending actuating rod between valve and handbrake intermediate lever.

(Reference dimension for adjustment: 115 mm between check nuts of actuating rod. Final adjustment depends on total of tolerances!)

6 Check system for leaks. (Dab test points with soapy water)

Note: Use only new sealing rings.

Disassembly, Inspection and Assembly

1 Clean valve externally (P3 solution, compressed air).

2 Remove cotter pin on castle nut (handbrake lever end) and loosen castle nut.

3 Remove running ring with balls.

4 Remove lever.

5 Unscrew four hexagon bolts on housing and remove cover.

Note: Caution, cover is under spring pressure.

6 Remove spring.

7 Remove cap screw. For this purpose, remove cotter pin, washer and bolt.

8 Remove large diaphragm disk, loosen locking ring, remove small diaphragm disk and remove cup sleeve.

9 Unscrew exposed socket head bolts.

10 Remove support with sealing rings and valve tappet.

11 Remove valve tappet from support.

12 Unscrew cap.

13 Remove compression spring and spring disk.

14 Remove valve from housing.

15 Check all parts for wear and replace, if necessary.

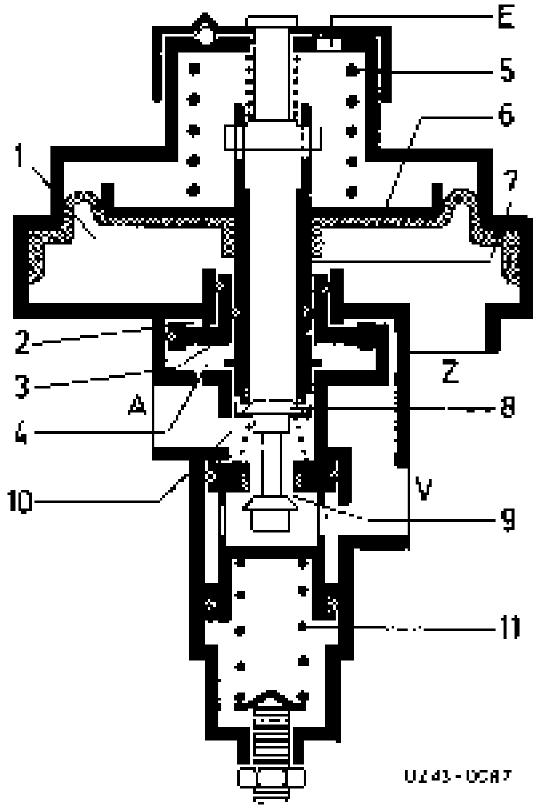
16 Assembly takes place in the reverse sequence.

Trailer Control Valve (1-Line)

Part No	Westinghouse Designation
000 431 49 05	471 200 008 0

Technical Data

Operating pressure and test pressure	bar 7.25
Pressure reduction for trailer	bar 5.2 + 0.2
Pressure drop at connection (A) with 1.0 bar at connection (Z)	bar 2–2.5
Pressure at connection (A) 0 bar with gauge pressure at connection (Z)	bar 5–5.6
Thread size	M 22 x 1.5



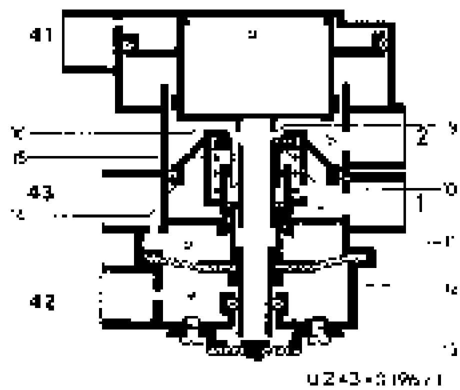
1 Chamber
2 Orifice
3 Graduating piston
4 Orifice
5 Compression spring
6 Diaphragm
7 Valve sleeve
8 [illegible]
9 Inlet
10 Chamber
11 Compression spring
A Connection trailer brake line
V Connection compressed air tank
Z [illegible]
E Breather

Trailer Control Valve (2-Line)

Part No.	Westinghouse Designation
001 431 37 05	973 002 402 0

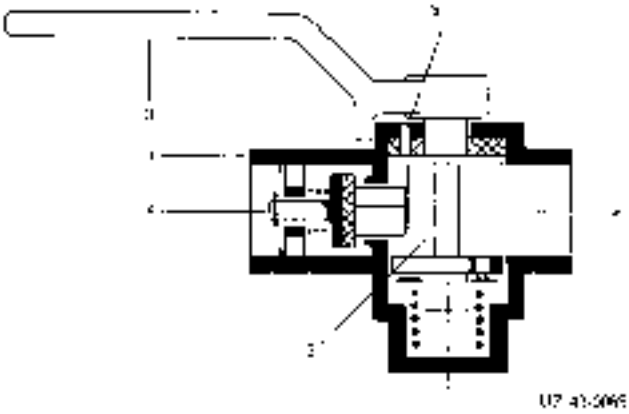
Technical Data

Operating pressure max	8.0 bar
Gauge pressure in trailer brake line (connection 2) at operating brake pressure (connection 4) of 1 bar	1.0 bar
Adjusting range of lead max.	1.0 bar
Thread of line connections	M 16 x 1.5 - 12 deep



1 Supply
2 Trailer brake
4 Control (pneumatically actuated)
5 Control (actuated by [illegible])
6 [illegible] valve
7 Piston
8 Compression spring
9 Outlet
10 Valve
11 Piston seat
12 Diaphragm
13 [illegible]
14 Piston
15 Inlet
16 Piston
17 Adjusting screw

Shutoff Valve



07-43-066

1 Housing
2 Camshaft
3 Lever
4 Valve
5 Evacuation

Part No	Westinghouse Designation
000 429 10 31	452 002 007 0
000 429 14 31	452 002 107 0

Technical Data

Operating pressure max	8 bar
Version	Handle deflects 90° in both directions
Thread connection	M 22 x 1.5

Installation Instructions

The shutoff valve is located in front of the rear coupling head of tractor unit. Observe flow rate (direction of arrow). Install in such a manner as to ensure access to and operate of handle

Disassembly, Inspection and Assembly

(Shutoff valve removed)

1 Clamp shutoff valve in vice (input connection on top).

2 Unscrew guide nut for valve stem and remove valve assembly

3 Change position of housing in vice (bottom closure up).

4 Unscrew closing plug (pay attention to sealing ring), remove spring

5 Change position of housing in vice (handle up)

6 Force cross pin out of handle and knock camshaft out in downward direction including sealing washer

7 Clean all parts, replace damaged parts.

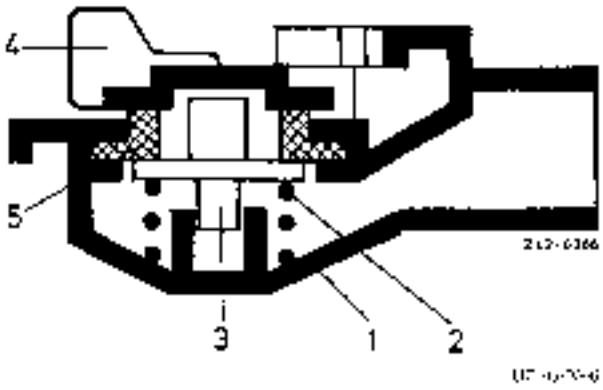
8 Assembly takes place in the reverse sequence Slightly grease all parts first

Coupling head (1-line)

Part number		Westinghouse designation
000 429 27 30	optional	133 966 09 E
000 429 28 30		452 200 004 0

Technical data

Working pressure max.	6.0 bar
Complies with: standard	A DIN 74 294



1 Housing
2 Spring
3 Valve
4 Closing cover
5 Sealing ring

Maintenance

The coupling head needs no special maintenance. When coupling up ensure that the sealing surface are clean and close correctly. Damaged sealing rings are to be replaced.

Coupling head (1-line)

Part number	Knorr designation
000 429 48 30	KU 41 09

Technical data

Service overpressure max.	8.0 bar

Maintenance

The coupling head needs no special maintenance. When coupling up ensure that the sealing surface are clean and close correctly.

Installation instructions

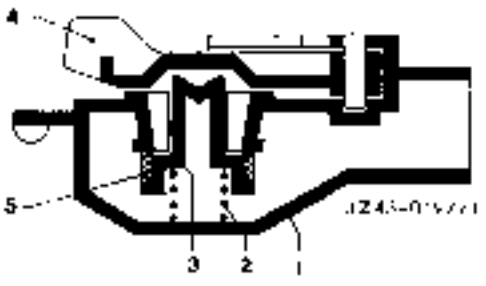
Pointing in direction of travel, the coupling head is positioned to the right of the trailer coupling so that the opening points to left.

Coupling head automatic (1-line)

Part number	Westinghouse designation
00 429 68 30	452 303 011 0

Technical data

Working pressure max.	8,0 bar
Thread connection	M22 x 1.5



1 Housing
2 Spring
3 Valve
4 Closing
5 Gland ring

Coupling head (2-line) with valve

Part number	Westinghouse designation *)
000 429 80 30	952 200 221 0 Supply line
000 429 81 30	952 200 222 0 Brake line

Technical data

Working pressure max. 10 bar
Threaded connection M 16 x 1.5

Supply line **Brake line**

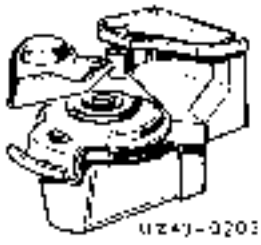
Maintenance

When coupling up, ensure that the sealing surfaces which touch are clean. Damaged sealing rings are to be replaced.

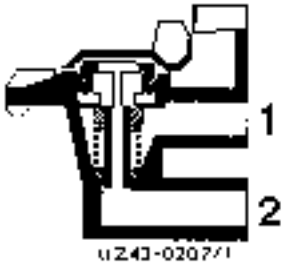
*) Both coupling heads may also be used optionally

Coupling head (2-line) with valve and two connections

Part number	Westinghouse designation
000 429 78 30	952 200 210 0



Supply line



1 Connection
2 Connection

*) Both coupling heads may also be used optionally

Technical data

Working pressure max.	10 bar
Threaded connection	M 16 x 1.5

Maintenance

When coupling up, ensure that the sealing surfaces which touch are clean. Damaged sealing rings are to be replaced.

Pressure Control Valve

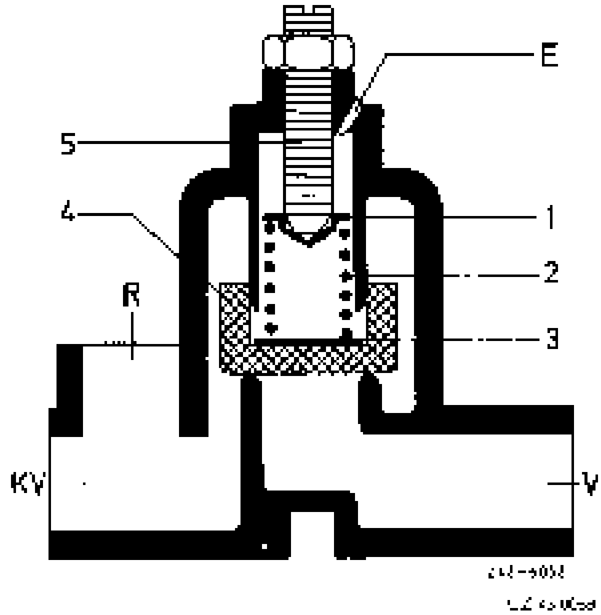
Part No.	Westinghouse Designation
000 429 14 44	434 400 000 0

Technical Data

Operating pressure max	8.0 bar
Free passage max.	12 mm dia. = 1.13 cm²
Opening pressure	4.5 ± 0.2 bar
Closing pressure	4.0 ± 0.3 bar
Thread Connection	M 22 x 1.5

Installation Instructions

Install pressure control valve with adjusting screw pointing downward.



1 [illegible]
2 Spring
3 [illegible]
4 Sleeve
5 Adjusting screw
V [illegible]
KV [illegible]
R [illegible]
E [illegible]

Relay Valve

Part No.	Westinghouse Designation
000 429 64 44	473 010 000 0
000 429 68 44	473 011 000 0
001 429 21 44	473 017 000 0

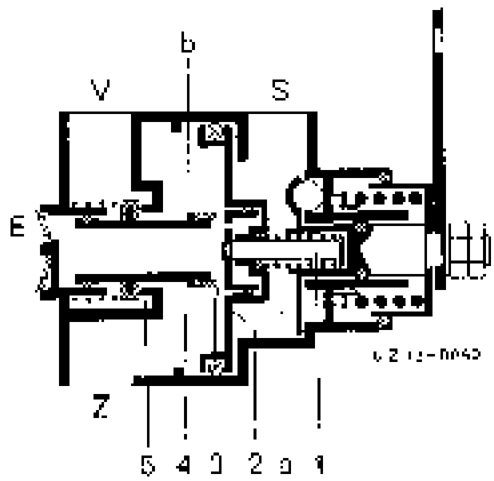
Technical Data

Operating pressure max	8.0 bar
Response range	0.2 – 0.4 bar
Nominal width	15 mm
Thread connection	M 22 x 1.5 – 14 deep

Installation Instructions

The relay valve must be installed close to coupling head so that trailer brake lines to be charged with air are as short as possible. The valve must be connected to the handbrake linkage and can be arranged vertically (bleed hole downward) or horizontally.

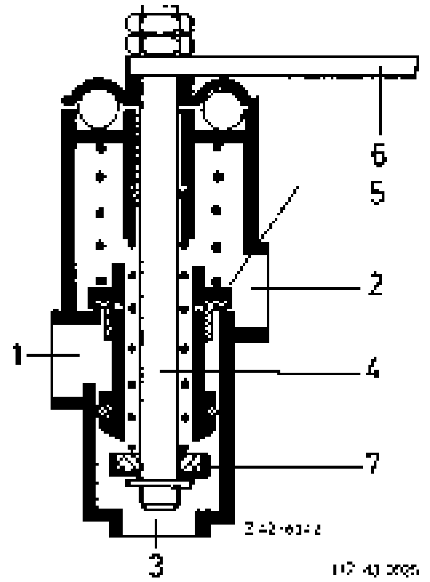
If required, the handbrake lever of the valve can be moved out of the basic position into two additional starting positions by swivelling 120° in each case.



1 Tappet
2 [illegible]
3 [illegible]
4 [illegible]
5 [illegible]
a Chamber
b Chamber

Connections:
S [illegible]
V Supply tank
Z [illegible]
E [illegible]

Handbrake Valve (Dual-Line)



1 Connection, compressed air line
2 Connection, relay valve or trailer brake line
3 Bleed hole
4 Valve rod
5 Brake valve
6 Lever
7 Outlet valve

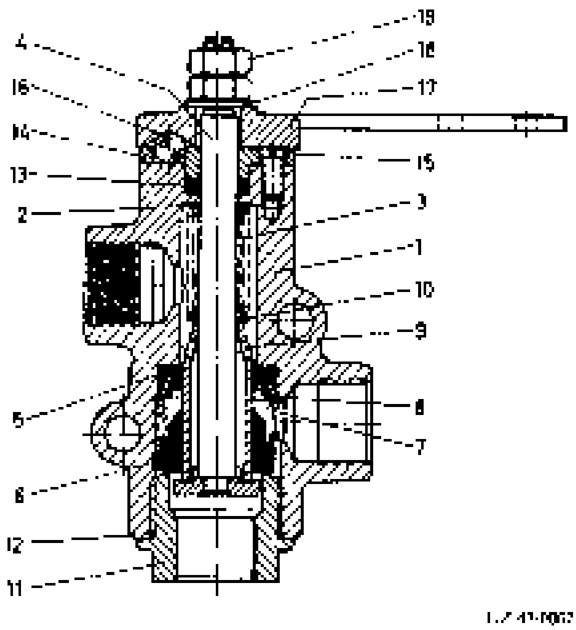
Part No.	Westinghouse Designation
000 430 30 81	461 702 001 0

Technical Data

Operating pressure max	8.0 bar
Nominal width	12 mm ∅ = 113 mm²
Thread connection	M 22 x 1.5 – 12 deep

Installation Instructions

Valve is installed in brake line toward relay valve as through valve and connected to handbrake linkage.



1 Housing, compl.
2 Washer
3 Compression spring**
4 Pull rod
5 Slot ring (with support)*
6 Valve*
7 Compression spring**
8 Supporting ring
9 Piston
10 Washer
11 Cap
12 Round cord ring 25 x 3*
13 Round cord ring 5.2 x 2.5*
14 Ball cage**
15 Hexagon bolt M 5 x 12
16 Anti-S ring 1..
17 Lever**
18 Washer 6.4
19 Hexagon nut M 6

* Wear parts
** These parts should be replaced during repairs

Disassembly, Inspection and Assembly

1 Clean valve externally (P 3 solution, compressed air).

2 Clamp valve in vice (handbrake lever up).

3 Unscrew check nut and hexagon nut and remove lever.

4 Change position of valve in vice.

5 Unscrew cap.

6 Pull out with rod with compression spring (larger), valve, piston and compression spring (small).

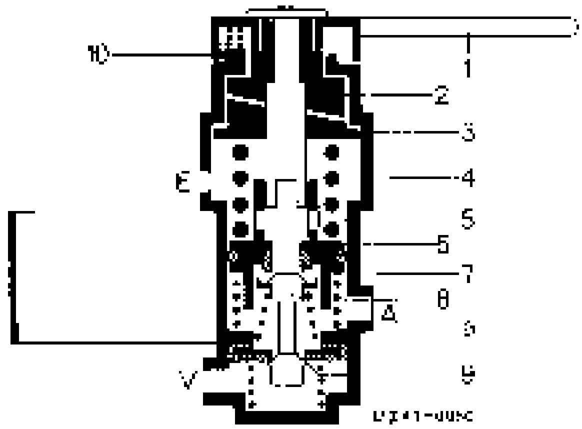
7 Remove slot ring with supporting ring from housing.

8 Check parts and, if necessary, replace.

9 Re-assembly takes place in the reverse sequence.

Handbrake Valve (Dual-Line)

Part No.	Westinghouse Designation
000 431 02 15	461 704 025 0



1 Hand lever
2 [illegible]
3 Lower thrust piece
4 Compression springs
5 Bore
6 Piston
7 Outlet
8 Double cone valve
9 Inlet
10 Clamping piece

■ Chamber
Connections
V Supply tank
A Trailer line
E Bleed hole

Technical Data

Operating pressure max.	7.5 bar
Transmitted pressure max.	4.5 ± 0.5 bar
Nominal width	8 mm
Thread connection	M 22 x 1.5 - 12 deep

Installation Instructions

Handbrake valve is installed as a through-valve in brake line toward relay valve and is connected to handbrake linkage via a brake cylinder.

A pipe or hose may be connected at connection E (bleed hole) to dissipate the air escaping when releasing the brake directly into the atmosphere to prevent any noise disturbance.

Single-Chamber Brake Cylinder (Piston Cylinder)

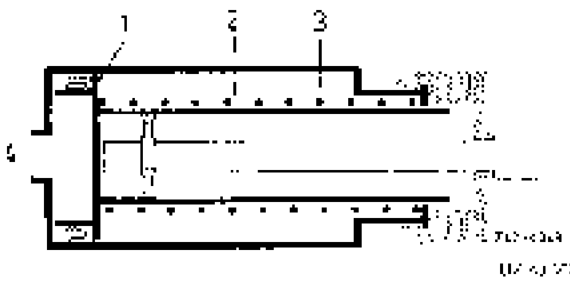
Part No.	Westinghouse Designation
000 420 62 24	421 002 000 0
000 420 70 24	421 021 000 0

Technical Data

Westinghouse Designation	Piston dia. mm	Piston stroke mm	Piston force in N at 6.0 bar
421 002 000 0	80	110	2450
421 021 000 0	65	90	1450

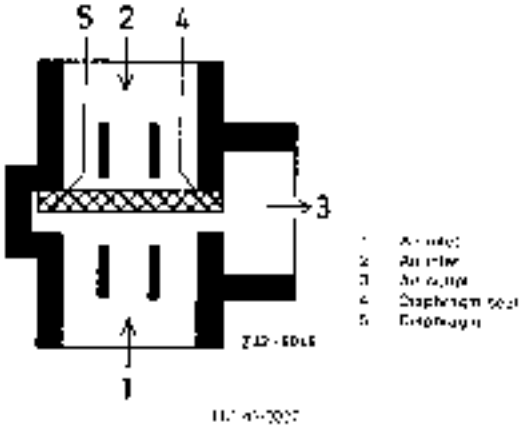
Inspection

The brake cylinder is designed for a response pressure of 0.3 bar. If the response pressure exceeds 0.5 bar, an internal inspection is required. With the wheel brake correctly set, the piston stroke is 1/3 of the possible total stroke. The angle between piston rod and brake wrench should be approx. 90° during full braking operation.



1 Piston
2 Push rod
3 Spring
4 Compressed air [illegible]

Two-Way Valve

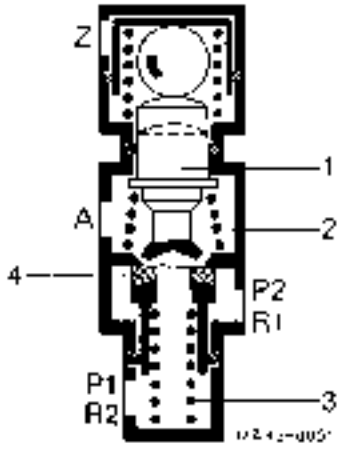


Part No.	Westinghouse Designation
000 429 40 44	434 202 000 0

Technical Data

Operating pressure max.	15 bar

Three-Way-Valve



Part No.	Westinghouse Designation
000 429 68 44	371 020 000 0

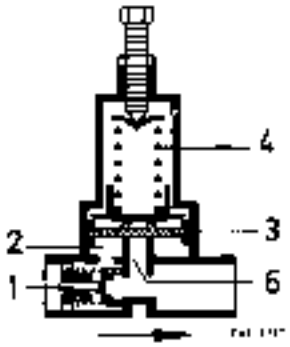
Technical Data

Operating pressure max	10 bar

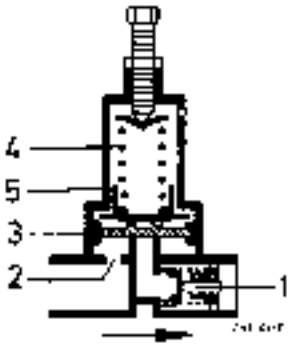
Overflow Valve

Technical Data

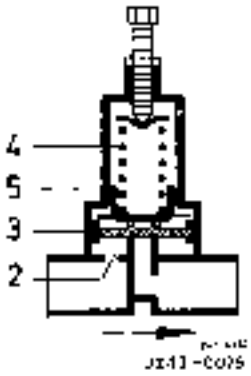
Part No.	Westinghouse-Designation	Overflow pressure bar	Operating pressure max. bar
000 429 03 44	434 100 104 0 without return flow	5.5	8.0
000 429 04 44	434 100 102 0 without return flow	4.5	8.0
000 429 72 44	434 100 203 0 with limited return flow	4.0	8.0
000 429 78 44	434 100 103 0 without return flow	6.0	8.0



with return flow



without return flow



with limited return flow

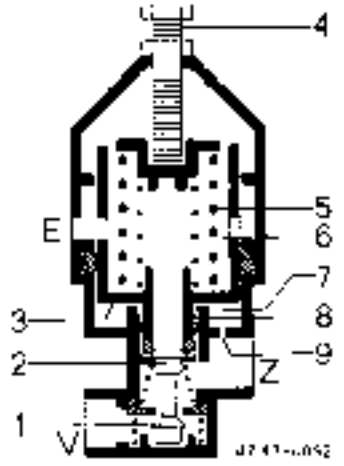
1 Check valve 2 Body 3 Diaphragm 4 Adjusting spring 5 Piston 6 Bore

Pressure Reduction Valve

Part No.	Westinghouse-Designation
000 429 45 44	475 003 005 0
001 429 17 44	475 010 003 0

Technical Data

Operating pressure max. (high-pressure inlet)	10.0 bar
Transmitted overpressure (low-pressure line)	5.7 bar
Thread connection	M 22 x 1.5 – 12 deep



Installation Instructions

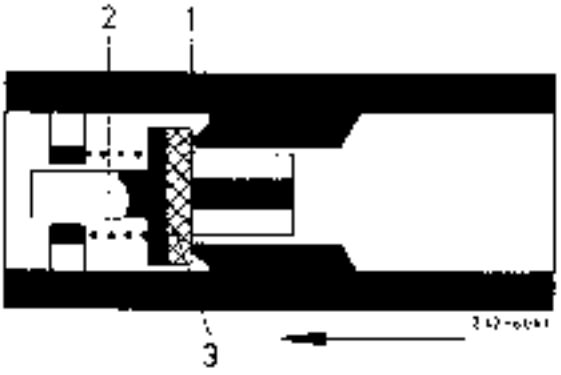
Always install valve vertically with adjusting screw on top.

If necessary, lower half of valve and valve cap can be offset by 90° each relative to each other.

1 Inlet valve
2 Outlet valve
3 Valve
4 Adjusting screw
5 Adjusting spring
6 Chamber
7 Diaphragm
8 Piston rod
9 Bore

Connections
X High-pressure line
Z Low-pressure line
V Breather bore

Check Valve



1 Housing 2 Piston 3 Sleeve

Part No.	Westinghouse Designation
000 429 04 44	434 014 000 0

Technical Data

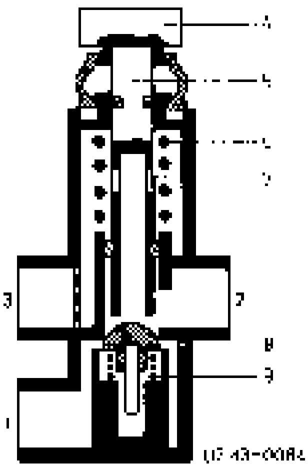
Operating pressure max	20 bar
Thread connection	M 22 x 1.5

Installation Instructions

The valve is installed in such a manner that the arrow in the housing indicates the direction of flow.

Engine Brake Valve

Part No.	Westinghouse Designation
000 434 05 01	463 013 010 0



1 Connection supply
2 Connection actuating cylinder
3 Breather
4 Actuating knob
5 Tappet
6 Spring
7 [illegible]
8 Intake valve
9 Spring

Technical Data

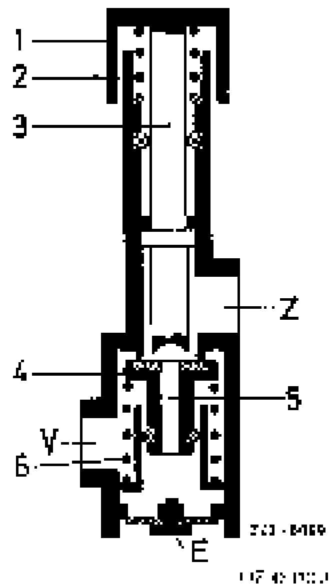
Operating pressure	max. 10.0 bar
Thread connection	M 12 x 1.5

Inspection

Check unit for leaks in actuating and release position. A slight leak may show up during actuation of valve tappet (5).

Charging Valve

Part No.	Westinghouse Designation
000 430 04 09	463 037 000 0



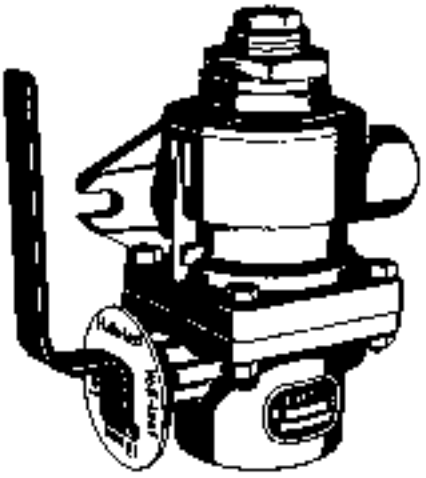
Technical Data

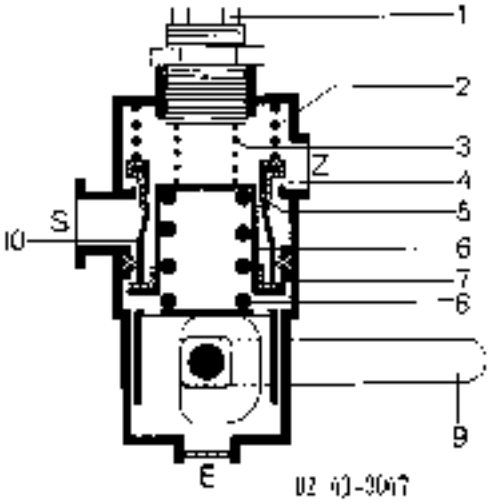
Operating pressure	8.0 bar
Thread connection	M 12 x 1.5

1 Actuating knob
2 Springs
3 Tappet
4 Intake valve
5 Bore
6 Compression spring
Z Connection power cylinder
V Connection compressed air tank
E Breather

Brake Force Regulator

Part No. 004 431 32 12 **Westinghouse Designation** 475 601 014 0





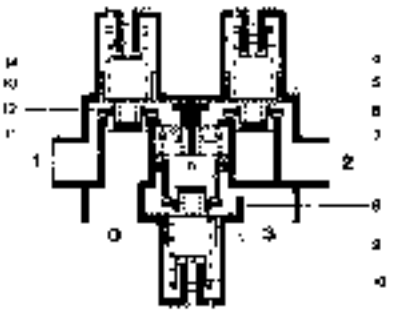
1 Adjusting screw
2 Spring
3 Screw
4 Inlet
5 Screw
6 Piston
7 Outlet
8 Spring
9 Adjusting lever
10 Valve body
E Breather hole
S Connection, main brake valve
Z Connection, parking brake valve

Technical Data

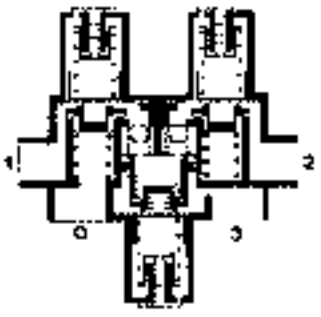
Operating pressure max		5.3 bar	7.35 bar
Brake cylinder pressure in position	"No load"	1.4 to 1.7 bar	2.0 to 2.3 bar
	"Half load"	3.0 to 3.6 bar	3.0 to 4.2 bar
	"Full load"	Air tank pressure	Air tank pressure
	Release"	0	0
Adjusting range in position	"No load"	1.4 to 2.3 bar	1.4 to 2.5 bar
Thread connection		M 22 x 1.5 16 deep	

Three-Circuit Protection Valve

Part No.	Westinghouse Designation
001 431 26 06	424 701 040 0



Version 1



Version 2

0 Connection pressure regulator
1 Connection brake circuit I
2 Connection parking circuit I
3 Connection circuit III
4 Compression spring
5 Diaphragm
6 Valve
7 Check valve
8 Valve
9 Diaphragm
10 Compression spring
11 Check valve
12 Valve
13 Diaphragm
14 Compression spring

Technical Data

Operating pressure	max.	20 bar
Version II Opening pressure (= assured pressure)	circuit I circuit II	$5_{-0.5}$ bar
	circuit III	$5.5_{-0.5}$ bar

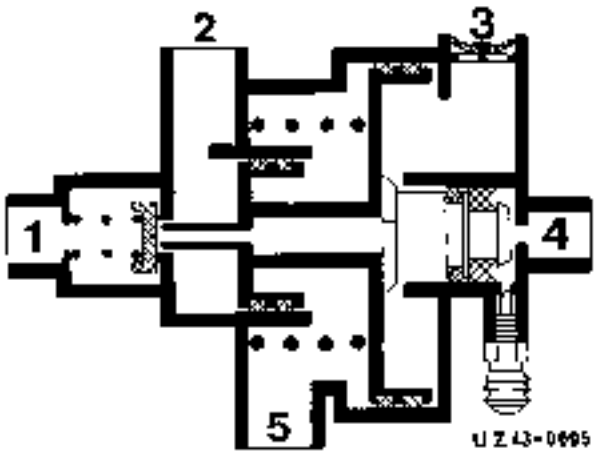
With the brake circuits intact, valves 10 and 12 are held open above preset opening pressure by means of compression springs acting in direction of opening (upward) so that with a slight pressure drop in circuit I or II the pressure may flow from the circuit with the higher pressure to the other one reducing the cut-in frequency of the pressure regulator.

Hydropneumatic Control Valve

Part No.	Westinghouse Designation
000 431 30 13	470 013 000 0

Technical Data

Operating pressure max.	13 bar (compressed air) 140 bar (hydraulic)
Hydr. operating volume	1.3 cm³
Thread connection	M 16 x 1.5/M 12 x 1



1 Supply (compressed air)
2 Connection trailer control valve
3 Breather
4 Hydr. + compressed air (140 bar)
5 Pneumatic brake cylinder (13 bar)

Operation

Normal: With the entire system intact, supply air flows to connection 5 from compressed air brake booster and continues to flow to trailer control valve via connection 2 compressed air.

Special: In the event of air failure (connection 5 pressureless), connection 4 is hydraulically actuated and since with trailer attached, connection 1 is always connected to supply air, compressed air is passed toward trailer control valve via connection 2

Survey	Version
Electrical installation 421 (engine 61R)	54.9
Electrical installation 421,411	15/54

Contents

Technical data

Battery		Series	SA 35 613 until Sept. 81	SA 35 613 from Sept. 81
Voltage Volt		12	24	24
Capacity Ah		88	2 x 55	2 x 70
Electrolyte level over upper edge of electrode			10 12	
Charging current	with first charge	max. 5%	of battery capacity	
	normal when recharging	** max. 10%		
	with quick charge	to 75%		
Maximum temperature			40 °C	
Maximum temperature	Tropics		50 °C	
	Fully charged	−70 °C (for tropics −40 °C)		
	Half charged	25 °C (for tropics −15 °C)		
	discharged	6 °C (for tropics −6 °C)		

Electrolyte density (normal)

The operability of the battery is closely recognizable from the electrolyte density

Electrolyte density after Baume	Specific weigth	Charging state of the battery
32° Bé	1.285	Fully charged
22° Bé	1.18	Half charged
10.6° Bé	1.08	empty, immediately charge

[illegible]

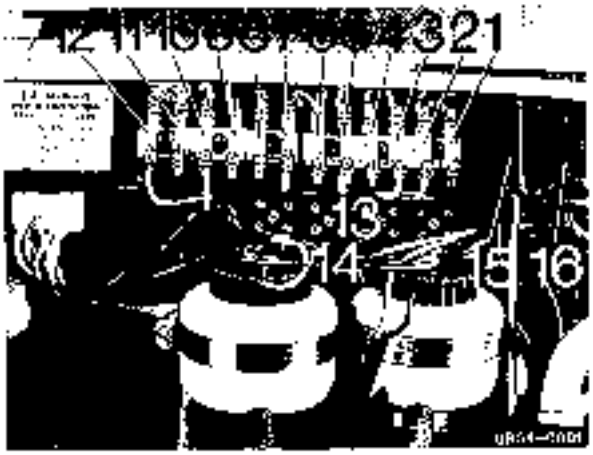
[illegible]

Electrolyte denslily (tropics)

at 20 °C		at 30 °C		at 40 °C		
Electrolyte density	Specific weigth	Electrolyte density	Specific weigth	Electrolyte density	Specific weigth	Charging state
27.9° Be	1.24	26.9° Bé	1.23	26° Be	1.22	well charged
22° 21° Be	1.19 – 1.17	22° – 20° Bé	1.18 1.16	21° 19° Bé	1.17 1.15	half charged
14.2° – 10.6 Bé	1.11 – 1.08	13° 9.40 Bé	1.10 1.07	11.2° – 8.0 Bé	1.09 – 1.06	empty immediately charge

Fuse boxes and cable connectors

1 to 12 fuses
13 Cable connector
14 Plug connection, warning lamp (brake fluid)
15 Plug connection, main cable harness
16 Plug connection, headlamp



Fuses according to DIN 72581

No.	Power consumer	Current A
1	Parking/side-marker lamp, right	8
2	Parking/side-marker lamp, left	8
3	Headlamp-low beam, right	8
4	Headlamp-low beam, left	8
5	Headlamp-main beam, right	8
6	Headlamp-main beam, left	8
7	Brake lamp/interior lamp/blower	16*
8	Horn/windscreen wiper	8
9	Indicator lamp/transistor-pin counter	8
10	Rear lamp right, speedometer lamp	8
11	Rear lamp left, instrument cluster lamp	8
12	Hazard warning lamp/sockets	8
-	Windscreen heated	25
*	in 24-volt system 8 Amp.	-

Bulbs according to DIN 72601

Power consumer	Output at 12 V W	Output at 24 V W	Shape acc. to DIN 72601
Main headlamp	45/40	55/50	A
Auxiliary headlamp	45/40	-	A
Parking light	4	4	H4
Side-marker lamp	4	4	H1
Indicator lamp front	21	21	P25-1
Indicator lamp rear	21	21	P25-1
Rear lamp	10	10	G
Brake lamp	21	21	P25-1
Instrument cluster lamp	2	2	H
Speedometer lamp	2	2	H
Revolution counter lamp	2	2	H
Interior lamp	10	10	K
Working lamp at rear	25	-	F
Windscreen heated	1.2	1.2	W 5/12
Rotating beacon	45	45	U
Reversing lamp (1)	35		D
Reversing lamp (2)	21		P25-1
Position lamp (export)	2	4	H
(1) to chassis End no.			
(2) from chassis End no.			

Electrical circuit diagram

Key to 1.2/3
From chassis end no. 000090

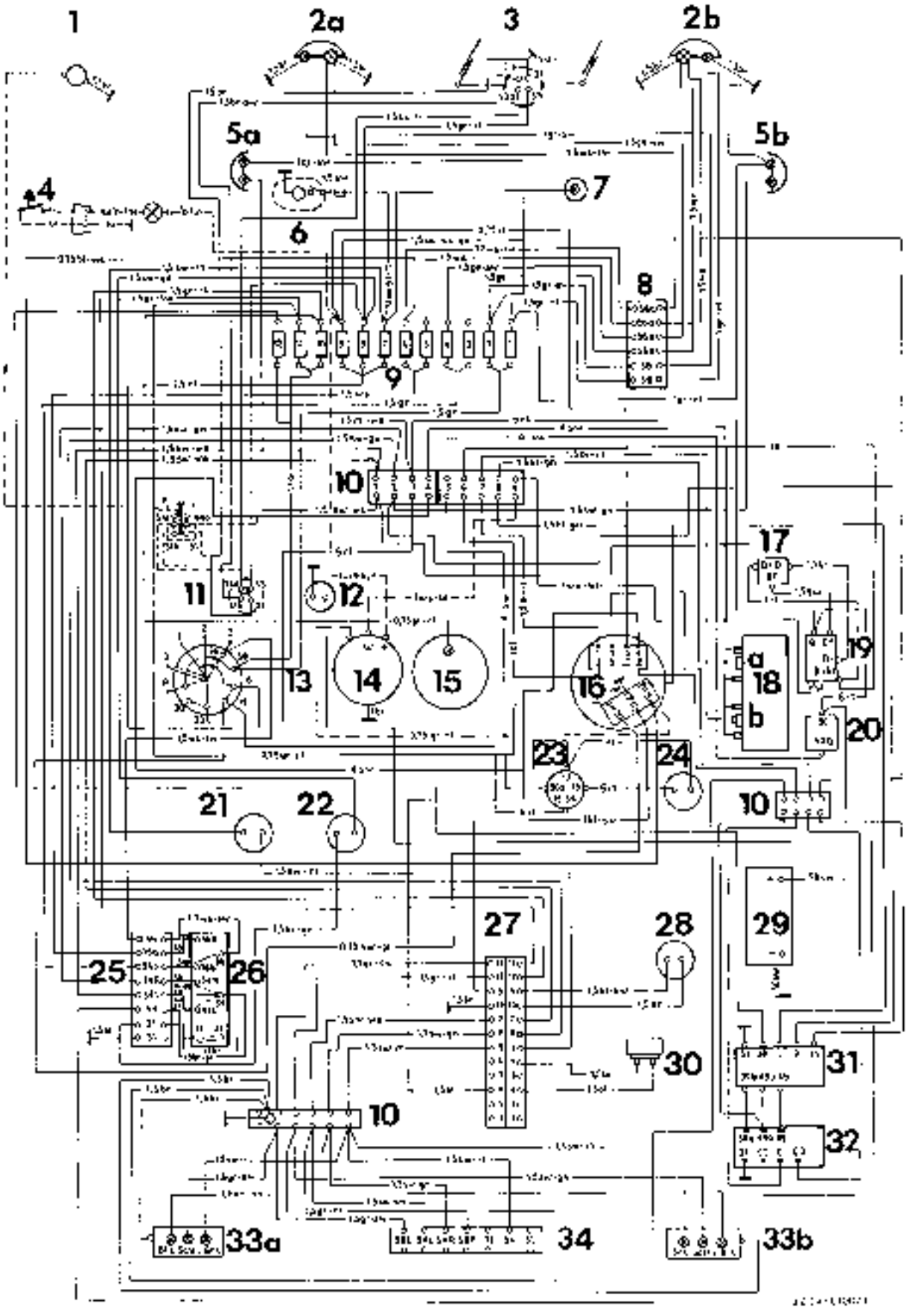
1 Motor for windscreen washer
2a Main headlamp left
2b Main headlamp right
3 Windscreen wiper
4 Warning lamp for telescopic cylinder
5a Indicator Marker lamp left
5b Indicator marker lamp right
6 Blower for heating and ventilation
7 Interior lamp
8 Plug connection
9 Fuse box
10 Cable connector
11 Windscreen wiper-switch
12 Lamp for second trailer
13 Switchbox
14 Transistor-rpm counter
15 Tachograph
16 Instrument cluster
17 Regulator (not in alternator with integrated regulator)
18 Engine
18a Oil pressure pickup
18b Coolant temperature pick up
19 Alternator
20 Starter motor
21 Stop light switch
22 Horn
23 Glow plug and starter switch
24 Glow plug indicator
25 Plug connection
26 Blink-horn-dimmer switch
27 Plug indicator connection
28 Fuel tank capacity pickup
29 Battery (12 V, 88 Ahs)
30 Pressure switch
31 Hazard warning flasher switch
32 Warning flasher
33a Indicator/rear/brake lamp left
33b Indicator/rear/brake lamp right
34 Trailer socket

_ Series
------- Special version
⏚ Ground

Colour codes of the leads

b	blue
br	brown
ge	yellow
gr	grey
gn	green
li	lilac
rt	red
sw	black
ws	white

Electrical circuit diagram[1] from chassis end no. 006 090
(to chassis end no. 006 089 see 15/54-0/3 and 15/54-0/4a)



[1] not valid for model 129/129

SA 35.613

Electrical circuit diagram

Model 128/129

Key to 1.1/4

1a	Main headlamp left
1b	Main head amp right
2	Windscreen wiper
3a	Indicator/marker lamp left
3b	Indicator/marker lamp right
4	Plug connection
5	Fuse box
6	Cable connector
7	Windscreen wiper-switch
8	Flasher unit
9	Switchbox
10	Speedometer
11	Instrument cluster
12	Regulator (not in alternator with integrated regulator)
13	Engine
13a	Oil pressure pickup
13b	Coolant temperature pick-up
14	Alternator
15	Starter motor
16	Brake lamp-switch
17	Horn
18	Glow plug and starter switch
19	Glow plug indicator
20	Plug connection
21	Indicator horn dimmer switch
22	Plug connection
23	Fuel tank capacity pickup
24	Battery
25a	Indicator/rear/brake lamp left
25b	Indicator/rear/brake lamp right
26	Trailer socket

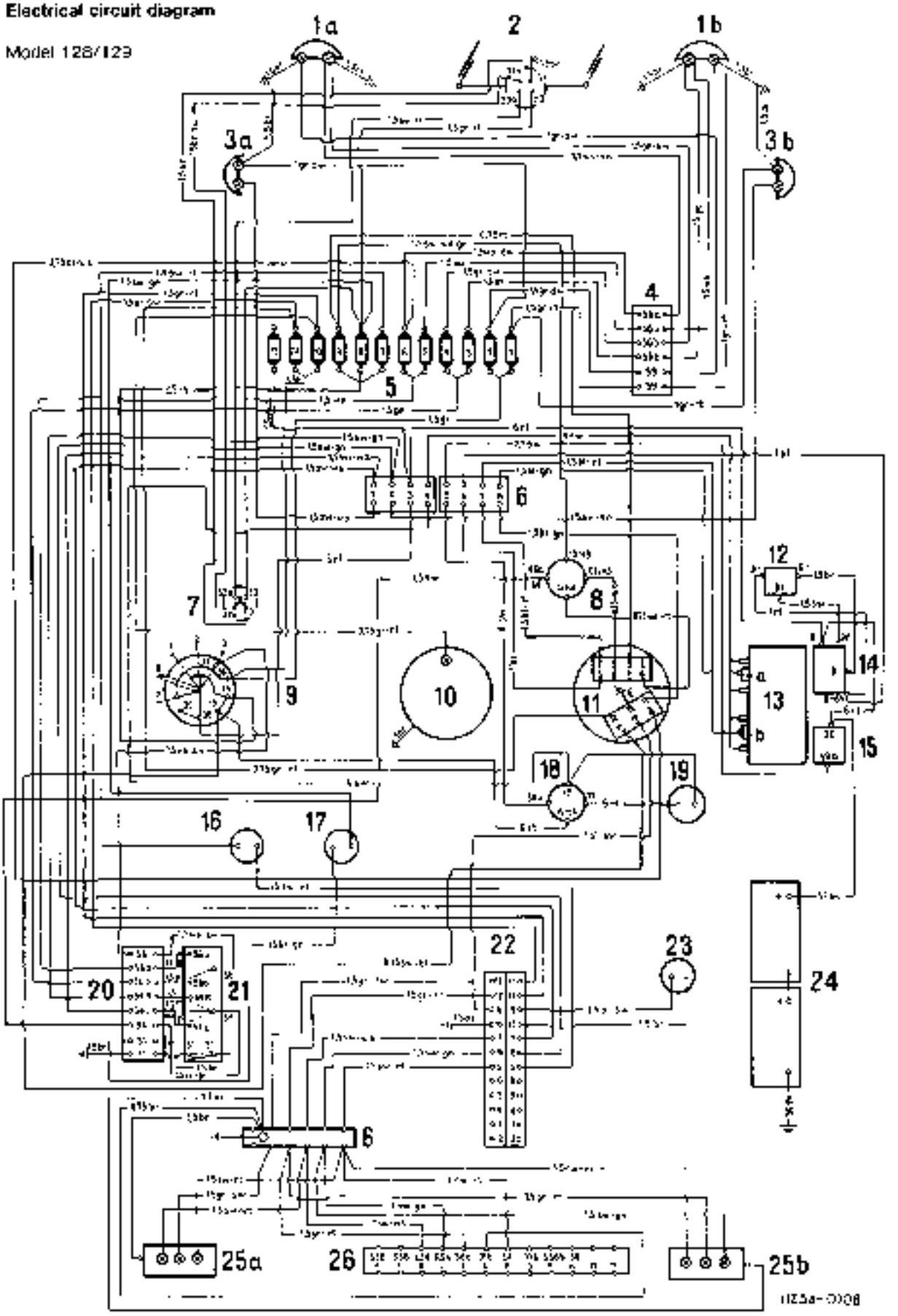
1	Ground

Colour codes of leads:

bl	blue
br	brown
ge	yellow
gr	grey
gn	green
li	lila
rt	red
sw	black
ws	white

Electrical circuit diagram

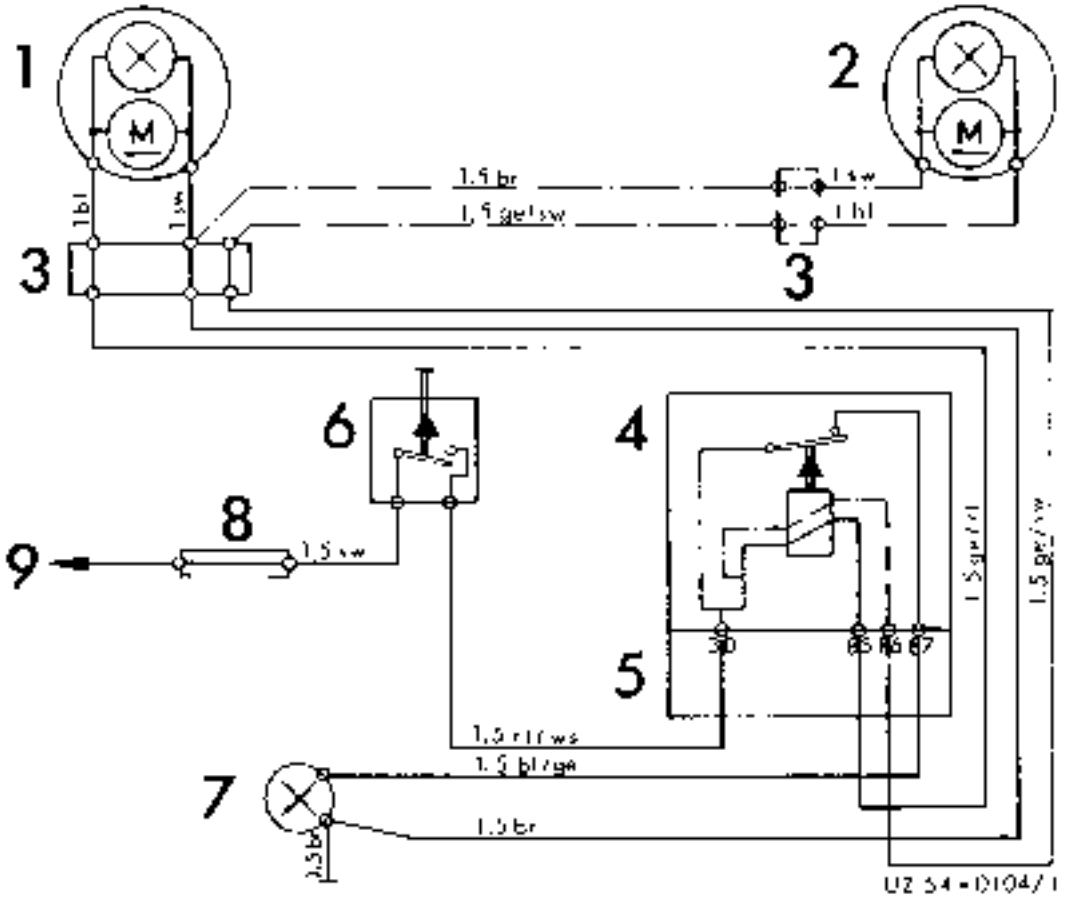
Model 128/129



SA 35 581
SA 35 582

Electrical circuit diagram

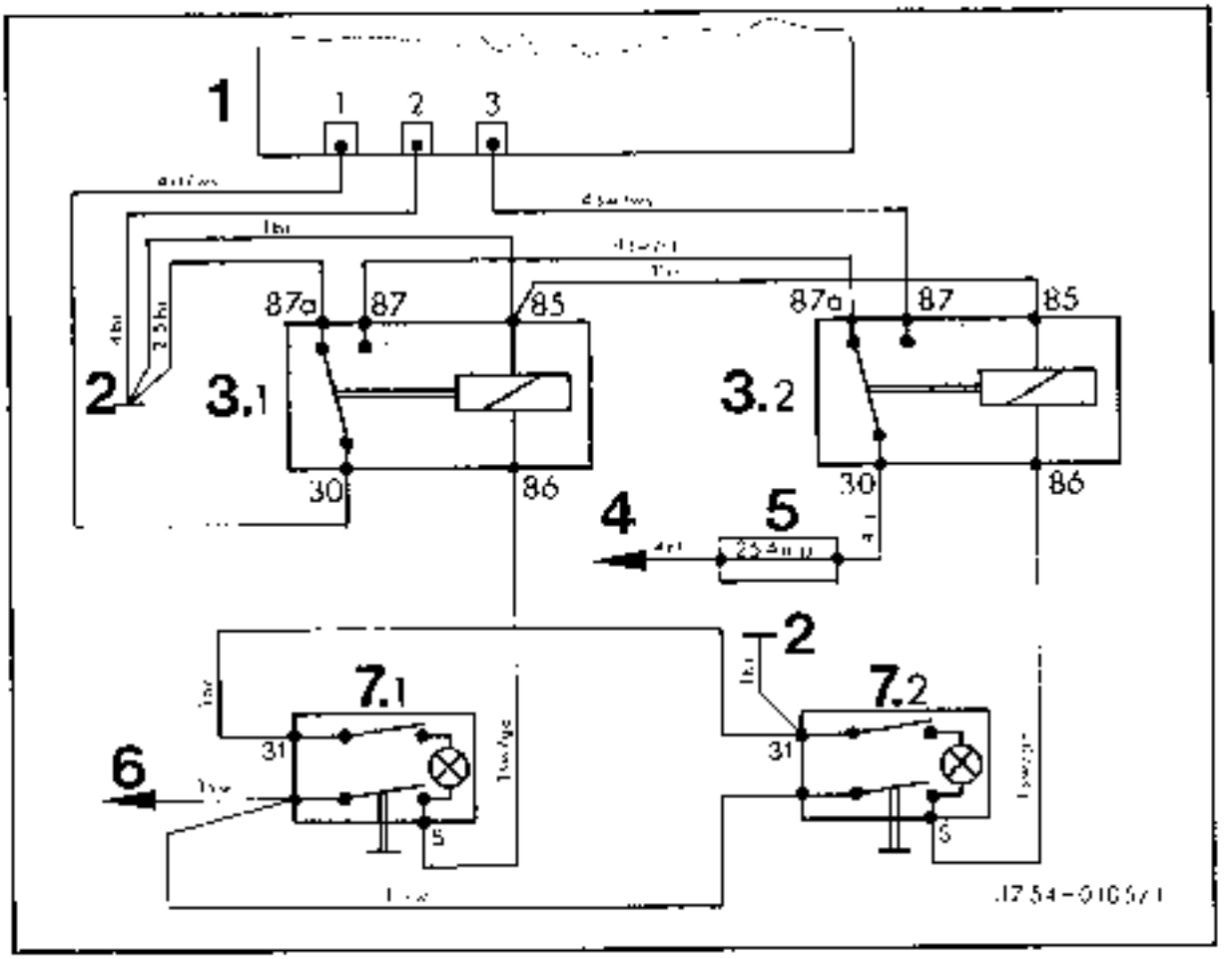
Rotating beacon



1 Rotating beacon left
2 Rotating beacon right
3 Cable connector
4 Relay
5 Socket housing
6 Switch
7 Indicator lamp
8 Fuse holder with fuse
9 to the terminal strip 30

Electrical circuit diagram

Windscreen heated



1 Windscreen
Connection 1-2 driver's side
Connection 1-3 front passenger's side
Connection 2-3 total heated area
2 Ground bulkhead
3.1 Relay for heated area (driver's side)
3.2 Relay for heated area (front passenger's side)
4 To switchbox
5 Fuse holder with fuse
6 To fuse (windscreen wiper)
7.1 Switch for heated area (driver's side)
7.2 Switch for heated area (front passenger's side)

Removing and installing

1 Unscrew screw plug at the battery case cover and fold down cover.

2 Remove terminal strip.

3 Remove battery so far that the battery terminals are exposed.

4 Release the bolts at the terminals and remove the connections from above the pole.

5 Remove battery

6 The installation takes place in reverse sequence.

Note:
When installing and connecting the battery observe: install first (+) terminal then (-) terminal. The positive pole has the larger diameter. Tighten battery terminals firmly. Then grease with acid-resistant grease to prevent oxidation.

Checking battery with hydrometer

Tests	Findings	Possible errors	Remedy
Checking electrolyte level (white acid mark)	ok	–	–
	too high	Acid escapes when charging	Electrolyte up to mark
	too low	Poor maintenance	Top up dist. water
Electrolyte density (measure in all cells)	1.27 – 1.24 Battery charged	none	Battery ok
	1.19 – 1.22 Battery semi-discharged	Power consumers switched on for lengthy period when standing, extensive stop-and-go driving, driving in town	Recharge battery
	1.12 – 1.18 Battery fully discharged	Power consumer not switched off, alternator does not charge, short circuits in electric leads	Immediately charge battery well. Electrolyte density must again be 1.28 at the end. Final charging voltages must be reached. Approx. 15.6 V 12 V battery
	Electrolyte density in cells varies	Defective cells	Replace battery

Checking battery with cell tester load current at 88 Ah battery = 4.4 Amp., max. 8.8 Amp.

Load of charged battery with cell tester	1.4 – 1.9 V/cells battery healthy		
	less than 1.4 V poss. varies	Defective cells	Replace battery

Recharging

Note:
If, when checking the battery, it was found that the electrolyte density of the specific density is less than 1.20 (in tropics less than 1.17), the battery must be recharged. The charging current of the battery (110 AH) is not more than 11.0 Amperes and must not be exceeded.

1 Before recharging battery, check electrolyte level (10 to 12 mm above upper edge of plates). Top up if necessary.

2 Connect battery to external source of DC current.

3 When charging, the electrolyte temperature increases from 15° C to 40° C. It is only possible to accurately measure the electrolyte density half an hour after charging.

4 When charging the battery, note that gas escapes evenly out of each cell and that the voltage of 2.6 to 2.7 Volts is reached at each cell. Gasing increases towards the end of charging.

5 Recharging is complete when the electrolyte density has reached 1.285 and the terminal voltage of each cell is 2.6 to 2.7. Measure the voltages with the charging current switched on and the electrolyte density at the specified electolyte level.

6 Batteries with sulphated plates, recognizable from the white deposit or from the low specific density (below 1.12), must be charged for 40 hours with 2.5 Amperes followed by final charging at full charging current.

Batteries not in use require regular care to maintain them in a serviceable condition. Re-charge once at least every 8 weeks. Failure to do this will render the battery unusable.

Battery

A. Remove and install battery

1. Remove lock screws on battery box cover and cover itself.

2. Disconnect and remove the battery terminals.

3. Remove battery.

4. Instal vice-versa

Remark:

When installing and connecting a battery, look out for the following:

Before connecting terminals on battery, clean same with alcohol or soda solution.

B. Battery

1. Keep battery always dry and clean. Cherk acid level and density as per our luh sketch.

2. Do only clean battery outside, when battery acid filler plugs are screwed in

   Ventilation holes must be open, to allow the gas formation to escape while the battery is loaded when engine is running.

   Never use an open light to check the battery, always use a flash light

3. The acid must be approx. 10 12 mm over the upper edges of the plates.

   To re-fill, use only clean destilled water.

   (Water evaporates when battery is charged while engine is running.)

The terminals should be tightened good, dirty or oxidised ones are often the reason for bad functioning of electrical system. The current flow can be interrupted by loose terminals. Coat the terminals from time to time with acid protection grease Ft 40 v 1 (from Bosch) to avoid oxidise.

The inside of the terminal should not be greased with acid protection grease.

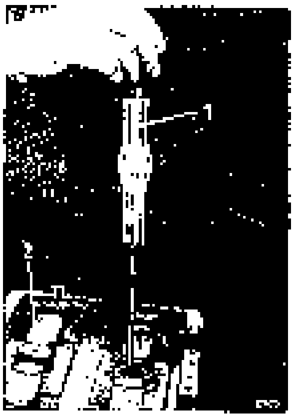
Attention:
When connecting, do not mix up the + and – terminals (marked).

Avoid spark formation, explosion danger, cover terminals with an insulating plate

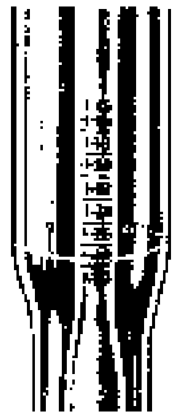
Picture 54-1/1
Check acid level
1 = Glas tube
2 = Mark for acid level
3 = Terminals greased

For re-filling the battery with acid or destilled water, don't use metallic containers, use only plastic ones or glas containers.

4. **Check acid density at a temperature of +20° C.**
Lift up just enough acid (use acid lifter) to make the spindel float. The battery is well charged when the no. 1.285, stamped on the spindel, is level with the acid upper edge. Picture 54-1/2 and 54-1/3. Page 15/54 0/2 lists the various nominations for acid density and specific weight, also the load condition of the battery.



Picture 54-1/2
Check acid density
1 = Acid tester [illegible]
2 = [illegible]



Picture 54-1/3

Picture 54-1/4
Check battery cell
1 = Cell tester [illegible]

Remark:

Batteries not in use all the times, need special care to keep them alive. At least every 6–8 weeks recharge, if not done so, battery becomes unserviceable.

C. Battery recharge

Remark:

If noticed, the acid density, resp. the specific weight drops below 1.20 (in tropics below 1.17), the battery must be recharged.

The max. charging current of the battery is:

a: On type 421 (88 Ah) 9.0 Amps.

b: On type 411 (105 Ah) 9.5 Amps.

1. Before recharging the battery, check acid level (10-12 mm on top of upper edge of protest), if necessary, refill.

2. Connect battery on outside direct current supplier.

3. When charging, the acid temp. is going up from 15° C to 40° C.
An exact measurement can only be done when battery is cooled off.

4. Each cell of the battery must equally develop gas, each cell should have a current of 2.6–2.7 V. Picture 54-1/4. Gas developing increases when battery charging comes to its end.

5. Recharging is finished when acid density has reached 1.285 and the cells show 2.6–2.7 V. The current should be checked with switched-on charging current and the density with the recommended acid level.

6. Batteries with sulphated plates, to be recognized by white sediments and very low specific weight (below 1.12) should be charged with 2.5 A for 40 hours. After that finish with full load current.

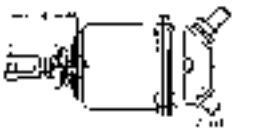
Group 15

I Type 421

Starter motor

Engine-type	Bosch-designation	Idle-test Current Amp.	Idle-test Voltage Volt	Number of revolutions	Minimum pull-in voltage (volt) solenoid switch	Adjustment "a" in mm
621	EJD (R) 12 V 1.8 PS 0 001 354 064	60 80	11.5	6000—7100	8	49.0 ± 0.2
615	JF — 12 V 2.5 PS	80—95	11.5 12	7500—8500	8	49.0 ± 0.2

"a" = adjustment for starting-motor solenoid switch with link fork taken in



	Short-circuit test Current Amp	Short-circuit test Voltage Volt	Load-test Current Amp.	Load-test Voltage Volt	Number of revolutions 1/min
621	650—750	6	310—350	9	1250—1450
615	9000 1200	6	650 750	9	1000—1200

Alternator

Bosch-Order No	Type	Voltage	Number of revolutions 1/min	Maximum-current
–	K1 — 14 V 35 A 20	14 V	5752	35 Amp

Regulator

Bosch-Order-No	Type	Regulating voltage	Maximum field current (not continuous current)
–	AD 1/14 V	13.9 to 14.6 volts	3 Amp

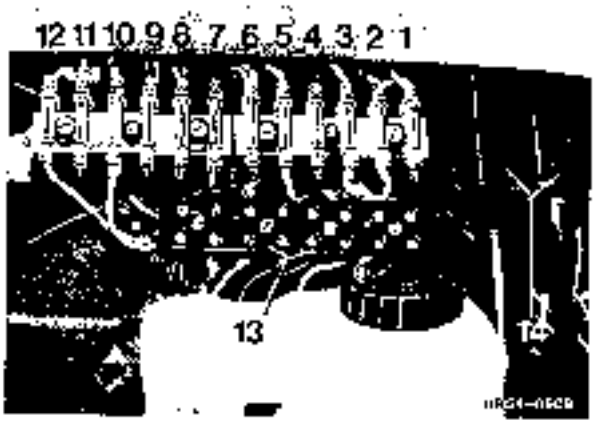
Glow plugs

Order-number	Type	Thickness of the glow wire	Rated voltage
	Bosch KE/GA 1/21	1.8 mm Ø	0.9 volts
	Beru 381 GK	1.9 mm Ø	0.9 volts

Note: The part of the Beru glow plug not of which the glow wire projects is not live and thus not sensitive to grounding

Table of the power circuits 421 (to chassis end-no. 006 089)
(all fuses 8 Amp. according to DIN 72581):

Fuse no.	Consumer
1	Spare
2	Rear lamp, left
3	Rear lamp, right Instrument lamp
4	Indicator
5	Horn and windscreen wiper
6	Brake lamp
7	Main beam, left
8	Main beam, right
9	Low beam, left
10	Low beam, right
11	Parking light and position light, left
12	Parking light and position light, right

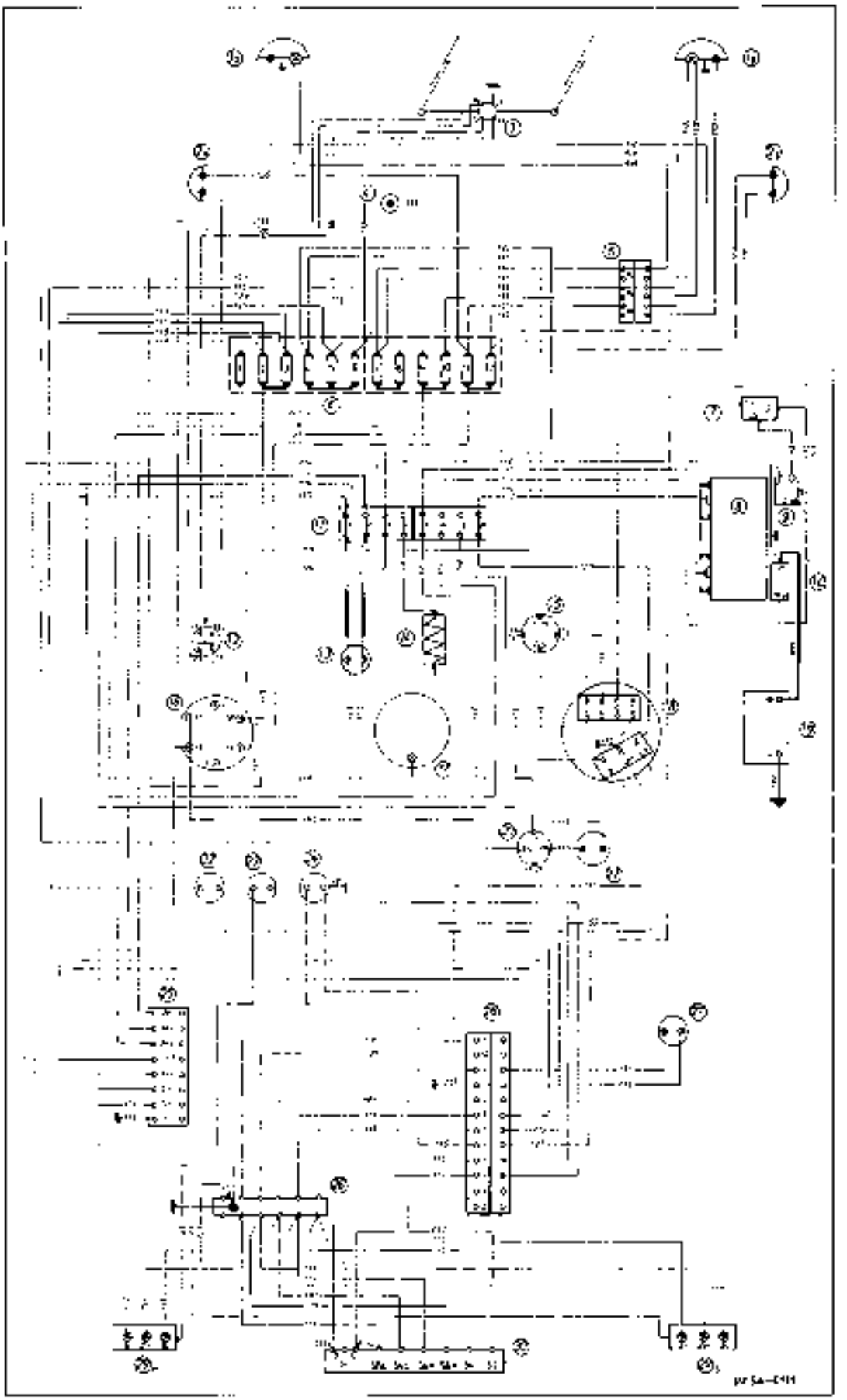


Arrangement of the fuses
1 to 12 Fuses
13 Cable connector
14 Plug-and-socket connections

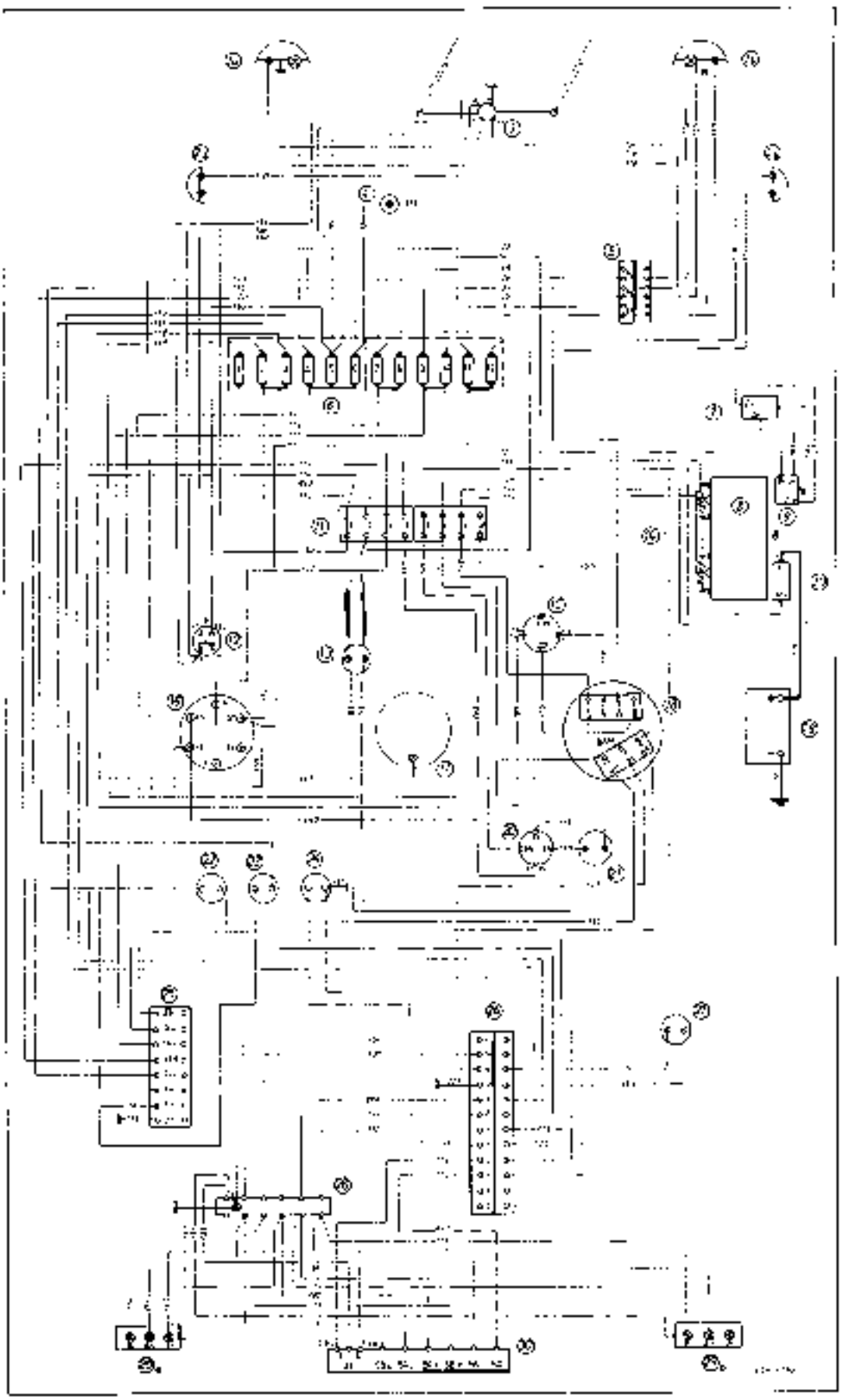
Key to the circuit diagrams see 15/54-0/4 and 16/54-05

1a/1b	Headlamp left and right
2a/2b	Indicator lamps right and left
3	Wiper motor with end cut-out
4	Dome light
5	Plug connection in the engine compartment
6	Fuse box with locks 1–12
7	Regulator for alternator
8	Engine with glow plugs/oil pressure and water temperature pickup
9	Alternating current-generator
10	Starter motor
11	Cable connector
12	Push switch for windscreen wiper
13	Indicator lamp for first trailer
14	Glow resistance
15	Indicator signal flasher
16	Trip and light switch
17	Instrument lamp
18	Combination instrument
19	Battery 12 volts/ 88 Ah
20	Glow plug and starter switch
21	Glow plug indicator
22	Stop light switch
23	Horn
24	Switch for third brake(over 9 t)
25	Plug-and-socket connection at the steering column switch
26	Socket 12-pin
27	Tank-gauge
28	Cable connector at frame at rear
29a	
29b	Rear/indicator brake lights left and right
30	Trailer-socket 7-pole

Electrical circuit diagram type 421 with engine OM 621
(to chassis end-no. 002 228)



Electrical circuit diagram type 521 with engine OM 615
(from chassis end-no. 022 229) to chassis end-no. 006 089
(from chassis end-no. 006 090) see 54.6-1,2/2 and 1,2/3)



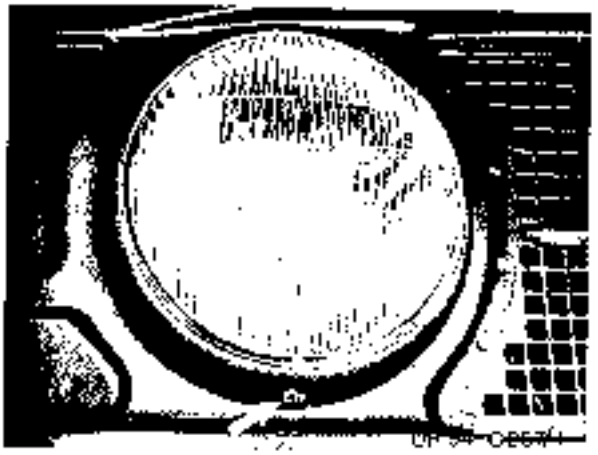
Electrical system 82

Contents

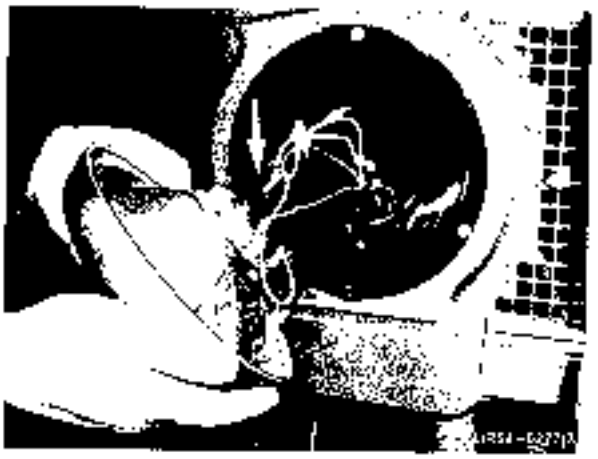
Exchanging bulb main headlamp

Bulb-table see 54.0–1.2/1

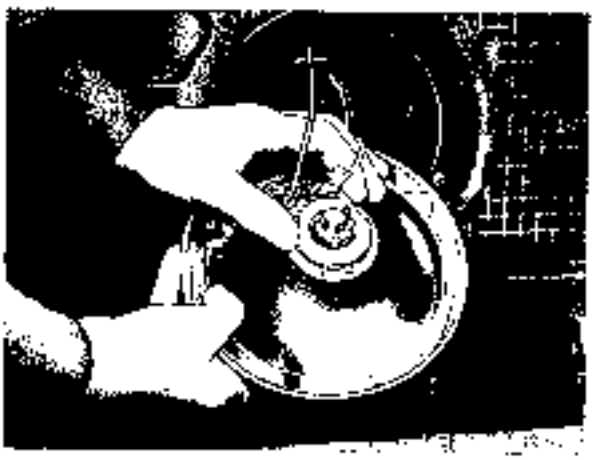
1 Unscrew and remove main headlamp element



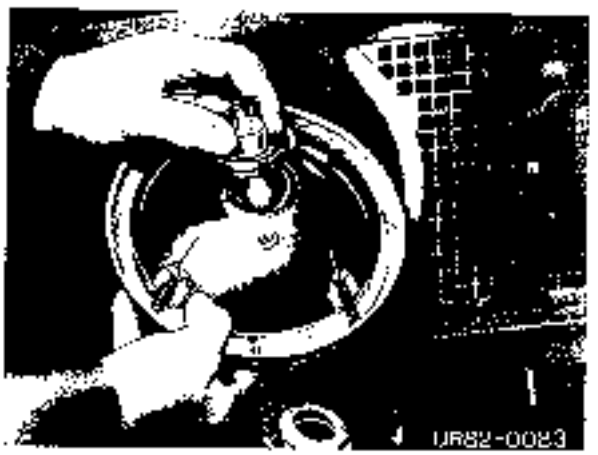
2 Pull off multiple connector at bulb

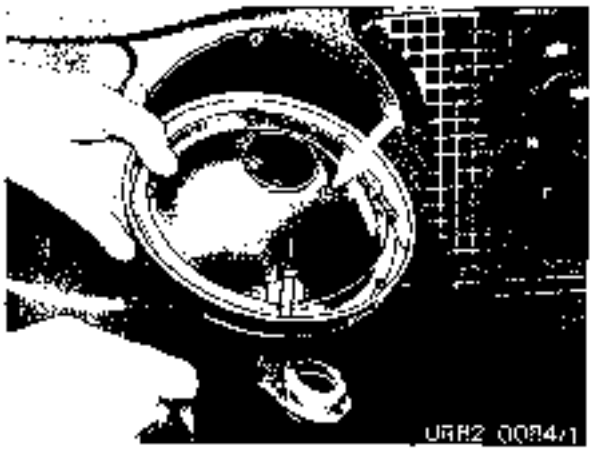


3 Press in bulb holder, turn and remove



4 Remove bulb





5 Remove bulb (parking light). Installation takes place in reverse sequence. Then check headlamp adjustment, adjust as required. See 3.1/1.

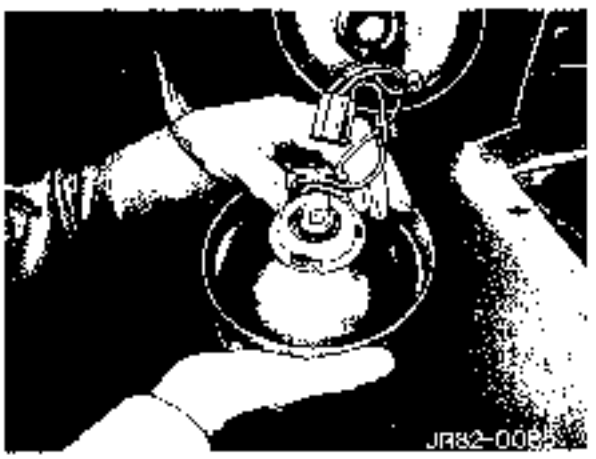
Note:
When exchanging a bulb do not work with dirty or greasy fingers, since the oil evaporates through the heat of the bulb and deposits itself on the headlamp reflectors so that the illumination of the headlamps is considerably weakened. In addition to this, the reflector of the headlamps must not be cleaned; any contact damages the highly polished reflector surface.

Exchanging bulb auxiliary headlamp

Bulb table, see 54.8 1.2/1.

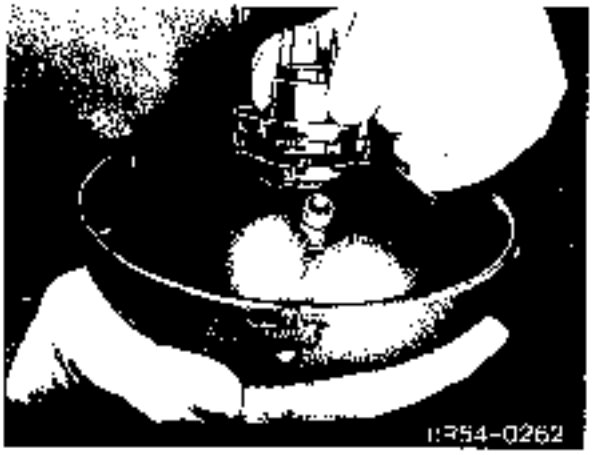
1 Unscrew and remove

2 Pull off multiple connector at bulb.

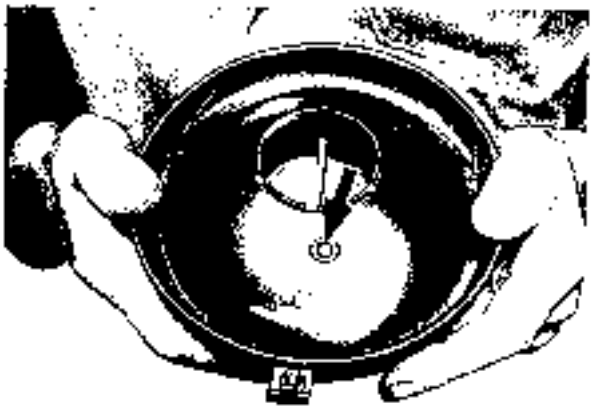


3 Press in, turn and remove bulb holder.

4 Remove bulb.



5 Remove bulb (parking light).



Installation takes place in reverse sequence. Then check headlamp adjustment, adjust as required. See 3.1/2.

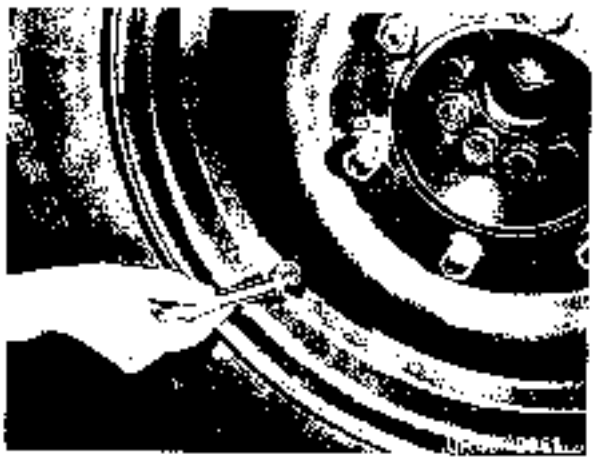
Note:
When exchanging a bulb do not work with dirty or greasy fingers, since the oil evaporates through the heat of the bulb and deposits itself on the headlamp reflectors so that the illumination of the headlamps is considerably weakened. In addition to this, the reflector of the headlamps must not be cleaned; any contact damages the highly polished reflector surface.

Adjusting main headlamps

1 Check tyre pressure, adjust as required

2 Park vehicle on even surface.

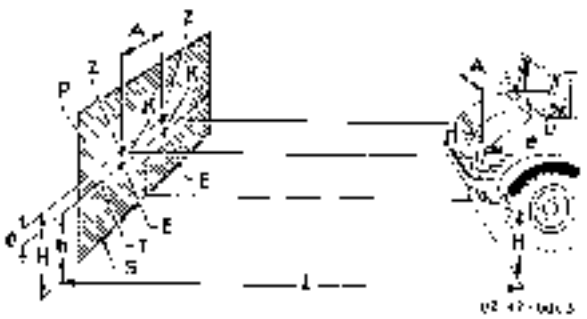
3 Make headlamp adjuster ready for service according to instructions of the manufacturer



4 Check headlamp adjustment. If headlamps require to be adjusted, vary height adjusting screw (1) or side adjusting screw (2) appropriately

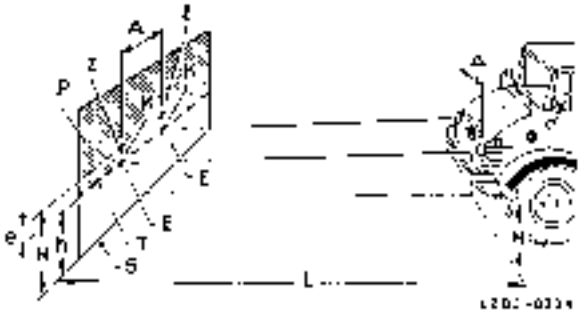
5 If no headlamp adjuster is available, place vehicle on an even surface 5 m distance from a vertical wall or other test surface. Position central and adjusting marks with division mark according to legend on wall (test surface)

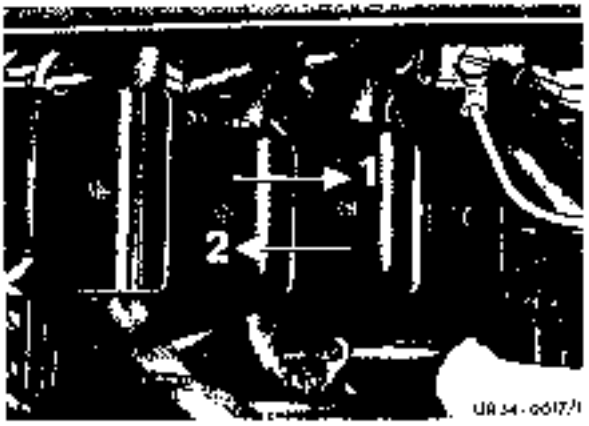
H Height centre of headlamp
h Height division mark
e Adjustment 5 cm
P Test surface
S Standing surface
Z Central mark
E Adjusting mark
T Division mark
K Cutoff point 15°
A Distance between centre of beams
L Distance 5 m – test surface – headlamp

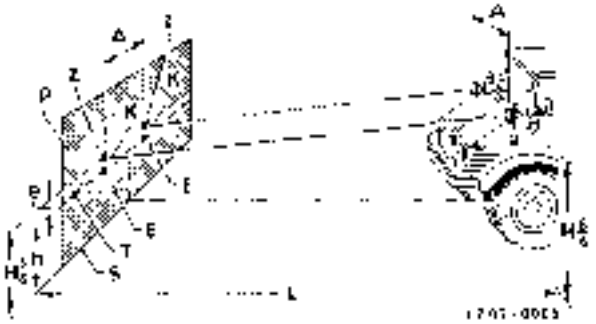


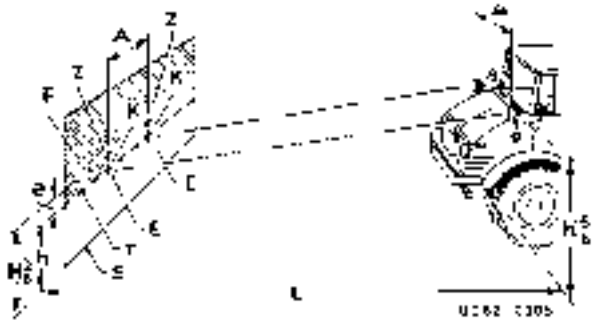
6 Switch on main beam and individually check headlamp adjustment. The centre of beams must lie on the central mark "Z", adjust headlamps as required.

7 Switch on low beam and individually check headlamp adjustment. The bright/dark boundary must lie on the division mark left to the adjusting mark "E" as horizontal as possible and then on the cutoff point line "K", adjust headlamps as required.









Adjusting auxiliary headlamps

1 Check tyre pressure, adjust as required.

2 Park vehicle on even surface

3 Make headlamp adjuster ready for service according to instructions of manufacturer

4 Exchange plug (1) against plug (2) in engine compartment

5 Check headlamp adjustment. If headlamps require to be adjusted, release nut and adjust accordingly

6 If no headlamp adjuster is available, set up vehicle on an even place 5 m distance from a vertical wall or other test surface. Position central and adjusting marks with division marks according to legend on wall (test surface).

H 5/6 Height centre of headlamp at test surface
H 6/6 Height centre of headlamp at vehicle
H Height division mark
e Adjustment 5 cm
P Test surface
S Standing surface
Z Central mark
E Adjusting mark
T Division mark
K Cutoff point 15°
A Distance between centre of beams
L Distance 5 m – test surface – headlamp

7 Switch on main beam and individually check headlamp adjustment. The centre of beams must lie on the central mark "Z", adjust headlamps as required.

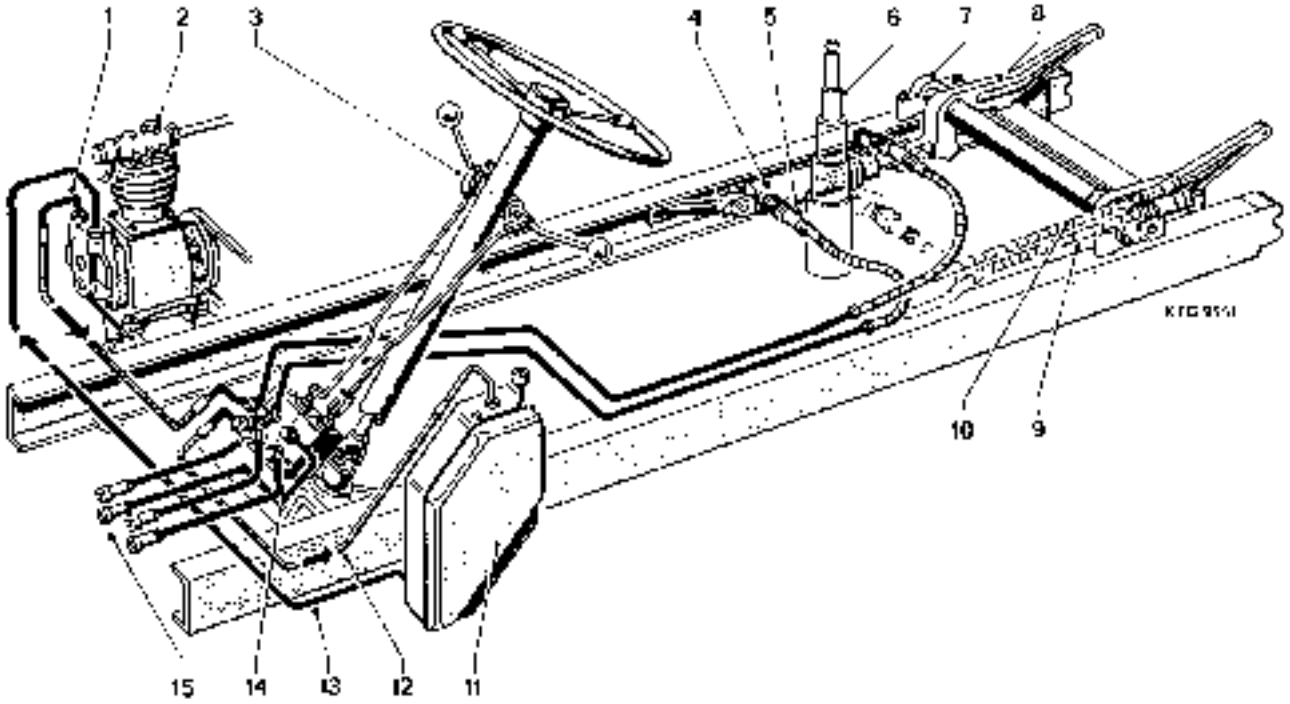
8 Switch on low beam and individually check headlamp adjustment. The bright/dark boundary must lie on the division mark left of the adjusting mark "E" as horizontal as possible and then on the cutoff point line "K", adjust headlamps as required.

Note:
The auxiliary headlamps may only be switched on if the main headlamps are concealed by front attachment.

I. Type 421

Hydraulic system

Gear type driven oil pump w. air compressor	Westinghouse 415 701 100 0
Gear type driven oil pump	Designation 416 101 000 0
Oil pump rpm.	2600/min.
Operating pressure	150 kp/cm²
Output at max. engine rpm. of 3000/min. without counter pressure	20 ltr./min.
Hydr. double operating valve with pressure relief valve	Designation 466 797 000 0
Capacity of oil storage tank	approx. 13 ltr.
Tilting angel of loading platform	max. 50°



Picture 55-01
Hydraulic system (Principle sketch)

1 = Pressure line from pump to double operating valve
2 = Air compr. w. oil pump
3 = Operating lever (to be locked with ignition key)
4 = Hydraulic cylinder
5 = Pressure line, II
6 = 4-fold telescope cylinder
7 = Bearing
8 = Rear power lift arm with mechanical lock
9 = Connection rear, press. line lift
10 = Connection rear, press. line down
11 = Oil storage tank
12 = Return line from double oper. valve to oil tank
13 = Suction line, oil tank to oil pump
14 = Double operating valve w. press. relief valve
15 = Quick couplings front, for press. line

Lifting capacity

a) Rear power lift system

The lifting capacity is in the range of 470 to 525 mkp, depending upon the swivel point

Lifting capacity on the implement mounting points of the 3-point linkage at 550 mm connecting height and a middle hub spindle length (of upper arm) of 100 mm free thread:

Center of gravity behind the swivel bearings (m)	Lifting power (kp)		Lifting height in center of gravity (mm)*	
	UL – front	UL – rear	UL – front	UL – rear
0	1190	1250	410	390
0.4	900	1010	555	520
0.8	750	850	710	610
1.0	690	790	775	640
1.2	630	730	825	675
1.4	580	680	850	690

Remark: UL = bottom arm

* The max. travel in center of gravity under consideration of vehicle spring action and tire flattening. However, losses occurring in floating position while operating the vehicle are not taken into consideration.

b) Front power lift system

Max. power at the most permissible psion Ø of the cylinder of 72 mm

Pressure 6000 kp
Pull 5000 kp

Installation survey hydraulic pump

Chassis model designation	Sales designation	Hydraulic pump Manufacturer	Type Version 1	Type Version 2	Installation Version 1	Installation Version 2	Installation special version
421	S2 U 600 U 600 L U 600 T	Westinghouse	1 P 41	IPM 10625	starting PM* up to chassis end No. . . 006 089	starting chassis end No. . . 00 090	35 323

* begin of production

Technical data

Type		1P 41	IPM 10625
Version		external-gear pump	internal-gear pump
Delivery flow	cc/min	7.8	10.2
Delivery volume	l/min	16/20	28/30
Engine speed	1/min	3000/3500	3000/3500
Pump speed	1/min	2450/2860	2840/3310
Pump gauge pressure	bar	150	
Oil temperature	°C	50	

Filling capacities

Hydraulic oil tank	Fluid	Capacity
– complete refill	engine oil SAE 10 W* or hydraulic oil	15.0 l
during oil change		13.0 l
– perm. removal		7.0 l

* in hot zones SAE 30
in cold zones SAE 5 W – 20/30

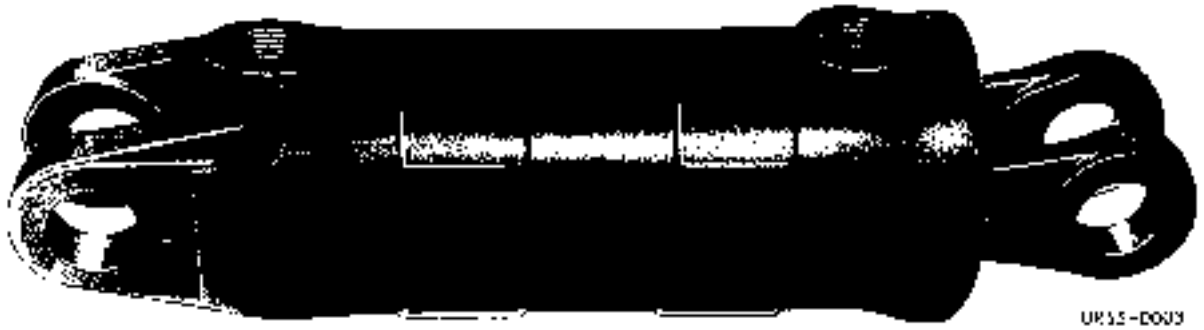
SA 35 323

Installation survey hydraulic cylinder

Chassis		Hydraulic cylinder		
Model designation	Sales designation	Manufacturer	Type	Installation
400 406 416 421	U 800 U 900 U 1100 U 600	Weber-Hydraulik	DZ 80/30/150	SA 35 223 [1] SA 35 630 [2]
440.162 440.163	MB trac 700 MB trac 800	Hunger-Hydraulik	G 80/30/150	SA 35 651 SA 35 801 [3] SA 35 658 SA 35 671
442 443	MB trac 1100 MB trac 1300			SA 35 811

[1] not valid for UNIMOG 421
[2] not valid for UNIMOG 416
[3] valid for MB trac 440.163 only

General view



UR55-0003

Technical data

Design		Double-acting hydraulic cylinder
Piston dia.	mm	80
Piston rod dia.	mm	30
Stroke max.	mm	150
Perm. peak pressure (0.1 s)	bar	400
Nominal gauge pressure	bar	150
Operating pressure	bar	180
Pressure at nominal gauge pressure	N	90 000
Pulling force at nominal gauge pressure	N	77 000
Stroke speed range	m/min	0 to 15
Oil temperature range	°C	– 20 to + 70

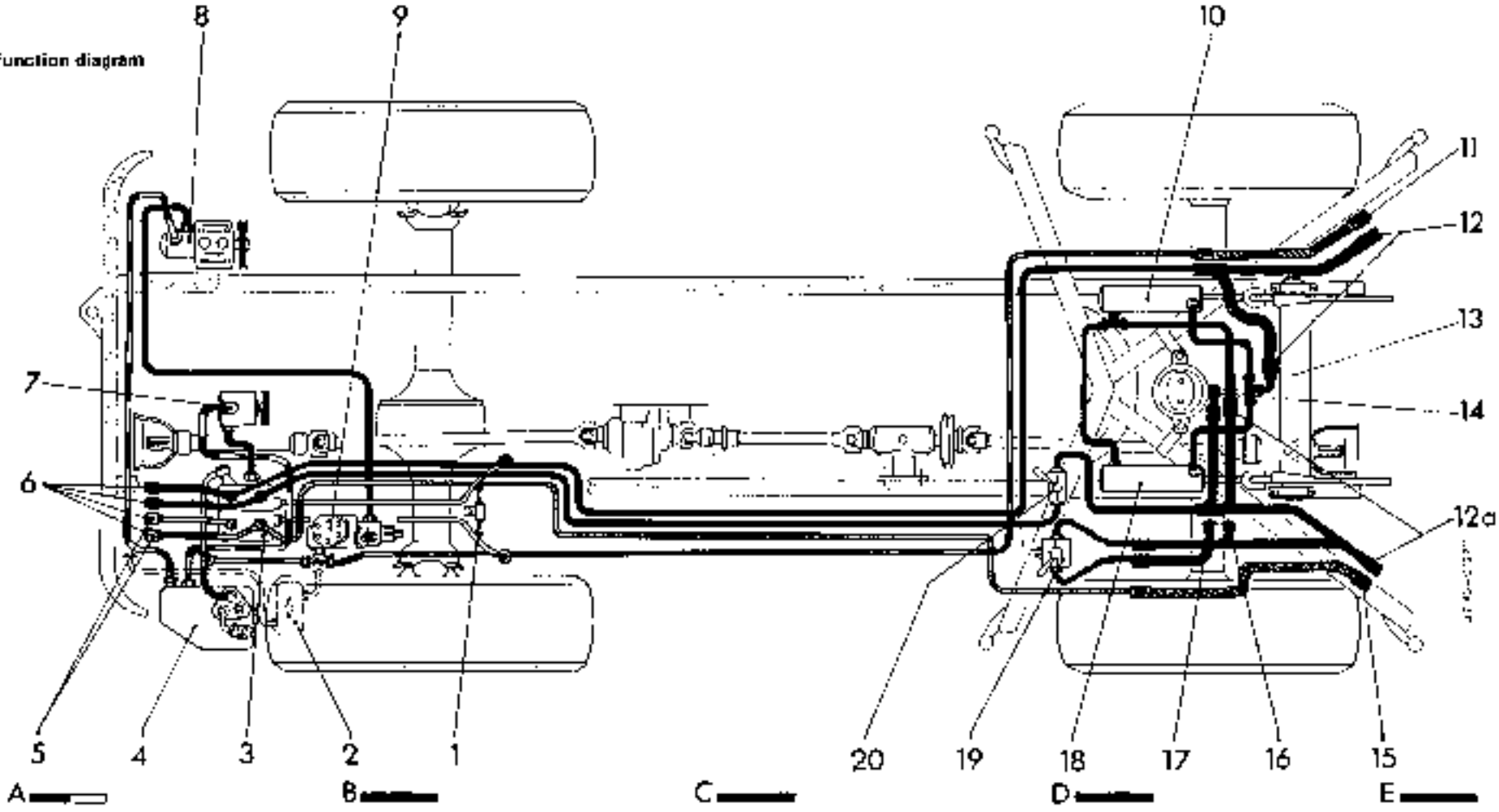
Installation survey double control valve

Chassis		Double control valve	
Model designation	Sales designation	Manufacturer	Installation
421	U 52 U 600 U 600 L U 600 T	Westinghouse	SA 35 323

Technical data

Design		Valve cell with pressure limiting valve
Control valve stroke	mm	11.5 ± 0.5
Rotary float position	°	40
Pressure limit	bar	150

Function diagram



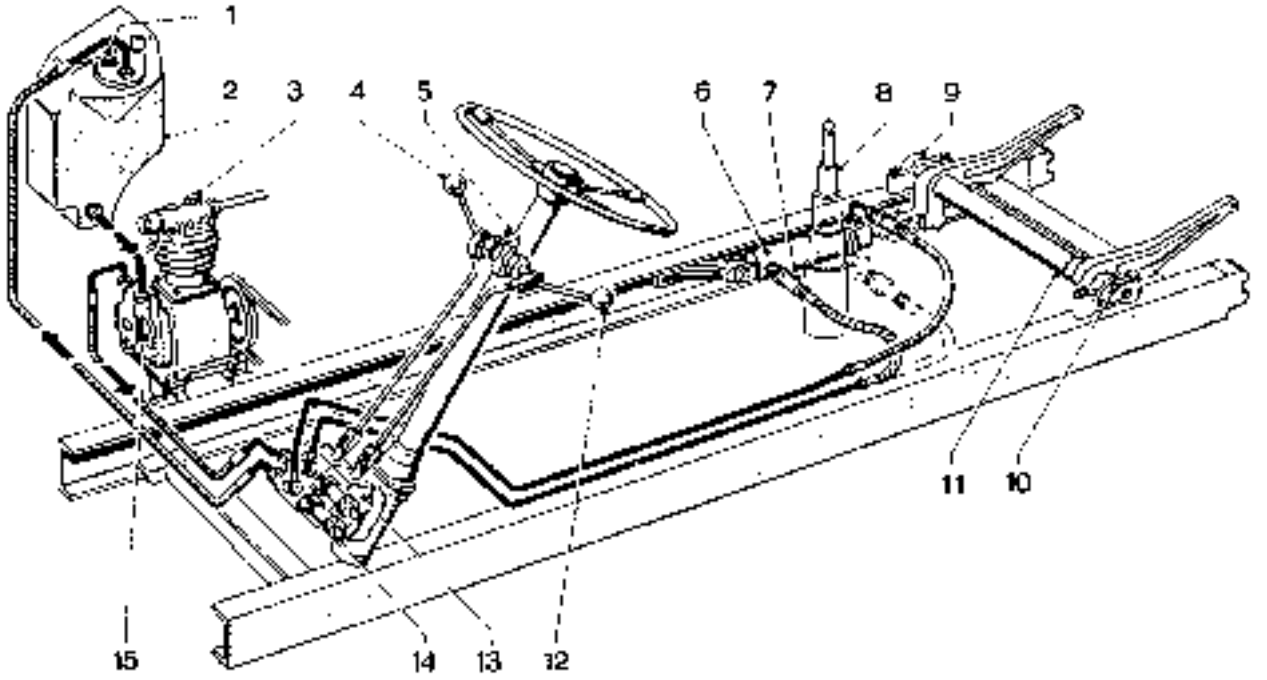
A Intake line
B Pressure line
C Hydraulic circuit 1 and 2
D Hydraulic circuit 3 and 4
E Separate return line

Hydraulic system – steering system – **PTO shafts**

1 Actuating lever
2 Steering oil tank
3 Control valve
4 Hydraulic oil tank
5 Plug connection 2-point
6 Plug connection 4-point
7 Hydraulic pump
8 Steering pump
9 Hydraulic steering
10 Power lift cylinder
11 Separate return line
12 Plug connection 1 (lowering) for powerlift or implement connection
12a Plug connection 1 (lifting) for powerlift or implement connection
13 Power lift
14 Tipping cylinder
15 Plug connection 3 (3rd pressure line)
16 Connection 1 (lifting) for powerlift
17 Connection 1 (lifting) for tipping cylinder
18 Powerlift cylinder
19 3-way valve, tipping cylinder powerlift – detent position
20 2-way valve, tipping cylinder only – or powerlift only – detent position

Hydraulic system (as of chassis no. 411.112.017 845)

Gear type driven oil pump with air compressor	Westinghouse 415 701 100 0
Gear type driven oil pump	Designation 416 101 000 0
Oil pump rpm.	2600/min
Operating pressure	150 kp/cm²
Output at max. engine rpm. of 2750/min. without counter pressure	20 ltr./min.
Hydraulic double operating valve with pressure relief valve	Designation 466 799 000 0
Capacity of oil storage tank	approx. 8.5 ltr.
Tilting angel of loading platform	max. 50°



Picture 55-0/2 (Principle sketch)

1 = Filler plug w. dip stick
2 = Oil storage tank
3 = Air compressor
4 = Operating lever f. rear power lift arm
5 = Ignition key for locking operating levers
6 = Hydraulic cylinder
7 = Male and female plug of hydraulic line
8 = 4-fold telescopic cyl. for tilting platform
9 = Bearing
10 = Lub. pipe
11 = Power lift arm shaft
12 = Operating lever for front impl.
13 = Double acting operating valve
14 = Quick coupling for front impl.
15 = Oil pump

Lifting capacity of hydraulicly operated power lift system (as of chass. no 411.112.017 845)

a) **Rear power lift system**

The lifting capacity of the power lift system is in the range of 470-525 mkp depending upon the swivel point. The capacity on the implement mounting points of the 3-point linkage at 550 mm connecting height and a middle hub spindel length (of upper arm) of 100 mm free thread:

Center of gravity behind the swivel bearings (m)	Lifting power (kp)		Lifting height in center of gravity (mm)*	
	UL – front	UL – rear	UL – front	UL – rear
0	1190	1350	410	390
0.4	900	1010	555	520
0.8	750	850	710	610
1.0	690	790	775	640
1.2	630	730	825	675
1.4	580	680	850	690

Remark: UL = bottom arm

* The max. travel in center of gravity under consideration of vehicle spring action and tire flattening. However, losses occuring in floating position while operating the vehicle are not taken into consideration

b) **Front power lift system**

Max. power at the most permissible piston Ø of the cylinder of 72 mm — Pressure 6000 kp, Pull 5000 kp

Lifting capacity of pneumatic power lift system (up to chass. no. 411.112.017 844)

a) **Rear power lift arm**

at the following distance of mounted implement.

Max. lifting capacity on the implement mounting points:

Center of gravity distance (cm)	Lifting capacity (kp)	
	Type 401*	Type 411**
0	645	830
25	550	730
50	460	630
80	350	520
120	200	360
150	90	240

b) **Front power lift arm** (at 8.5 kp/cm² operating pressure)

Max. power lift capacity at 35 cm lenght (cylinder connection-shaft) at the following center of gravity distance of mounted-on implement in front of the turning shaft:

Center of gravity distance (cm)	
40	640
60	570
80	510
100	440
120	370
150	270

* = Good for the old power lift system with 7.5 kp/cm² (cyl. Ø 170 mm)
** = Good for the new power lift system with 8.5 kp/cm² (cyl. Ø 150 mm)

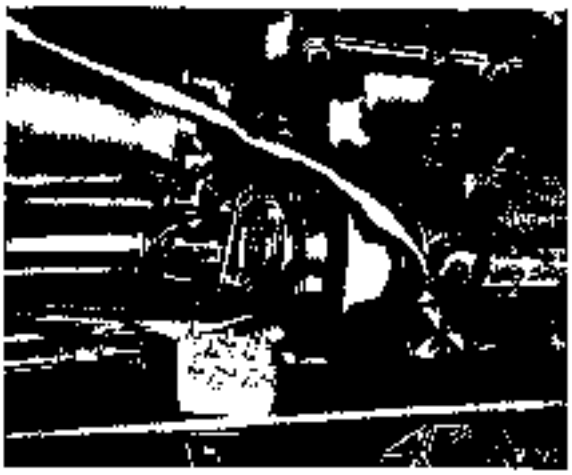
PTO Shaft on Type 421 and 411

A. Remove and install shaft

If the grooved spline and sleeve is parted, the universals must be lined up again to have the same position of the universal joints before put together again. Arrow points to arrow.

Remark:

As of chass. no. 411.850 2175 the shafts and the bearings of pto s have been re-enforced. The formerly 10 hole connection (Picture 55-1/1) hase been changed into one with wedge and only 4 hole connection. The not yet re-enforced pto. shaft bearings still have the 3 mounting screw connection between the bearing housing and the frame.



Picture 55-1/1

I. Remove and install front pto.

1. Remove 4 hex. head screws on the drive flange of the transmission, look out for toothed washers.
2. Remove 1 hex. screw M 10 and 2 hex. nut M 10 on front pto. bearing, also watch the toothed washers.

Remove the clamp.

3. Pull out complete pto. with pto. bearing to the front
4. Installation is done vice-versa.

II. Remove and install rear pto.

1. Tilt dump bed to the right and secure.

   On vehicles without a dump bed remove the rear wall and the inserted floor piece

2. Remove 4 hex. screws M 8 on transmission drive flange, do sam on flange of rear pto. bearing. Look out for toothed washers. Now remove the shaft, bearing remains on frame.
3. Installation is done vice-versa

III. Remove and install intermediate drive for rear pto.

1. Tilt dump bed to the right and secure.
2. Remove 4 hex. screws each on drive flange of transmission and on flange of middle pto. bearing, look out for toothed washers. Hold or to the shaft and remove.
3. Remove the 4 hex. screw of the flange of rear pto. shaft bearing look out for toothed washers.
4. Remove the pto. shaft after, loosening the grooved hub on middle pto. shaft bearing. The hub itself can also be loosened from the flange of the pto. shaft (4 hex. screws M 8)

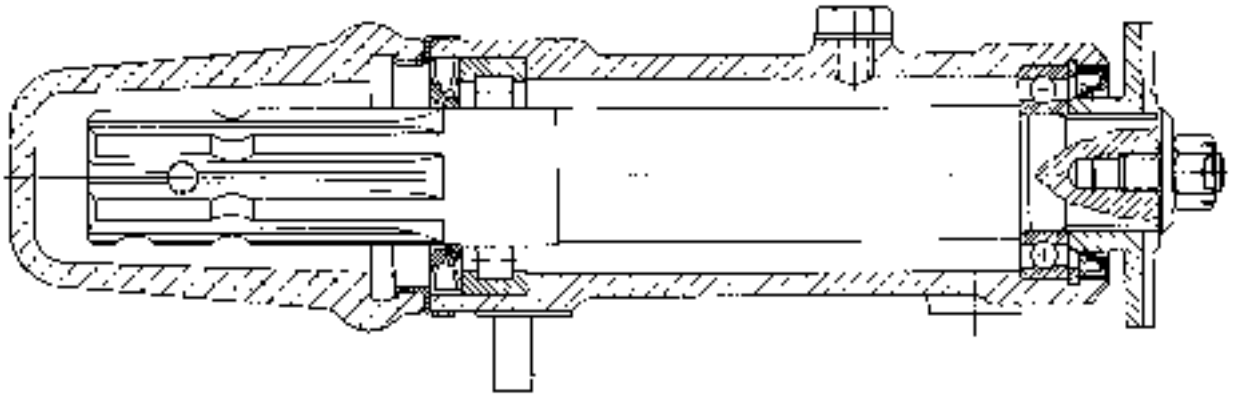
5. Disconnect the middle pto. bearing on mounting bracket (one hex. screw M 10 and 2 hex. nuts; look out for toothed washers.
   Remove U-clamp and pto. bearing
6. Remove rear pto. bearing (4 hex. head screws with nuts M 10).

Remark:

On type 411, the same mounting procedure as described under pos. no. 5.

7. Installation is done vice-versa.

B. Remove, install and repair pto. bearing



Picture 55-1/2

1. After the pto. shafts are disconnected on the flange of front and rear pto. bearings, remove one each hex. screw M 10 and 2 each nut from front and rear bearing. Take off bearings complete.

Remark:

On the type 421, the rear pto. bearing is mounted with 4 hex. head screws and nuts on the cross member.

2. Remove rubber cap.
3. Take out oil filler screw and drain oil.
4. Decotter castle nut on flange and remove with washer.
5. Pull off flange for pto. (use common type puller)
6. Press out shaft (from the flange side).
7. Remove sealing rings on both ends of bearing housing.
   Prior, remove the shrinkage ring.
8. Remove the lock ring on the side of the oil filler hole.
9. Push out grooved ball bearing, use arbor.
10. The still remaining cylindrical roller bearing in the bearing housing can now be pulled out with a puller (opposite of oil filler hole).
11. Wash, clean and check all parts, replace unserviceable ones.
12. Reassembling and installation is done vice-versa.
13. Fill with transmission oil SAE 80, 0.08 ltr. for each bearing.

1. Loosen nut for tensioner and remove tensioner, also take off sleeve and rubber buffer.

2. Remove V-belt.

3. Loosen and disconnect line.

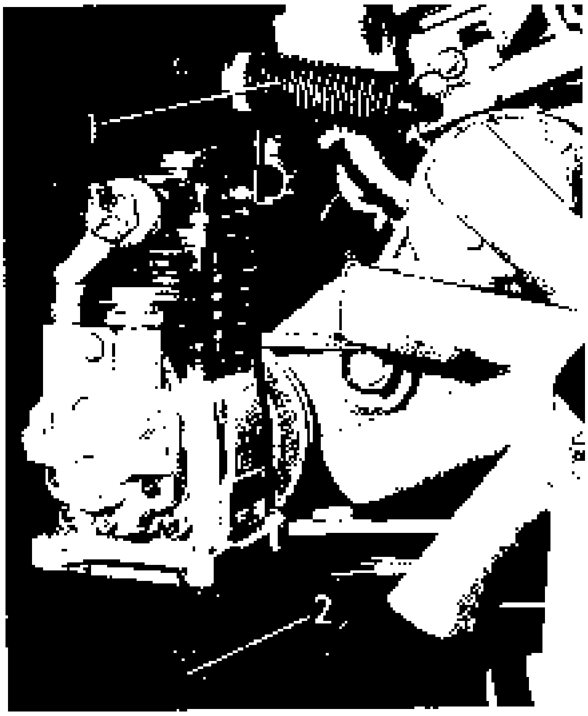
4. Loosen the 4 mounting screws on the base of compressor, take out air compressor with oil pump.

5. Installation is done vice versa.

Remark: After installation, the V-belt should be tensioned until the rubber buffer is tightened together at a distance of 70 mm. Now tighten front counter nut.

6. Fill up hydraulic oil in pump to upper mark of dip stick.

7. Repair pump and air compressor, see job no. 55–6.



Picture 55–2/1

1 = Tension mechanism for V-belt
2 = Swivel point for air compressor mounting bracket

B. Remove and install hydraulic cylinder

1. Disconnect hoses on hydraulic cylinder (quick couplings).

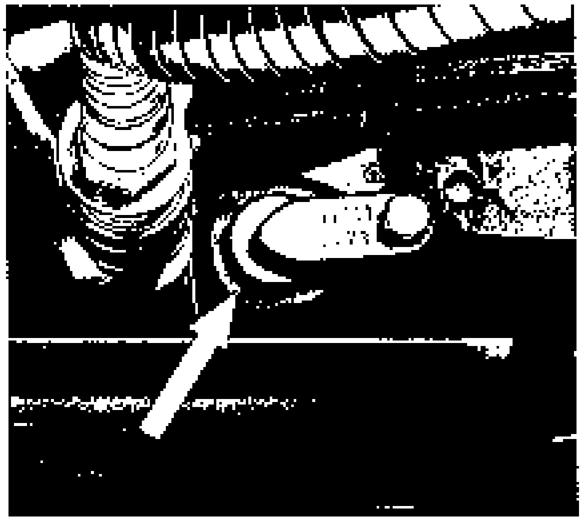
2. Both pins (on frame mounting bracket and eye of shaft) to be unlocked by taking out 2 screws with lock ring M 8.

3. Remove both pins, Picture 55–2/2

4. Remove hydraulic cylinder.

5. Installation is done vice-versa.

6. Refill hydraulic oil and do perform functioning test of the power lift system.



Picture 55–2/2

Arrow = Mounting pin

C. Remove and install oil tank

1. Drain hydraulic oil, look out for sealing ring.

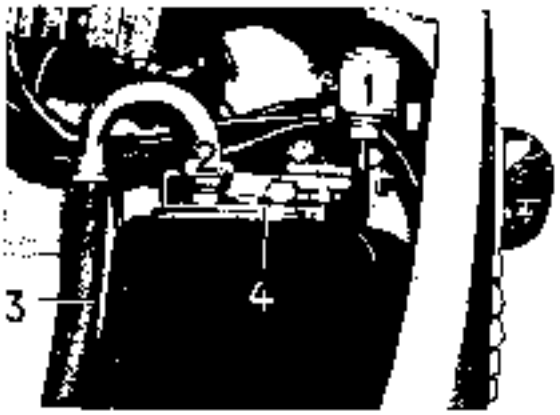
2. Disconnect hose lines as well as ventilation filter.

3. Remove 2 hex. screws M 8 with nuts on bracket of cab and one same on cab itself, remove oil tank.

4. To remove the strainer basket, the cover with gasket must be taken off.

5. The installation is done vice-versa.

6. Fill up hydraulic oil.



Picture 55 2/3

1 = Vent. air filter
2 = Return line
3 = Oil level check glass
4 = Tank cover

Hydraulicly Operated Power Lift System as of Type 411a

(as of chassis no. 411.112.017 845)

A. Air compressor with gear type driven oil pump, remove and reinstall

1. Loosen tension mechanism on air compressor.
2. Remove V-belt.
3. Remove lines.
4. Remove the 4 hex. screws on base of compressor, take out same with oil pump.
5. Installation is done vice-versa.

Remark: After installation, the tensioning of V-belt must be checked and if necessary corrected. One should be able to depress the V-belt 5-8 mm. Recommended axle tension is 60 kp.

6. Fill up hydraulic oil to the upper mark of dip stick. Check markings on dip stick. Correct distance from dip stick mounting to top marking is 56 mm.

Picture 55-2.1/1 Hydraulic system in the engine compartment

1 = Oil tank
2 = Air compressor with oil pump
3 = V-belt tensioner
4 = Operating valve

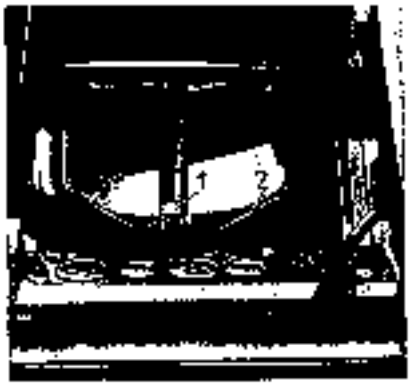
B. Double acting operating valve and hydraulic cylinder, remove and install

I. Remove and install double acting valve

1. Disconnect hose lines.
2. Decotter operating linkage on fork head. Remove pin and washer, disconnect fork head.

Remark: For further dismounting of the operating linkage, decotter pin of operating lever and remove.

3. Unscrew counter sunk screws of mounting plate, remove operating valve.



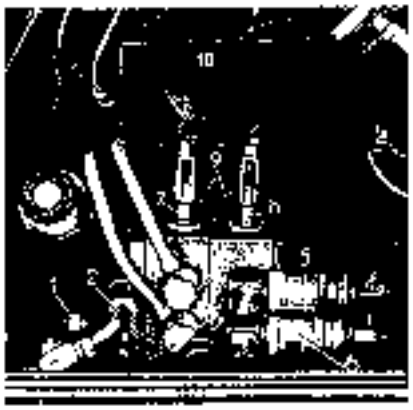
Picture 55-2.1/2

1 = Locking device
2 = Lever for front mounted implements
3 = Lever for rear mounted implements and lifting cylinder

4. Installation is done vice-versa. the operating lever on the steering column must be in normal position (resting position).

II. Remove and install hydraulic cylinder

1. Disconnect hose lines on hydraulic cylinder (quick couplings).
2. De-lock both pins on frame mounting bracket and mounting eye of shaft by taking out both M 8 screws with lock washers.
3. Remove both pins
4. Remove hydraulic cylinder.
5. Reinstall vice-versa.
6. Refill with hydraulic oil and do perform functioning test of the hydraulic operated power lift.



Picture 55-2.1/3

1 = Return line to the tank
2 = Pressure line (right) back
3 = Pressure connect on 4- coupl. rear
4 = Same as no. 3
5 = Pressure connection 4- front coupl.
6 = Same as no. 5
7 = Operating valve for rear power lift
8 = Operating valve for front power lift
9 = Oil filler plug (steering
10 = Rear lift

C. Oil storage tank with filter, remove and install

1. Drain hydraulic oil, look out for sealing ring
2. Disconnect hose lines

3a) **Open cab**

Remove 2 hex. screws with lock rings on the cab and take off oil tank. Watch for spacer.

Remark:
Prior, remove air compressor with hydraulic pump for lack of space (4 hex. screws M 8 with lock rings)

b) **Closed cab**

Remove 2 hex. head screws with lock rings on the support bracket.

Remove 2 screws on cab wall, take out oil tank with bracket.

Disconnect bracket from tank by unscrewing both hex. nuts M 8.

4 To remove the strainer, the cover with gasket must be removed (6 hex. screws with lock rings).

5. Installation is done vice-versa. Watch guide pins on bottom of oil storage tank
6. Refill hydraulic oil.

Picture 55-2.1/4

Oil storage tank with air compressor and oil pump

1 = Breather filter
2 = Filler plug with dip stick
3 = Return line to oil tank
4 = Connection for suction line
5 = Suction line
6 = Pressure line
7 = Tension adjustment for V-belt

(up to chass no. 411.112.01/ 844)

A. Rotary slide valve, remove, install and repair

Remark:

Release the pressure in the system.

1 Disconnect the 3 tube connections

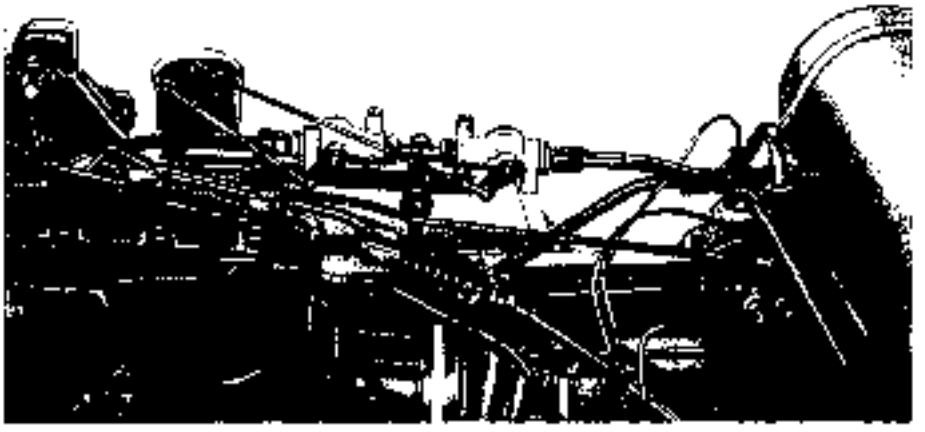
2. Remove pin from linkage connection.

3. Remove the 4 mounting screws (head screws) on the angel and take off valve.

4 Installation is done vice-versa After the valve is mounted back on again, only the pressure connection is connected. The housing and the outlets in middle position must be checked for leaks (soapy water). After this, connect a check line with pressure gauge on the different outlets. Place operating lever in the respective positions and check for max. pressure On the free connections and on the breather hole, no air should escape.

Remark:
New operating system for power lift system.

As of chass. no. 411-75 027 53, the old type rotary slide valve has be replaced by two single valves. This valves are mounted on the transmission cover and the operating levers installed between driver seat and 4 wheel drive respectivly differential lock operating lever. See picture 55 3/1



Picture 55 3/1

I. Remove and install operating levers for rotary slide valve

1. Remove pin on rotary slide valve.
2. Remove upper pin on universal.
3. Remove upper linkage with operating lever (to the top).
4. Pull off lower half of linkage from valve connection.
5. Clean linkage, if necessary straighten it.
6. Reassembly is done vice-versa. grease mounting connections. Check the position of operating lever, if need to be, correct with threaded piece.

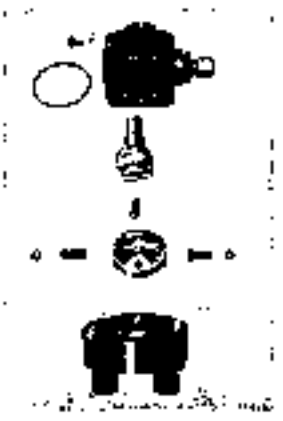
II. Repair rotary valve

1. Place valve into vise. Bottom side pointing upwards. Remove the 4 head screws, carefully take off lower part. Now remove sealing ring, rotary spool, both cylindrical rollers, pressure piece and springs as well as operating spindle.

2. Check the remaining grooved ring in the housing upper part, if necessary renew.

3. Remove strainer screw on upper part, clean strainer. Remove both same in lower part (look out for seals), clean strainers. Unscrew, out of lower part, the threaded ring and clean the strainer and small filter being underneath.

4. Reassembly is done vice-versa, coat all sliding parts with grease before reassembling.



Picture 55-3/2
Rotary valve dismounted

B. Remove, install and repair the front power lift arm

(place lever in cab into position "down")

1. Disconnect tube line connection.

2. If an implement is still mounted in front, remove the pin of the fork head.

3. Remove mounting screws on mounting bracket, lift out cylinder.

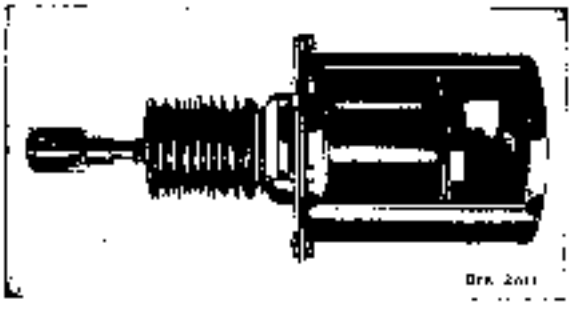
4. Installation into the vehicle is done vice-versa.

I. Repair front mounted lifting cylinder

1. Loosen connecting screw on cylinder, return spring in cylinder must be under tension and freed by taking off the last screw. Take off cylinder.

2. After loosening both tension rings, pull off bellows.

3. Put piston rod into vice and unscrew fork head, prior decoiler.



Picture 55-3/3
Cut-away model of new power lift cylinder with out return spring

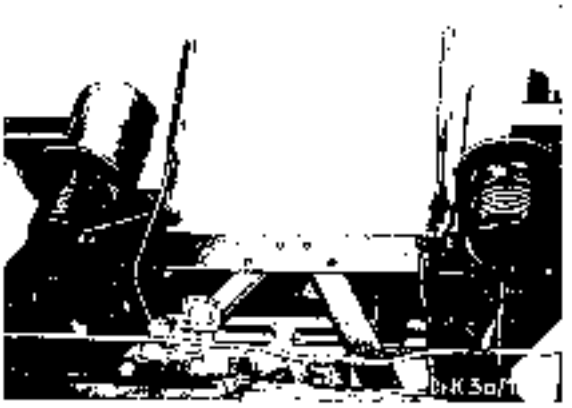
4. Piston sleeve and piston bottom must be loosened by taking out 6 hex. screws. Now remove piston rod, guide tube and spring.
5. Clean all parts, renew unserviceable ones.
6. Reassembling is done vice-versa

Remark:
The piston sleeve should be replaced from time to time because its condition is responsible for the lifting capacity of the cylinder.

The cylinder inside, during reassembly, is coated with an acid free grease.
When inserting the piston sleeve, do not damage the edges of same.

C. Remove, install and repair rear power lift arms

a) **For type 401**

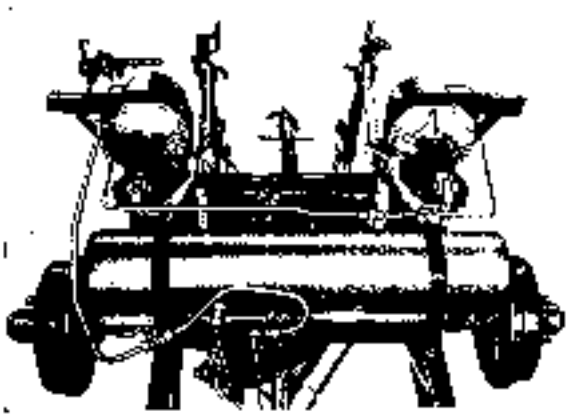


Picture 55-3/4

Picture represents the rear power lift system with removed loading platform

1. Remove rear wall and inserted floor
2. Remove air line.
3. Decotter connection pin for lifting linkage on fork head and push power lift arms into upwards position.
4. Loosen 4 hex. nut each on the mounting brackets and remove cylinder towards the middle of the vehicle.
5. Installation is done vice versa

b) **For type 411**



Picture 55-3/5

1 = Breather filter

1. Remove loading platform.
2. Remove both cylinders in forward direction after removing the hex. screws on the mounting bracket.
3. Installation is done vice-versa.

Remark:

As of chass. no. 2010/3/02100/52, cylinders with a dia. of 170 mm have been installed instead the formerly ones with 150 mm ø. At the same time, the shafts and levers have been reenforced too.

Repair rear lifting cylinder

Same as mentioned in B/I.

Remark:

In the rear power lift cylinder, contrary to the front one, there are no return springs.

Besides, pay attention for a gasket on the cylinder flange.
On the reenforced lifting cylinders, a breather filter is mounted, which should be cleaned when taken off (see picture 55-3/5).

D. Power lift arm linkage, remove, install and repair

1. Remove rear wall and inverted floor.

2. Decotter pin of fork head on lifting cylinder right and left. Now remove same.

3. Decoter nut right next to it (on both sides) and unscrew. Remove washer and connection piece for the lifting shaft.

4. Remove (on bottom side of frame) the mounting brackets for power lift arm shaft, 4 hex. screws each. Take off brackets, watch intermediate ring, the universal mostly remains on shaft, look out for shims.

5. Pull power lift arm shaft downwards, remove connection plate after taking off snap ring.

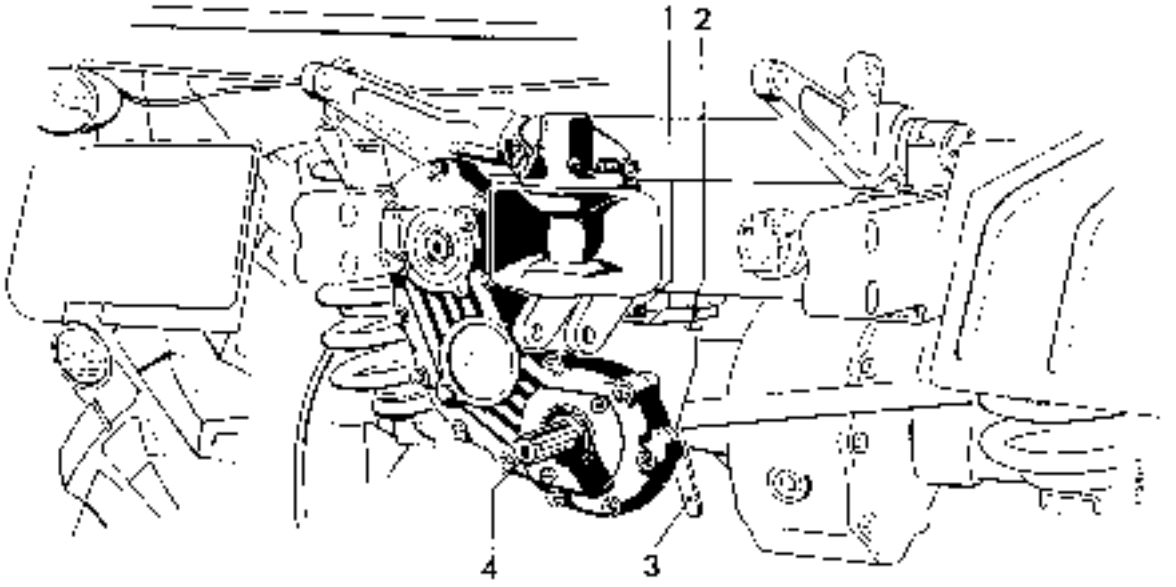
6. The forward located intermediate shaft (right and left) can be taken out by delocking and removing a tightening screw on the outside lever. The shaft with intermediate levers can now be taken out.

   Remark:

   On the reenforced execution, as of chass. no. 5501620, both levers are united and can be removed to the outside, after taking off a lock ring.

7. The mounting bracket for intermediate shaft is tightened with two vertical positioned screws, after unscrewing both, the shaft can also be taken out.

8. Installation is done vice-versa.



Picture 55-4/1

1 = Tension screw
2 = Mounting bracket with washer
3 = Tension lever, tensioned
4 = Re-located pto

The pto. shaft re-locating transmission is a gear type driven one, running in oil in a closed housing. The pto. shaft splined outlet is of 1³/₈" designe.

Since this transmission is mostly installed on the pto. rear afterwards, we will describe a mounting installation procedure. Required is a right angle mounting to avoid unequal tension on the transmission housing.

1. Mount the clamping bracket for the quick coupling under the last cross member of chassis frame, use the included spacers too. This clamping bracket remains on the chassis frame even if the transmission is taken off from time to time.

   A slot is in the middle of the clamping bracket which must be **showing to the right** with its narrowest spot of slot.

   It is adviseable, before installation of the clamping bracket, to fit the bracket into the support, described in the next chapter, possible regrinding.

2. The loose included parts for mounting the transmission onto the clamping bracket should be assembled first. Adjustment of the tensioning screw must be done on the first installation only, same goes for adjustment of the stop screw for tension lever.

   The support itself is mounted on the transmission with 2 screws M 10×20.

3. **Adjustment of tension screw**

   a) Slide transmission onto the well cleaned pto. shaft. Prior, turn the trailer coupling for 90°, otherwise transmission housing hits trailer coupling.

   b) Swing transmission to the right, place tension lever **to the left.** In this position, slide the tension screw into the left part of the slot in the mounting bracket. The ball shape tension screw head must rest exactly in the notch of the right side slot-end.

   c) Swing tension lever to the right and at the same time press tension screw head (with screw driver) **to the right.**

If the tension distance is not exact, same must be adjusted and the counter nut be tightened. Also adjust the side stop screw for the tension lever in a way that the lever goes only a little over the dead end for to get the utmost tension.

Important:

Every time after tensioning the connection screw **put pressure to the right** onto the tension screw head to check the correct and final seat of the bolt head to avoid a self-loosening of the tension mechanism.

The transmission is delivered dry, no oil.

Before the first installation, 0.4 ltr. transmission oil SAE 80 must be filled-in. More oil leads to overheating. Temperatures up to 100° C of the oil means nothing and is normal under continously max. power flow.

The oil must be changed every 100 hours.

4. The removal is done in vice-versa sequences.

Repair Telescopic Cylinder of the Dump Bed

The following wear and tear parts can only be changed on a telescopic cylinder

A. Leaking swivel connection

a) Remove lock ring.

b) Take off swivel connection with the 2 lip rings. Picture 55-5/1

Remark:
The lip rings must be coated with acid free grease before inserted. Sealing lip pointing to the inner side. The pinion edge should not be sharp or damaged for not to destroy the sealing lips when inserting the swivel connection. Formation of rust must be removed.

B. Leaking floor plate

On type 411, there are 2 executions.

1. **Execution** with O-ring in floor plate; up to telescopic cylinder Z 605 (stamped on type designation plate of cylinder). Picture 55-5/2a.

2. **Execution** with O-ring in cylinder sleeve: as of telescopic cylinder Z 605/65. Picture 55-5/2b.

Remark:
On type 421, only the **2nd execution** is installed.

c) Remove snap ring.

b) Remove floor plate by hitting cylinder sleeve on a smooth wooden board.

c) Remove O-ring. When reassembling, look out for (as per execution):

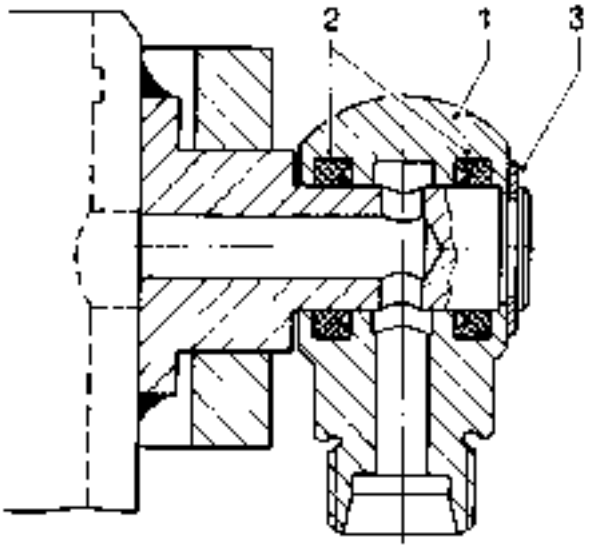
1. **Execution:** Install new O-ring. Before installation, smoothen the rear edge of groove for snap ring in cylinder sleeve with fine sand paper, because this edge can damage the O-ring when inserting same. Before reassemble, coat parts with acid free grease.

2. **Execution:** Insert new grease coated O-ring into the groove of the cylinder sleeve, grease contact surface of floor plate and cylinder sleeve. Do not tilt floor plate when inserting. Install snap ring.

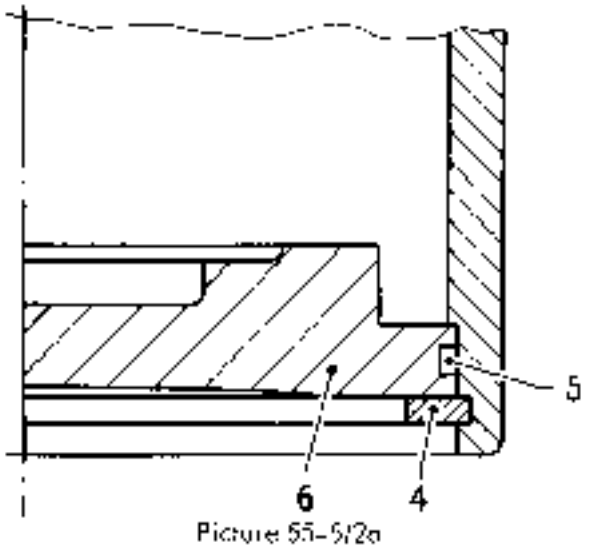
C. Change worn out ball head plates

a) Loosen cylindrical screws (2 each), remove together with "Schnorr-Lock".

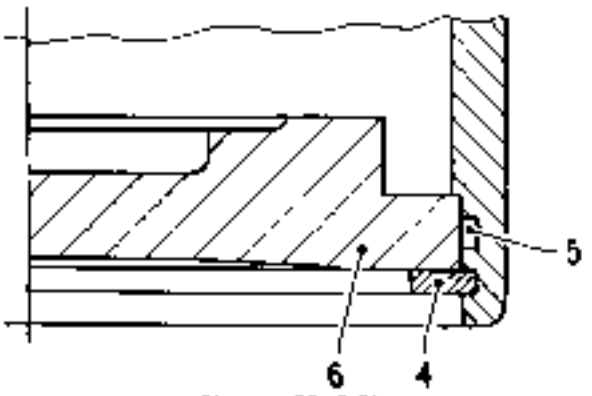
b) Remove stop-and pressure plate, further dismounting of the telescopic cylinders is not possible



Picture 55-5/1
1 = Swivel connection head
2 = O-ring
3 = Snap ring



Picture 55-5/2a



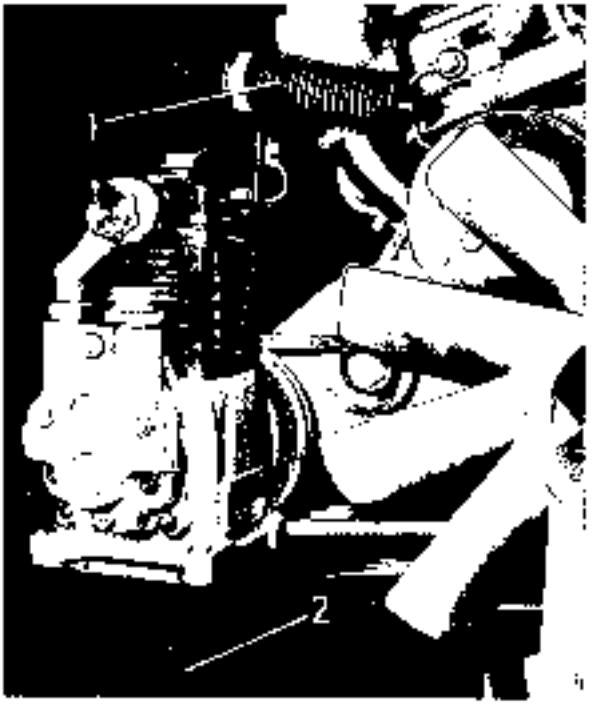
Picture 55-5/2b
4 = Snap ring
5 = O-ring
6 = Floor plate

I. Remove and install

1 Disconnect steer pipes and hose lines on oil pump and compressor.

2 Remove V-belt tension mechanism from bracket and take off V-belt.

3 Remove the 4 mounting bolts from base of compressor-oil pump, take out the unit



Picture 55-6/1

1 = tension mechanism for V-belt
2 = bolt (one of 4) on air compressor

4. Installation is done vice-versa.

Remark:

When installing, check for flexibility of the belt tension mechanism. The V-belt is correct tensioned when the same can hardly by pressed together by hand.

If necessary, check or change the spring.

Spring data.

Length, untensioned 213 mm
Spring load 30 kp for each 100 mm spring travel.

II. Repairing

The air compressor is repaired as mentioned in section 42–10.

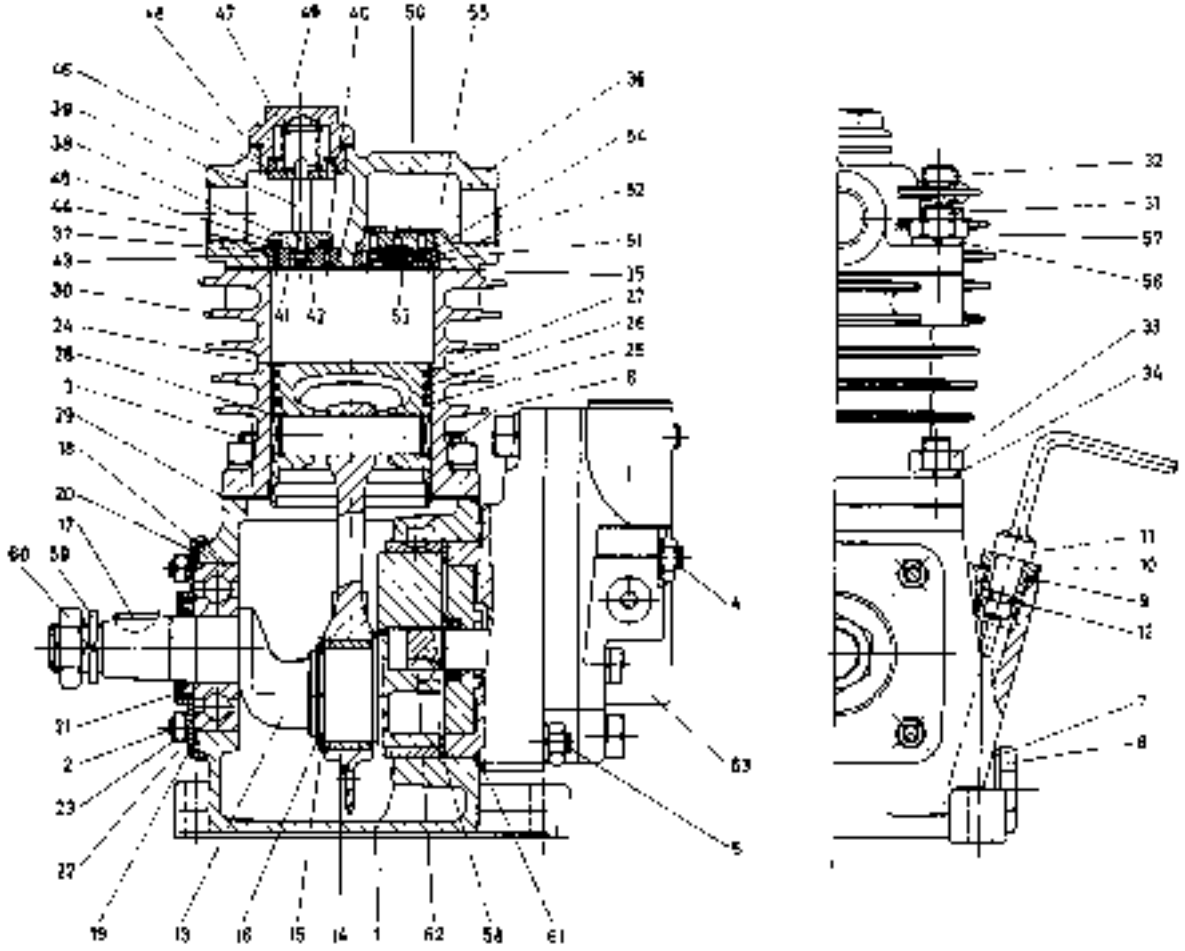
1 Disconnect hydraulic pump. Three bolts are exposed which serve as a clutch of the air compressor resp. of the compressors bottom part.

This bolts must always be renewed when reassembled. They should be inserted with grease into the groove of the pump shaft. Turn same, until it slides into the opposite part of the air compressor.

Tighten mounting screws equally on pump flange.

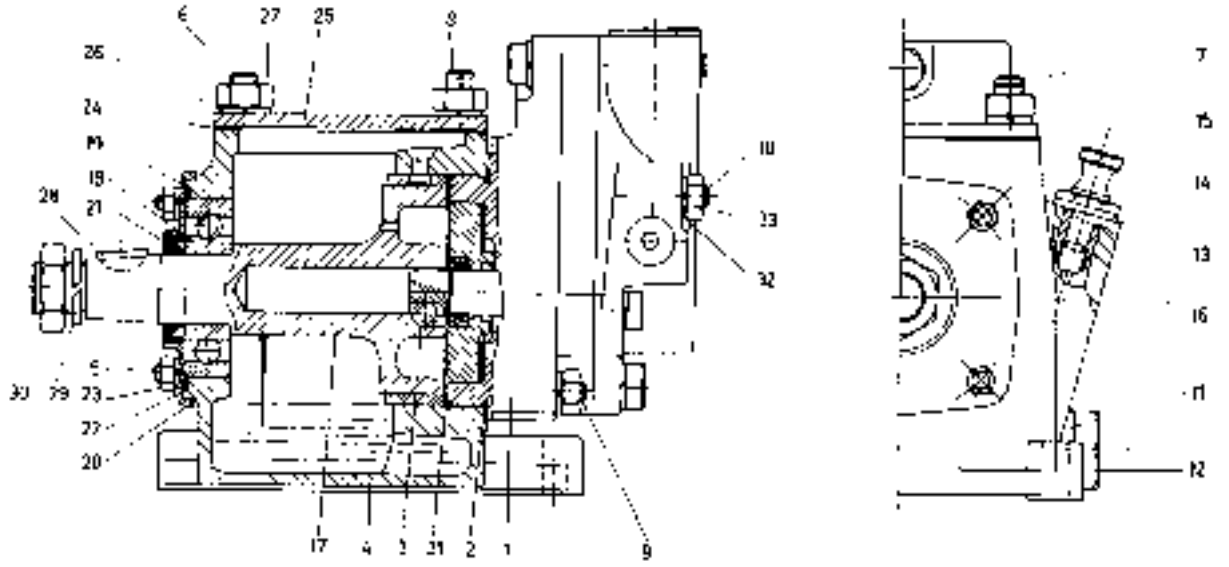
Dismounting of a hydraulic pump for purpose of repairing is not allowed by the manufacturer. An exchange pump should always be available. There are complete combinations air compressor-oil pump of which the air compressor is an exchange unit.

Besides the combination air compressor-oil pump (Picture 55-6/1), there are oil pumps without air compressor (Picture 55-6/3), in which, instead of a crankshaft, a straight shaft is installed. Pictures 55-6/2 and 55-6/3.



Picture 55-6/2

1–6 = Crankcase, compl.
* = Housing, compl.
2 = Stud bolt M 6 × 13
3 = Stud bolt M 10 × 22
4 = Stud bolt M 8 × 35
5 = Stud bolt M 5 × 35
6 = Breather screw
7 = Sealing ring* A 22 × 27
8 = Locking screw
9 = Sealing ring* A 18 × 22
10 = Bushing
11 + 12 = Dip stick, compl.
13 = O-ring*
13 17 = Crankshaft, compl.
13 = Camshaft
14 = Rod, comp.
15 = Washer
16 = Lock ring 22 × 1.5
17 = Key 5 × 7 × 5
18 = Grooved ball bearing 25 × 52 × 17
19 = Gasket
20 + 21 = Cover, compl.
20 = Cover
21 = Sealing ring B 1*
22 = Lock ring 6
23 = Hex. nut M 6
24 26 = Piston compl. 60 ø
24 = Piston with piston pin
25 = Rectangle ring*
26 = Nose ring*
27 = Top ring*
28 = Lock ring 15 × 1
29 = Gasket*
30 32 = Cylinder, comp. 60 ø
31 = Stud bolt M 12 × 25
32 = Stud bolt
33 = Hex. nut M 12
34 = Lock ring 10
35 = Cover*
36–54 = Cylinder head, compl.
36 = Cylinder cover
37–46 = Pressure valve, compl.
37 = Valve seat*
38 = Pressure valve stop*
39 = Valve guide
40 = Sinus spring*
41 = Washer*
42 = Lock washer 3.2
43 = Sealing ring*
44 = Valve ring*
45 = Washer*
46 = Spring retainer
47 = Pressure spring
48 = Sealing ring A 32 × 36
49 = Cap
50 55 = Suction valve, compl.
52 = Valve seat*
53 = Suction valve stop
54 = Washer*
55 = Coil spring*
54 = Valve ring*
55 = Sealing ring*
56 = Lens ring 12
57 = Hex. nut M 12
58 = Washer
59 = Lock ring A 18
60 = Hex. nut M 18 × 1.5
61 = Sealing ring*
62 = Bolt 2 III
63 = Gear type pump, compl.



Picture 55-6/3

1 = Gear type oil pump, compl.
2 = Sealing ring*
3 = Ball** 8 III
4—31 = Pump mounting compl.
4—10 = Crankcase, cover
4 = Crankcase, pump
5 = Stud bolt M 6X 1
6 = Stud bolt M 10×22
7 = Stud bolt M 10× 22
8 = Breather screw
9 = Stud bolt M 8×56
10 = Stud bolt M 8×75
11 = Sealing ring* A 22×27
12 = Locking screw
13 = Sealing ring* A 18×22
14 = Bushing
15—16 = Dip stick comp.
16 = O-ring
17 = Shaft, compl.
18 = Grooved ball bearing 20/62×17
19 = Sensing ring*
20—21 = Cover compl.
20 = Cover
21 = O-ring* B 1 25×3*
22 = Lock ring A
23 = Hex. nut M 6
24 = Gasket*
25 = Cap*
26 = Lock ring 10
27 = Hex. nut M 25
28 = Key 5×7 5
29 = Lock ring A 7t
30 = Hex. nut M 18×1 5
31 = Washer
32 = Lock ring B
33 = Hex. nut M 8

* Wear and parts

** This parts should be exchanged always when repairing compressor-oil pump. When ordering parts, give designation and order number

Only the positions mentioned above should be dismounted and repaired. The dismounting of the gear type driven oil pump is not permissible, automatically, the warranty would be lost. If the pump does not function correct anymore, install or exchange pump. Always use, when changing the pump, 3 new balls (pos. no. 3). The groove of the balls should not be worn out.