USA and Canada

1971
1972
1973

SERVICE

Without Guesswork

Types 1, 2, 3 and 4

October 1972

TECHNICAL DATA FOR WORKSHOP USE

This booklet contains all major measurements and adjustments for Volkswagens of the Types 1, 2, 3 and 4 imported into the USA and Canada for the model years 1971, 1972 and 1973.

Use this booklet together with the applicable workshop bulletins and workshop manuals.

VOLKSWAGENWERK AG · WOLFSBURG

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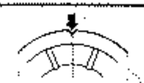
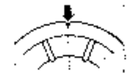
*) The term "Wear limit" means that parts, which are near, or have reached the dimensions given should not be reinstalled during repairs.
All measurements are in mm followed by inches in brackets ( )

ENGINE

1. Technical Data

Type	Engine Code letter	Installed	Output / rpm in 1000 DIN (PS)	Output / rpm in 1000 SAE (bhp)	Maximum torque at rpm in 1000 DIN (mkg)	Maximum torque at rpm in 1000 SAE (lb ft)	Capacity ccm (cu in.)	Bore mm(in.)	Stroke mm (in.)
1/1600	AE	from Aug. 1970 up to July 1972	48/4.0 +++)	46/4.0 +++)	10.2/2.0 +++)	72.0/2.0 +++)	1584 (96.6)	85.5 (3.96)	69.0 (2.72)
	AK +)	from Aug. 1972							
1/1600	AH	from Aug. 1971	48/4.0	46/4.0	10.2/2.0	72.0/2.0	1584 (96.6)	85.5 (3.96)	69.0 (2.72)
2/1600	AE	from Aug. 1970 up to July 1971	50/4.0	60/4.4	10.8/2.8	81.7/3.0	1584 (96.6)	85.5 (3.96)	69.0 (2.72)
2/1700	CB	from Aug. 1971	66/4.8	63/4.8	11.6/3.2	81.0/3.2	1679 (102.5)	90.0 (3.54)	66.0 (2.60)
2/1700	CD++)	from Aug. 1972	62/4.0	59/4.2	11.6/3.2	83.0/3.2	1679 (102.5)	90.0 (3.54)	66.0 (2.60)
3/1600	U	from Aug. 1967	54/4.0	65/4.6	11.2/2.2	87.0/2.8	1584 (96.6)	85.5 (3.96)	69.0 (2.72)
3/1600	X	from Aug. 1971	54/4.0	52/4.0	11.2/2.2	77.0/2.2	1584 (96.6)	85.5 (3.96)	69.0 (2.72)
4/1700*	W	from Aug. 1970 up to July 1971	80/4.9	85/5.0	13.5/2.7	99.5/3.5	1679 (102.5)	90.0 (3.54)	66.0 (2.60)
4/1700	EA	from Aug. 1971	80/4.9	76/4.9	13.5/2.7	95.0/27	1679 (102.5)	90.0 (3.54)	66.0 (2.60)
4/1700	EB	for California only from Aug. 1972	72/5.0	69/5.0	12.3/2.7	87.0/2.7	1679 (102.5)	90.0 (3.54)	66.0 (2.60)

Combustion chamber in cylinder head ccm	Compression ratio	Maximum compression pressure *) kg/cm² (psi)	Octane requirement RON	Ignition timing TDC	Ignition setting	Idling speed rpm	Dry weight lbs
50 – 52	7.3 +++)	8.0–10.0 (114–142)	91	5° after ++)		800–900 +++)	264
50 – 52	7.3	7.5–9.5 (107–135)	91	5° after ++)		800–900 +++)	264
50 – 52	7.5	8.0–10.0 (114–142)	91	5° after ++)		800–900	264
51 – 52	7.3	7.0–9.5 (100–135)	91	5° after**)		800–900	275
51 – 52	7.3	7.0–9.5 (100–135)	91	5° after**)		900–1000	275
48 – 50	7.7	8.0–10.0 (114–142)	91	5° before +)		800–900 +++)	288
50 – 52	7.3	7.5–9.5 (107–135)	91	5° before +)		800–900 +++)	288
51 – 52	8.2	9.0–11.0 (128–156)	98	27° before ++)		800–900 +++)	282
51 – 52	8.2	9.0–11.0 (128–156)	98	27° before ++)		800–900 +++)	282
51 – 52	7.3	7.0–11.0 (100–135	91	27° before ++)		800–900 +++)	282

+) From August 1972 for code letter AE
++) For Automatic Transmission only
+++) Up to July 1971: 50/4.0 (60/4.4), 10.8/2.8 (81.7 (3.0)

+) At idling speed (throttle valve closed, vacuum hoses off)
++) at 3500 rpm (vacuum hoses off)
+++) Engine with code letter AE up to July 1971: 7.5

*) Minimum compression (wear limit) see page 14
**) At idling speed (Throttle valve closed, vacuum hoses on)
***) Vehicles with Automatic Stick Shift / Automatic Transmission: 900 – 1000 rpm
****) From August 1972: 10° after TDC

II. Tolerances, wear limits and settings

Designation		Types 1, 2, 3/1600 New part		Types 1, 2, 3/1600 Wear limit		Types 2/1700, 4 New part		Types 2/1700, 4 Wear limit		Remarks
a - Crankcase bores										
1 - Bores for main bearings										
a) Bearings 1 - 2 - 3	diameter	65.00–65.02	(2.5590–2.5598)	65.03	(2.5601)	70.00–70.02	(2.7559–2.7567)	70.03	(2.7570)	
b) Bearing 4	diameter	50.00–50.03	(1.9685–1.9696)	50.04	(1.9700)	50.00–50.03	(1.9685–1.9696)	50.04	(1.9700)	
2 - Bore for oil seal/flywheel end	diameter	90.00–90.05	(3.5433–3.5452)	–	–	95.00–95.05	(3.7401–3.7420)	–	–	
3 - Bore for oil seal/fan end	diameter	–	–	–	–	62.00–62.05	(2.4409–2.4428)	–	–	
4 - Bores for camshaft bearings	diameter	27.50–27.52	(1.082–1.083)	–	–	27.50–27.52	(1.0825–1.0833)	–	–	
5 - Bore for oil pump housing	diameter	–	–	–	–	70.00–70.03	(2.7559–2.7570)	–	–	
6 - Bores for cam followers	diameter	19.00–19.02	(.7480–.7488)	19.05	(.7500)	24.00–24.02	(.9448–.9456)	24.05	(.9467)	
b - Crankshaft										
3 undersizes of 0.25 mm (.010 in.) each										
1 - Crankshaft										
a) Main journals 1 - 2 - 3	diameter	54.97–54.99	(2.1640–2.1648)	–	–	59.97–59.99	(2.3609–2.3617)	–	–	
b) Main journal 4	diameter	39.98–40.00	(1.5739–1.5748)	–	–	39.98–40.00	(1.5739–1.5748)	–	–	
c) Connecting rod journals	diameter	54.98–55.00	(2.1644–2.1653)	–	–	54.98–55.00	(2.1644–2.1653)	–	–	
2 - Crankshaft at No. 2 and 4 main journals (No. 1 and 3 journals on V blocks)	runout	–	–	0.03	(.0012)			0.02	(.0008)	
3 - Crankshaft	unbalance	max. 12 cmg	–	–	–	max. 12 cmg	–	–	–	
4 - Main bearing journal	out of round	–	–	0.03	(.0012)	–	–	0.03	(.0012)	
5 - Connecting rod journal	out of round	–	–	0.03	(.0012)	–		0.03	(.0012)	

Designation		Types 1, 2, 3/1600 New part		Wear limit		Types 2/1700, 4 New part		Wear limit	Remarks
6 - Crankshaft/main journals (taking housing preload into account):									
a) Bearings 1 and 3	radial play	0.04–0.10	(.0016–.004)	0.18	(.007)	0.05–0.10	(.002–.004)	0.18	*) When repairing
b) Steel bearing 2	radial play	0.03–0.09	(.001–.003)	0.17	(.0067)	0.03–0.09		0.17	
c) Bearing 4	radial play	0.05–0.10	(.002–.004)	0.19	(.0075)	0.05–0.10		0.19	
7 - Crankshaft/main journal 1	end play	0.07–0.13	(.0027–.005)	0.15	(.006)	0.07–0.13		0.15	
8 - Connecting rod journal/connecting rod	radial play	0.02–0.07	(.0008–.0027)	0.15	(.006)	0.02–0.07		0.15	
	end play	0.10–0.40	(.004–.016)	0.70	(.027)	0.10–0.40		0.70	
c - Connecting rods									
1 - Weight difference between connecting rods in one engine		max. 5 grams		max. 10 grams*)		max. 6 grams		max. 10 grams*)	
Weight of replacement connecting rods									
– Weight (white) brown/white		580–588 grams			–	746–752 grams		–	
+ Weight (black) grey/black		592–600 grams			–	769–775 grams		–	
2 - Piston pin	diameter	21.996–22.00	(.8658–.8661)		–	23.996–24.00	(.9445–.9448)	–	
3 - Piston pin bush	diameter	22.009–22.017	(.8664–.8667)		–	24.015–24.024	(.9454–.9457)	–	
4 - Piston pin/bush	radial play	0.01–0.02	(.0004–.0008)	0.04	(.0016)	0.01–0.03	(.0004–.0012)	0.04	
d - Camshaft									
1 - Bearings 1 - 2 - 3	diameter	24.99–25.00	(.9837–.9842)		–	24.99–25.00		–	
2 - Measured at center bearing (bearings 1 and 3 on V blocks)	runout	0.02	(.0008)	0.04	(.0016)	0.02		0.04	
3 - Camshaft/camshaft bearings (taking housing preload into account)	radial play	0.02–0.05	(.0008–.002)	0.12	(.0047)	0.02–0.05		0.12	
Thrust bearing	end play	0.04–0.13	(.0016–.0051)	0.16	(.0062)	0.04–0.13		0.16	
4 - Camshaft gear	backlash	0.00–0.05	(.0–0.02)		–	0.00–0.05		–	

Designation		Types 1, 2, 3/1600 New part	Wear limit	Type 2/1700,4 New installation	Wear limit	Remarks
5 - Cam follower	diameter	18.98–18.96 (0.7471–0.7463)	18.93 (0.7452)	23.96–23.98 (0.9432–0.9440)	23.93 (0.9421)	*) Note the matching color coding within the individual size groups. The colors are: blue, pink, green.
6 - Bore/cam follower	radial play	0.02–0.06 (0.0008–0.0024)	0.12 (0.0047)	0.02–0.06 (0.0008–0.0024)	0.12 (0.0047)	
7 - Push rod	runout	max. 0.3 (0.12)	–	max. 0.3 (0.12)	–	
e - Lubrication system						
1 - Oil pressure (for SAE 30 only) at an oil temperature of 70° C (158° F) and 2500 rpm		approx. 3 kg/cm² (42 psi)	2 kg/cm² (28 psi)	approx. 3 kg/cm² (42 psi)	2 kg/cm² (28 psi)	
2 - Spring for pressure relief valve Length loaded 44.1 mm (1.73 in.)	load	5.6–7.3 kg (12.3–16.0 lbs.)	–		–	
3 - Spring for oil pressure relief valve Length loaded: 39.0 mm (1.54 in.)	load	–	–	6.8 – 8.8 (15 – 19 lbs.)	–	
4 - Spring for oil pressure control valve Length loaded 20.2 mm (0.795 in.)	load	3.1–3.8 kg (6.8–8.4 lbs.)	–		–	
5 - Spring for oil pressure control valve Length loaded; 26.0 mm (1.02 in.)	load	–	–	1.7–2.0 kg (3.7–4.4 lbs.)	–	
6 - Oil pressure switch open at	pressure	0.15–0.45 kg/cm² (2.1–6.4 psi)	–	0.15–0.45 kg/cm²	–	
f - Flywheel						
1 - Flywheel (measured at center of friction surface)	lateral runout	max. 0.30 (0.12)	–	max. 0.40 (0.16)	–	
	unbalance	max. 20 cmg	–	20 cmg	–	
2 - Shoulder for oil seal	outside dia.	69.9–70.1 (2.7519–2.7598)	–	74.9–75.1 (2.948–2.956)	–	
3 - Drive plate	unbalance	max. 5 cmg	–	max. 5 cmg	–	
g - Pistons and cylinders 2 oversizes of 0.5 mm (.020 in.) each						
1 - Cylinders	out of round	max. 0.01 (0.0004)	–	max. 0.01 (0.0004)	–	
2 - Cylinder/piston	clearance *)	0.04–0.06 (0.0016–.0023)	0.20 (0.008)	0.04–0.06 (0.0016–0.0023)	0.20 (0.008)	
3 - a) Upper piston ring	side clearance	0.07–010 (0.0027–.0039)	0.12 (0.0047)	0.06–0.09 (0.0023–0.0035)	0.12 (0.0047)	
b) Lower piston ring	side clearance	0.05–0.07 (0.002 –.0027)	0.10 (0.004)	0.04–0.07 (0.0016–0.0027)	0.10 (0.004)	

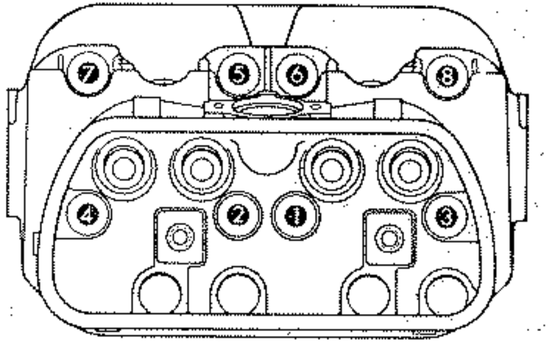
Designation		Types 1, 2, 3 / 1600 New part		Wear limit		Types 2 / 1700, 4 New part		Wear limit		Remarks
4 - Oil scraper ring	side clearance	0.03–0.05	(.0011–.0019)	0.10	(.004)	0.02–0.05	(.0008–.0019)	0.10	(.004)	*) when repairing
5 - a) Upper piston ring	gap	0.30–0.45	(.012–.018)	0.90	(.035)	0.35–0.55	(.014–.021)	0.90	(.035)	**) Type 1 – from August 1971
b) Lower Piston ring	gap	0.30–0.45	(.012–.018)	0.90	(.035)	0.30–0.35	(.012–.014)	0.90	(.035)	***) Piston weight:
6 - Oil scraper ring	gap	0.25–0.40	(.010–.016)	0.95	(.037)	0.25–0.40	(.010–.016)	0.95	(.037)	Type 2 / 1700
7 - Piston weight						***)				– weight (brown) 496 – 504 grams
– weight (brown)		398–410 grams		–				–		456 – 464 grams
+ weight (grey)		406–418 grams		–				–		+ weight (grey) 504 – 512 grams
– weight (brown)		402–412 grams	**)	–		–		–		464 – 472 grams
+ weight (grey)		410–420 grams	**)	–		–		–		Type 4
8 - Weight difference between pistons in one engine		max. 5 grams		max. 10 grams *)		max. 4 grams		max. 10 grams *)		– weight (brown) 472 – 488 grams
h - Cylinder head and valves										+ weight (grey) 480 – 496 grams
1 - Cylinder seating depth in cylinder head		13,45–13.55	(.528–.532)	–		5.4–6.5	(.21–.25)	–		Type 4 (from November 1971)
a) Rocker arm	inside dia.	18.00–18.02	(.7086–.7088)	18.04	(.7090)	20.00–20.02	(.7874–.7882)	20.04	(.7890)	– weight (brown) 480 – 488 grams
b) Rocker shaft	diameter	17.99–17.97	(.7081–.7073)	17.95	(.7065)	19.95–19.97	(.7854–.7861)	19.93	(.7846)	498 – 506 grams
2 - Valve springs:										+ weight (grey) 488 – 496 grams
Length loaded 31.0 mm (1.22)	load	53.2–61.2 kg	(117.2–134.8 lb)	–		–		–		506 – 514 grams
Length loaded 29.0 mm (1.14)	load	–		–		76.5–84.5 kg	(168–186 lb)	–		Because of the different piston weights it is necessary to check the weight during repair.
3 - Valve seats										
a) intake	width	1.4–2.5	(.05–.10)	–		1.8–2.2	(.07–.08)	–		
b) exhaust	width	1.4–2.5	(0.5–.10)	–		2.0–2.5	(.078–.098)	–		
c) intake	seat angle	45°		–		30°		–		
d) exhaust	seat angle	45°		–		45°		–		
e) outer correction angle		15°		–		15°		–		
f) inner correction angle		75°		–		75°		–		

Designation		Types 1, 2, 3 / 1600 New part		Types 1, 2, 3 / 1600 Wear limit		Types 2 / 1700,4 New part		Types 2 / 1700,4 Wear limit		Remarks
4 - Valve guides:										
intake	inside dia.	8.00–8.02	(0.3150–0.3157)	8.06	(0.3172)	8.00–8.02		8.06		*) Measured with throttle valve open, engine warm, all spark plugs out, good gauge, engine turned with starter.
exhaust	inside dia.	8.00–8.02	(0.3150–0.3157)	8.06	(0.3172)	8.98–8.99	(0.3534–0.3538)	9.06	(0.3566)	**) For Type 2 (and Type 4 EB) engines only
5 - Valve stem: intake	diameter	7.95–7.94	(0.3125–0.3129)	7.90	(0.3109)	7.94–7.95		7.90		
exhaust	diameter	7.91–7.92	(0.3113–0.3117)	7.88	(0.3101)	8.91–8.92	(0.3507–0.3511)	8.87	(0.3491)	
	out of round	0.01	(0.004)		–	0.01			–	
6 - Valve head: intake	diameter	35.6	(1.40)		–	39.1–39.3	(1.539–1.546)		–	
exhaust	diameter	32.1	(1.26)		–	32.7–33.0	(1.286–1.299)		–	
7 - Valve guide/valve stem:										
intake and exhaust	rock	0.23–0.27	(0.009–0.010)	0.8	(0.031)	0.45	(0.018)	1.20	(0.046)	
8 - Valve clearance (cold)										
intake	setting	0.15	(0.006)		–	0.15	(0.006)		–	
exhaust	setting	0.15	(0.006)		–	0.15	(0.006)		–	
9 - Compression pressure		8.0–10 kg/cm²	(114–142 psi)	7 kg/cm²	(100 psi)	9.0–11.0 kg/cm²	(128–156 psi)	7.0 kg/cm²	(100 psi)	
*) Types 1 and 3 – from Aug. 1971		7.5–9.5 kg/cm²	(107–135 psi)	6 kg/cm²	(85 psi)	7.0–9.5 kg/cm² **)	(100–135 psi)	6.0 kg/cm²	(85 psi)	
Pressure difference between cylinders		max. 2 kg/cm²	(28 psi)		–	max. 2 kg/cm²	(28 psi)		–	
3 - Cooling										
1 - Thermostat	opening temperature	65–70°C	(149–158° F)		–	65–70° C	(149 – 158° F)		–	
2 - Fan/belt pulley	out of balance	max 5 cmg			–	max. 5 cmg			–	

Designation		Types 1, 2, 3/1600 New part		Wear limit	Types 2/1700,4 New part		Wear limit		Remarks
k - Clutch									*) Type 3 from August 1971: 380 – 440 kg (838 – 970 lbs.)
1 - Total pressure		380–420 kg *)	(838–925 lbs) *	–	380–440 kg	(838–970 lbs)	–		
2 - Complete clutch	out of balance	max. 15 cmg	–	–	max. 15 cmg	–	–		
3 - Pressure plate	runout	–	–	0.10 mm (0.004 in.)	–	–	0.10 mm	(0.004 in.)	
4 - Clutch plate	lateral runout	max. 0.5 mm	(0.020 in.)	–	max. 0.5 mm	(0.020 in.)	–		
5 - Play at clutch pedal		10 – 20 mm	(0.4–0.8 in.)	–	10 – 20 mm	(0.4–0.8 in.)	–		

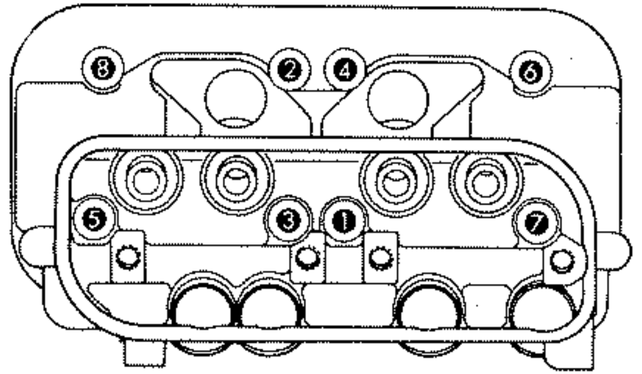
III. Tightening torques Types 1, 2 and 3

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
Connecting rods	connecting rod nut	M 9 x 1	8 G	8	3–3.5 *)	22–25 *)	*) Replace; contact surfaces oiled
Crankcase halves	nut	M 8	5 S	–	2	14	**) Tightening cylinder head nuts:
Crankcase halves	sealing nut	M 12 x 1.5	35 S 20 K	–	2.5	18	1-Tighten nuts lightly first
Cylinder head	nut	M 10	35 S 20 KV	–	3.2 **)	23 **)	2-Then tighten to 1mkg (7 lb ft) in the order shown
Rocker shaft to cylinder head	nut	M 8	8 G	10	2–2.5	14–18	3-Finally tighten to the required torque
Oil pump to crankcase	nut	M 8	–	10	2.0	14	
Oil drain plug	plug	M 14 x 1.5	9 S 20 K	–	3.5	25	
Oil strainer to crankcase	nut	M 6	–	6	0.7	5	
Generator pulley	nut	M 12 x 1.5	5 S	6	5.5–6.5	40–47	
Flywheel to crankshaft	gland nut	M 28 x 1.5	45 S 20 KN	–	35	253	
Clutch to flywheel	bolt	M 8 x 1.5	8 G	8.8	2.5	18	***) Replace
Spark plugs	spark plug	M 14 x 1.25	–	–	3–4	22–29	
Engine to transmission	nut	M 10	–	8	3	22	
Converter to drive plate	bolt	M 8	8 G	–	2.5	18	
Types 1 and 2/1600 only							
Special nut for fan	nut	M 12 x 1.5	9 S 20 K	–	5.5–6.5	40–47	
Crankshaft pulley	bolt	M 20 x 1.5	9 S 20 K	–	4–5	29–36	
Type 2/1600							
Engine carrier to crankcase	bolt	M 8	8 G	–	2.5	18	
		M 10	–	–	4	29	
Type 3/1600							
Engine carrier to crankcase	bolt	M 8	8 G	–	4	30	
		M 10	–	–	6.5	50	
Special bolt for fan and crankshaft pulley	bolt	M 20 x 1.5	9 S 20 K	–	13–15	94–108	
Types 2 and 3/1600 only							
Engine carrier to body	self-locking nut	M 8	8 G	–	2.5 ***)	18 ***)	



Tightening torques Types 2/1700,4

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
Connecting rods	connecting rod nut	M 9 x 1	41 Cr 4	8	3.3 *)	24 *)	*) Replace; contact surfaces oiled.
Crankcase halves	nut	M 8	6 G	8	2.0	14	**) Tighten nuts slightly and then turn to specified torque in the following sequence.
Crankcase halves	sealing nut	M 10 x 1,25	35 S 20 KV		3.2	23	
Cylinder head	nut	M 10	35 S 20 KV		3.2 **)	23 **)	
Rocker shaft to cylinder head	nut	M 7	6 G	8	1.5	11	
Oil drain plug	plug	M 12 x 1,5	9 S 20 K		2.2	16	
Oil strainer to crankcase	sealing nut	M 8	9 S 20 K		1.3	9	
Drive plate to crankshaft	socket head screw	M 12 x 1.5	10 K	10.9	8.5	61	
Hub to crankshaft	self-locking bolt	M 8	SAE 1022		3.2	23	
Fan to hub	socket head screw	M 8	–	8.8	2.0	14	
Spark plugs	spark plug	M 14 x 1.25	–		3.5	25	
Engine carrier or brackets to crankcase	self-locking nut	M 8	SAE 1022		2.0	14	
Oil pump to crankcase	nut	M 8	–	8	2.0	14	
Flywheel to crankshaft	self-locking bolt	M 12 x 1.5	22 Cr 4	10.19	11.0	80	
Clutch to flywheel	bolt	M 8 x 20	8 G	8.8	2.5	18	



Fuel System

I. Carburetor settings and jets

Vehicle		Type 1/1600		Type 1/1600 (M 9)	Type 1/1600 (M9)
Carburetor type Part No. from Engine No.		34 PICT – 3 113 129 029 S 141 129 029 T AE 000 001	34 PICT – 3 113 129 031 K 141 129 031 G AH 000 001	34 PICT – 3 113 129 029 T 141 129 029 T AH 000 001 AK 000 001	34 PICT – 3 113 129 031 M 141 129 031 K AH 000 001 AK 000 001
Venturi	mm diameter	26	26	26	26
Main jet		x 130	x 127.5/ x 130	x 127.5 / x 130	x 127.5/ x 127
Air correction jet		75 Z **)	75 Z / 80 Z	75 Z / 80 Z	75 Z / 70 Z
Pilot jet		g 60	g 55	g 55	g 55
Pilot jet air bleed	mm diameter	147.5	147.5	147.5	147.5
Auxiliary fuel jet		47.5	42.5	42.5	42.5
Auxiliary air jet		90	90	90	90
Relief drilling	mm	–	1.2 / 1.2	1.2 / 1.2	1.2 / 1.2
Power fuel jet		100 / 100	100 / 100	100 / 100	100 / 100
Float needle valve	mm diameter	1.5	1.5	1.5	1.5
Washer under float needle valve	mm	0.5	0.5	0.5	0.5
Float weight	grams	8.5	8.5	8.5	8.5
Pump injection quantity	cm^3/stroke	1.45 – 1.75	1.3 – 1.6	1.3 – 1.6	1.3 – 1.6
Throttle valve gap	mm	–	–	–	–

*) For California only
**) Karmann Ghia Models: 80 Z

Type 2/1600	Type 2/1700 (up to July 1972)		Type 2/1700 man. transm. (from Aug. 1972)		Type 2/1700 autom. transm. (from Aug. 1972)	
34 PICT – 3 211 129 031 DG AE 000 001	34 PDSIT – 2 left 021 129 027 L CB 000 001	34 PDSIT – 3 right 021 129 028 L	34 PDSIT – 2 left 021 129 027 P CB	34 PDSIT – 3 right 021 129 028 P	34 PDSIT – 2 left 021 129 027 M CD 000 001	34 PDSIT right 021 129 028 M
26	26		26		26	
125	137.5		x 130		x 132.5	
60 Z	155/050		140		155	
g 60 (67.5)	55		–		–	
147.5	145		140		130	
47.5 (42.5)	45	–	45	–	45	–
90	0.7	–	0.7	–	0.7	–
	–		–		–	
95 / 95	–		–		–	
1.5	1.2		1.2		1.2	
0.5	0.5		1.0		1.0	
8.5	7.0		7.0		7.0	
1.45 ± 0.15	0.45 ± 0.1		0.7 ± 0.1		0.5 ± 0.1	
–	0.8		0.6		0.6	

11. Fuel pump

Type	from Engine No.	Part No.	Minimum delivery capacity rpm	Maximum delivery pressure	Remarks
1 + 2	AE, AH, AK } 000 001	113 127 025 C (D)	400 cm^3/min. 4000	0.2–0.35 kg/cm^2 (3–5 psi)	
2	CB, CD } 000 001	021 127 025 A	400 cm^3/min. 3800	0.35 kg/cm^2 (5 psi)	

FRONT AXLE

I. Tolerances, wear limits and settings

a - Front torsion bar settings

Type	Model	Introduced from Chassis No.	Number of leaves	Position	Diameter mm (in.)	Length mm (in.)	Setting angle
1	111	116 000 001	10 10	top bottom	– –	954 (37.558)	44° ± 30' 35° 30 ± 30'
2	all	210 2000 001	9 9	top bottom	– –	980 (38.582)	60° ± 1° *)
3	all	0 000 001	–	–	14.9 (0.586)	859 (33.818)	39° 10' + 50

*) Torsion bars are preloaded, white paint spot on end must be on left

Stabilizer (Type 3)

3	31, 36	319 000 001	–	–	13.7 (0.539)	–	–
	36 Automatic	368 149 834	–	–	13.7 (0.539)	–	–

b - Suspension struts

Designation	Dimensions Type 1 / Sedan 113 mm	(in.)	Type 4 mm	(in.)	mm	(in.)
	*)		up to Juli 1972 *), **)		from Aug. 1972	
Coil spring						
No. of coils	10.5	–	8	–	8.5	– –
No. of effective coils	9	–	6.5	–	7	– –
Coil diameter mm (in.)	110	(4.33)	129	(5.08)	–	– –
Wire diameter mm (in.)	10.45	(0.410)	12.35	(0.485)	***)	
Length unloaded mm (in.)	326	(12.8)	385	(15.16)	441.5	(17381)
Shock absorber piston diameter mm (in.)	32	(1.25)	32	(1.259)	32	(1.259)
Shock absorber maximum stroke mm (in.)	175	(6.88)	180	(7.08)	180	(7.08)

*) When installing a new spring, note color code: Springs are available in 3 groups. Both springs on one axle must be same color code.

**) Front and rear springs are different.

***) Varying wire diameter 10.3 mm (0.404 in.) to 12.25 mm (0.431 in.) largest diameter in the center. New and previous springs must not be paired. When springs are replaced during repairs, note the differences in the dimensions.

Designation		Type 1 / Sedan 111		Type 2		Type 3		Remarks
		New part	Wear limit	New part	Wear limit	New part	Wear limit	
c - Axle beam and torsion arms								*) when testing with VW 282 d the mandrel must contact the measuring surface.
1 - Torsion arm bearings in axle beam								
a) Seat for upper needle bearing	diameter	45.97–45.99 (1.809–1.810)	–	56.97–56.99 (2.242–2.243)	–	43.97–43.99 (1.730–1.731)	–	
Needle bearing	diameter	46.0 (1.811)	–	56.96–56.99 (2.242–2.243)	–	44.0 (1.7322)	–	
Thrust rings	diameter	–	–	57.17–57.19 (2.250–2.251)	–	44.15 (1.7381)	–	
Oversize	diameter	46.17–46.19 (1.817–1.818)	–	57.17–57.19 (2.250–2.251)	–	44.17–44.19 (1.7388–1.739)	–	
Needle bearing	diameter	46.2 (1.819)	–	–	–	44.2– (1.7400)	–	
Thrust rings	diameter	–	–	–	–	44.35 (1.7460)	–	
b) Seat for lower needle bearing	diameter	49.97–49.99 (1.967–1.9685)	–	56.97–56.99 (2.242–2.243)	–	49.97–49.99 (1.967–1.968)	–	
Needle bearing	diameter	50.0 (1.968)	–	56.96–56.99 (2.242–2.243)	–	50.0 (1.9685)	–	
Oversize	diameter	50.17–50.19 (1.975–1.976)	–	57.17–57.19 (2.250–2.251)	–	50.17–50.19 (1.975–1.976)	–	
Needle bearing	diameter	50.2 (1.9763)	–	57.17–57.19 (2.250–2.251)	–	50.2 (1.9663)	–	
2 - Bushing for								
a) Torsion arm, upper		37.20–37.25 (1.463–1.465)	37.38 (1.47)	43.2–43.27 (1.700–1.702)	43.40 (1.70)	35.15–35.20 (1.383–1.385)	32.38 (1.27)	
b) Torsion arm, lower		37.20–37.25 (1.463–1.465)	37.38 (1.47)	43.2–43.27 (1.700–1.702)	43.40 (1.70)	33.17–33.22 (1.305–1.307)	33,38 (1.66)	
3 - Torsion arm	twist	*)	–	*)	–	*)	–	

Designation	Type 1 / Sedan 111		Type 1 / Sedan 113		Type 2		Type 3		Type 4		Remarks
	New part	Wear limit	New part	Wear limit	New part	Wear limit	New part	Wear limit	New part	Wear limit	
d - Ball joints, steering knuckles											
1 - Steering ball joints ..... play	—	—	1.0 (.04)	2.5* (.10)	—	—	—	—	1.0	2.5*)	*) When checking with lever VW 281 a.
Ball joints, upper **) ..... play	max. 0.5	2.0*) (.08)	—		max. 0.3 (.012)	2.0*)	1.0	2.5*)	—	—	**) Type 2 only After fitting new joints, peen to 6—9 tons with VW 471 three times
Ball joints, lower **) ..... play	max. 0.5	1.0 *) (.04)	—	—	max. 0.3	2.0 *)	max. 0.5	2.0 *)	—	—	***) Measured with VW 258 k/p
2 - Steering knuckle/stub axle	0.15 ***) (.006)						0,15 ***)				
distortion											
Steering knuckle/caliper flange	± 0.05 ***) (.002)						± 0.05 ***)				
distortion											
3 - Wheel bearing inner, inside dia	29.00—29.01 (1.1417—1.1420)		29.00—29.01		31.75—31.77 (1.2499—1.2507)		29.00—29.01		29.00—29.01		
outside dia	50.29—50.32 (1.9799—1.9810)		50.29—50.32		59.13—59.16 (2.3279—2.3290)		50.29—50.32		50.29—50.32		
4 - Wheel bearing outer, inside dia.	17.46—17.48 (.6873—.6880)		17.46—17.48		19.05—19.07 (.7499—.7507)		17.46—17.48		17.46—17.48		
outside dia	39.88—39.90 (1.570—1.5708)		39.88—39.90		45.24—45.26 (1.7810—1.7818)		39.88—39.90		39.88—39.90		
5 - Seat for inner wheel bearing stub axle	28.98—29.00 (1.1408—1.1417)		28.98—29.00		31.73—31.75 (1.2491—1.2499)		28.98—29.00		28.98—29.00		
brake drum	50.25—50.28 (1.9783—1.9795)		50.25—50.28		59.09—59.12 (2.3263—2.3275)		50.25—50.28		50.25—50.28		

Designation	Type 1 / Sedan 111		Type 1 / Sedan 113		Type 2 +)		Type 3		Type 4		Remarks
	New part	Wear limit	New part	Wear limit	New part	Wear limit	New part	Wear limit	New part	Wear limit	
6 - Seat for outer wheel bearing stub axle ...	17.45–17.46 (.6869–.6873)		17.45–17.46		19.03–19.05 (.7491–.7499)		17.45–17.46		17.45–17.46		*) If axle is noisy, adjust to lower limit
brake drum ...	39.84–39.87 (1.5684–1.5696)		39.84–39.87		45.20–45.23 (1.7794–1.7806)		39.84–39.87		39.84–39.87		**) Model 14 : 14.14
7 - Wheel bearing play	0.03–0.12*) (.001–.004)		0.03–0.12 *)		0.03–0.12 *)		0.03–0.12 *)		0.03–0.12 *)		***) After covering 3000 miles 8–10 cmkg (7–8.7 in. lb)
e - Steering											
1 - Steering wheel turns from lock to lock	2 1/2		2 3/4		2 3/4		2 3/4		3 1/2		+) up to July 1972; from Aug. 1972 – Worm and Roller type steering gear (no repair possible)
2 - Steering gear ratio	19.4		17.8		15.0		19.4		22.38		
3 - Overall ratio	14.34 **)		16.5		15.7		14.8		19.35		
4 - Worm turning torque (for axial adjustment)											
without oil seal	1.5–2.5 cmkg (1.3–2.2 in. lb)		2.0–3.0 cmkg		2.0–5.0 cmkg (1.7–4.4 in. lb)		1.5–2.5 cmkg		1.5 cmkg		
with seal	2.0–3.0 cm kg (1.7–2.6 in. lb)						2.0–3.0 cmkg		2.0–2.5 cmkg		
5 - Tightening torque for peg securing nut ...	–		–		25 cmkg (22.9 in. lb)		–		–		
6 - Peg turning torque	–		–		2.0–3.0 cmkg		–		–		
7 - Total turning torque ..... (Steering gear assembled)	9–12 cmkg (7.8–10.6 in.lb)		5–9 cmkg (4.4–7.8 in. lb)		24 cmkg ***) (22.0 in. lb)		9–12 cmkg (7.8–10.6 in.lb)		up to 8 cmkg (7.0 in. lb)		

f - Wheel alignment data

With 14 in. wheels, an angle of 10' equals a toe measurement of . . . . . 1.1 mm (0.043 in.)
15 in. . . . . 1.2 mm (0.047 in.)
+ in front of a track measurement means toe-in, – means toe-out

Test conditions:
Instrument and wheel mirrors properly set.
Vehicle empty
Correct tire pressures (for permissible total weight).
Suspension free of tension.
Vehicle aligned correctly.

Designation	Value
Type 1 / Sedan 111	
1 - Total toe angle with wheels not pressed	+ 30' ± 15'
2 - Total toe angle with wheels pressed	+ 5' ± 15'
3 - Pressure applied to wheels	10 ± 2 kg (22 ± 4 lb
4 - Maximum permissible difference between readings with wheels pressed and not pressed	25'
5 - Front wheel camber in straight-ahead position	0° 30' ± 20'
Maximum permissible difference between sides	30'
6 - Toe-angle at 20° lock to left and right (wheels not pressed) to left	– 1° 20' ± 30'
to right	– 2° 10' ± 30'
7 - Offset between stub axles	max. 8 mm (0.314 in
8 - Caster angle of a wheel	3° 20' ± 1°
9 - Corresponds to the camber difference of a wheel on a 20° lock to left and right	2° 15' ± 40°

Remarks

Designation	Value	Remarks
Type 1/Sedan 113		
1 - Total toe angle of front wheels, not pressed	+ 30' ± 15'	
2 - Total toe angle of front wheels, pressed	10' ± 15'	
3 - Pressure applied to wheels	10 ± kg (22 ±4 lbs)	
4 - Maximum permissible difference between total toe angle with wheels pressed and not pressed	25'	
5 - Front wheel camber with wheels straight ahead *)	1° + 20' / −40'	
6 - Maximum permissible difference between sides	30'	
7 - Toe-out angle at 20° lock to left and right (not pressed)	− 30' ± 30'	
8 - Stub axle offset	max. 11mm (0.433 in)	
9 - Caster angle of a wheel	2° ± 35'	
10 - Corresponds to the camber difference of a wheel on a lock from 20° left to 20° right	1° 20' ± 25'	
Rear axle		
1 - Rear wheel camber with spring plates properly set (after at least 300 miles)		
a) Vehicles with double-joint rear axle — all models	−1° 20' ± 40'	
b) Vehicles with swing axle		
Model 111	1° ± 1°	
permissible minimum camber	−1°	
Models 14, 15	+ 15' ± 1°	
permissible minimum camber	−1° 30'	
Maximum permissible difference between sides		
all models with double-joint axle	45'	
all models with swing axle	20'	
2 - Rear wheel toe angle with correct camber		
all models with double-joint axle	0° ± 15'	
all models with swing axle	−5° ±10'	
3 - Maximum permissible deviation in wheel alignment	max. 10'	

*) Adjust as close as possible to 1°

V

Designation	Value	Remarks
Type 2		
1 - Total toe angle with wheels not pressed	+ 15′ ± 15′	
2 - Total toe angle with wheels pressed	0° ± 10′	
3 - Pressure applied to wheels	15±3kg(33±6 lbs	
4 - Maximum permissible difference between readings with wheels pressed and not pressed	25′	
5 - Front wheel camber in straight ahead position	+ 40′ ± 20′	
Maximum permissible difference between sides	30′	
6 - Toe out angle at a 20° lock to left and right (wheels not pressed)	− 2° 30′ ± 30′	
7 - Offset between stub axles	max.8mm(0.314 in	
8 - Caster angle of a wheel	3° ± 40′	
equals the camber difference of a wheel on a 20° lock to left and right	2° ± 25′	

Designation	Value	Remarks
9 - Rear wheel camber with spring plates properly set (after at least 300 miles)		
all models	– 50′ ± 30′	
Maximum permissible difference between sides	30′	
10 - Rear wheel toe angle with correct camber		
all models	+ 10′ ± 20′	
11 - Maximum permissible deviation in wheel alignment		
all models	10′	

Designation	Value	Remarks
Type 3		
1 - Total toe angle with wheels not pressed	+ 40' ± 15'	
2 - Total toe angle with wheels pressed	+ 30' ± 15'	
3 - Pressure applied to wheels	10±2kg(22±4lb	
4 - Maximum permissible difference between readings with wheels pressed and not pressed	20'	
5 - Front wheel camber in straight ahead position	1° 20' ± 20'	
Maximum permissible difference between sides	20'	
6 - Toe-out angle at a 20° lock to left and right (wheels not pressed)		
to left	– 40' ± 30'	
to right	–10' ± 30'	
7 - Offset between stub axles	max.8mm(0.314in	
8 - Caster angle of a wheel	4° ± 40'	
equals the camber difference of a wheel on a 20° lock to left and right	2° 40' ± 25'	

Designation		Value	Remarks
9 - Rear wheel camber with spring plates properly set (after at least 300 miles)	all models	– 1° 20′ ± 40′	
Maximum permissible difference between sides	all models	45′	
10 - Rear wheel toe angle with correct camber	Model 31	+ 5 ± 15′	
	Model 36	0° ± 15′	
11 - Maximum permissible deviation in wheel alignment		max. 10′	

Designation	Value	Remarks
Type 4		
1 - Total toe angle with wheels not pressed	+ 20′ ± 15′	*) Measure only with test appliance VW 361 (three-piece) in position. Pointer of VW 361/1 on center of casting rib.
2 - Total toe angle with wheels pressed	0′ ± 15′	
3 - Pressure applied to wheels	10 ± 2 kg (22 ± 4 lbs)	
4 - Maximum permissible difference between readings with wheels pressed and not pressed	25′	
5 - Toe-out angle on 20° lock to left and right (wheels not pressed)	1° 20′ ± 40′	
6 - Camber with wheels straight ahead	1° 10′ + 25′ – 30′	
Maximum permissible difference between sides	30′	
7 - Caster angle	1° 45′ ± 35′	
equals the camber difference of a wheel on a 20° lock to left and right	1° 10′ ± 25′	
8 - Stub axle offset	max. 11 mm (0.43 in.)	
9 - Total rear wheel toe angle *)	+ 10 ± 15′	
10 - Camber of rear wheels	– 1° ± 30′ **)	
Permissible difference between sides	30′	
11 - Maximum permissible deviation in wheel alignment	10′	
12 - Drive shaft settings	25 mm (1.0 in.)	
Offset between vehicle center and engine/transmission unit center	25 mm (1.0 in.)	
Center of left measuring hole to center of right measuring hole	1126 ± 1 mm (44.3 ± 0.04 in.)	
Center of left measuring hole to center of rib on transmission	588 ± 0.5 mm (23.1 ± 0.02 in.)	
Center of right measuring hole to center of rib on transmission	538 ± 0.5 mm (21.2 ± 0.02 in.)	

**) Take into account lateral angle of vehicle.

II. - Tightening torques

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
a - Front axle – Type 1/Sedan 111							
Front axle to frame	bolt	M 12 x 1.5	8 G	8.8	5.0	36	*) Tighten nut while turning wheel. Then back off nut until the specified axial play of 0.03 – 0.12 mm (0.001 – 0.005 in.) is obtained (Bracket VW 769 with dial gauge). If front axle tends to be noisy, keep play to lower limit 0.03 – 0.06 mm (0.001 – 0.002 in.) When play is correct, tighten socket head screw to the correct torque.
Shock absorber to side plate	nut	M 10	6 G	8	2.0	14	
Shock absorber to lower torsion arm	nut	M 10	6 G	8	3.0–3.5	22–25	
Steering ball joints ***)	self-locking nut	M 12 x 1.5 or M 10 x 1	6 S	8	5.0–7.0 4.0–5.0	36–50 29–36	
Wheel bearing clamp nut	socket head screw	M 7	10 K	10.9	1.0–max. 1.3 *)	7–max. 9*)	
Tie rods	slotted nut	M 12 x 1.5	8 G	10	3.0 **)	22**)	**) Turn on to cotter pin hole.
Steering damper to tie rod ***)	self-locking nut	M 10 x 1	6 G	8	2.5	18	
Steering damper to axle tube	bolt	M 10	8 G	8.8	4.0–4.5	29–32	***) Always use new self-locking nuts after removal.
Setscrew for torsion bar	setscrew	M 14 x 1.5	CK 15 KV	–	4.0–5.0	29–36	
Locknut for setscrew	locknut	M 14 x 1.5	6 G	–	4.0–5.0	29–36	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
b - Front axle – Type 1/Sedan 113							
Track control arm to frame head	nut	M 10 x 1	–	10	4.0	29	*) Turn on to cotter pin hole
Track control arm to ball joint	nut	M 12 x 1.5	–	6	4.0	29	
Stabilizer to track control arm	slotted nut	M 12 x 1.5	–	4	3.0 *)	22 *)	**) Tighten nut while turning wheel. Then back off nut until the specified axial play of 0.03 – 0.12 mm (0.001 – 0.005 in.) is obtained (Bracket VW 769 with dial gauge). If front axle tends to be noisy, keep play to lower limit 0.03 – 0.06 mm (0.001 – 0.002 in.). When play is correct, tighten socket head screw to the correct torque.
Stabilizer clamp to frame head	bolt	M 8	–	8.8	2.0	14	
Strut mounting to shock absorber	nut	M 14 x 1.5	–	6	7.0–8.5	50–61	
Steering knuckle axle ball joint to strut	bolt	M 10	–	8.8	4.0	29	
Strut to body	nut	M 8	–	6	2.0	14	
Backing plate to steering knuckle	bolt	M 10	–	10.9	5.0	36	
Screw in clamp nut	socket head screw	M 7	–	10.9	1.0–max. 1.3**)	7–max. 9**)	
Idler arm bracket to body	bolt	M 10	–	8.8	3.0	22	
Idler arm to bracket	nut	M 14 x 1.5	–	6	4.0	29	
Adjusting bolt in idler arm bracket	nut	M 8	–	8	2.0	14	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
Center tie rod to drop arm and idler arm	slotted nut	M 12 x 1.5	–	8	3.0 *)	22 *)	*) Turn on to cotter pin hole
Side tie rods to center tie rod and steering knuckle	slotted nut	M 12 x 1.5	–	8	3.0 *)	22 *)	
Clamps on tie rods	nut	M 8 x 1	–	8	1.5	11	
Locknut on tie rod	nut	M 14 x 1.5	6 G	6	2.5	18	
Steering damper to frame head	bolt	M 10	–	10.9	6.0	43	
Steering damper to drop arm	bolt	M 10	–	8.8	4.0–4.5	29–32	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
c - Front axle – Type 2							
Front axle/frame bolts (side member)	bolt	M 12 x 1.5	12 K	12.9	9.0–12.5	65–90	*) Tighten nut while turning wheel. Then back off nut until the specified axial play of 0.03 – 0.12 mm (0.001 – 0.005 in.) is obtained (Bracket VW 769 with dial gauge). If front axle tends to be noisy, keep play to lower limit 0.03 – 0.06 mm (0.001 – 0.002 in.). When play is correct, tighten socket head screw to the correct torque.
Shock absorber upper mounting	nut	M 12 x 1.5	8 G	8.8	5.0	36	**) Turn on to cotter pin hole.
Shock absorber lower mounting	nut	M 10	5 S	–	2.5–3.5	18–25	***) Always use new self-locking nuts after removal.
Ball joints to steering knuckle ***)	self-locking nut	M 18 x 1.5	6 S	6.	10	72	
Wheel bearing clamp nut	socket head screw	–	–	10.9	1.5–max. 2.0*)	11–max. 14*)	
Tie-rods and draglink	slotted nut	M 12 x 1.5	8 G	–	3.0 **)	22 **)	
		M 10 x 1	8 G	–	2.5 **)	18 **)	
Steering damper/axle tube	bolt	M 10 x 40	8 G	–	4.0–4.5	29–32	
Steering damper/swing lever	bolt	M 10 x 72	8 G	4.2	4.0–4.5	29–32	
Setscrew for torsion bars	setscrew	M 14 x 1.5	CK 45 KV	–	4.0	29	
Locknut for setscrew	locknut	M 14 x 1.5	6 G	6	4.0	29	
Stabilizer to torsion arm	nut	M 10	6 G	–	3.5–5.0	25 – 36	
		M 8	10 K		2.5	18	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
d - Front axle – Type 3							
Front axle mounting							
a - upper and lower	bolt	M 10	8 G	8.8	3.0	22	
b - center	bolt	M 10	8 G	8.8	4.0	29	
Setscrew for torsion bars	setscrew	M 14 x 1.5	8 G	8	3.0	22	
Setscrew for stabilizer	setscrew	M 14 x 1.5	8 G	8	4.5–5.5	32–40	
Locknut for setscrew	locknut	M 14 x 1.5	8 G	8	4.0	29	
Torsion bar to axle beam	bolt	M 10	8 G	8.8	4.0	29	
Clamp bolt for stabilizer	bolt	M 10	10 K	10.9	4.0	29	
Adjusting bolt for stabilizer	bolt	M 8	8 G	8.8	1.0 ***)	7 ***)	
Shock absorber to axle beam	bolt	M 12 x 1.5	10 K	10.9	3.0–3.5	22–25	
Shock absorber to torsion arm	nut	M 10	6 G	8	3.0–3.5	22–25	
Steering arm on steering knuckle	bolt	M 10 x 1	10 K	10.9	5.5	40	
Upper and lower ball joints	nut	M 20 x 1.5 or M 18 x 1.5	8 G	8	11.0	80	
Clamp bolts for upper and lower ball joints	bolt	M 10 x 40	10 K	10.9	5.5	40	
Wheel bearing clamp nut	socket head screw	M 7	10 K	10.9	1.0–max. 1.3*)	7–max. 9 *)	
Tie-rods	slotted nut	M 12 x 1.5	8 G	10	3.0**)	22 **)	
		M 10 x 1	5 S	8	2.5**)	18 **)	
Steering damper to axle	bolt	M 10	8 G	8.8	4.0–4.5	29–32	
Steering damper to drop arm	nut	M 10	6 G	8	2.5	18	

*) Tighten nut while turning wheel. Then back off nut until the specified axial play of 0.03 – 0.12 mm (.001 – .005 in.) is obtained (Bracket VW 769 with dial gauge).
If front axle tends to be noisy, keep play to lower limit 0.03 – 0.06 mm (.001 – .002 in.). When play is correct, tighten socket head screw to the correct torque.

**) Turn on to cotter pin hole.

***) Tighten clamp bolt to 4 mkg (29 lb ft) first, then tighten adjusting bolt to 1 mkg (7 lb ft) and lock it.

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
e · Front axle – Type 4							
Front axle carrier to body	bolt	M 12 x 1.5	8 G	8.8	5.5–6.5	40–47	*) Tighten nut while turning wheel. Then back off nut until the specified axial play of 0.03 – 0.12 mm (0.001 – 0.005 in.) is obtained (Bracket VW 769 with dial gauge). If front axle tends to be noisy, keep play to lower limit 0.03 – 0.06 mm (0.001 – 0.002 in.). When play is correct, tighten socket head screw to the correct torque.
Track control arm to front axle carrier	nut	M 12 x 1.5	8 G	10	8–9	58–65	
Radius rod to front axle carrier	bolt	M 12 x 1.5	10 K	10.9	8–9	58–65	
Stabilizer to track control arm	nut	M 10	6 G	6.9	3–3.5	22–25	
Stabilizer to body	nut	M 10	8 G	–	4–4.5	29–32	**) Turn on to cotter pin hole.
Steering knuckle and ball joint to strut	bolt	M 10	8 G	8.8	4–4.5	29–32	***) Always use new self-locking nuts after removal.
Strut bearing to strut ***)	self-locking nut	M 14 x 1.5	6 S	6	7–8.5	50–61	
Strut to track control arm ***)	self-locking nut	M 14 x 1.5	6 S	6	4–4.5	29–32	
Strut to body ***)	self- locking nut	M 8	6 S	8	2	14	
Idler arm bracket to body	bolt	M 10	10 K	10.9	3	22	
Idler arm to bracket ***)	self-locking nut	M 12 x 1.5	6 S	8	3	22	
Lock adjusting screw	nut	M 8	6 G	–	2	14	
Taper ring on tie-rod	nut	M 14 x 1.5	6 G	8	2–2.5	14–18	
Clamp on tie-rod	nut	M 8 x 1	6 G	8	1.5–2	11–14	
Side tie-rod to center tie-rod and steering knuckle	slotted nut	M 12 x 1.5	8 G	8	3 **)	22 **)	
Tie-rod to drop arm and idler arm	slotted nut	M 12 x 1.5	8 G	8	3 **)	22 **)	
Steering damper to front axle carrier	bolt	M 10	8 G	8.8	4–4.5	29–32	
Steering damper to tie-rod	bolt	M 10	8 G	8.8	4–4.5	29–32	
Splash shield to steering knuckle	bolt	M 8	5 D	5.6	1	7	
Wheel bearing clamp nut	socket head screw	M 7	10 K	10.9	1–max. 1.3 *)	7–max. 9 *)	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
a - Steering gear - Types 1 and 3							
Steering gear to axle – Type 1	bolt	M 10	8 G	8.8	2.5–3.0	18 – 22	
Steering gear to axle – Type 3	bolt	M 10	8 S	8.8	2.5–3.0	18 – 22	
Locknut for roller shaft adjusting screw	locknut	M 10 x 1	5 S	–	2.5	18	
Steering gear cover	bolt	M 8 x 1.25	8 G	–	2.0 – 2.5	14 – 18	
Drop arm to roller shaft	bolt	M 12 x 1.5	8 G	8.8	7.0	50	
Steering wheel	nut	M 18 x 1.5	6 G	–	5.0	36	
Locknut for steering worm adjustment screw	locknut	M 35 x 1.5	9 S 20 K	–	5.0 – 6.0	36 – 43	
Steering coupling to steering worm	bolt	M 8	10 K	10.9	2.0 – 2.5	14 – 18	
Flange to coupling disc	nut	M 8	6 G	8	1.5	11	
Self-canceling ring on steering wheel	fillister head screw	AM 3.5	8 G	8.8	0.5	3.5	
Locknut for tapered ring to tie-rod	locknut	M 14 x 1.5	6 G	–	2.5	18	
Tie-rod retaining clamp	nut	M 8 x 1	8 G	8.8	1.5	11	
Steering column mounting plate to instrument panel	bolt	M 8	6 G	8.8	1.5	11	
Bracket for eccentric ring on steering column tube	bolt	M 8	6 G	–	1.5	11	
Type 1/Sedan 113 additional parts							
Universal joint shaft to steering gear and column	self-locking nut	M 8	–	10	2.5	18	
Drop arm to steering gear roller shaft	nut	M 20 x 1.5	–	34 Cr 4	10.0	72	
Steering gear to body	bolt	M 10	–	8.8	4.0	29	
Locknut for spindle adjusting bolt	locknut	M 42 x 1.5	9 S 20 K	–	6.5	47	
Steering gear cover	bolt	M 8 x 1.25	8 G	–	2.0 – 2.5	14 – 18	
Locknut for steering adjusting bolt	locknut	M 10 x 1	5 S	–	2.5	18	
Column tube to instrument panel	bolt	M 8	–	8.8	1.5 – 2.0	11 – 14	
Switch to column tube	socket head screw	M 8	–	–	0.5 – 1.0	3.6 – 7	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
b – Steering gear – Type 2 (upto July 1972)							
Steering gear to side member	bolt	M 10 x 40	8 G	–	3.5–5.0	25 – 36	
Drop arm to shaft	nut	M 20 x 1.5	8 G	–	8.0–11.0	58 – 80	
Swing lever to shaft	bolt	M 12 x 1.5	8 G	–	6.0	43	
Steering wheel to column	nut	M 16 x 1.5	8 G	–	2.5–3.0	18 – 22	
Flange to steering worm	nut	M 8	6 G	8	2.0	14	
Coupling disc to flange	slotted nut	M 8	5 S	6	1.5	11	
Steering column cap to floor plate	fillister head screw	M 6	8 G	8.8	0.5	3.5	
Steering gear case cover	bolt	M 8	8 G	8.8	2.5	18	
Steering gear end cover	bolt	M 6	–	8.8	1.5	11	
– Steering gear – Type 2 (from August 1972)							
Drop arm to shaft	nut	M 22	8 G	–	14.0	101	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
c - Steering gear — Type 4							
Steering case upper and lower parts	bolt	M 8 x 1.25	10 K	10.9	2–2.5	14–18	
Locknut for worm spindle	locknut	M 35 x 1.5	9 S 20 K	—	5–6	36–43	
Locknut for sector shaft	locknut	M 10 x 1.5	6 G	8	2–2.5	14–18	
Steering box to body	bolt	M 10	10 K	10.9	4.5	29–32	
Drop arm to sector shaft	special nut	M 20 x 1.5	8 G	8	9–11	65–80	
Coupling to worm spindle	bolt	M 8	10 K	10.9	2–2.5	14–18	
Steering coupling to column	socket head screw	M 8	8 G	8.8	2	14	
Two-arm flange to disc	socket head screw	M 8	8 G	8.8	2	14	
Column switch to bracket/pedal cluster	socket head screw	M 8	8 G	8.8	0.5–1	3.5–7	
Column tube support ring to bracket	bolt	M 6	8 G	8.8	1	7	
Steering wheel to column	nut	M 18 x 1.5	6 G	8	4.5–5.5	32–39	
Steering column switch to column tube	socket head screw	M 8	8 G	8.8	1.0	7	
Cancelling cam to steering wheel	fillister head screw	M 3.5	8 G	8.8	0.5	3.5	

1. Marking of transmissions

Type	Transmission type	M No.	Remarks	Code letter	Marking of valve assembly	Introduction of marking Transmission No.
1/1600	1	Standard	Double-joint axle	AH	–	from August 1968 on the 1/1500
	1	Standard	Double-joint axle	AT	–	from August 1972
	2	M 9	Automatic Stick Shift	BA	–	0 123 698
2/1600	1	Standard	Double-joint axle	CA	–	0 216 409
2/1700	1	Standard	Double-joint axle	CE	–	from August 1971
	3	M 249	Automatic Transmission	NA	none	from September 1972
3/1600	1	Standard	Double-joint axle	DC	–	0 231 799
	3	M 249	Automatic transmission	EB	B	0 117 822
4	1	Standard	Double-joint axle	FC	–	from August 1970
				FB	–	from May 1972
	3	M 249	Automatic transmission	EG	D	up to July 1971
	3	M 249	Automatic transmission	EH	D	from August 1971

Remarks	
Type of transmission	1 = Manual transmission 2 = Automatic Stick Shift 3 = Automatic transmission

I. Tolerances, wear limits and settings

Designation	Manual transmission Types 1, 2 and 3		Automatic Stick Shift		Remarks
	New part mm (in.)	Wear limit mm (in.)	New part mm (in.)	Wear limit mm (in.)	
a - Gears, drive pinion					*) Try to keep to lower limit (0.10 mm/0.004 in.)
1 - 1st gear ... end play	0.10–0.25 *) (0.004–0.010)	–	–	–	**) Bearings used more than 30 miles
2 - 3rd gear ... end play	0.10–0.25 *)	–	0.10–0.25 *)	–	
3 - 4th gear ... end play	0.10–0.25	–	0.10–0.25	–	***) Operating sleeve with wider slot 0.5–0.85 mm (0.019–0.033 in.)
4 - Synchromesh units					
clearance "a" between coupling teeth and synchronizer ring 1./2. gears ... clearance	1.1–1.8 (0.043–0.070)	0.60 (0.024)	1.1–1.8 (0.043–0.070)	0.60 (0.024)	
3./4. gears ... clearance	1.0–1.8 (0.039–0.070)	0.60 (0.024)	1.1–1.8 (0.043–0.070)	0.60 (0.024)	
5 - Shift fork/operating sleeves for 1./2. and 3./4. gears ... end play	0.10–0.30 ***) (0.004–0.012)	–	0.10–0.30 ***) (0.004–0.012)	–	
6 - Preload of pinion tapered roller bearing					
Turning torque ... new	6–21 cmkg (5.2–18.3 in.lb)	–	6–21 cmkg (5.2–18.3 in.lb)	–	
used**)	3–7 cmkg (2.6–6.1 in. lb)	–	3–7 cmkg (2.6–6.1 in. lb)	–	

H

Designation		Manual transmission Types 1, 2 and 3		Automatic Stick Shift		Remarks
		New part mm (in.)	Wear limit mm (in.)	New part mm (in.)	Wear limit mm (in.)	
b - Drive shaft						
7 - Drive shaft, front (surface for 3rd gear needle bearing)	runout	max. 0.02 (0.0008)		–		
c - Final drive						
8 - Play at differential gears with diff. housing bolted together	axial	0.14–0.20 (0.0055–0.008)		–		
Play between diff. housing and cover/gearshaft	radial old	0.03–0.08 (0.001–0.003)	0.12 (0.005)	–		
	radial new	0.03–0.06 (0.001–0.002)	0.12 (0.005)	–		
9 - Rear axle shafts:						
a - Flange/differential gears (measured across the convex faces)	clearance	0.03–0.10 (0.001–0.004)	0.20 (0.008)	–		
b - Measured at bearing seat shaft between centers	runout	max. 0.05 (0.002)	–	–		

Designation		Manual transmission Types 1, 2 and 3		Automatic Stick Shift		Remarks
		New part mm (in.)	Wear limit mm (in.)	New part mm (in.)	Wear limit mm (in.)	
d - Gearbox and gearshift housing						*) Bearings used more than 30 miles.
10 - Preload of final drive covers on tapered roller bearings						
Turning torque	new	30–35 cmkg (26–30 in. lb)	–	18–22 cmkg (15.8–19.3 in. lb)	–	
	used *)	3–7 cmkg (2.6–6.1 in. lb)	–	3–7 cmkg (2.6–6.1 in. lb)	–	
11 - Plastic packing/transmission case/ axle tube/ tube retainer	clearance	0.00–020 (0.000–0.008)	–	–	–	
12 - Shift rod shift pressure		15–20 kg (30–44 lb)	–	6.5 kg (14 lb)	–	
13 - Gearshift housing bushings	inside diameter	15.05–15.03 (0.592–0.591)	15.25 (0.600)	15.05–15.03 (0.592–0.591)	15.25 (0.600)	
14 - Inner shift lever	diameter	15.00–14.96 (0.590–0.588)	14.75 (0.580)	15.00–14.96 (0.590–0.588)	14.75 (0.580)	
15 - Starter bushing	inside diameter	12.55–12.57 (0.493–0.494)	12.65 (0.497)	12.55–12.57 (0.493–0.494)	12.65 (0.497)	
16 - Starter shaft/bushing	radial clearance	0.09–0.14 (0.0035–0.005)	0.25 (0.010)	0.09–0.14 (0.0035–0.005)	0.25 (0.010)	
17 - Drive shafts; measured between centers	runout	0.5 (0.020)	–	0.5 (0.020)	–	

Designation	Manual transmission Type 4	
	New part mm (in.)	Wear limit mm (in.)
Gear set (adjusting) Type 4		
1 - Axial play	0.09–0.16 (0.003–0.006)	–
2 - Synchromesh units Clearance between coupling teeth / synchronizer ring 1st/2nd gears	1.0–1.75 (0.039–0.068)	0.5 (0.019)
synchronizer ring 3rd/4th gears	1.20–1.95 (0.047–0.077)	0.5 (0.019)
3 - Clearance between operating sleeve / shift fork	0.7–1.0 (0.027–0.039)	1.2 (0.047)
4 - Axial clearance of the countershaft	0.07–0.35 (0.002–0.013)	–
5 - Countershaft run out	0.01 (0.0003)	–
6 - Shift lock / Shift rod shift pressure	6.5 kg (14 lbs)	5.5 kg (12 lbs)

Designation	Manual transmission Type 4	
	New part mm (in.)	Wear limit mm (in.)
Final drive, Type 4		
1 - Turning torque for tapered roller bearing / drive pinion new bearing Timken	18–22 cmkg (16–19 in. lb)	–
SKF	16–20 cmkg (14–17 in. lb)	–
FAG	11–15 cmkg (10–13 in. lb)	–
all used bearings (bearings used more than 30 miles)	3–7 cmkg (3–6 in. lb)	–
2 - Turning torque for differential bearings new bearings	18–22 cmkg (16–19 in. lb)	–
all used bearings (bearings used more than 30 miles)	3–7 cmkg (3–6 in. lb)	–
3 - Axial clearance on differential tapered roller bearings	0–0.14 (0–0.005)	–
4 - Radial play at differential housing or cover / gear shaft	0.03–0.05 (0.001–0.002)	0.08 (0.003)
5 - Backlash (measured in the pitch circle diameter)	0.15–0.25 (0.006–0.010)	–

Designation	New part mm (in.)	Wear limit mm (in.)
e - Data for automatic transmission		
1 - Adjusting planetary gear end play	0.45–1.05 (0.018–0.042)	–
2 - Adjusting brake bands		
a - 2nd gear		
Tighten screw to, then back off 1 3/4 to 2 turns *)	0.5 mkg (3.5 ft. lb)	–
b - 1st gear		
Tighten screw to, then back off 3 1/4 – 3 1/2 turns *)	0.5 mkg (3.5 ft. lb)	–
3 - Clutches		
a - Forward clutch **)		
End play "a"	0.8–1.2 (0.032–0.048)	–
b - Direct and reverse clutch (with 2 lined plates) ***)		
Circlip ... thickness	1.7 (0.067)	–
c - Direkt and reverse clutch (with 3 lined plates) +)		
Axial play	1.7–2.2 ((0.067–0.087)	–
4 - Preload of pinion bearings (turning torque) ... new	14–20 cmkg (12–18 in. lb)	–
Bearings used more than 30 miles	2 cmkg (2 in. lb)	–
5 - Total preload (turning torque)		
Pinion and differential ... new	18–24 cmkg (16–22 in. lb)	–
Bearings used more than 30 miles	3 – 5 cmkg (2 – 5 in. lb)	

Remarks
*) Adjust bands with transmission horizontal and tighten adjusting screws to 1 mkg (7.0 lb ft) first to settle the bands.
**) Use only lined plates with annular groove and 6.1–5.85 mm (0.240–0.230 in.) thick pressure plate. Note thickness of circlip.
***) Use only lined plates with waffle surface, 6.3–6.15 mm (0.248–0.240 in.) thick pressure plate and circlip 1.7 mm (0.067 in.) thick.
+) Use only lined plates with waffle surface and 6.3–6.15 mm (0.248–0.240 in.) thick pressure plate. Adjust to correct play 1.7–2.2 mm (0.067–0.087 in.).

f - Automatic transmission test data

Stall torque speed for all Types and Models 1900–2000 rpm

Pressure table

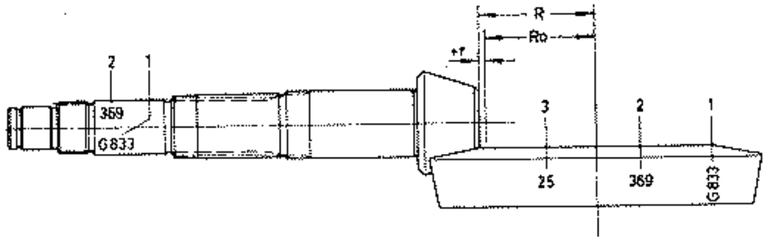
Selector lever position	Pressure	Type 2 kg/cm² (psi)	Type 3 kg/cm² (psi)	Type 4 kg/cm² (psi)	Remarks
N	Primary throttle pressure	3.2 (45.5)	3.0 (42) *)	3.2 (45.5)	*) From August 1971: 3.2 (45.5)
	Main pressure	6.5 (92)	8.2–8.5 (116–120)	8.4–8.7 (119–124)	Increase idling speed to 1000 rpm Vacuum hose off
	Primary throttle pressure	0.35–0.45 (5–6)	0.35–0.45 (5–6)	0.35–0.45 (5–6)	Increase idling speed to 1000 rpm Vacuum hose on
	Main pressure	3.3–3.5 (47–50)	3.3–3.5 (47–50)	3.1–3.3 (44–47)	
R	Main pressure	10–11 (142–156)	6.7–7.7 (95–110)	6.5–7.5 (92–106)	at stall torque speed (full throttle) Vacuum hose on
D	Primary throttle pressure	2.2–3.1 (31–44)	2.8–3.0 (40–42)	3.0–3.2 (42–45)	
	Main pressure	6.5 (92)	8.0–8.4 (114–120)	8.2–8.6 (116–122)	
R	Main pressure	18–23 (256–327)	15–20 (213–284)	15–20 (213–284)	at full throttle and a road speed of over 18 mph
D	Main pressure	6.5 (92)	6.1–6.3 (87–90)	5.9–6.1 (84–87)	

Gear shift speeds mph

Gear	Full throttle				Kickdown			
	Type 2	Type 3 (upto 7.72)	Type 3 (from 8.72)	Type 4	Type 2	Type 3 (up to 7.72)	Type 3 (from 8.72)	Type 4
1 – 2	18 – 25	17 – 18	17 – 19	17 – 20	27 – 33	30 – 39	31 – 40	30 – 40
2 – 3	41 – 46	45 – 49	43 – 50	48 – 55	47 – 51	55 – 59	54 – 59	56 – 65
3 – 2	29 – 25	34 – 28	37 – 30	33 – 25	48 – 44	55 – 52	55 – 50	60 – 53
2 – 1	16 – 14	15 – 13	15 – 11	14 – 11	30 – 24	34 – 27	35 – 27	36 – 27

g - Marking of gear sets

1 - Manual transmission Types 1 and 3 and Automatic Stick Shift

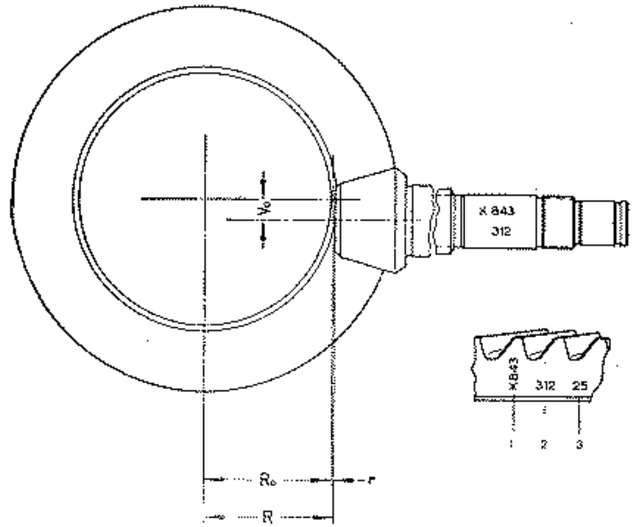


(Example: Manual transmission with double-joint axle)

1 - "G 833" means Gleason gear set with a ratio of 8 : 33.
2 - Matching number (369) of gear set. *)
3 - Deviation "r" based on the master gauge of the special machine used in production. The deviation is given in 0.01 mm with the same sign. For example: "25" means that r = + 0.25 mm *)
Ro - Length of master gauge used in special machine, "Ro = 58.70 mm"
R - Actual measurement between ring gear centerline and end of drive pinion at point of quietest running.

*) From January 1972 not marked in production. Therefore determine "actual" measurements before repair.

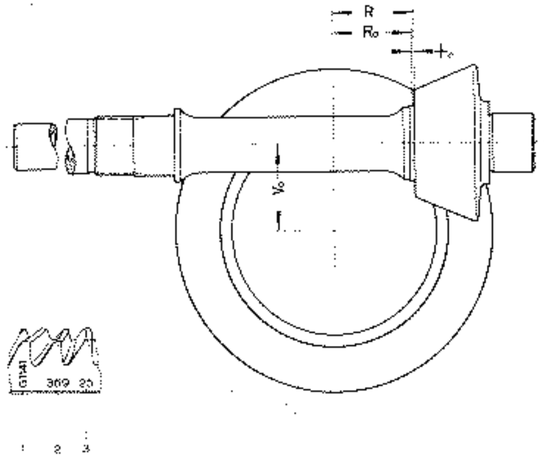
2 - Manual transmission Type 2



1 - "K 843" means Klingelnberg gear set with a ratio 8 : 43.
2 - Matching number (312) of gear set. *)
3 - Deviation "r" based on the master gauge of the special machine used in production. *)
Ro - Length of master gauge used in special machine "Ro = 63 mm"
R - Actual measurement between ring gear centerline and end to drive pinion at point of quietest running.
Vo - Hypoid offset = 10 mm.

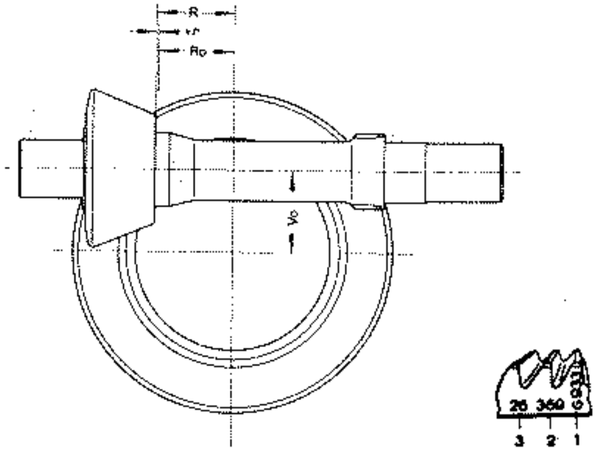
*) From March 1972 not marked in production. Therefore determine "actual" measurements before repair.

3 - Manual transmission Type 4



1 - "G 1141" means Gleason gear set with a ratio of 11 : 41.
2 - Matching No. of gear set (369).
3 - Deviation "r" based on the master gauge of the special machine used in production
Ro - Length of the gauge used in the special machine "Ro = 41,2 mm"
R - Actual measurement between ring gear centerline and the end of the drive pinion at the quietest running point.
Vo - Hypoid offset = 44 mm.

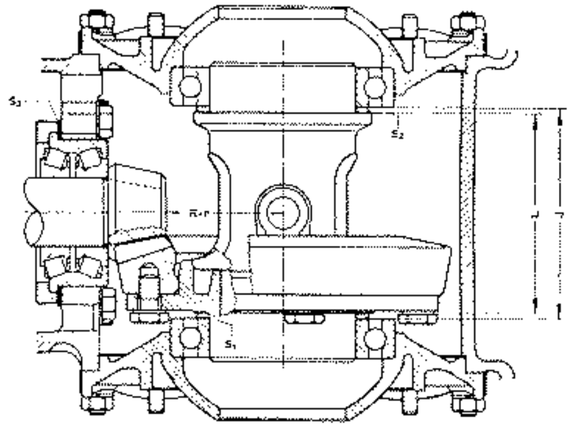
4 - Automatic transmission Types 2, 3 and 4



1 - "G 933" means Gleason gear set with a ratio of 9:33
2 - Matching number of gear set (369)
3 - Deviation "r" based on the master gauge of the special machine used in production. The deviation is given in 0.01 mm with the same sign. For example: "26" means that r = + 0.26 mm
Ro - Length of master gauge used in special machine. "Ro" = 40.55 mm.
R - Actual measurement between ring gear centerline and end of drive pinion at quietest running point.
Vo - Hypoid offset = 42,5 mm

Adjusting final drive

1 - Manual transmission with swing axle



1 - Shims S_3 for drive pinion
2 - Shims S_1 at ring gear end
3 - Shims S_2 at opposite end
4 - J depth of housing between ball bearings
5 - L length of differential housing

Explanation of signs

Sign	Designation	Dimension
Svo	Mean backlash	0.20 mm
MR	Measuring ring	–
$\triangle S_1$	Axial movement of ring gear to give specified mean backlash	0.01 mm
S_1	Shim at ring gear end	find thickness
S_2	Shim at opposite end	find thickness
e	Difference between zero setting of mandrel/pinion actual dimension without shims	0.10–0.50 mm
p	Preload on one bearing	0.07 mm
r	Deviation in gear set G 358/K 835/G 338/K 833	0.05–0.65 mm
Eo	Actual dimension measuring mandrel/setting pin	–

Finding thickness of:

Shim S_3

S_3 nominal = e + r

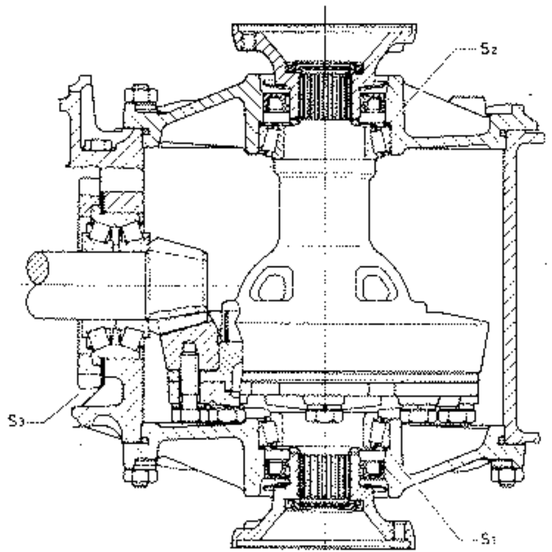
Shim S_2

$S_2 = J - L - S_1 + 2p$

Shim S_1

$S_1 = MR + \triangle S_1 + p$

2 - Manual transmission with double joint axle Types 1 and 3



Explanation of signs

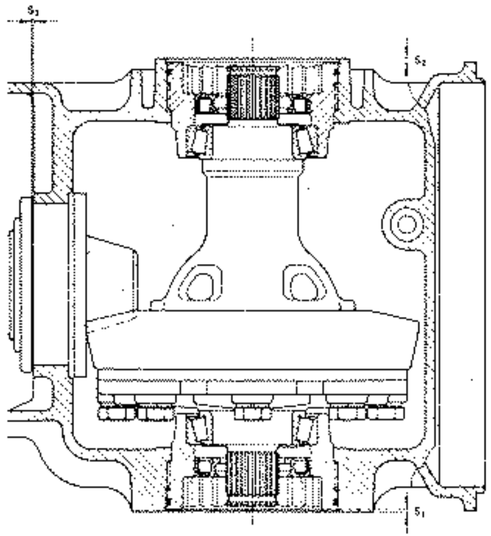
Sign	Designation	Dimension
Svo mean	Average of several backlash readings	0.01 mm
◿ S_1	Axial movement of ring gear to give specified mean backlash	0.01 mm
S_1	Shim at ring gear end	find thickness
S_2	Shim at opposite end	find thickness
e	Difference between zero setting of measuring mandrel and actual pinion dimension without shims	0.10–0.50 mm
r	Deviation for gear set G 833 / K 833	0.05–0.65 mm
w	Correction factor for gear set G 833	1.00
	Correction factor for gear set K 833	1.10
h	Ring gear lift from full mesh position for G 833 gear set	0.20 mm
	Ring gear lift from full mesh position for K 833 gear set	0.20 mm
Eo	Length of setting pin	58.70 mm

Finding thickness:
Shim S_3

S_3 nominal = e + r

Finding ◿ S_1

◿ $S_1 = (Svo_{mean} \times w) - h$



Explanation of signs

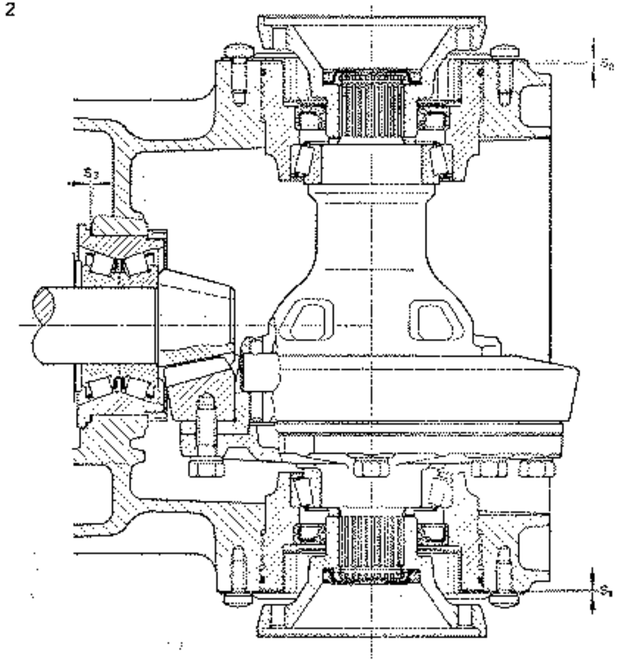
Sign	Designation	Dimension
Svo mean	Average of several backlash readings	0.01 mm
◿ S_1	Axial movement of ring gear to give specified mean backlash	0.01 mm
S_1	Screw-in depth of adjusting ring at ring gear end	–
S_2	Screw-in depth of adjusting ring at opposite end	–
e	Difference between measuring mandrel and setting pin	0.10–0.50 mm
r	Deviation for gear set G 835/K 835	0.05–0.65 mm
w	Correction factor for gear set G 835	1.00
	Correction factor for gear set K 835	1.10
h	Ring gear lift from full mesh position for G 835 gear set	0.20 mm
	Ring gear lift from full mesh position for K 835 gear set	0.22 mm
Eo	Length of setting pin	58.70 mm

Finding thickness: Shim S_3

S_3 nominal = e + r

Finding ◿ S_1

◿ S_1 = (Svo_{mean} x w) – h



Explanation of signs

Sign	Designation	Dimension
Svo mean	Average of several backlash measurements	0.01 mm
ΔS_1	Axial movement of ring gear to give average backlash	0.01 mm
M.S.	Measuring shim VW 381/10 (two off)	1.30 mm
S	Movement of tapered roller bearing outer race	0.01 mm
w	Correction factor for individual gear set	–
h	Ring gear lift from no-play mesh position with pinion of individual gear set	0.01 mm
r	Deviation from "Ro", marked on gear set in hundredths of a millimeter	r = 25 = 0.25 mm
e	Difference between setting pin and mandrel	Measured in mm (0.85–1.30 mm possible)

Finding thickness:
Shims S_3 *)

S_3 nominal = e – r

S_3 nominal = e + r **)

Shim thickness S_1 nominal and S_2 nominal

S_1 nominal = M.S. – ΔS_1

Determining ΔS_1

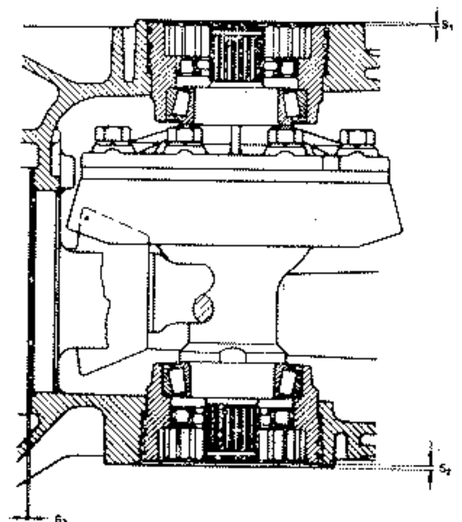
$S_1 = (Svo_{mean} \times w) - h$

S_2 nominal = M.S. + ΔS_1 – S

*) From Chassis No. 218 000 001 to Chassis No. 218 202 251 the shim is on the ring gear side

**) From Chassis No. 219 000 001 the shim is on the transmission side. The final drive is adjusted with adjusting rings as on Type 1 Automatic Stick Shift

5 · Manual transmission Type 4



Explanation of signs

Sign	Designation	Dimension
Svo mean	Average of several backlash measurements	0.01 mm
◿ S_1	Axial movement of ring gear to give average backlash	0.01 mm
S_1	Screw-in depth of adjusting ring at ring gear end	–
S_2	Screw-in depth of adjusting ring at opposite end	–
e	Difference between measuring mandrel and setting pin	0.70–1.20 mm
r	Deviation for gear set G 1141	0.10–0.55
w	Correction factor for gear set G 1141	1.30
h	Ring gear lift from full mesh position for gear set G 1141	0.26 mm
E_D	Length of setting pin	61.2 mm

Finding thickness:
shim **S 3**

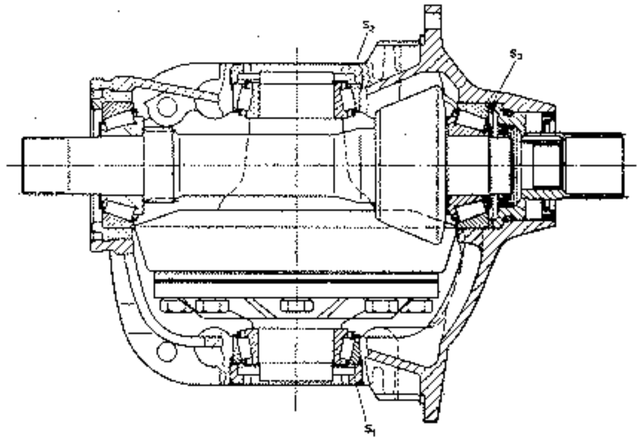
$$S_3 \text{nominal} = e + r$$

Finding
◿ S 1

$$◿\ S_1 = (\text{Svo mean} \times w) - h$$

6 - Automatic transmission Types 2, 3 and 4

(On **Type 2** the differential and drive pinion are located in the final drive housing. The adjustment of the drive pinion and ring gear is basically the same as on the Types 3 and 4. The shim S_3, is positioned behind the tapered roller bearing inner race.)



Explanation of signs

Sign	Designation	Dimension
S_1	Screw-in depth of adjusting ring at ring gear end	
S_2	Screw-in depth of adjusting ring at opposite end	
S_3	Shim between taper roller bearing and drive pinion	
Ro	Length of master gauge used in special test machine	40.55 mm
R	Location of pinion in relation to centerline of ring gear at quietest running point (nominal dimension)	R = Ro + r
r	Deviation from "Ro", marked on gearset	
Svo	Backlash	0.15–0.25 mm
Vo	Hypoid offset	42.5 mm
G 933	Gear set G = Gleason: 933, No. of teeth 33/9	ratio = 3.67
D/2	Half diameter of mandrel	D/2 = 10.00 mm
Eo	Length of setting pin VW 380/3 Eo = Ro + D/2 mm	Eo = 50.55 mm
e	Difference between mandrel and setting pin	measured in mm

Finding thickness:

Shim S_3 = e – r

III. Ratios

	Types 1 and 3 Manual transmission		Type 2 Manual transmission		Type 4 Manual transmission		Automatic Stick Shift		Types 2, 3 and 4 Automatic transmission		Remarks
	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	
1st gear	38/10	3.80	38/10	3.80	31/18 x 31/14	3.81	33/17	2.06	–	2.65	*) Up to Chassis No. 112 2 961 362: 60:53 (0.88)
2nd gear	35/17	2.06	35/17	2.06	31/18 x 27/22	2.11	29/23	1.26	–	1.59	**) Type 1 up to Chassis No. 112 2 569 362: 20/14 x 43/17 (3.61) Type 3 up to Chassis No. 312 2 087 704: 20/14 x 43/17 (3.61)
3rd gear	29/23	1.26	29/23	1.26	31/18 x 22/27	1.40	24/27	0.89	–	1.0	
4th gear	54/58 *)	0.93 *)	23/28	0.82	direct	1.00	–	–	–	–	
Reverse	20/14 x 40/15 **)	3.80 **)	20/14 x 40/15 ***)	3.80 ***)	31/18 x 35/14		43/14	3.07	–	1.8	***) Up to Chassis No. 211 2 276 560: 20/14 x 43/17 (3.61)
Torque increase max.	–		–		–		2.1		2.5		

Final drive	Manual transmission Types 1 and 3		Model 14		Type 2		Type 4		Automatic Stick Shift		Automatic transmission Type 2		Type 3		Type 4		Remarks
	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	No. of teeth	ratio	
Klingelnberg	8 : 33 +)	4.125	8 : 31	3.875	8 : 43	5.375	11 : 43 ++)	3.91	8 : 33	4.125							+) Type 1 from August 1972: 8:31 (3.875) ++) Type 4 sedan from May 1972: 11:41 (3.73)
Gleason											9 : 49	4.45	9 : 33	3.67	11 : 43	3.91	

IV. Tightening torques

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
a - Transmission and final drive Types 1 and 3							*) tighten to 22.0 mkg (160 lb ft), loosen, tighten finally to 22.0 mkg (160 lb ft).
Engine/transmission	nut	M 10 x 1.5	8 G	–	3.0	22	
Bearing retainer	bolt	M 10 x 1.5	10 K	–	5.0	36	
Gears/housing	pinion retaining nut	M 80 x 1	Cq 35	–	22.0 *)	160 *)	
Gear carrier/housing	nut	M 8 x 1.25	6 G	–	2.0	14	
Final drive covers	nut	M 8 x 1.25	8 G	–	3.0	22	
Transmission/bonded rubber mounting	nut	M 8 x 1.25	6 G	–	2.0	14	
Shift housing/gear carrier	nut	M 7 x 1	6 G	–	1.5	11	
Tapered roller bearing/drive pinion	round nut	M 35 x 1.5	C 35 N	–	20.0	144	
Ring gear/differential housing	bolt	M 10 x 1.5	10 K	–	6.0	43	
Selector shaft/fork	bolt	M 8 x 1.25	C 45 KN	–	2.5	18	
Support/reverse lever	nut	M 10 x 1.5	8 G	–	3.5	25	
Bushing/clutch operating shaft	lock bolt	M 6 x 1	8 G	–	1.0	7	
Oil filler hole	plug	M 24 x 1.5	M b K 6	–	2.0	14	
Oil drain hole	magnetic plug	M 24 x 1.5	M b K 6	–	2.0	14	

Location	Designation	Thread	Quality grade	Tensite class	mkg	lb ft	Remarks
Rear wheel shaft	slotted nut	M 24 x 1.5	C 45 KN	–	35.0	253	
Spring plate	bolt	M 12 x 1.5	10 K	–	11.0	80	
Drive shaft / flange	socket head screw	M 8 x 1.25	10 K	–	3.5	25	
Control arm/fitted bolt	socket head screw	M 14 x 1.5	C 45	–	12.0	87	
Spring plate bushing/cover	bolt	M 10 x 1.5	8 G	–	3.5	25	
Transmission carrier/frame	fitted bolt	M 18 x 1.5	8 G	–	23.0	166	
Front mounting/frame/sub-frame	nut	M 10 x 1.5	10 K	–	3.5	25	
Engine carrier	self-locking nut	M 8 x 1.25	6 S	–	2.5	18	
Shock absorber/control arm	nut	M 12 x 1.5	8 G	–	7.0	50	
Shock absorber/frame	nut	M 12 x 1.5	8 G	–	7.0	50	
Bearing cover/wheel bearing	bolt	M 10 x 1.5	8 G	–	6.0	43	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
b - Automatic Stick Shift							*) Tighten to 22 mkg (160 lb ft), loosen, tighten finally to 22 mkg (160 lb ft). When using VW 183 'C' wrench, set torque wrench to 18 mkg (130 lb ft).
Clutch housing	temperature switch	M 14 x 1.5	GD-ZuA 14	–	2.5	18	
Transmission case	selector switch	M 14 x 1.5	GD-ZuA 14	–	2.5	18	
Gearshift housing	neutral safety switch	M 14 x 1.5	GD-ZuA 14	–	2.5	18	
Converter/drive plate	socket head screw	M 8 x 1.25	8 G	–	2.5	18	
Gears/transmission case	retaining nut	M 80 x 1	Cp 35	–	22 *), **)	160 *), **)	
Lock plate/retaining ring	tapping screw	4.8	Cp 5 K	–	1.0	7	
Gear carrier/transmission case	nut	M 8 x 1.25	6 G	–	2.0	14	
Lock plate/adjusting ring	fillister head screw	M 7 x 1.25	6 S	–	1.0	7	
Gearshift housing/transmission case	nut	M 7 x 1	6 G	–	1.5	11	
Converter housing/transmission case	nut	M 8 x 1.25	6 G	–	2.0	14	
Cover/transmission case	fillister head screw	M 7 x 1.25	6 G	–	1.0	7	
Bonded rubber mounting/ converter housing	nut	M 8 x 1.25	6 G	–	2.0	14	
Transmission mounting/ bonded rubber mounting	nut	M 8 x 1.25	6 G	–	2.0	14	
Selector shaft/fork	bolt	M 8 x 1.25	C 45 KN	–	2.5	18	
Bearing lock bolt	bolt	M 8 x 1.25	5 S	–	1.0	7	
Pinion	round nut	M 35 x 1.5	Cp 35	–	20.0	145	
Ring gear	bolt	M 10 x 1.5	10 K	–	4.5	32	
Gearshift housing/bonded rubber mounting	nut	M 10 x 1.5	8 G	–	3.5	25	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
One-way clutch support tube/converter	socket head screw	M 6 x 1	10 K	–	1.5	11	*) After installing a new gasket, tighten as detailed in Workshop Manual H
Clutch/clutch carrier plate	socket head screw	M 6 x 1	10 K	–	1.5	11	
Oil feed line/transmission	union	M 12 x 1.5	9 S 20 K	–	3.5	25	
Oil return line/transmission	union	M 14 x 1.5	9 S 20 K	–	3.5	25	
Oil suction line/tank	union	M 14 x 1.5	9 S 20 K	–	3.5	25	
Clamp bolt/clutch lever	bolt	M 8 x 1.25	8 G	–	3.0	22	
Joint to flange	socket head screw	M 8 x 1.25	10 K	–	3.5	25	
c · Automatic transmission							
ATF pump to transmission case	bolt	M 6 x 1	8 G	–	0.4	2.8	
Transfer plate on valve body	slotted screw	M 5 x 0.8	8 G	–	0.3	2.1	
Valve body to transmission case	bolt	M 6 x 1	8 G	–	0.4	2.8	
Pan to transmission case	bolt	M 8 x 1.25	8 G	–	1.0 *)	7.0 *)	
ATF strainer to valve body	slotted screw	M 6 x 1	8 G	–	0.3	2.1	
Manual valve lever/cable lever	nut	M 8 x 1.25	8 G	–	0.6	4.3	
Cable lever to transmission case	retaining screw	M 6 x 1	8 G	–	0.5	3.5	
Operating lever on transmission case	threaded pin	M 10 x 1.5	8 G	–	0.6	4.3	
Cable bracket on transmission case	bolt	M 8 x 1.25	6 G	–	1.5	11.0	
Filler tube on transmission case	bolt	M 6 x 1	8 G	–	0.5	7.0	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
Plug for pressure connection/ transmission case	socket or hex. head	M 10 x 1	–	–	1.0	7	+) Tighten to 1 mkg (7 lb ft), loosen, tighten to 0.5 mkg (3.5 lb ft) and loosen screw 1 3/4 to 2 turns from this position.
Vacuum unit/transmission case	–	M 14 x 1.5	–	–	2.5	18	++) Tighten to 1 mkg (7 lb ft), loosen, tighten to 0.5 mkg (3.5 lb ft) and loosen screw 3 1/4 to 3 1/2 turns from this position.
Adjusting screw for front brake band	–	M 12 x 1.75	–	–	0.5 +)	3.5 +)	
Adjusting screw for rear brake band	–	M 12 x 1.75	–	–	0.5 ++)	3.5 ++)	
Lock nut for band adjusting screw	nut	M 12 x 1.75	8 G	–	2.0	14	
Air deflector on final drive housing	bolt	M 10 x 1.5	8 G	–	1.0	7.0	
Differential carrier on final drive housing	nut	M 6 x 1	8 G	–	0.8	6.0	
Side cover/final drive housing	nut	M 6 x 1	8 G	–	0.8	6.0	
Starter/final drive housing	nut	M 10 x 1.5	8 G	–	2.5	18	
Bearing cap/differential carrier	bolt	M 10 x 1.5	10 K	–	6.0	43	
Ring gear/differential housing	bolt	M 9 x 1	10 K	–	5.0	36	
Transmission case/final drive housing	nut	M 8 x 1.25	8 G	–	2.0	14	
Converter to drive plate	bolt	M 8 x 1.25	8 G	–	2.0	14	
Drive shaft/flange	socket head screw	M 8 x 1.25	10 K	–	3.5	25	

H

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
d - Transmission and final drive Type 2							*) Tighten to 22.0 mkg (160 lb ft), loosen, tighten finally to 22.0 mkg (160 lb ft).
Gears / housing	retaining nut	M 80 x 1	Cp 35	–	22 *)	160 *)	
Round nut / pinion	round nut	M 35 x 1.5	Cp 35	–	20	144	
Union nut / sleeve	union nut	M 14 x 1.5	S 20 K	–	3.0	22	
Bracket / reverse shifter shaft on gear carrier	bolt	M 8 x 1.5	8 G	–	2.5	18	
Support / rocker lever on gear carrier	bolt	M 8 x 1.5	8 G	–	2.5	18	
Selector shaft / fork	bolt	M 8 x 1.25	C 45 KN	–	2.5	18	
Locking screw with dog point	bolt	M 8 x 1.25	5 S	–	1.5	11	
Clamp sleeve on gear carrier	clamp sleeve	M 14 x 1.5	45 S 20 K	–	4.5	32	
Shift housing to gear carrier	nut	M 7 x 1	6 G	–	1.5	11	
Nuts for gear carrier, transmission and clutch housing	nut	M 8 x 1.25	6 G	–	2.0	14	
Ring gear to differential housing	bolt	M 9 x 1	10 K	–	5.0	36	
Lock plate / adjusting ring	phillips head screw	M 6	8 G	–	1.0	7	

Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
Diagonal arm to rear wheel bearing housing	bolt	M 14 x 1.5	10 K	–	13.0	94	*) At least 32 – 35 mkg (230 – 253 lb ft) with reinforced sleeve
Diagonal arm to frame	bolt	M 12 x 1.5	8 G	–	8.0	58	
Shock absorber to frame and rear wheel bearing housing	bolt	M 12 x 1.5	8 G	–	6.0	43	
Drive shaft / flange	socket head screws	M 8	10 K	–	3.5	25	
Cover / spring plate bushing	bolt	M 10	8 G	–	4.5	32	
Backing plate to housing	bolt	M 8	8 G	–	2.5	18	
		M 10	8 G	–	3.5	25	
Rear wheel hub to rear wheel shaft	slotted nut	M 30 x 1.5	C 45 KN	–	35 *)	253 *)	

Location	Designation	Thread	Quality grade	mkg	lb ft	Remarks
e - Transmission Type 4						
Transmission case to final drive	cap nut	M 8x1,25	8 G	2.0	14	
Shift housing to transmission case	nut	M 8x1,25	6 G	2.0	14	
Cover plate to transmission case	Phillips screw	M 7x1,25	5 S	1.0	7	
Cover plate to transmission case	Phillips lock screw	M 7x1,25	5 S	1.0	7	
Drive shaft to drive gear	nut	M 9x1,25	Cq 35	2.0	14	
Knurled cap on transmission case	Phillips screw	M 7x1,25	5 S	1.0	7	
Shift fork to shift rod	square head screw	M 8x1,25	C 35 K	2.0	14	
Cover detent plungers	Phillips screw	M 7x1,25	6 G	1.0	7	
Bearing pin, selector shaft	bearing pin	M 14 x 1,5	Cq 22	1.5	11	
End plate, mainshaft carrier	nut	M 10 x 1,5	6 G	4.5	32	
Lock plate, adjusting ring	Phillips screw	M 7x1,25	5 S	1.0	7	
Ring gear, differential housing	screw	M 9 x1	10 K	4.5	32	
Switch, backup light	switch	M 18x1,5	–	2.5	18	
Oil filler hole	plug	M 24x1,5	M b K 6	2.0	14	
Oil drain hole	plug	M 24 x 1,5	M b K 6	2.0	14	

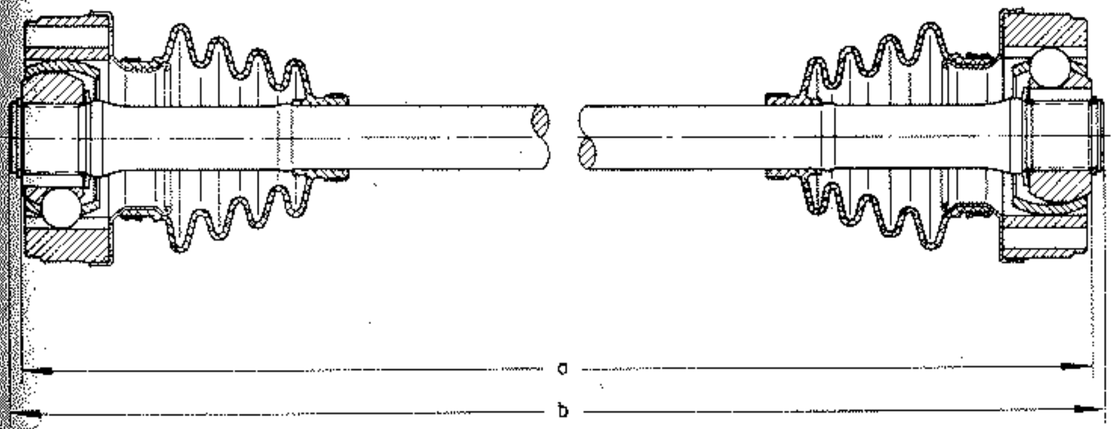
Location	Designation	Thread	Quality grade	Tensile class	mkg	lb ft	Remarks
f - Rear axle Type 4							
Rear axle carrier to body	bolt	M 10	8 G	–	4.0	29	
Retaining plate to body	nut	M 8 x 1.25	8 G	–	2.0	14	
Shock absorber to body	self-locking nut	M 10	6 S	–	3.0	22	
Bonded rubber mounting to rear axle carrier	bolt	M 10	8 G	–	4.0	29	
Engine carrier to mounting	self-locking nut	M 8	6 S	–	2.5	18	
Rear bonded rubber mounting to body	self-locking nut	M 8	6 S	–	2.5	18	
Shock absorber to wishbone	bolt	M 12 x 1.5	6 S	–	6.0	43	
Bracket to rear axle carrier	nut	M 12 x 1.5	8 G	–	8.5	61	
Wishbone to bracket	nut	M 12 x 1.5	8 G	–	8.5	61	
Rear wheel bearing retainer	bolt	M 10 x 1.5	10 K	–	6.0	43	
Wheel shaft and flange	stretch bolt	M 14 x 15	8 G	–	9–11	65–80	
Drive shaft / flange	socket head screw	M 8 x 1.25	12 K	–	4.5	32	
Bonded rubber mounting to gearshift housing	nut	M 8	6 G	–	2.0	14	

V. Double joint shafts
a - Drive shafts

Type	Trans-mission Type	Code number: On end of shaft	Code number: Shaft assembly	Length, mm (inch): Shaft Dimension "b" mm (in.)	Length, mm (inch): Shaft assembly Dimension "a" mm (in.)	Part No. Shaft (without joints)
1	1	1	1	415.5 (16.357)	405.3 (15.955)	113 501 211
	2	1	1	415.5 (16.357)	405.3 (15.955)	113 501 211
2	1	2	–	476 (18.739)	–	211 501 211
	3	2	–	457 (17.992)	–	211 501 211 B *) left
	3	2	–	505 (19.881)	–	211 501 212 B *) right
3	1	1	1	415.5 (16.357)	405.3 (15.955)	113 501 211
	3	2 left	2 left	389.5 (15.333)	379.3 (14.931)	311 501 211 left
	3	3 right	3 right	439.5 (17.302)	427.3 (16.821)	311 501 212 right
4	1	4	4	435 (17.125)	433 (17.047)	411 501 211
	3	4	5	435 (17.125)	427 (16.810)	

*) Drive shafts for autom. transmission have a ridge in the middle of the shaft.

Remarks
Transmission types: 1 = Manual transmission 2 = Automatic Stick Shift 3 = Automatic transmission



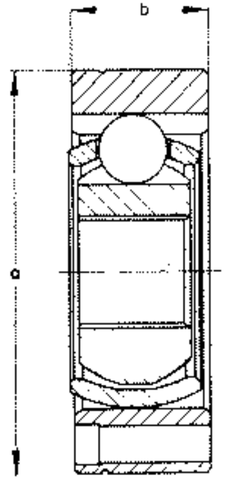
H

b - Constant velocity joints

Type	Part No.	Diameter "a" mm (in.)	Width "b" mm (in.)	Ball diameter mm (in.)	Grease per joint
1	113 501 331	91 – 0.1 (3.582 – 0.003)	32 ± 0.3 (1.259 – 0.011)	15.88 (0.624)	
up to Chassis No. 2102 300 000	211 501 331 A[1]	100 – 0.2 (3.937 – 0.007)	32 ± 0.3 (1.259 – 0.011)	17.46 (0.687)	
2 from Chassis No. 2 112 000 001	211 501 331 B[2]	100 – 0.2 (3.937 – 0.007)	32 ± 0.3 1.259 – 0.011)	19.05 (0.749)	90 grams of multi purpose grease with MoS_2 additive
3	113 501 331	91 – 0.1 (3.582 – 0.003)	32 ± 0.3 (1.259 – 0.011)	15.88 (0.624)	
4	113 501 331 A	100 – 0.1 (3.937 – 0.003)	34 ± 0.3 (1.338 ± 0.011)	17.46 (0.687)	

[1]) Groove for metal cap on flange end
[2]) Annular groove on outside diameter must be towards flange.

Designation	New part mm (in.)	Wear limit
1 – Shaft, run-out	0.5 mm (0.019)	–
2 – Turning torque in tapered roller bearings (rear wheel bearings)	max. 20 cmkg (17.4 in. lb)	–



VI. Torsion Bar Adjustment (Spring plates unloaded)

Type	Model	Transmission Type	Installed from Chassis No.	to	Torsion bar length mm (in.)	diameter mm (in.)	Setting
with equalizer spring							
1	11	1	117 000 001		552 (21.732)	21 (0.826)	20° + 50'
with double-joint axle							
1	all	1 + 2	118 000 001		676 (26.614)	22 (0.866)	20° 30' + 50'
3	311	1	318 000 001		676 (26.614)	23.5 (0.925)	23° + 50'
	311	3					24° + 50'
	361	1 + 3	368 000 005				21° 30' + 50'
2	21, 23, 26	1	218 000 002		610 (24.015)	28.1 (1.104)	21° 10' + 50'
	22	1	218 000 002		610 (24.015)	26.2 (1.070)	23° + 50'
	21, 23	1 + 3 *)	212 2 000 001		610 (24.015)	28.9 (1.137)	20° + 50'
	22	1 + 3	212 2 000 001		610 (24.015)	26.9 (1.059)	23° + 50'

Transmission types: 1 = Manual transmission
2 = Automatic Stick Shift
3 = Automatic transmission
*) Model 23 (Campmobile) only

VII. Suspension Type 4

Designation	Dimensions		
	Sedan upto July 1972	Sedan from August 1972	Wagon
Coil spring *) **)			
No. of coils	8.5	8.5	9
Effective coils	7	7	7.5
Mean coil diameter	135.0 mm (5.3 in.)	***)	139.0 mm (5.471 in.)
Wire diameter	15.1 mm (0.594 in.)	15.4 mm (0.605 in.)	16.4 mm (0.644 in.)
Unloaded length	382.0 mm (15.0 in.)	380.0 mm (14.960 in.)	362.0 mm (14.24 in.)

Remarks

*) front and rear springs are different
**) When installing new spring, note color codes. Springs are available in 3 groups.
Both springs on one axle must be the same.
Sedan with 2 or 3 paint marks
Wagon with 1, 2 or 3 paint marks
***) Conical Top = 133 mm (5.236 in.) diameter
Bottom = 138 mm (5.432 in.) diameter

I. Tolerances, wear limits and settings

Designation	From Chassis No.	Type 1 New part	Type 1 Wear limit	From Chassis No.	Type 2 New part	Type 2 Wear limit	From Chassis No.	Type 3 New part	Type 3 Wear limit	From Chassis No.	Type 4 New part	Type 4 Wear limit	Remarks
a - Master cylinder													
1 - Tandem master cylinder *) **)													
Front wheel circuit stroke . .	111 2 000 001	17.5 (0.689)	–	211 2 000 001	19.0 (0.748)	–	317 000 001	15.0(0.590)	–	418 000 001	15.0(0.590)	–	*) Model 111 from Chassis No. 117 000 001: front wheel circuit stroke: 15.5 mm (0.610 in.) rear wheel circuit stroke: 12.5 mm (0.491 in.)
Rear wheel circuit stroke		11.5 (0.453)	–		13.0 (0.512)	–		15.0(0.590)	–		15.0(0.590)	–	
diameter	117 000 001	19.5 (0.750)	–	211 2 000 001	23.81(0.936)	–	317 000 001	19.05(0.750)	–	418 000 001	19.05(0.750)	–	**) Model 14 from Chassis No. 147 000 001: front wheel circuit stroke: 14 mm (0.551 in.) rear wheel circuit stroke: 14 mm (0.551 in.)
b - Wheel cylinder													
1 - Wheel cylinder:													
front . . . . . diameter	111 2 000 001	23.81(0.936)	***)	–	–	–	–	–	–	–	–	–	
rear . . . . . diameter	118 000 001	17.46(0.687)	–	218 000 001	22.2(0.874)	–	0 000 001	22.2(0.874)	–	418 000 001	22.2(0.874)	–	***) Model 111 from Chassis No. 117 000 001: 22.2 mm (0.874 in.)
				212 2 000 001	23.81(0.936)	–							
2 - Cylinder in caliper . diameter	147 000 001	40.0(1.575)	–	211 2 000 001	54.0 (2.126)	–	316 000 001	42.0(1.654)	–	418 000 001	42.0(1.654)	–	

Designation	From Chassis No.	Type 1 New part	Type 1 Wear limit	From Chassis No.	Type 2 New part	Type 2 Wear limit
c - Brake drums/brake discs						
5 - Brake drums: *)						
front . . . . . inside diameter	111 2 000 001	248.1+0.2 **) (9.768+0.008)	249.5 (9.823)	211 1 000 001	–	
rear . . . . . inside diameter		230+0.2 (9.055+0.008)	231.5 (9.114)		252.+0.2 (9.92+0.008)	253.5 (9.98
front and rear . . . . wall thickness		--	4.0 (0.157)		--	4.0 (0.15
out of round		max. 0.10 (0.004)	–		max. 0.10 (0.004)	–
taper		max. 0.10 (0.004)	–		max. 0.10 (0.004)	–
lateral runout		max. 0.25 (0.010)	–		max. 0.25 (0.010)	–
measured at friction surface . . radial runout		max. 0.15 (0.006)	–		max. 0.10 (0.004)	–
6 - Brake disc . . . . thickness		9.50–9.45 (0.374–0.372)	8.0 (0.315)		13.0–0.2 (0.511–0.007)	11.5 (0.45
Disc thickness after turning	147 000 001	min. 8.5 (0.335)	8.0 (0.315)		min. 12 (0.472)	11.5 (0.45
Maching dimension per side		max. 0.5 (0.020)	–		max. 0.5 (0.020)	–
Thickness tolerance		max. 0.02 (0.0008)	–		max. 0.02 (0.0008)	–
Disc runout		max. 0.2 (0.008)	–		max. 0.1 (0.004)	–
d - Brake linings	111 2 000 001					
7 - Brake linings:						
front . . . . . width		45.0 ***) (1.77)	–		–	–
rear . . . . . width	118 000 001	40.0 (1.57)	–	211 2 000 001	55.0 (2.165)	–
front and rear . . . thickness		4.0–3.8 (0.160–0.150)	2.5 (0.100)		6.0–5.8 (0.235–0.225)	2.5 (0.09
(oversize)		4.5–4.3 (0.177–0.170)	2.5 (0.100)		–	–
8 - Friction pad for disc brake +) . . . thickness	147 000 001	10.0 (0.393)	2.0 (0.079)		14.0 ++-) (0.551)	2.0 (0.07

From Chassis No.	Type 3 New part	Type 3 Wear limit	From Chassis No.	Type 4 New part	Type 4 Wear limit	Remarks
0 221 975	–	–	418 000 001	–	–	*) The drum turning dimension for 0.5 (0.020) oversize linings is 1.0 (0.040) above the given dimension for all drums
	248.1+0.2 (9.768+0.008)	249.5 (9.823)		248.1+0.2 (9.768+0.008)	249.5 (9.823)	**) Model 111: 231 + 0.2 (9.059 + 0.008)
	–	4.0 (0.157)		--	4.0 (0.157)	***) Model 111: 40.0 (1.57)
	max. 0.10 (0.004)	–		max. 0.10 (0.004)	--	+) Measured without pad carrier plate.
	max. 0.10 (0.004)	–		max. 0.10 (0.004)	–	++) From August 1971: Thickness: 11.0–0.1 (0.433–0.004) Thickness after machining: min. 10.0 (0.393) Wear limit: 9.5 (0.374)
	max. 0.25 (0.010)	–		max. 0.25 (0.010)	–	
	max. 0.20 (0.008)	–		max. 0.20 (0.008)	--	+++) Up to July 1972: 10.0 (0.393)
	9.50–9.45 ++) (0.374–0.372)	8.0 (0.315)		11.0–0.1 (0.433–0.004)	9.5(0.374)	
	min. 8.5 (0.335)	8.0 (0.315)		min. 10.0 (0.393)	9.5(0.374)	
	max. 0.5 (0.020)	–		max. 0.5 (0.020)	–	
	max. 0.02 (0.0008)	–		max. 0.02 (0.0008)	–	
	max. 0.2 (0.008)	--		max. 0.2 (0.008)	–	
	–	–			–	
0 378 300	45.0 (1.77)	--	418 000 001	45.0 (1.77)	–	
	4.0–3.8 (0.160–0.150)	2.5 (0.100)		4.0–3.8 (0.160–0.150)	2.5 (0.100)	
	4.5–4.3 (0.177–0.170)	2.5 (0.100)		4.5–4.3 (0.177–0.170)	2.5 (0.100)	
	10.0 (0.393)	2.0 (0.079		14.0 +++) (0.551)	2.0 (0.079)	

II. Tightening torques

Location	Designation	Thread	Quality grade	Tensile class	Torque mkg	Torque lb ft	Type 1	Type 2	Type 3	Type 4	Remarks
Brake master cylinder											
Stop bolt in housing	bolt	M 6	8 G	8.8	0.5–1.0	3.6–7	x	x	x	x	*) for all line connections
Residual pressure valve on housing	–	M 12 x 1			2.0	14	x	x			**) Type 3 from August 1971: 7.5 mkg (54 lb ft)
Brake light switch valve on housing	–	M 10 x 1			2.0	14	x	x	x	x	***) Type 2 from August 1972: Bolt M 14 x 1.5 16 mkg (116 lb ft)
Brake master cylinder on frame	bolt	M 8	8 G	8.8	2.5	18	x	x	x		
Tandem brake master cylinder on support	bolt	M 10 x 1.5	8 G	8.8	4–4.5	29–33				x	
Brake line on master cylinder *)	union nut	M 10 x 1			1.5–2.0	11–15	x	x	x	x	
Push rod (rod on clevis)	nut	M 9 x 1	6 G	6	1.5–2.0	11–15		x			
Tandem brake master cylinder on brake servo	nut	M 8	8 G	10	max. 1.3	max. 9.4		x			
Front wheel brakes											
Backing plate on steering knuckle	bolt	M 10	10 K	10.9	5.0	36	x				
Wheel cylinder and backing plate on steering knuckle	bolt	M 10	10 K	10.9	5.5–6	40–43		x			
Splash shield on steering knuckle	bolt	M 7	5 D	5.6	1.0	7	x		x		
Splash shield on steering knuckle	bolt	M 8	5 D	5.6	1.0	7				x	
Wheel cylinder on backing plate	bolt	M 8	8 G	8.8	2.5	18	x				
Caliper housing	socket head screw	M 7			2.0–2.5	14–18			x *)		
Caliper on steering knuckle	bolt	M 10	10 K	10.9	4 **)	29	x		x		
Caliper on steering knuckle	bolt	M 12 x 1.5	10 K	10.9	7.5	54		x		x	
Caliper on steering knuckle	bolt	M 12 x 1.5	10 K	10.9	10.0 ***)	72	x	x	x	x	
Bleeder valve in wheel cylinder/caliper	–	M 6/ M 7	9 S MnPb 2	–	max. 0.5	max. 3.6	x	x	x	x	
Brake hose on wheel cylinder/caliper	–	M 10	9 S 20 K	–	1.5–2.0	11–15	x		x	x	
Socket head screw for clamp nut	socket head screw	M 7	10 K	10.9	1.0 max. 1.3	7 max. 9		x			
	socket head screw	M 7	10 K	10.9	1.5 max. 2.0	11 max. 15		x			

Location	Designation	Thread	Quality grade	Tensile class	Torque mkg	Torque lb ft	Type 1	Type 2	Type 3	Type 4	Remarks
Rear wheel brakes											*) Wheel nuts:
Wheel cylinder on backing plate	bolt	M 8	8 G	8.8	2–3	14–22	x		x	x	12–14 mkg (87–101 lb. ft.)
Bearing cover on wheel bearing housing	bolt	M 10	10 K	10.9	6.0	43	x		x	x	
Backing plate on wheel bearing housing	bolt	M 8	8 G	8.8	2–3	14–22		x			
Backing plate on wheel bearing housing	bolt	M 10	8 G	8.8	3–4	22–29		x			
Brake drum/rear wheel hub on rear wheel shaft	slotted nut	M 24/ M 30	C 45 KN	–	35	253	x	x	x		
Wheels											
Wheel on brake drum	bolt	M 14 x 1.5	Ck 35	–	12–13	87–94	x		x	x	
Wheel on brake drum	bolt	M 14 x 1.5	Ck 35	–	13 *)	94		x			
Brake pressure regulator											
Regulator on luggage compartment floor	nut	M 8	8 G	10	2.0	14				x	
Plug on body	plug				11	80				x	
Adjusting screw nut	nut	M 10	–	–	2.5–3.5	18–25				x	
Spring housing on body	socket head screw	M 6	8 G	8.8	1.0	7				x	
Regulator on side member	bolt	M 8	–	8.8	1.5	11		x			
Brake servo											
Brake servo on front axle	nut	M 8	8 G	10	max. 1.3	max. 9.4		x			
Pedal cluster											
Pedal cluster on frame	bolt	M 10	8 G	8.8	4–4.5	29–33	x		x		
Pedal stop plate on frame	bolt	M 8	8 G	8.8	2–2.5	14–18	x		x		
Brake pedal/pin	bolt	M 12 x 1.5	8 G	8.8	3–4	22–29		x			
Brake pedal/push rod	bolt	M 8	8 G	8.8	2.0	14		x			
Clutch pedal/pin	nut	M 10	8 G	10	2.5	18		x			
Support/clutch pedal on frame	bolt	M 8	8 G	8.8	2.0	14		x			

III. Tire Data

Type	Type 1						Type 2					
Model	111		113, 15		14		21,22,23,26		21,23		22	
Tire (tubeless)	6.00–15 4PR **)		6.00–15 4PR **)		6.00–15 4PR **)		7.00–14 8 PR		185 SR 14			
Rim x wheel size	4 1/2 J x 15 **)		4 1/2 J x 15 **)		4 1/2 J x 15		5 1/2 J x 14					
Inflation pressures (psi)	front	rear	front	rear	front	rear	front	rear	front	rear	front	rear
a - up to two occupants	16	24	16	27	16	24	–	–	–	–	–	–
b - fully loaded	17	26	18	27	17	26	–	–	–	–	–	–
c - with half payload	–	–	–	–	–	–	28	36	30	37	30	37
d - with full payload	–	–	–	–	–	–	28	40	30	40	30	40

Wheel for all types
Radial run-out
Lateral run-out
maximum 1.5 mm (0.060 in.)

For prolonged high speed travel the pressures on vehicles with bias ply tires should be increased by 3 psi.

Under no circumstance is the cold tire pressure to exeed the maximum inflation pressure marked on the tire.

Type			Type 3								Type 4			
Model	21,23		31		36		31		36		42		46	
Tire (tubeless)	185 R 14 C		6.00–15L4PR		6.00–15L6PR		165 SR 15 *)				155 SR 15		165 SR 15	
Rim x wheel size			4 1/2 J x 15								4 1/2 J x 15			
Inflation pressures (psi)	front	rear	front	rear	front	rear	front	rear	front	rear	front	rear	front	rear
a - up to two occupants	–	–	17	26	–	–	18	28	–	–	20	26	–	–
b - fully loaded	–	–	18	29	–	–	18	28	–	–	23	31	–	–
c - with half payload	30	40	–	–	17	26	–	–	18	28	–	–	19	30
d - with full payload	30	44	–	–	18	36	–	–	18	35	–	–	19	36

*) for Canada only

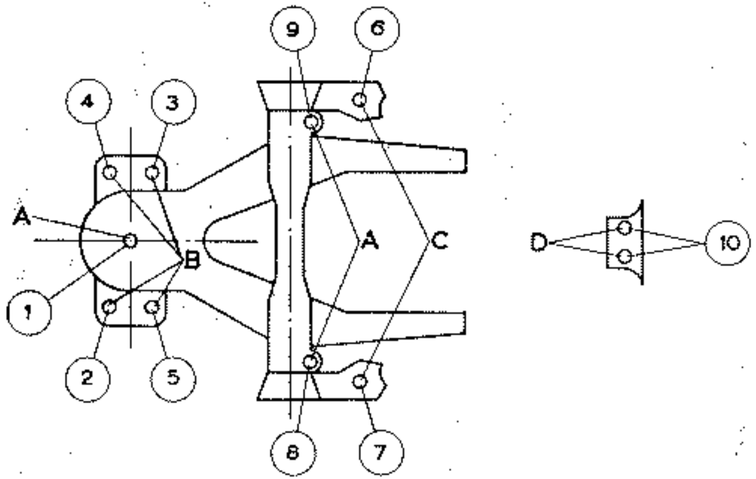
**) Up to March 1972:
Models 111, 113, 151
Tire: 5.60 – 15
Wheel size: 4 J X 15

Model 14
Tire: 5.60 S – 15

BODY

1. Tightening torques

Location	Designation	Thread	Quality grade	Tensile class	Torque mkg	Torque lb ft	Remarks
a – Body (Types 1 and 3)							*) The bolts for the sub-frame must be tightened in the order as shown here
When installing body:							
body bolts	bolt	M 8	8 G	–	1.5 – 2.0	11 – 14	
body bolts	bolt	M 10	8 G	–	1.6 – 2.0	11 – 14	
When checking:							
body bolts	bolt	M 8	8 G	–	1.0 – 1.5	7 – 11	
body bolts	bolt	M 10	8 G	–	1.0 – 1.5	7 – 11	
Frame head to body (only Type 1/Model 113)	bolt	M 10	–	8.8	3.5	25	
b – Body (additional for Type 3 only)							
Sub-frame to frame (A)	bolt	M 10	8 G	–	4.0 – 4.5	30 – 32	
Sub-frame to frame (B)	bolt	M 8	8 G	–	2.0	14	
Body to sub-frame (tightened from lugagge compartment) (C)	bolt	M 10	8 G	–	4.0	30	
Rear engine support (D)	bolt	M 8	5 S	–	1.0 – 1.5	7 – 11	
Body to front axle support	bolt	M 10	8 G	–	4.0	30	



I. Batteries (Standard equipment)

Type 1	Type 2	Type 3	Type 4
12 V/45 Ah	12 V/45 Ah	12 V/45 Ah	12 V/45 Ah

State of charge	Normal Specific gravity	Tropical Specific gravity
Discharged	1.12	1.08
Half charged	1.20	1.16
Fully charged	1.285	1.23

Checking battery
Level of acid over the plates and separators 5 mm (3/16 in.)

If acid level indicators are fitted, top acid up to level shown.

Load test

Battery	12 Volt	6 Volt
Load current	110 amps.	165 amps.
Minimum voltage	9.6 V	4.6 V
Load period	5–10 secs.	

II. General data

a - Ignition	Types 1 and 2 / 1600	Type 3	Type 2/1700	Type 4
Firing order	1–4–3–2			
Distributor: Ignition timing in degrees Setting marks	5° after TDC *) at idling speed	+) 0° **) at idling speed		27° before TDC**) at 3500 engine rpm
Setting marks	notch in crankshaft pulley/crankcase joint	left notch in pulley/ tongue of setting gauge	red notch in fan pulley/fan housing	
Contact breaker gap dwell angle	44 – 50°			
Spark plugs Make/Designation ***)	Champion L 88 A Bosch W 145 T 1 Beru 145/14		Bosch W 175 T 2 Beru 175/14/3	
Electrode gap	0.7 mm (.028 in.)			

Distributor . . . . . Details of distributor interchangability are given in the Workshop Manual, volume K

Remarks

*) Vacuum hoses **on**
) Vacuum hoses **off
***) The types given or plugs with the same values from other manufacturers

+) From August 1971 : 5° before TDC
++) From August 1972 with manual transmission 10° after TDC

5° after TDC ++)
at idling speed

E

Designation	Type 1	Type 2/1600	Type 3	Types 2/1700, 4
b - Generator				
1 - Drive ratio — generator shaft/crankshaft	1:1.9	1:1.9	1:2.3	—
2 - Maximum output	30 Amp.	38 Amp.	30 Amp.	—
3 - Voltage regulator (for test data, see Workshop Manual)				
c - Alternator				
1 - Drive ratio — alternator shaft/crankshaft	—	—	—	1:2.26
2 - Maximum output	—	—	—	55 Amp.
3 - Stator winding resistance	—	—	—	0.13–0.013 Ω
4 - Exciter winding resistance	—	—	—	4.0 ± 0.4 Ω
5 - Minimum brush length	—	—	—	14 mm (0.551 in.)
6 - Brush pressure	—	—	—	300–400 gram (10.6–14.1 oz)
7 - Minimum diameter of slip rings	—	—	—	31.5 mm (1.240 in.)
8 - Slip ring out of round	—	—	—	max. 0.03 mm (0.001 in.)
9 - Rotor out of round	—	—	—	max. 0.05 mm (0.002 in.)
d - Voltage regulator				
1 - Regulating voltage under load	12.5 – 14.5	12.5 – 14.5	12.5 – 14.5	13.8–14.9 Volts
2 - Load current	25 Amp. at 2000–2500 rpm (generator)	25 Amp. at 2000–2500 rpm (generator)	25 Amp. at 2000–2500 rpm (generator)	25–30 Amp. at 2000 rpm (engine)

Remarks
*) Check within 30 seconds.

Designation	Type 1	Type 2/1600 Type 2/1700	Type 3	Type 4
e - Starter	12 Volt,0.7 hp *)	12 Volt,0.7 hp **)	12 Volt,0.7 hp **)	12 Volt,0.7 hp **)
1 - Test data (see Workshop Manual)				
2 - End play 311911023 B/C/D	0.1 – 0.3 (0.004 – 0.012)	0.1 – 0.3 (0.004 – 0.012)	0.1 – 0.3 (0.004 – 0.012)	0.1 – 0.3 (0.004 – 0.012)
003911023 A/Automatic	0.1 – 0.15 (0.004 – 0.006)	–	0.1 – 0.15 (0.004 – 0.006)	0.1 – 0.15 (0.004 – 0.006)
3 - Permissible commutator runout				
311911023 B/C/D	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)
003911023 A	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)	0.05 (0.002)
4 - Minimum commutator diameter				
311911023 B/C/D	34.5 (1.358)	34.5 (1.358)	34.5 (1.358)	34.5 (1.358)
003911023 A	33.5 (1.319)	33.5 (1.319)	33.5 (1.319)	33.5 (1.319)
111911023 A	33.0 (1.299)	33.0 (1.299)	33.0 (1.299)	33.0 (1.299)
5 - Brush pressure approx.	1200 grams (42.3 oz)	1200 grams (42.3 oz)	1200 grams (42.3 oz)	1200 grams (42.3 oz)
f - Solenoid				
1 - Pull-in coil current (Bosch)	35 Amp.	35 Amp.	35 Amp.	35 Amp.
2 - Pull-in coil current (VW)	30 Amp.	30 Amp.	30 Amp.	30 Amp.
3 - Holding coil current (Bosch)	11 Amp.	11 Amp.	11 Amp.	11 Amp.
4 - Holding coil current (VW)	12 Amp.	12 Amp.	12 Amp.	12 Amp.

Remarks
**) Automatic Stick Shift : 0.8 hp **) Automatic transmission: 0.8 hp

Designation	Type 1	Type 2/1600 Type 2/1700	Type 3	Type 4
g - Windshield wiper motor				
1 - Current at low speed. . . . . approx.	2.5 Amp.	2.5 Amp.	2.5 Amp.	2.5 Amp.
at high speed . . . . . approx.	3.5 Amp.	3.5 Amp.	3.5 Amp.	3.5 Amp.
2 - Minimum commutator diameter	–	21.5 (.846)	–	21.5 (.846)
3 - Radial runout	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)	0.03 (0.001)
4 - Armature end play	0.2–0.3 (0.008-0.012)	0.2–0.3 (0.008-0.012)	0.2–0.3 (0.005-0.012)	0.2–0.3 (0.008-0.012)
5 - Wiper shaft/bearing end play	0.4 (0.016)	0.4 (0.016)	0.4 (0.016)	0.4 (0.016)
h - Fresh air fan motor				
1 - Current at low speed (3500 rpm) installed	3.0 Amp.	2.0 Amp.	3.5 Amp.	2.0 Amp.
at high speed (5500 rpm) installed	6.0 Amp.	3.0 Amp.	6.0 Amp.	3.0 Amp.
j - Headlamp				
1 - Maximum voltage drop in lighting wiring	0.6 Volt	0.6 Volt	0.6 Volt	0.6 Volt
k - Windshield washer				
1 - Washer container Max. pressure	–	3.0 kg/cm^2 (42 psi)		
Cut-off valve	1.5–2.0 kg/cm^2 (21–28 psi)	–	1.5–2.0 kg/cm^2 *) (21–28 psi)	1.5–2.0 kg/cm^2 *) (21–28 psi)
Spare wheel pressure	3.0 kg/cm^2 (42 psi)	–	3.0 kg/cm^2 **) (42 psi)	3.0 kg/cm^2 **) (42 psi)
l - Speedometer				
- Ratio of distance/revolutions	0.82 ***)	0.82 ***)	0.82 ***)	0.82 +)
m - Heated rear window	60–70 Watts	60–70 Watts	60–70 Watts	80 Watts
n - Fuse box	10/12 point	12 point	12 point	12 point

Remarks
*) Model 36, 46: 2.5–3.0 kg/cm^2 (35–42 psi)
**) Model 36, 46: 4.0 kg/cm^2 (57 psi)
***) Up to July 1971: 0.8
+) Up to July 1971: 0.84

Description	Types 1 and 3 BN 2		Type 2/1600 Type 2/1700 BN 4		Type 4 BA 4		Remarks
General data							
1 - Heater output	max. 2000 Kcal/h	(8000 BTU/h)	max. 4000 Kcal/h	(16000 BTU/h)	max. 4000 Kcal/h	(16000 BTU/h)	
2 - Fuel consumption	0.31–0.37 l/h	(0.65–0.78 U.S. pt/h) (0.54–0.65 Imp.pt/h)	0.61–0.71 l/h	(1.29–1.50 U.S. pt/h) (1.17–1.25 Imp. pt/h)	0.2–0.6 l/h	(0.42–1.28 U.S. pt/h) (0.39–1.16 Imp. pt/h)	
3 - Fuel pump delivery capacity at 200 strokes	5.9–7.1 cm^3	–	13.3–15.2 cm^3	–	11.8–12.5 cm^3	–	
4 - Power consumption: at starting	200 Watt	–	110 Watt	–	200 Watt	–	
at normal operation	36 Watt	–	50 Watt	–	130 Watt	–	
5 - Temperature limitation	160–200° C	(266–320° F)	–	–	–	–	
6 - Temperature range: upper	–	–	approx. 130° C	(266° F)	approx. 115°–133° C	(239–271° F)	
lower	–	–	approx. 50° C	(122° F)	approx. 30°– 40° C	(86 –104° F)	
7 - Overheating switch response time	110–150 sec.	–	approx. 170–200 sec.	–	approx. 180 sec.	–	
8 - Safety switch response time	120–180 sec.	–	120–180 sec.	–	150–230 sec.	–	
9 - Ignition coil voltage	–	–	5000 Volts	–	5000 Volts	–	
10 - Heater plug electrode gap	–	–	2.5 mm	(0.10 in.)	2.5 mm	(0.10 in.)	
11 - Flame detector switch							
Switch housing to heat exchanger distance	8 mm	(0.314 in.)	8 mm	(0.314 in.)	8 mm	(0.314 in.)	
Run-on time	110–150 sec.	–	110–150 sec.	–	90–150 sec.	–	
12 - Combustion air fan							
Ignition contact breaker gap	–	–	–	–	0.4 mm	(0.016 in.)	
Fuel pump contact breaker gap	–	–	–	–	0.4 mm	(0.016 in.)	
Blower fan/motor support housing clearance	–	–	–	–	1.0 mm	(0.040 in.)	
Fan rpm at nominal voltage	5450–6050		4850–5350	–	6400–7100	–	

General data

I. Performance and consumption

Type		Type 1 up to July 1971					Type 1 from Aug. 1971				Type 1 from Aug. 1972		Remarks
Model		111	113	14	111+113M9	14 M 9	113	14	113 M 9	14 M 9	113	113 M 9	
Maximum and cruising speed	mph	81	81	86	77	83	81	90	78	88	80	77	*) Model 15: 44.5
at an engine speed of	rpm	4060	4060	4080	3900	4130	4060	4200	3900	4375	3855	3835	23.0
Road speeds													12.5
at an engine speed of	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	7.5
1st gear	mph	18	18	20	—	—	19	20	—	—	20	—	
2nd gear	mph	34	34	37	34	34	34	36.5	31	32	36	31	**) Model 15: 34.0
3rd gear	mph	56	56	60	56	56	56	60	56	56	59	56	27.5
4th gear	mph	79	78	86	79	81	80	86	80	81	80	80	19.5
Hill climbing ability on good roads with two occupants													
1st gear	%	48.0	47.0	43.5	35.5	35.5	48	43.5	35.5	35.5	42	35	***) Model 15: 38.0
2nd gear	%	25.0	24.0 *)	22.5	29.0 **)	28.5	25	22.5	29.0 **)	28.5	21 ***)	28	20.0
3rd gear	%	14.0	13.0	12.5	20.5	20.5	14	12.5	20.5	20.5	11	20	10.5
4th gear	%	8.0	8.0	7.5	—	—	8	7.5	—	—	8	—	6.5
Acceleration times (through the gears)													
0–31 mph	seconds	—	—	—	—	—	—	—	—	—	—	—	
0–50 mph	seconds	13.0	13.0	13.0	15.0	14.5	12	12	14	12.5			
0–62 mph	seconds	21.0	21.0	21.0	23.0	—	19.5	18.5	22.5	19.5			
Fuel consumption (DIN 70030)													
miles per Imp. gallon		31.3	31.3	32.1	29.7	30.4	28.4	30.7	28.2	28.2	25.5	25.5	
miles per US gallon		26.1	26.1	26.7	24.7	25.3	23.8	25.5	23.5	23.5	30.6	30.6	
Oil consumption													
Imp. pints per 1000 miles		1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	
US pints per 1000 miles		1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	

Type		Type 2			Type 3			Remarks
		1600	1700	1700 M 249	31	36	31+36 M 249	
Model		21,22,23,26	21,23,26	21,23				
Maximum and cruising speed	mph	68	78	75	84	84	81	*) Squareback with full load 29 %
at an engine speed of	rpm	4100	4660	4530	4220	4220	4250	
Road speeds								
at an engine speed of	rpm	4000	4800	4200	4000	4000	4000	
1st gear	mph	14	16.5	–	18	18		
2nd gear	mph	27	32.0	22	34	34	28	
3rd gear	mph	43	52.0	38.5	56	56	47	
4th gear	mph	66	79.0	69	79	79	75	
Hill climbing ability on good roads with two occupants								
1st gear	%	–	–	22	44.0	41.5	40/36 *)	
2nd gear	%	–	–	–	23.0	21.5	–	
3rd gear	%	–	–	–	13.0	12.0	–	
4th gear	%	–	–	–	8.0	7.5	–	
Acceleration times (Through the gears)								
0 – 31 mph	seconds	–	–		–	–	–	
0 – 50 mph	seconds	–	–		11.5	11.5	14	
0 – 62 mph	seconds	–	–		–	–	–	
Fuel consumption (DIN 70030)								
miles per Imp. gallon		26.4	21.8	21.8	31.7	31.7	29.1	
miles per US gallon		22.4	18.2	18.2	26.4	26.4	23.7	
Oil consumption								
Imp. pints per 1000 miles		1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	
US pints per 1000 miles		1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	

Type / Model		Type 4 42	Type 4 46	Type 4 M 249 42	Type 4 M 249 46	Type 4 (Calif. only) 42	Type 4 (Calif. only) 46	Type 4 M 249 (Calif. only) 42	Type 4 M 249 (Calif. only) 46	Remarks
Maximum and cruising speed	mph	96	96	94	94	92	92	89	89	
at an engine speed of	rpm	5300	5130	5200	5045	4800	4860	4660	4660	
Road speeds										
at an engine speed of	rpm	4900	4900	4900	4900	5000	5000	5000	5000	
1st gear	mph	24	24	–	–	25	25	–	–	
2nd gear	mph	43	43	35	35	45	44	36	35.5	
3rd gear	mph	65	66	58	58	68	67	60	57	
4th gear	mph	92	92	92	92	95	94	95	94	
Hill climbing ability on good roads with two occupants										
1st gear	%	46	41.5	40	36	39	35	35	33	
2nd gear	%	24	21.5	–	–	20.5	18	–	–	
3rd gear	%	14	13	–	–	12	10.5	–	–	
4th gear	%	9	7.5	–	–	7	6	–	–	
Acceletation times (through the gears)										
0 – 31 mph	seconds	–	–	–	–					
0 – 50 mph	seconds	10	10	12	12					
0 – 62 mph	seconds	14.5	14.5	20.1	20.1					
Fuel consumption (DIN 70030)										
miles per Imp. gallon		27.1	27.1	27.0	27.0					
miles per US gallon		22.6	22.6	22.9	22.9					
Oil consumption										
Imp. pints per 1000 miles		1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	1.4–2.8	
US pints per 1000 miles		1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	1.7–3.4	

II. Capacities

Type	Model	Engine	Air Cleaner (fill to mark)	Transmission and final drive	Automatic Stick Shift		Automatic Transmission		Steering gear	Fuel tank	Brakes	Remarks
					Converter	Transmission final drive	Converter and transmission	Final drive				
1	111/14	5.3 US pt (4.4 Imp. pt)	0.9 US pt (0.8 Imp. pt)	6.3 US pt (5.3 Imp. pt) at changes: 5.3 US pt (4.4 Imp. pt)	7.6 US pt (6.3 Imp. pt)	6.3 US pt (5.3 Imp. pt) at changes: 5.3 US pt (4.4 Imp. pt)			160 cc (5.4 fl oz) trans. grease	10.6 US gal. (8.8 Imp. gal.) reserve: 1.3 US gal. (1.1 Imp. gal.)	0.8 US pt (0.7 Imp. pt)	*) Type 2/1600: 5.3 US pt (4.4 Imp. pt)
	113	5.3 US pt (4.4 Imp. pt)	0.9 US pt (0.8 Imp. pt)	6.3 US pt (5.3 Imp. pt) at changes: 5.3 US pt (4.4 Imp. pt)	7.6 US pt (6.3 Imp. pt)	6.3 US pt (5.3 Imp. pt) at changes: 5.3 US pt (4.4 Imp. pt)			175 cc (5.9 fl oz) trans. grease	11.1 US gal. (9.2 Imp. gal.) reserve: 1.3 US gal. (1.1 Imp. gal.)	0.8 US pt (0.7 Imp. pt)	
2	21/22/ 23/26	7.4 US pt (6.1 Imp. pt) *)	0.9 US pt (0.8 Imp. pt) from Aug. 72 paper element filter type	7.4 US pt (6.1 Imp. pt) at changes: 7.4 US pt (6.1 Imp. pt)			12.6 US pt (11.0 Imp. pt) at changes 6.3 US pt (5.3 Imp. pt)	3.0 US pt (2.5 Imp. pt)	0.6 US pt (0.5 Imp. pt) Hypoid trans. oil	15.8 US gal. (13.2 Imp. gal.) reserve: 1.3 US gal. (1.1 Imp. gal.)	1.0 US (0.9 Imp. pt)	
3	31/36	5.3 US pt (4.4 Imp. pt	0.9 US pt (0.8 Imp. pt)	6.3 US pt (5.3 Imp. pt) at changes: 5.3 US pt (4.4 Imp. pt)			12.6 US pt (11.0 Imp. pt) at changes: 6.3 US pt (5.3 Imp. pt)	2.1 US pt (1.7 Imp. pt) at changes: 2.1 US pt (1.7 Imp. pt)	160 cc (5.4 fl oz) trans. grease	10.6 US pt (8.8 Imp. pt) reserve: 1.3 US gal. (1.1 Imp. gal.)	0.8 US pt (0.7 Imp. pt)	
4	42/46	7.4 US pt (6.1 Imp. pt)	0.9 US pt (0.8 Imp. pt)	5.3 US pt (4.4 Imp. pt) at changes: 4.2 US pt (3.5 Imp. pt)			12.6 US pt (11.0 Imp. pt) at changes: 6.3 US pt (5.3 Imp. pt)	2.1 US pt (1.7 Imp. pt) at changes: 2.1 US pt (1.7 Imp. pt)	250 cc (8.5 fl oz) trans. grease	13.2 US gal. (11.0 Imp. gal.) reserve: 1.6 US gal. (1.3 Imp. gal.)	0.8 US pt (0.7 Imp. pt)	

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III. Dimensions

Types 1, 2, 3 and 4

Designation	111	14	113 up to July 1972	113 from Aug. 1972	21, 23, 26 up to July 1972	21, 23, 26 from Aug. 1972	31, 36	42, 46	Remarks
Wheelbase . . . . mm (in.)	2400 (94.5)	2400 (94.5)	2420 (95.3)	2420 (95.3)	2400 (94.5)	2400 (94.5)	2400 (94.5)	2500 (98.4)	*) Up to July 1972: 1310 mm (51.6 in.) 1350 mm (53.2 in.)
Track, front . . mm (in.)	1322 (52.0) *)	1304 (51.3)	1375 (54.1)	1390 (54.7)	1386 (54.5)	1395 (54.9)	1310 (51.6)	1376 (54.7)	
rear . . . . mm (in.)	1363 (53.7) *)	1338 (52.6)	1350 (53.1)	1363 (53.7)	1439 (56.6)	1455 (57.3)	1350 (53.1)	1350 (52.8)	
Length . . . . . mm (in.)	4030 (58.6)	4140 (162.6)	4080 (160.6)	4140 (163.0)	4420 (174.0)	4505 (177.4)	4368 (171.9)	4553 (179.2)	**) Kombi 1950 (76.7)
Width . . . . . mm (in.)	1550 (61.0)	1634 (64.3)	1585 (62.3)	1585 (62.3)	1765 (69.4)	1720 (67.7)	1640 (64.5)	1675 (65.9) ***)	***) Up to July 1972: 1635 mm (64.4 in.)
Height, empty mm (in.)	1500 (59.0)	1320 (51.9)	1500 (59.0)	1500 (59.0)	1955 **) (76.9)	1955 (76.9)	1470 (57.8)	1485 (58.5)	
Ground clearance, loaded . . mm (in.)	150 (5.9)	150 (5.9)	150 (5.9)	150 (5.9)	185 (7.3)	200 (7.8)	150 (5.9)	135 (5.4)	
Angle of approach	25°	23°	25°	25°	19°	19°	23°	19°	
departure	15°	12°	15°	15°	21°	20°	15°	16°	
Turning circle	10.5 m (34 ft. 2 1/2 in.)	11.25 m (36 ft. 11 in.)	9.6 m (31 ft. 5 in.)	9.6 m (31 ft. 5 in.)	12.3 m (40 ft. 4 in.)	12.5 m (41 ft.)	11.2 m (36 ft. 10 in.)	11.4 m (37 ft. 4 in.)	

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Air conditioner (VPC)
Z-Compressor oil level

Compressor Type	Compressor position	Oil height min. mm (in.)	Oil height max. mm (in.)	Remarks
Tecumseh (1 cylinder)	vertical	22.2 (7/8)	27.0 (1 1/16)	
	horizontal	22.2 (7/8)	28.6 (1 1/8)	
York (2 cylinder)	vertical	22.2 (7/8)	28.6 (1 1/8)	
	horizontal	20.6 (13/16)	30.2 (1 3/16)	

Temperature – Pressure relationship R – 12

Temperature °C	Temperature °F	Pressure kg/cm²	Pressure psi	Temperature °C	Temperature °F	Pressure kg/cm²	Pressure psi	Temperature °C	Temperature °F	Pressure kg/cm²	Pressure psi
– 41	– 40	0.77	11.0 *)	– 4	25	1.8	24.6	29	85	6.6	91.7
– 38	– 35	0.55	8.3 *)	– 1	30	2.0	28.5	32	90	7.0	99.6
– 35	– 30	0.28	5.3 *)	0	32	2.2	30.1	35	95	7.5	108.1
– 32	– 25	0.2	2.3 *)	2	35	2.3	32.6	38	100	8.2	116.9
– 29	– 20	0	0.6	4	40	2.6	37.0	41	105	8.8	126.2
– 26	– 15	0.2	2.4	7	45	3.0	41.7	44	110	9.5	136.0
– 23	– 10	0.3	4.5	10	50	3.3	46.7	46	115	10.5	146.5
– 20	– 5	0.5	6.8	13	55	3.6	52.0	49	120	11.4	157.1
– 18	0	0.6	9.2	16	60	4.0	57.7	52	125	12.3	167.5
– 15	5	0.8	11.8	18	65	4.5	63.7	55	130	13.4	179.0
– 12	10	1.0	14.7	21	70	4.8	70.1	60	140	14.6	204.5
– 9	15	1.2	17.7	24	75	5.4	76.9	67	150	16.4	232.0
– 6	20	1.5	21.1	27	80	6.0	84.1	70	158	18.3	260.2

*) inches of mercury vacuum

Torque specifications for Compressor

Description	York		Tecumseh		Remarks
	mkg	lb ft	mkg	lb ft	
Cylinder head	2.1–3.2	15–23	2.8–3.3	20–24	
Front seal plate	0.7–0.9	5– 7	0.8–1.4	6–10	
Service valve	4.1–4.8	30–35	9.0–9.7	65–70	
Oil filler plug	0.3–0.8	2–6	2.5–3.0	18–22	
Clutch pulley bolt	2.1–2.8	15–20	2.1–2.8	15–20	
Clutch holding coil	0.9–1.4	7–10	0.8	6	
Base plate	1.9–3.0	14–22	–	–	
Rear bearing cover	1.2–2.4	9–17	–	–	

Torque specifications for flare nut (SAE 45° double flare) *)

Nominal tube size mm (in.)	Steel - Steel		Aluminum - Steel or Brass - Steel		Copper - Brass		Remarks
	mkg	(lb ft)	mkg	(lb ft)	mkg	(lb ft)	
9.5 (3/8)	2.8–3.3	(20–24)	2.1–2.8	(15–19)	2.3–2.9	(17–21)	*) These torques are based on the first installation of a new flared fitting. If the seal is broken, for repair add 0.7 mkg (5 lb ft) to the torque specifications.
12.7 (1/2)	4.8–5.5	(35–40)	2.9–3.7	(21–27)	3.9–4.7	(28–34)	
15.9 (5/8)	5.8–6.5	(42–47)	3.5–4.3	(25–31)	4.6–5.4	(33–39)	