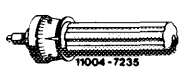
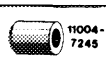
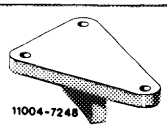
Data

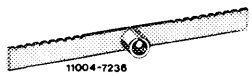
Number of balls in ball circuit	30–31

Adjusting data	Ncm	(kpcm)
Friction torque of steering worm in bearing cap prior to pretensioning bearing insert	8–10	(0.8–1.0)
Additional amount of steering worm friction torque after pretensioning bearing insert	16–18	(1.6–1.8)
Friction torque of steering nut in power piston	5–10	(0.5–1.0)
Friction torque, ball circuit, steering worm-steering nut	30–50	(3–5)
Total friction torque measured at pitman shaft	220–300	(22–30)

Tightening torques	Nm	(kpm)
Threaded ring for locking screw cover in power piston	160–200	(16–20)
Hex nut for locking bearing insert in bearing cap	80–100	(8–10)
Hex screws for attaching bearing cap to steering housing	40–45	(4–4.5)
Hex socket screws for attaching lower housing cover to steering housing	30–35	(3–3.5)
Pressure and return flow connection for attaching upper housing cover to steering housing	45–50	(4.5–5)
Hex nut and cap nut on adjusting screw of pressure device	25–30	(2.5–3)

Special tools

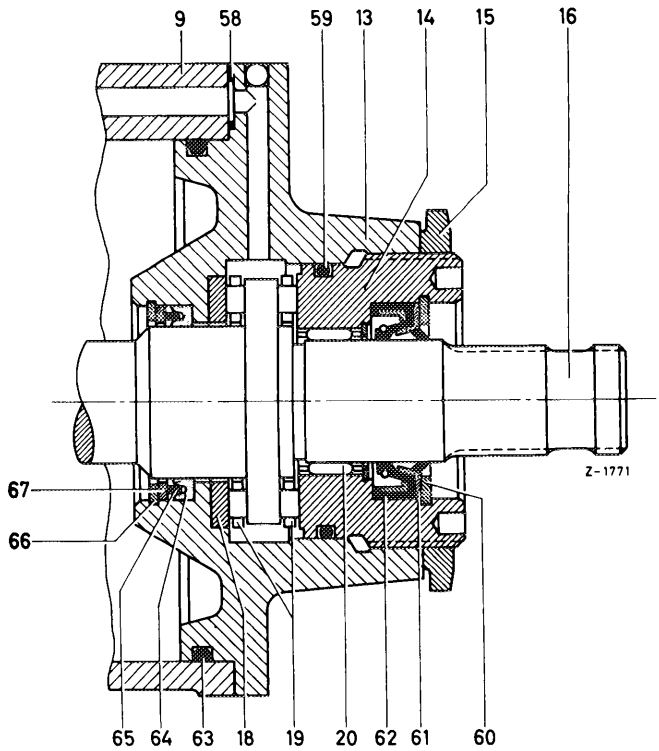
Torque screwdriver 15–65 Nm (1.5–6.5 kpm)	 11004-7235	001 589 09 21 00
Torque measuring instrument 0.3–6 Nm (3–60 kpcm)	 11004-7074	001 589 49 21 00
Splined insert 1/4" square for measuring friction torque	 11004-7245	112 589 00 08 00
Assembly fixture	 11004-7248	116 589 01 59 00

Tool for pressing sealing ring into bearing insert		116 589 08 43 00
Tool for adjusting friction torque of steering worm in steering nut		116 589 03 21 00

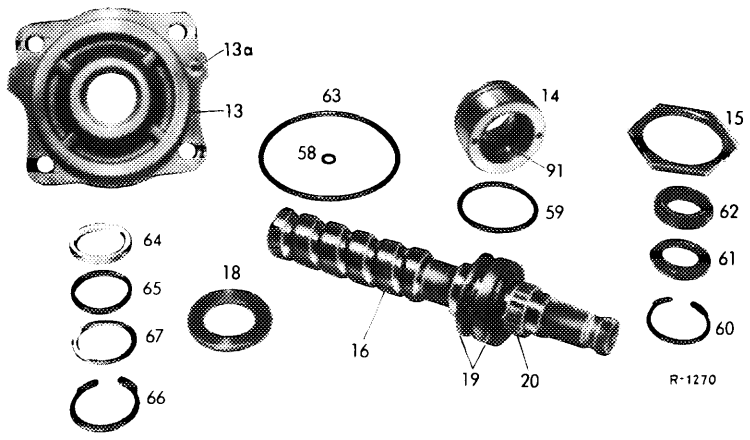
Note

During assembly, coat all sliding parts with oil.

1 Insert thrust washer (18) into bearing cap (13). Place one longitudinal bearing (19) each in front of and behind flange of steering worm (16). Insert steering worm into bearing cap, making sure that the teflon inside sealing ring of steering worm is not damaged. Place needle bearing (20) on steering worm.

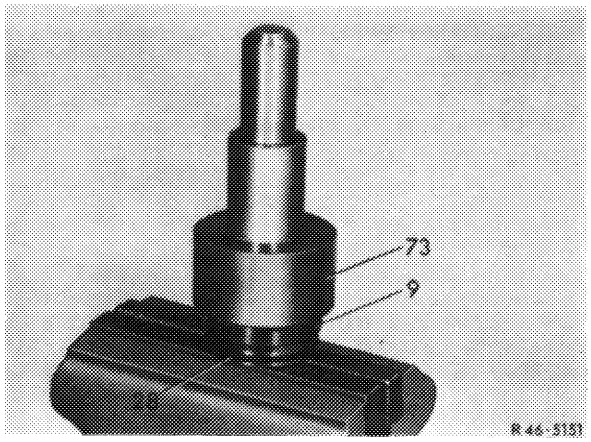


9 Steering housing
13 Bearing cap
14 Bearing insert
15 Hex nut
16 Steering worm
18 Thrust washer
19 Longitudinal bearing
20 Needle bearing
60 Locking ring
61 Supporting ring with dust lip
62 Sealing ring
63 O-ring
64 Teflon-inside sealing ring
65 Supporting ring
66 Locking ring
67 Steel washer



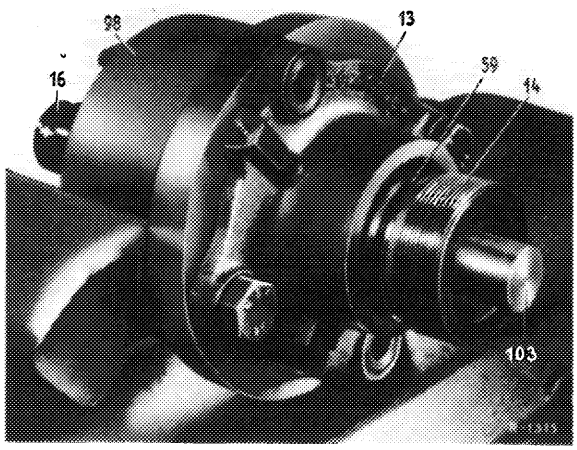
13 Bearing cap
13a Oil duct
14 Bearing insert
15 Hex nut
16 Steering worm
18 Thrust washer
19 Longitudinal bearing
20 Needle bearing
58 O-ring
59 O-ring
60 Locking ring
61 Supporting ring with dust lip
62 Sealing ring
63 O-ring
64 Teflon-inside sealing ring
65 Supporting ring
66 Locking ring
67 Steel washer
91 Washer

2 Press sealing ring and supporting ring into bearing insert with pressing-in tool.



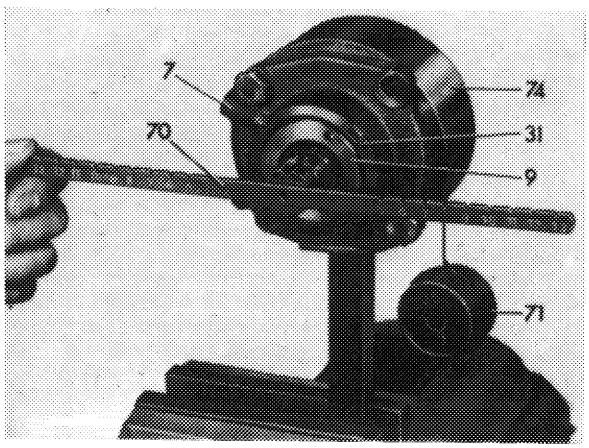
3 Insert locking ring. Fill intermediate space between sealing lips of sealing ring and dust ring with chassis grease. Insert O-ring into bearing insert.

4 Attach bearing cap (13) with steering worm (16) in fixture (73). Slip sleeve (103) over splining of steering worm and screw bearing insert (14) into bearing cap, but do not yet tighten.

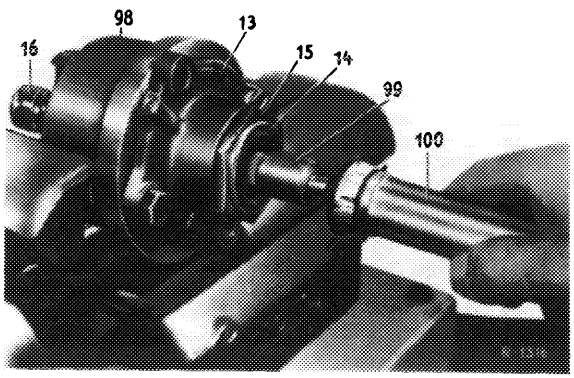


Note: If the fixture is not available, the bearing cap with the steering worm can also be attached to steering housing.

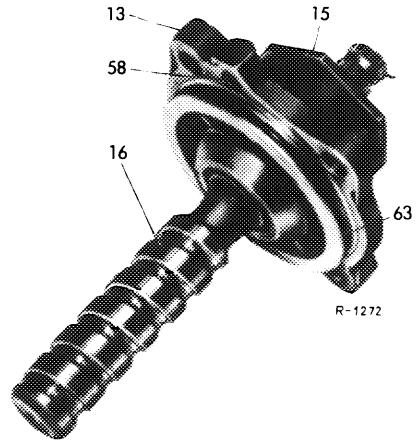
5 Measure friction torque of steering worm in bearing cap (only sealing members), by placing measuring device (70) on splining of steering worm. The friction torque should amount to 8 to 10 Ncm (0.8–1.0 kpcm = 200 g in notch "4" or "5" of measuring device). Then tighten bearing insert (9) with pin spanner until the friction torque increases to 16–18 Ncm (1.6–1.8 kpcm). Then tighten hex nut to 80–100 Nm (8–10 kpm) and check friction torque once again.



Note: The friction torque can also be measured with torque screwdriver.



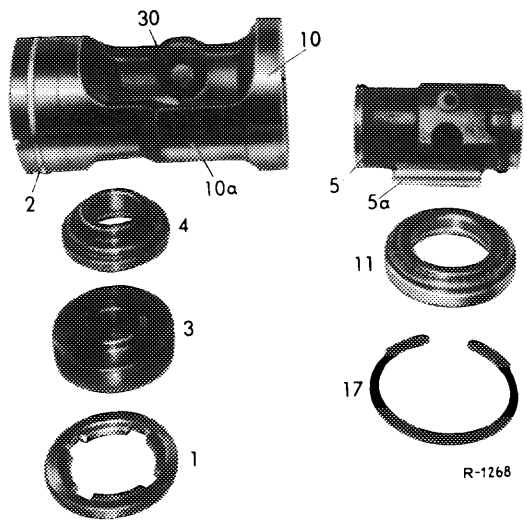
6 Remove bearing cap from fixture, place O-rings (58) and (63) on bearing cap (13).



7 Press outer race of lower axial-tapered ball bearing (4) into power piston (10). Screw-in screw cover (3) by a few turns. Insert ball cage into outer race.

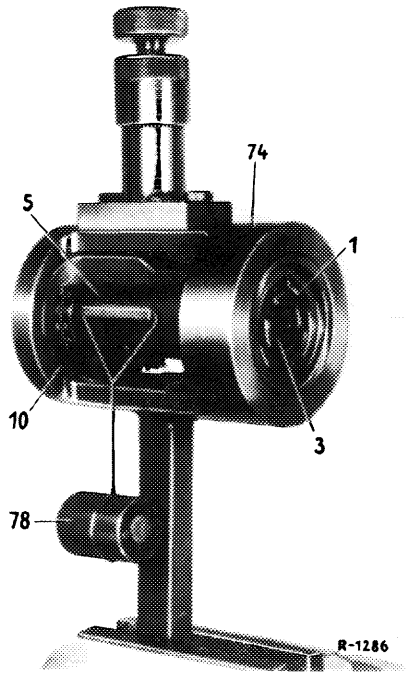
8 Place inside races of axial-tapered ball bearing to steering nut and insert steering nut (5) into power piston (10) in such a manner that the bores for the ball guide tube are below center (10a) in power piston for center position-check screw.

9 Place ball cage of upper axial-tapered ball bearing (11) on inside race, press-in outside race and insert locking ring (17) into groove of power piston, making sure that the locking ring is correctly seated in groove.



10 Clamp power piston (10) to device (74). Attach weight (78) to straightedge of steering nut (5). Tighten screw cover with special wrench first to approx. 40 Nm (4 kpm), then turn screw cover back until the specified torque between steering nut and power piston is available.

Note: The torque can also be measured with adjusting tool 116 589 03 21 00.

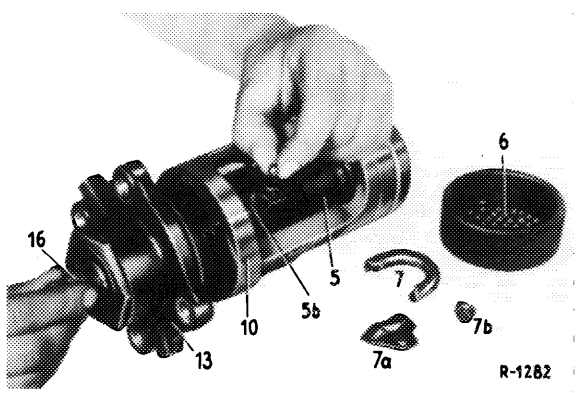


11 Secure screw cover with threaded ring, making sure that the screw cover is not turning along. Then check torque of steering nut once again.

Note: The tightening torque of the threaded ring must be high enough to prevent loosening.

12 Introduce steering worm (16) into steering nut, and fill balls (6) into ball circuit of steering nut and steering worm, while rotating steering worm. Introduce the remaining balls into ball guide tube (7) and fill both ends of ball guide tube with grease, so that the balls cannot fall out.

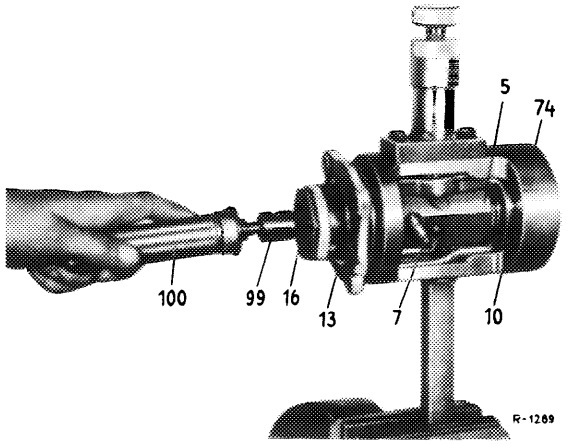
Note: The ball circuit is filled with 30–31 balls.



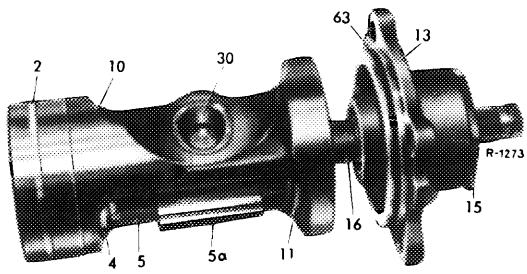
13 Place ball guide tube (7) with fastening clip (7a) of steering nut (5), screw-in hex screw (7b) with new locking plate and secure by bending.

14 Check friction value between steering nut (5) and steering worm (16). For this purpose, slip torque wrench (100) on splining of steering worm (16) and read torque on torque wrench when steering worm is rotated.

Note: a) If the friction is too high or too low, completely replace steering worm together with steering nut and balls. On steerings, used for extended periods, the friction torque specified for new parts in ball circuit can be reduced by up to 20 %.
b) Rotation of steering worm should proceed without binding.



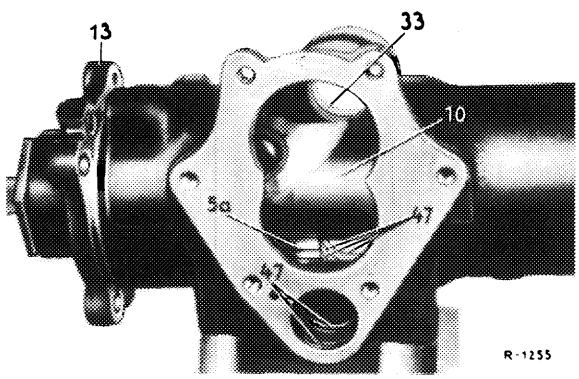
15 Insert power piston assembly, steering nut, steering worm and bearing cap into steering housing.



16 Set power piston (10) and steering nut (5) in steering housing in such a manner that the bore for the bushing of control valve in steering housing is unobstructed.

17 Slip bushing into steering case so that the two lugs of the bushing are on top and crosswise in relation to steering housing. The bushing can be aligned with the upper housing cover. Introduce straightedge of steering nut into recess of bushing.

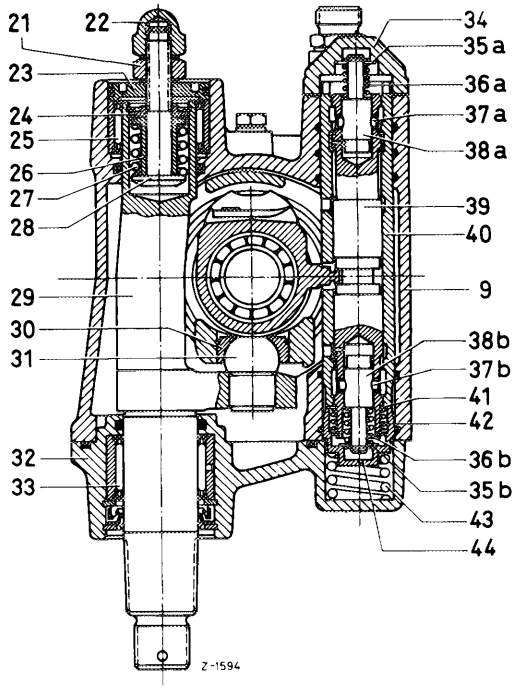
18 Introduce control valve into bushing.



19 Carefully introduce straightedge of steering nut into control valve while moving control valve (39) lightly back and forth.

Note: Do not force straightedge of steering nut into control valve, so that the edge at recess of control valve is not damaged.

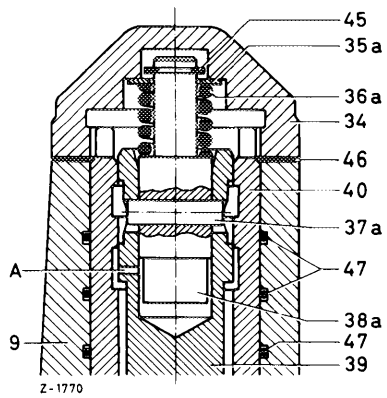
9 Steering case	34 Upper housing cover
21 Hex nut	35a Thrust washer
22 Cap nut	35b Thrust washer
23 Round nut	36a Compression spring
24 Thrust washer	36b Compression spring
25 Needle bearing	37a Set pin
26 Pressure sleeve	37b Set pin
27 Compression spring	38a Upper reaction piston
28 Adjusting screw	38b Lower reaction piston
29 Pitman shaft	39 Control valve
30 Ball socket in power piston	40 Bushing
31 Ball pin	41 Thrust washer
32 Housing cover	42 Centering spring
33 Needle bearing	43 Compressing spring
	44 Closing cover



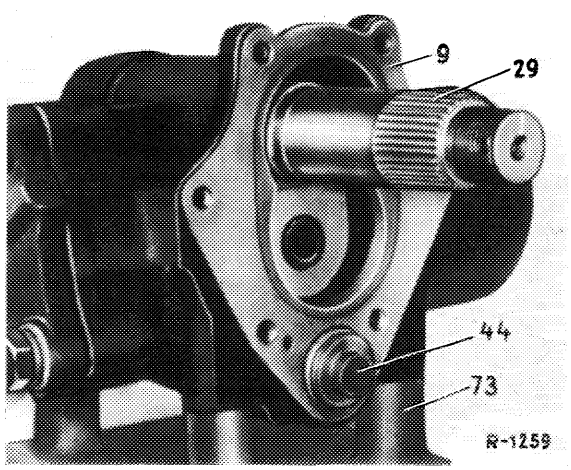
20 Attach bearing cap with hex screws to steering housing.

21 Attach upper housing cover (34) with new gasket (46) with pressure connection and return flow connection, then check steering on steering worm for easy operation.

Note: The pressure connection is sealed by means of O-ring, the return flow connection by means of an aluminum sealing ring.



22 Move power piston into center position. Insert shaft (29) and closing cover (44) into steering housing (9).

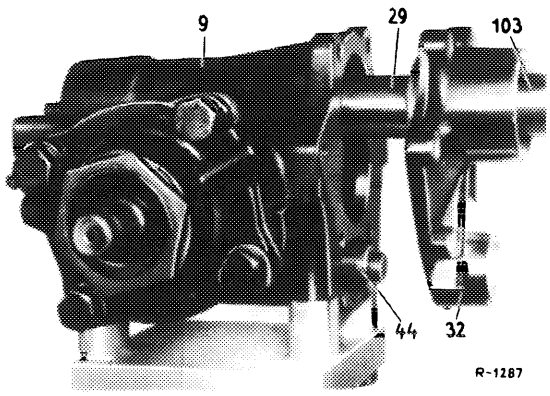


23 Place insertion sleeve (103) on splining of pitman shaft (29).

Note: The sleeve prevents damage to sealing ring.

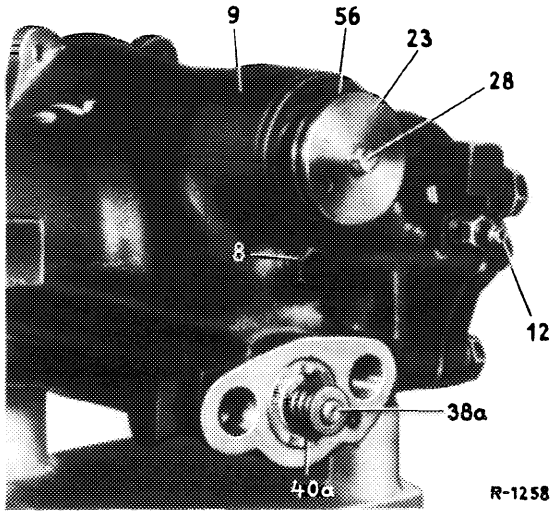
24 Replace O-rings in housing cover.

25 Insert compression spring in housing cover (32), slip cover over pitman shaft and attach to steering housing (9), remove sleeve (103).



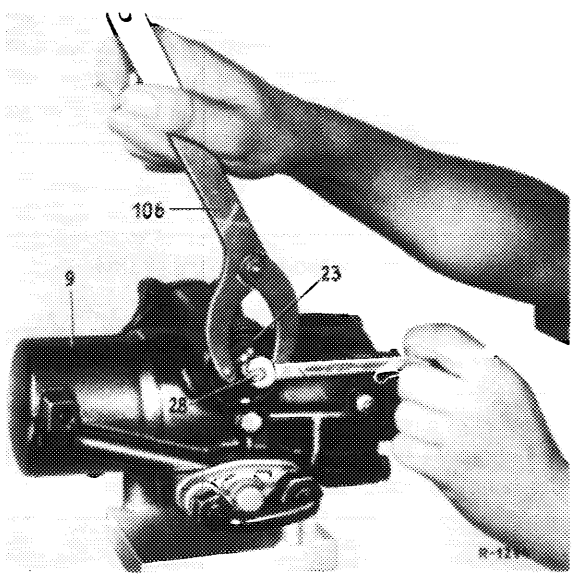
26 Replace O-rings (56) on round nut (23).

Screw round nut (23) with pin spanner on adjusting screw (28) and tighten.



27 Adjust pressure unit for pitman shaft, by loosening the tightened round nut (23) with pin spanner (106) by 1/8 to 1/4 turns while applying counterhold to adjusting screw (28).

28 Place sealing ring on adjusting screw, screw-on hex nut and tighten, while applying counterhold to round nut and adjusting screw. Mount sealing ring and screw-on cap nut.



29 Measure torque with torque wrench (measuring range of 0–60 Nm (0–6 kpm) and adjust, required for turning pitman shaft beyond center position.

Note: The torque should amount to 17.5–22.5 Nm (1.75–2.25 kpm).