

BEML - TATRA 815

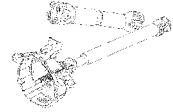
26RR36 22 255 6x6.1R/50T, 51T

Workshop manual

Part 2 – CLUTCH AND PROPELER SHAFT

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2 CLUTCH AND PROPELLER SHAFT

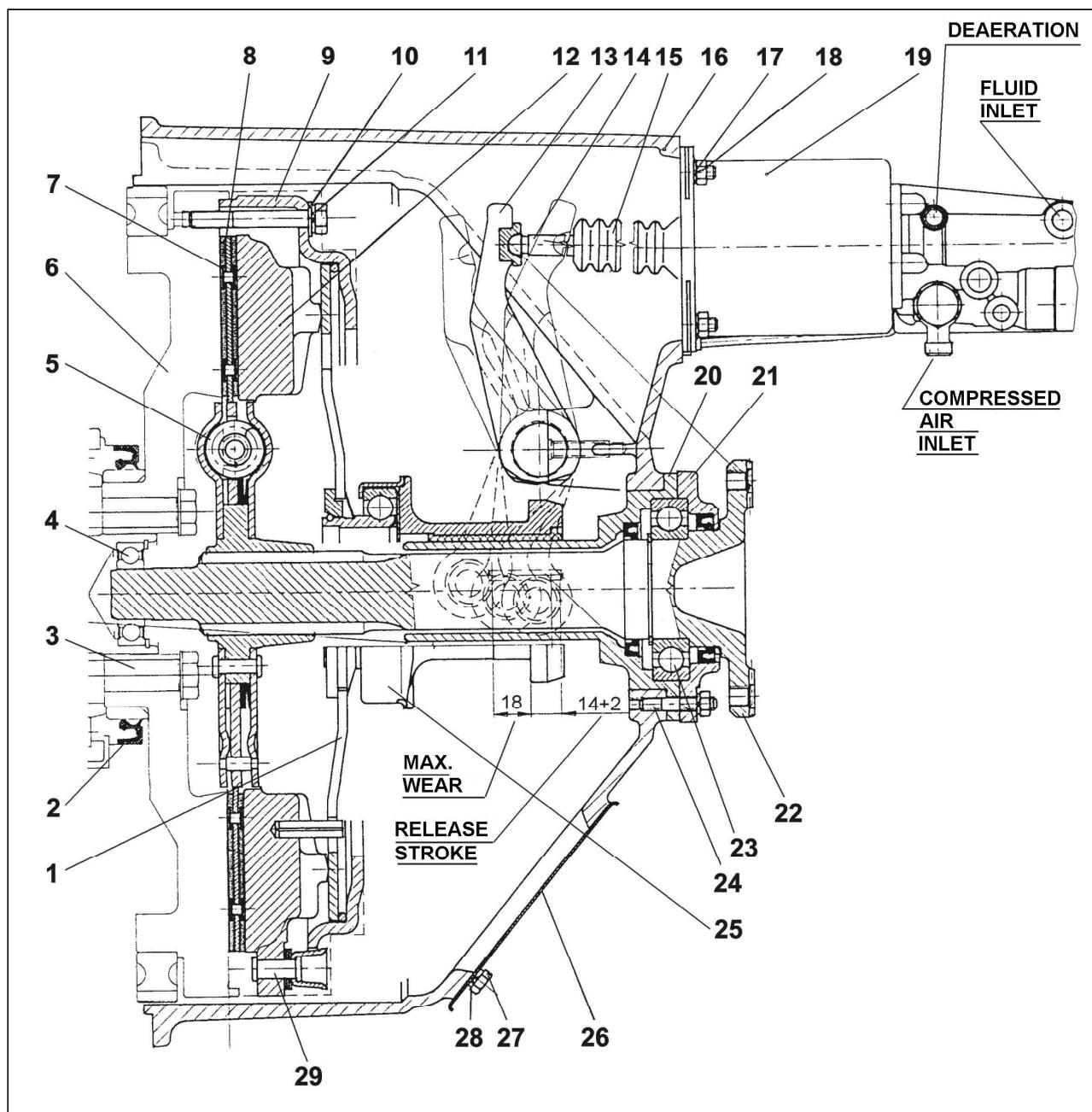
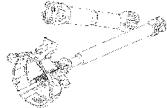
2.1 Description and Main Technical Specifications

The chassis BEML - TATRA T 815 - 26RR36 22 255 6x6.1R/50T and BEML - TATRA T 815 - 26RR36 22 255 6x6.1R/51T use the dry, friction, single-disc clutch with a Belleville spring. The clutch is of a MFZ 1 x 430 type. The clutch is hydraulically actuated and fitted with a pneumatic booster.

The cross-sectional view of the clutch is illustrated in the figure (See Fig. 2.1).



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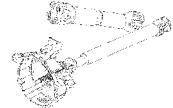


Legend: 1 - Belleville spring, 2 - shaft seal, 3 - screw, 4 - guide ball bearing, 5 - torsion damper, 6 - flywheel, 7 - lining rivet, 8 - clutch plate (driven plate c/w lining), 9 - clutch cover, 10 - washer, 11 - screw, 12 - thrust plate, 13 - clutch lever, 14 - release rod (push-button), 15 - rubber dust cup, 16 - clutch housing, 17 - washer, 18 - nut, 19 - clutch booster, 20 - bushing, 21 - cover, 22 - clutch shaft, 23 - bearing, 24 - screw, 25 - release bearing c/w sleeve, 26 - cover, 27 - screw, 28 - washer, 29 - pin c/w travel limiter

Fig. 2.1 Clutch cross-section



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The clutch control is illustrated in the figure (See Fig. 2.2). The clutch control mechanism consists of the clutch pedal **6**, mechanical gear c/w return spring **3**, clutch fluid cylinder **7**, clutch equalizing and storing reservoir **4**, manifold, pneumatic fluid booster **10** and clutch release lever **9**.

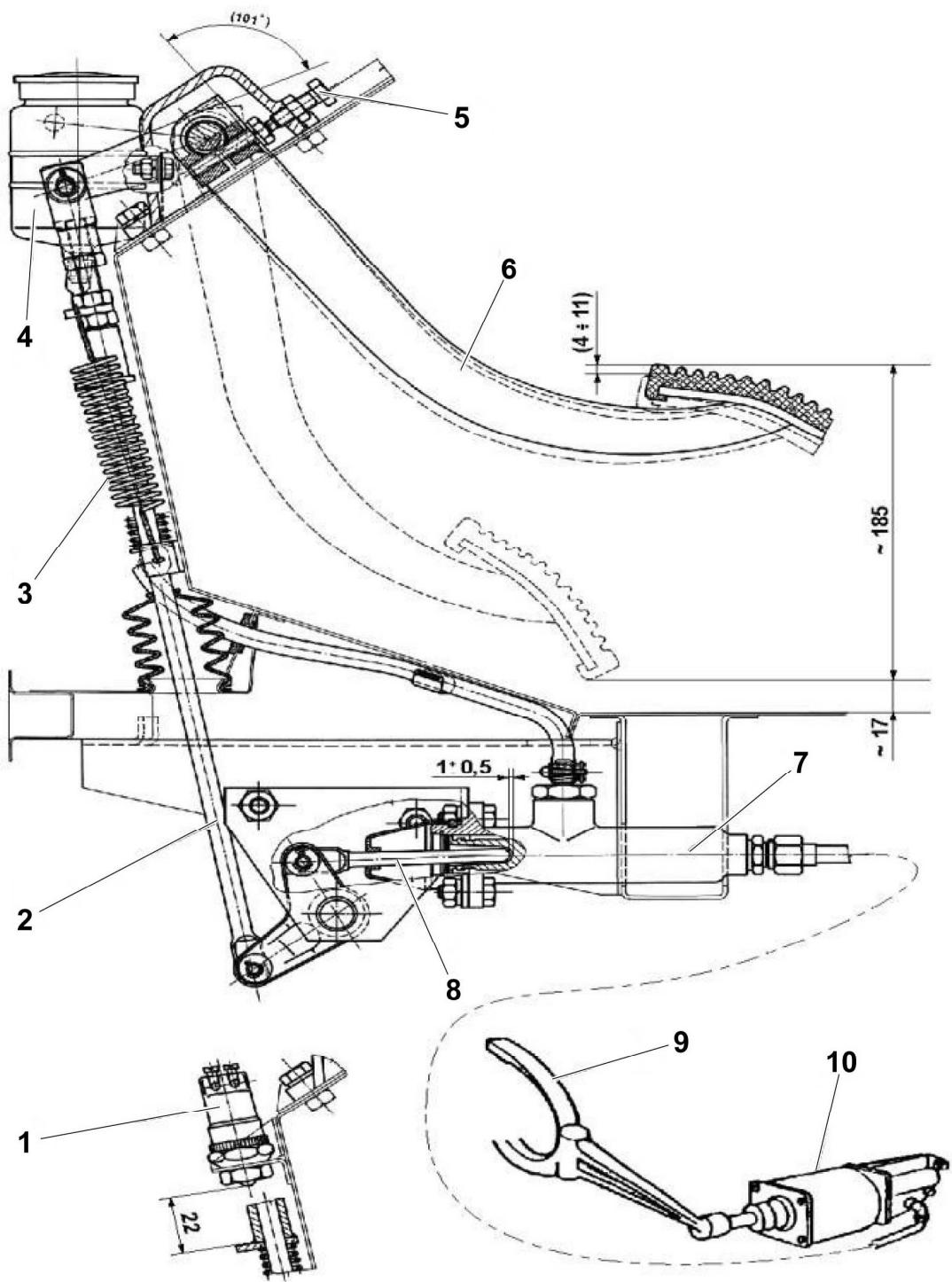
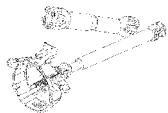
Clutch function:

When depressing the clutch pedal 6 the mechanical part of the control mechanism draws the fluid from the fluid cylinder **7** into a fluid part of the pneumatic fluid clutch booster **10**. The fluid pressure allows the opening of the pressure air supply into a pneumatic part of the pneumatic fluid clutch booster **10**. The pressure air acts on the differential piston and hereby the control force is increased. The differential piston acts on the thrust release rod **14** (See Fig. 2.1), which controls the clutch double-arm lever **13**. Hereby the release bearing c/w sleeve **25**, in which fits the Belleville spring **1** with its small diameter, will move. Hereby the clutch thrust plate **12** and also the clutch plate **8** will release. It results in the torque transfer interruption and so **the clutch is disengaged**.

When the clutch pedal is released, the pressure fluid acts no more, the pressure air supply is closed and all clutch components will return to the initial position by means of return springs in the mechanical part of the control mechanism. The residual pressure air from the pneumatic fluid clutch booster **10** (See Fig. 2.2) is released into the open air. The release bearing c/w sleeve **25** (See Fig. 2.1) will return into the initial position and the Belleville spring **1** will act with its pre-stress (thrust force) on the thrust plate **12** and on the clutch plate **8** too. Due to the friction among flywheel, driven plate and thrust plate, the torque will be transmitted and **the clutch is engaged**.



02 Clutch and Propeller Shaft

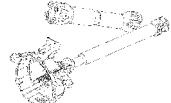


Legend: 1 – H/L gear switch; 2 – tie rod assembly; 3 – draw spring; 4 – equalizing reservoir; 5 – distance bolt; 6 – clutch pedal; 7 – clutch master cylinder; 8 – clutch push-button; 9 – clutch release lever; 10 – clutch booster

Fig. 2.2 Clutch control



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The figure (See Fig. 2.3) shows the integration of the clutch 2 and shaft 3 into a drive train. The clutch housing 2 c/w clutch are screwed to the engine 1. The clutch booster is attached to the clutch housing. The torque is transmitted from the clutch 2 to the input of the gearbox 4 by means of the propeller shaft 3.

This solution allows overcoming the different heights between the engine torque outlet and the gearbox torque inlet. In addition, it improves the weight distribution especially at the curb weight and makes the clutch and gearbox removal easier.

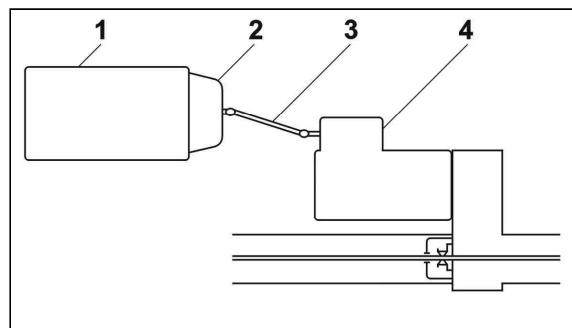
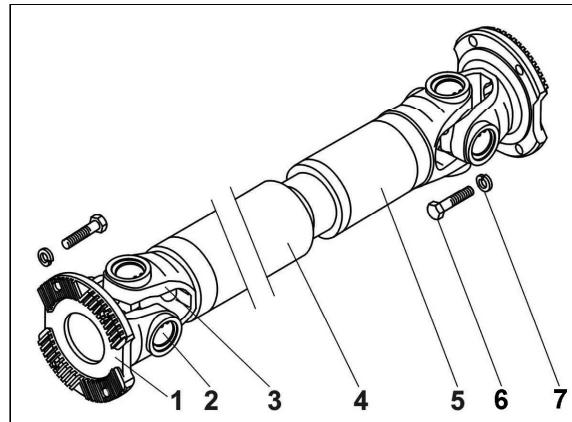


Fig. 2.3 Propeller shaft integration in a drive train

Description of the Propeller Shaft:

The propeller shaft is mounted between the clutch and gearbox. It is an articulated shaft with universal joints. It assures a permanent torque transmission between the clutch and gearbox. It allows overcoming the different heights of the clutch outlet and the gearbox inlet. The propeller shaft design is illustrated in the figure (See Fig. 2.4). The shaft is maintenance-free.



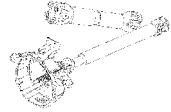
Legend: 1 - carrier c/w flange, 2 - rigid universal joint, 3 - carrier, 4 - carrier splined part, 5 - slide carrier, 6 - screw, 7 - spring washer

Fig. 2.4 Propeller shaft

The main technical specifications of the clutch and propeller shaft are mentioned in the table below.

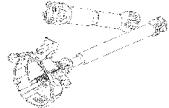


02 Clutch and Propeller Shaft



Tab. 2.1 Clutch and propeller shaft technical specifications

Data	Unit	Value	
Type		MFZ 1 x 430	
Kind		Single-disc, dry, friction clutch with Belleville spring	
Control		Hydraulically actuated clutch with pneumatic booster	
Flywheel outside diameter	(mm)	482	
Clutch lining outside diameter		430	
Clutch lining inside diameter		220	
Clutch lining thickness: - new		3,5	
		2,0	
Clutch & clutch housing weight	(kg)	100	
Kind of propeller shaft		Articulated with universal joints	



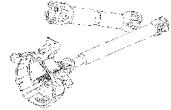
2.2 Faults Causes, Symptoms and Troubleshooting

The table below gives a survey of possible faults, which may occur on clutch and propeller shaft installed on the chassis BEML - TATRA T 815- 26RR36 22 255 6x6.1R/50T and BEML - TATRA T 815 - 26RR36 22 255 6x6.1R/51T .

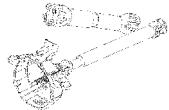
Fault	Cause	Remedy	Mentioned in:
The clutch is not disengaging	No fluid in the control circuit	Top up the fluid and bleed the circuit	(See Subchapter 2.5.2)
	Deformed manifold between the master clutch cylinder and booster	Replace the faulty manifold components	
	Faulty clutch master fluid cylinder	Replace the clutch master fluid cylinder	(See Subchapter 2.5.5)
The clutch is not disengaging	Faulty clutch booster	Replace the clutch booster, repair	(See Subchapter 2.5.6),(See Subchapter 2.5.11)
	Air in the fluid part of the control circuit	Bleed the fluid part of the control circuit	(See Subchapter 2.5.2)
	Damaged guide ball bearing in the flywheel	Remove the clutch and replace the guide bearing	(See Subchapter 2.5.8)
The clutch is slipping	A small free play on the clutch pedal	Adjust the free play on the clutch pedal	(See Subchapter 2.5.3)
	Worn lining of the driven clutch plate	Replace the driven clutch plate	(See Subchapter 2.5.8)
	Oil and lubricant leakage from engine into clutch housing and pollution of the driven clutch plate	Remove the clutch and replace the driven clutch plate	
Slow clutch release	Seizure of clutch release bearing sleeve or bushings of the release lever	Remove the clutch shaft c/w bushing or remove the clutch, degrease it and lubricate the bushingsTD>	(See Subchapter 2.5.4), (See Subchapter 2.5.10)
Increased noise during the clutch release	Damaged release bearing	Replace the release bearing	(See Subchapter 2.5.7)
Lubricant leaks from the clutch shaft bushing and cover	Damaged shaft seal	Replace the shaft seal	(See Subchapter 2.5.4)
Increased noise and a big play of the clutch shaft	Damaged clutch shaft bearing	Replace the clutch shaft bearings	(See Subchapter 2.5.4)



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Fault	Cause	Remedy	Mentioned in:
Increased noise and big plays of propeller shaft.	Damaged propeller shaft or universal joint and/or splined carrier.	Replace the propeller shaft or universal joint and/or splined carrier.	(See Subchapter 2.5.9)



2.3 List of Special Tools

Tab. 2.2 Repair tools for clutch and propeller shaft

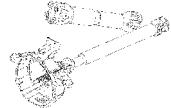
Name: Driver of bearings 6007, 3206, 6206 Tool number: PRL 0412.1	
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Name: Guide mandrel for drivers PRL-0412.1 and PRL-0923 Tool number: PRL 0922	
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Name: Universal driver Tool number: PRL 0925	
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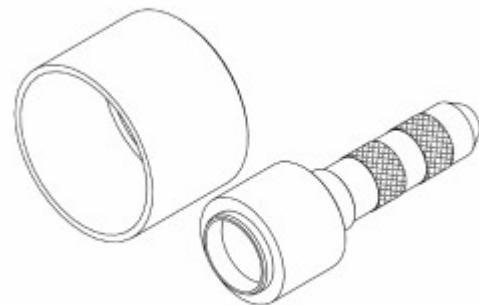


02 Clutch and Propeller Shaft



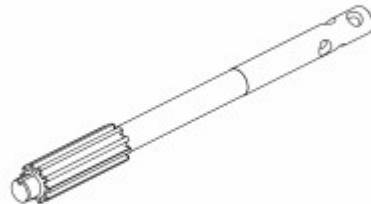
Name: Driver to press shaft seal 60x80x8 and centering ring into halfaxle

Tool number: PRL 0988.1



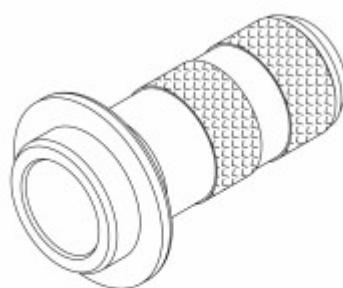
Name: Pin to fit of clutch plate

Tool number: PRM 2326.1



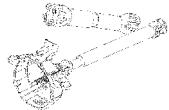
Name: Driver of inner race of bearing 30210 and shaft seal 70x90x13

Tool number: PRM 3116



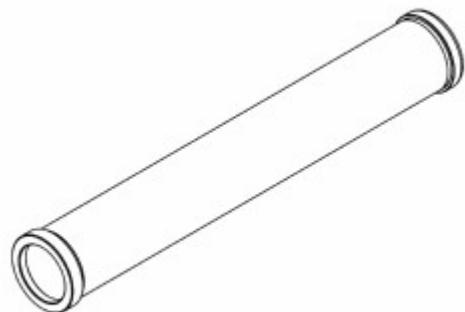


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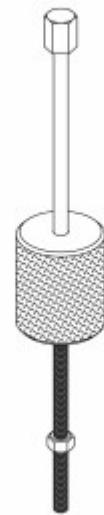
Name: Driver to press bearing bushing onto the articulated shaft and bearing 6212

Tool number: PRM 3153



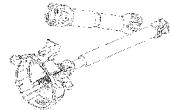
Name: Universal extractor

Tool number: PRM 3322





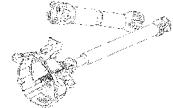
02 Clutch and Propeller Shaft



Name: Universal puller

Tool number: PRM 3354



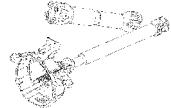


2.4 Survey of Torque Specifications

A survey of main torque specifications related to the clutch and propeller shaft installed on the chassis BEML - TATRA **T 815– 26RR36 22 255 6x6.1R/50T** and BEML - TATRA **T 815 - 26RR36 22 255 6x6.1R/51T** is mentioned in the following table.

Tab. 2.3 Torque specifications

Data	Unit	Value
Clutch cover fastening bolts	Nm	34 + 9
Fastening bolts M 12 x 100 of the clutch housing		58 + 15
Fastening bolts M 8 x 35 of the clutch housing		17 + 4
Propeller shaft flange fastening bolts		65 - 85
Fastening bolts of suspension brackets		58 + 15



2.5 Working Procedures

2.5.1 Inspection of the Clutch Disengagement

a) Reasons for Inspection

1. Difficult gear shifting.
2. Technical servicing after consuming every **8,000 ltr** of fuel, after working **600 eng. hrs** and/or after covering **20,000 km**, whichever first occurs.
3. Increased clutch pedal resistance.

b) Technical Conditions

1. Clutch and brake pedals must be positioned at the same level.
2. When the clutch pedal is depressed, the clutch must be fully disengaged and the torque must be disconnected from engine.
3. The clutch booster must reduce the effort needed to depress the clutch pedal.
4. Fluid and pneumatic clutch control components are not leaky.

c) Inspection Procedure

1. Pressurize the pneumatic system to **700 kPa (7.0 kg/sq.cm)** at least.
2. Depress the clutch pedal and check whether the propeller shaft rotation stops and starts to rotate again after the clutch pedal release.
3. If the propeller shaft continues to rotate and/or the control force is considerably increased, shut the engine off, depress and release the clutch pedal. At a sufficient air pressure in the pneumatic system you must hear an audible pressure air blow-in into a circuit of the clutch booster and its blow-off into the open air.
4. If the pressure air blow-in and blow-off do not occur and the clutch pedal is difficult to control, check the hoses and connections if they are not leaky or damaged. Loosen the bleeding screw **1**. Depress the clutch pedal and catch the brake fluid, which spills out into a bowl prepared. Tighten the bleeding screw **1** of the clutch booster **2** and release the clutch pedal. According to a condition of the brake fluid and if air bubbles appear at the same time, carry out the clutch deaeration or change the brake fluid in accordance with a procedure mentioned in the section (See Subchapter **2.5.2**).

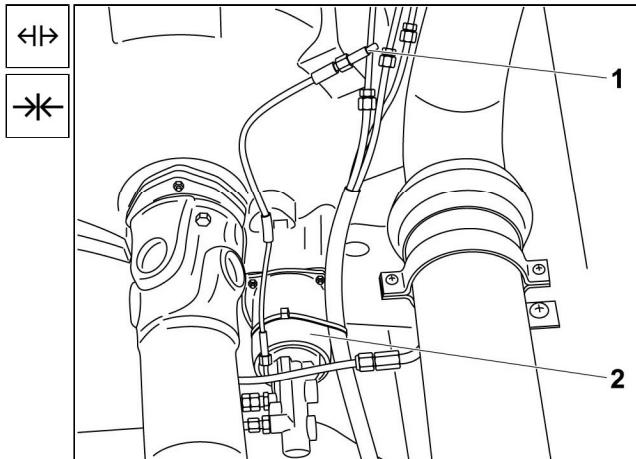


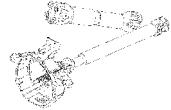
Fig. 2.5 Daeaeration of the clutch booster

Note:

If the clutch control circuit cannot be deaerated properly and the circuit is not leaky, replace the clutch master cylinder in accordance with a procedure mentioned in the section (See



02 Clutch and Propeller Shaft

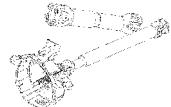


Subchapter 2.5.5).

5. If need be, top up the brake fluid into the expansion reservoir.
6. Repeat the inspection. If no change comes, replace the clutch booster.
7. If the pedal resistance during its actuation after loosening the bleeding screw 1 (See Fig. 2.5) of the clutch booster 2 does not decrease, you should dismantle, clean and grease the pedal bearing on the pin.
8. Should it happen during depressing the clutch pedal that the pressure air flows into the clutch booster and despite the propeller shaft is not stopping with the engine running, it is necessary to check and/or adjust the clutch control in accordance with a procedure mentioned in (See Subchapter 2.5.3).
9. With the vehicle brake actuated, start the engine, shift into the 4th gear and while releasing the clutch pedal, and check the moment of the clutch engagement start.
10. Shut the engine off.

Note:

When other faults occur (clutch slippage at the top torque, seizure of the clutch release or guide bearing and damage to inner parts), it is necessary to carry out the clutch removal.



2.5.2 Fluid Change in the Clutch Control Circuit

a) Reason for Change

1. After every three years of operation.

b) Technical Conditions

1. Drain the brake fluid from the clutch control circuit completely.
2. Fill a pure brake fluid into a expansion reservoir through the installed screen.

c) Change Procedure

1. Unlock, open and secure the cab's front bonnet in the open position.
2. Slide the bleeding hose on the end of the bleeding screw **1** of the clutch booster **2** and immerse it into a bowl prepared.
3. Use the 9 mm wrench to loosen the bleeding screw and let the fluid spill out of the control circuit.

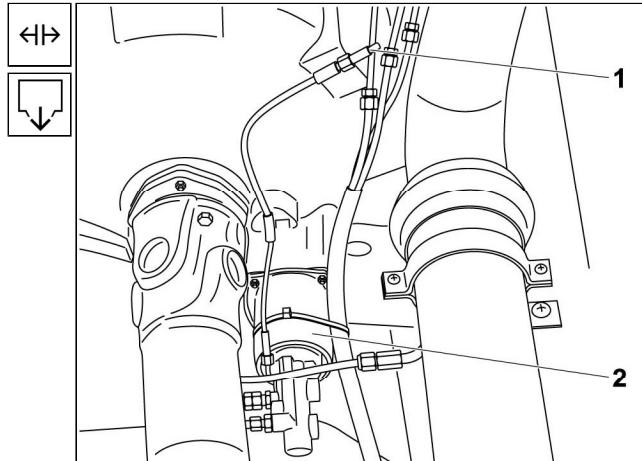
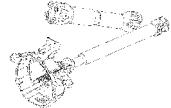


Fig. 2.6 Daeaeration of the clutch booster



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4. Depress the clutch pedal **2** to speed up the discharge of the control circuit until the air starts to bubble into the bowl.
5. Use the benzine to rinse the screen of the equalizing reservoir **1** and dry it using the air stream.
6. Top up a pure fluid into the equalizing reservoir **1** through the screen and rinse the control circuit (continue to drain the fluid) until a pure fluid starts to spill out of the bleeding hose.
7. Gently tighten the bleeding screw **1** (See Fig. 2.6) on the clutch booster.
8. Top up the brake fluid into the equalizing reservoir **1** (See Fig. 2.7) and bleed the clutch fluid control mechanism as follows:
 - immerse the end of the bleeding hose into a clean, transparent glass with a pure brake fluid;
 - loosen the bleeding screw;
 - continue to depress the clutch pedal until a fluid without air bubbles starts to spill out while checking the brake fluid drop in the equalizing reservoir and top it up continuously if need be;
 - tighten the bleeding screw **1** (See Fig. 2.6) with the clutch pedal depressed.

9. Release the clutch pedal **2** (See Fig. 2.7) and fill the equalizing tank **1** with the brake fluid in the level of the pressed-in part on the equalizing tank (above the metal sheet holder).

Note:

In case that it is not possible to deaerate the system as mentioned above, use the pressure instrument and proceed according to its operating instructions.

10. Check the clutch disengagement for function. When depressing the clutch pedal after setting a free travel, the resistance against the clutch pedal travel must increase, however, the pedal move must be continuous.
11. Start the engine and pressurize the pneumatic system to **700 kPa (7.0 kg/sq.cm)** at least.
12. Shut the engine off and check whether the clutch c/w booster disengages properly. When you depress the clutch pedal, you must hear an audible inlet of the pressure air into the clutch booster and when you release the clutch pedal, you must hear a blow-off of the pressure air from the booster circuit.
13. Close the cab's front bonnet.

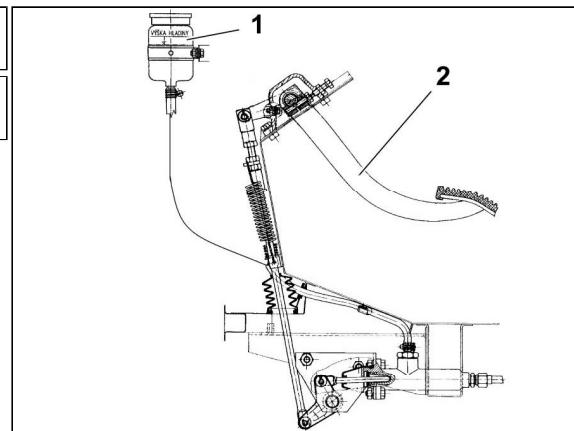
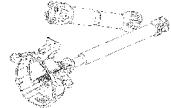


Fig. 2.7 Clutch control



2.5.3 Clutch Control Adjustment in the Driver's Cabin

a) Reasons for Adjustment

1. Replacement of faulty control mechanism components.
2. Increase in a free travel of the clutch pedal due to increase in control mechanism clearances.
3. Unequal level of the clutch and brake pedals positions.
4. The H/L gear is selected although the clutch is not fully disengaged.

b) Technical Conditions

1. The clutch pedal height must be at the same level with the brake pedal.
2. The clutch push-button stroke with the clutch pedal fully depressed is **24 mm**.
3. A free travel of the clutch push-button is **1 ± 0.5 mm**.
4. The H/L gear switch must engage when the clutch push-button is depressed by **$1 + 1$ mm**.
5. The distance between the push-button switch and H/L meshes switch pin should be **22 mm**.

c) Adjustment Procedure

1. Pressurize the clutch control pneumatic system to the pressure of **750 kPa (7.5 kg/sq.cm)**.
2. When positions of clutch **5** and brake pedals are unequal, disconnect the return spring **2**, unlock the distance screw **4** and loosen or tighten the screw to lower or to lift the pedal position.
3. Measure a free travel of the clutch push-button **6** (from the travel start to the first resistance increase).
4. In case that it is above or below the range of **1 ± 0.5 mm**, prolong or shorten tie rod **1**.
5. When you change the initial adjustment, check the ON position of the H/L gear switch **3** when the head of the H/L gear switch pin is depressed by **$1 + 1$ mm**.
6. Loosen the lock nut and adjust the distance between the head of the H/L gear switch pin **3** and the clutch push-button to **22 mm**. Secure the distance with a lock nut.
8. Make sure that the button **6** travel is **24 mm** with the clutch pedal **5** fully depressed. If this value (a full pedal stroke) has not been achieved, it is necessary to carry out a new adjustment of the clutch pedal position according to point 2 including adjustment of the brake pedal.
9. Start the engine and check the clutch release and the H/L gear shifting for function.
10. Close the cab's front bonnet and install the left-hand cover beneath the steering wheel.

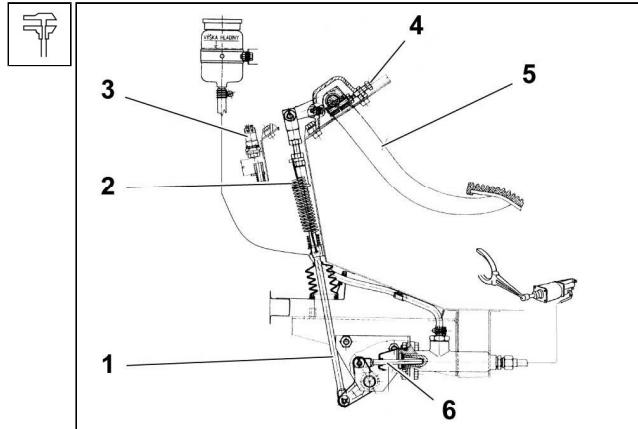
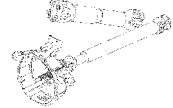


Fig. 2.8 Clutch control



2.5.4 Removal and Installation of the Clutch Shaft

a) Reasons for Removal and Installation

1. Battered shaft splining.
2. Faulty bearing 6212A SO.
3. Lubricant leaks from shaft seals.
4. Axial shaft clearance, damaged groove of the retaining ring.
5. The release-bearing sleeve bushing diameter has been worn.

b) Technical Conditions

1. Replace shaft seals, retaining ring and spring washers with new ones.
2. The bearing marked 6212A SO must be free to rotate without signs of the increased clearance.
3. No visible signs of the clutch shaft battering due to the clutch plate hub, no damage to groove for the retaining ring or signs of other damage (deformation, corrosion) are allowed to appear on the clutch shaft.
4. Rinse the shaft seals in the engine oil for 30 minutes at least before installation.
5. Keep the same position of the grease nipple in the cover towards the clutch housing during installation of the assembled unit of the clutch shaft as before removal.
6. Use special tools for removal and installation.

CAUTION:

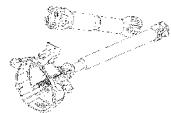
During removal and installation procedures of the clutch shaft, secure that nobody may depress the clutch pedal only at random (from point 3 of removal to point 8 of installation)!

c) Removal Procedure

1. Secure a place enough in front of the vehicle to tilt the cabin.
2. Remove all loose objects from inside the cabin.
3. Unlock and tilt the cabin into the front position
4. Remove the propeller shaft between the clutch and gearbox in accordance with a procedure (See Subchapter 2.5.9).



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5. Slacken and dismount nuts **5** from clutch housing stud bolts **1** and remove spring washers **4**.
6. Hammer the carrier **6** using the brass pin or use the flat chisel fitted between bushing **2** and the clutch housing **1** to loosen the clutch shaft c/w bushing **2** and cover **3**. You can use also the assembling lever for removal.

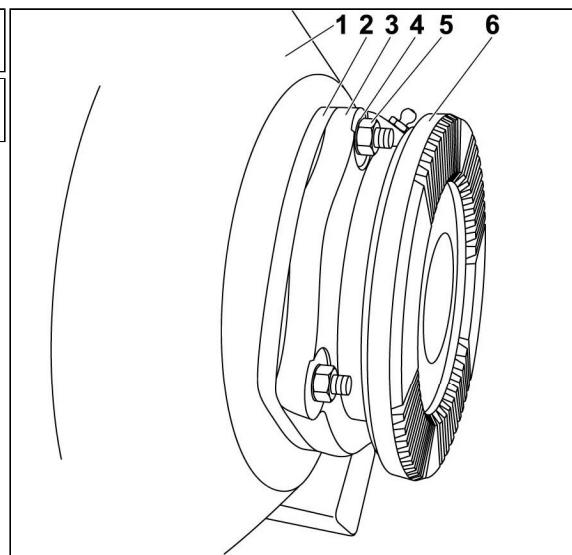
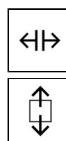


Fig. 2.9 Removal of the rear cover from the clutch housing

7. Remove the clutch shaft **2** c/w bushing **6** and cover **7** from the clutch housing **5**, from the hub **1** of the clutch plate **4** and bearing **3** of the rear part of the crankshaft.

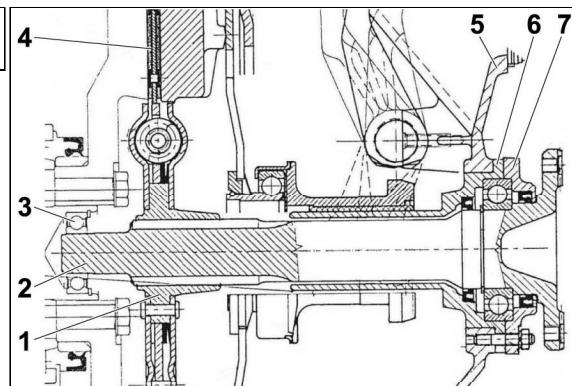
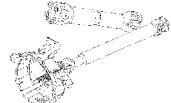


Fig. 2.10 Removal of the clutch shaft



02 Clutch and Propeller Shaft



8. Fit the clutch plate pin **PRM 2326.1**.

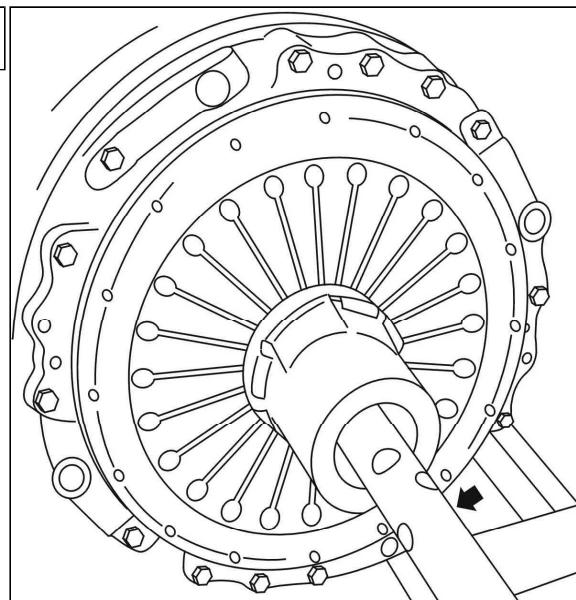


Fig. 2.11 Use of the tool PRM 2326.1

9. Use the flat chisel and hammer to separate the bushing **3** from the cover **5**.
10. Remove the lock ring **2** from the bearing **4** and withdraw the bearing **4** c/w cover **5** from the clutch shaft **7**.
11. Press the bearing **4** out of the cover **5**.
12. Pry shaft seals **1** and **6** out of bushing **3** and cover **5**.
13. Dismount the grease nipple from the cover **5**.

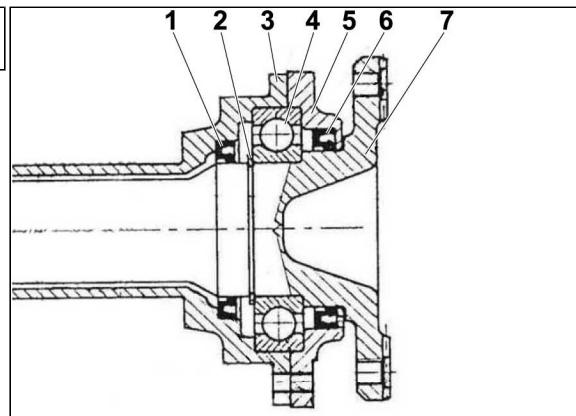
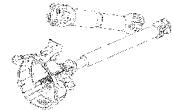


Fig. 2.12 Clutch shaft c/w bushing and cover - disassembly



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d) Installation Procedure

1. Use the tool **PRL 0988.1** to press the shaft sealing **2** into the bushing **1**.

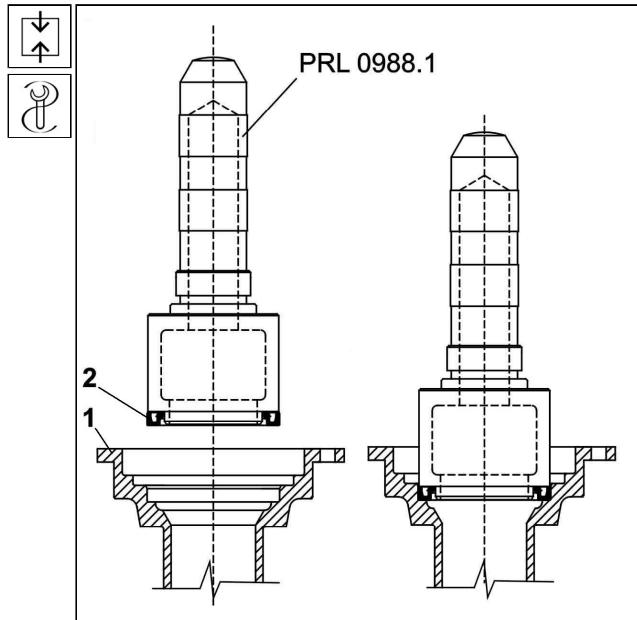


Fig. 2.13 Pressing-in the shaft seal 60x80x8

2. Use the tool **PRM 3116** to press the shaft sealing **1** into the cover **2**.

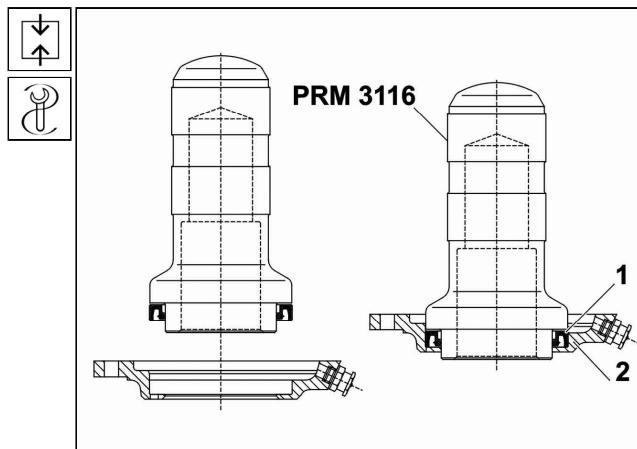
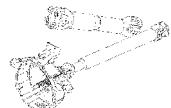


Fig. 2.14 Use of the tool PRM 3116



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3. Install the cover **5** c/w shaft seal **6** on the clutch shaft **7**.
4. Use the tool **PRM 3153** to press the bearing **4** on the clutch shaft **7**.
5. Secure the bearing **4** with the lock ring **2** in position.
6. Apply the sealant to the bearing surface of the bush **3**.
7. Press the clutch shaft **7** c/w bearing **4** into the bush **3**. Keep the position of holes for bolts during installation.

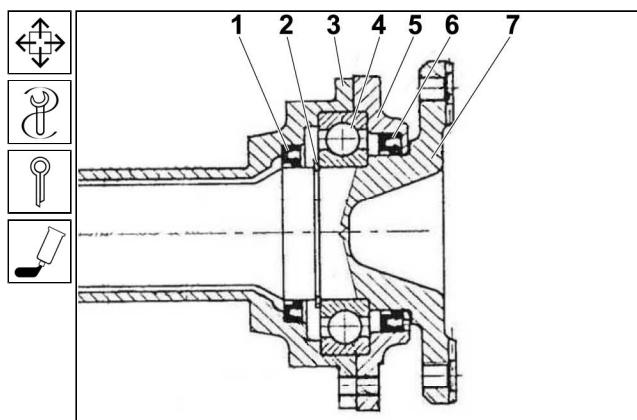


Fig. 2.15 Clutch shaft c/w bushing and cover - assembly

8. Remove the clutch plate mandrel **PRM 2326.1**.

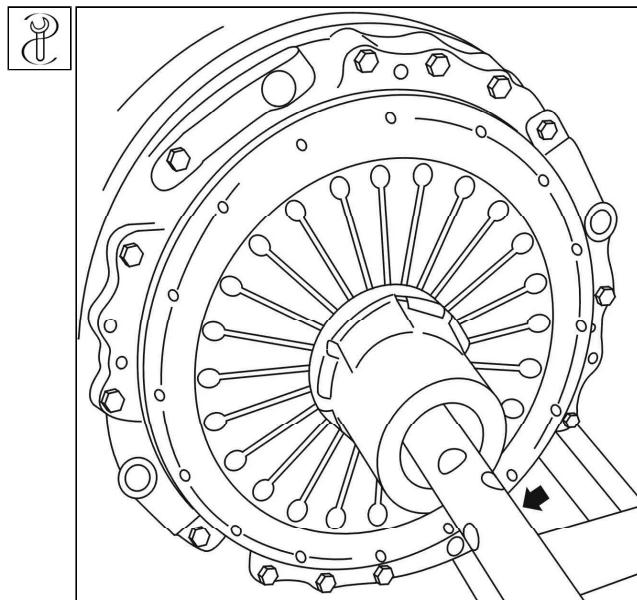
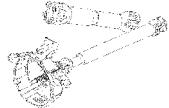


Fig. 2.16 Use of the tool PRM 2326.1



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9. Apply a thin continuous layer of the grease **AK 2** to the outer surface of the bushing **5**, on which the clutch release bearing moves.
10. Apply a thin continuous layer of the paste **Servo grease 'MP'** diluted with the engine oil in ratio 2 : 1, - i.e. 2 proportions of paste, 1 proportion of oil - into splines of the clutch shaft **2**.
11. Apply the sealant to the bearing surface of the bush **5**.
12. Slide the assembled group of the shaft **2** c/w cover **7** and bushing **5** into the clutch release bearing, hub **1** of the clutch plate **4** and bearing **3** of the rear part of crankshaft, position it on stud bolts **12** of the clutch housing **13** (if need be, gently press it through the clutch shaft) and use nuts **10** and spring washers **11** to attach it to the housing. Nuts should be cross-tightened.
13. Mount the grease nipple into the cover **7** and fill about 30% of the space between shaft seals with the grease **AK 2**.
14. Smear the machined areas of grooves and threads of the carrier **9** with the preservative oil.
15. Tilt the vehicle cab into the operating position.
16. start the engine and allow the pneumatic system to pressurize to **800 kPa**. With the engine running, listen if the clutch shaft bearing is not too noisy and check the clutch disengagement for function (function of the clutch release bearing) at the same time.
17. Install the propeller shaft (See Subchapter **2.5.9**) with the engine running, check whether it will stop to rotate during the clutch disengagement.
18. Make a test run with the vehicle.

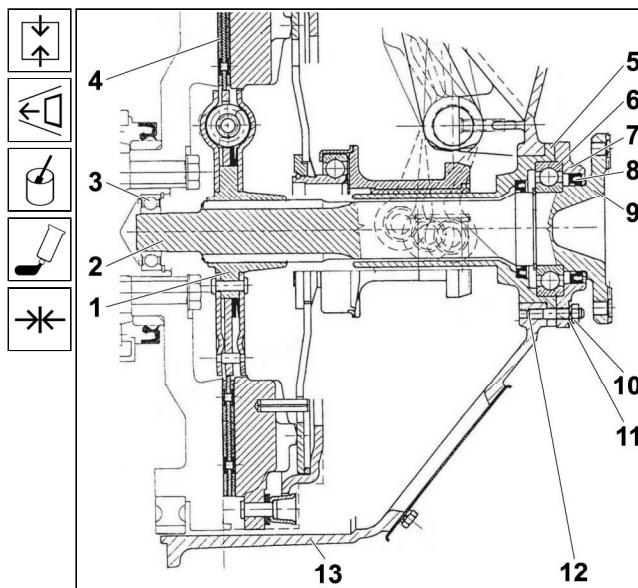
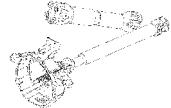


Fig. 2.17 Installation of the clutch shaft



2.5.5 Removal and Installation of the Clutch Master Cylinder

a) Reasons for Removal and Installation

1. The clutch is slipping (the clutch pedal free travel is correct); the malfunction is caused by the fact that the master cylinder piston does not return to the initial position.
2. The fluid level drops in the equalizing reservoir and an evident fluid drop from the clutch master cylinder occurs (a faulty rubber packing, rubbed inside working surface of the clutch master cylinder body).
3. A sudden increase in the clutch pedal free travel without a fluid loss.

b) Technical Conditions

1. Replace split pins, spring washers and sealing rings with new ones.
2. The clutch pedal and the button of the clutch master fluid cylinder must not rub during the motion.
3. No brake fluid is allowed to leak from connections.
4. Top up the brake fluid and bleed the clutch fluid control mechanism after installation.
5. The brake fluid level in the equalizing tank must reach to the pressed-in part on the tank above the upper edge of the metal sheet-fastening sleeve.
6. A free travel of the button after the clutch deaeration must be within 1 ± 0.5 mm.

c) Removal Procedure

1. Unlock, open and lock the cabin bonnet in the open position.
2. Detach the manifold 1 from the equalizing container and drain the brake fluid into a prepared pan.
3. Dismount the manifold 3 from the clutch booster and catch the fluid that spills out into a drain pan prepared.
4. Unscrew screwed connections 4 and remove the clutch master cylinder 2 from vehicle.

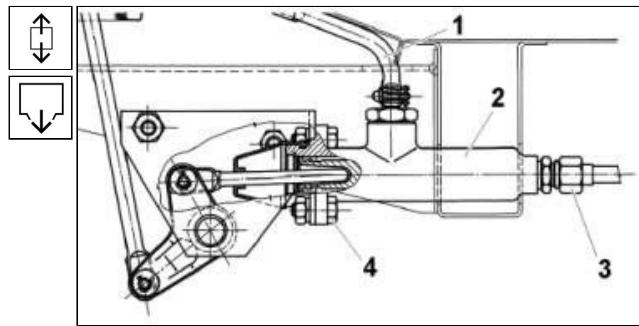


Fig. 2.18 Clutch master cylinder - removal

d) Installation Procedure

1. Install the clutch master cylinder 2 on the button, fit it to the bracket and use screws 4 to attach it.
2. Mount the manifold 3 to the clutch booster and manifold 1 from the equalizing container.
3. Top up the brake fluid into the equalizing container and bleed the clutch control fluid circuit (See Subchapter 2.5.2).
4. Check the button (1 ± 0.5 mm) for a free travel (See Subchapter 2.5.3).
5. Check the hoses and connections for leaks.

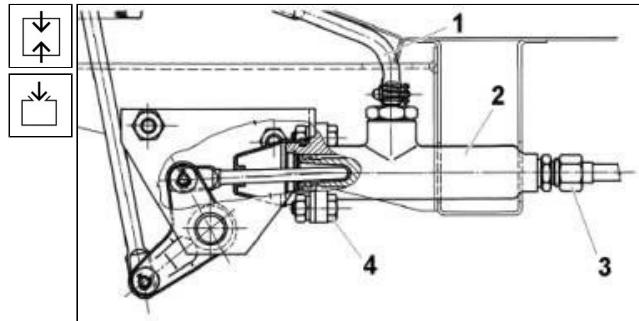
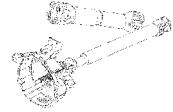


Fig. 2.19 Clutch master cylinder - installation



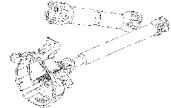
02 Clutch and Propeller Shaft



6. Start the engine and check the clutch release and shifting of H/L gears for function.
7. Shut the cabin bonnet.
8. Road test the vehicle.

Note:

Only the silicone paste **LUKOSAN M 11** may be applied to threads of line connections.



2.5.6 Removal and Installation of the Clutch Booster

a) Reasons for Removal and Installation

1. Stripped thread in the clutch booster body.
2. Rubbed functional areas of the clutch booster.
3. The air gets into a fluid part of the clutch booster continuously, it means that the pneumatic part of the clutch booster is leaky and the air penetrates into a fluid part.
4. After releasing the clutch pedal, the air blow-off does not occur.

b) Technical Conditions

1. Replace the copper (aluminum) sealing rings and spring washers with new ones.
2. The clutch booster thrust pin must engage into a recess in the clutch release lever during reinstallation.
3. Connections must be tightened properly, no air and brake fluid leakage are allowed.
4. Top up the brake fluid and bleed the clutch fluid control mechanism after installation.
5. The brake fluid level in the equalizing tank must reach to the pressed-in part on the tank above the upper edge of the metal sheet-fastening sleeve.
6. A free travel of the clutch master cylinder button must be **$1 \pm 0.5 \text{ mm}$** after the clutch deaeration.

c) Removal Procedure

1. Depress the brake pedal several times to force off the air from the pneumatic system.
2. Disconnect the cable clip 7.
3. Detach the air pressure inlet manifold 2.
4. Dismount the hollow screw 3 to disconnect the hose 4.
5. Disconnect the fluid inlet manifold 1. Mount the technological plug, made e.g. of the blinded neck (Order No 2053651294) to the union nut 1 of the fluid manifold.
6. Dismount the neck 10 c/w sealing ring 9 from the clutch booster 6.
7. Dismount four nuts 5 c/w spring washers fixing the clutch booster 6 to the clutch housing.
8. Withdraw the clutch booster 6 from the clutch housing rearwards.

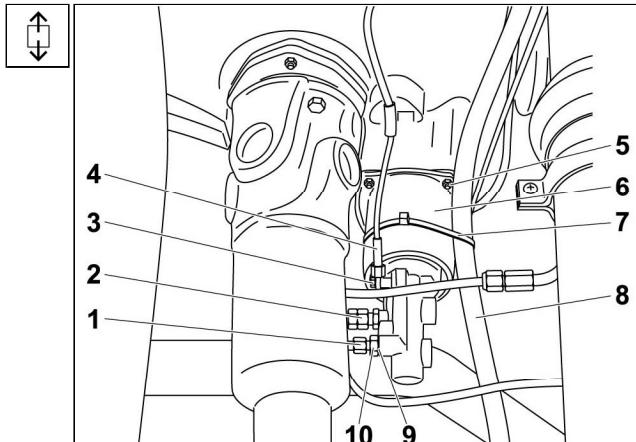
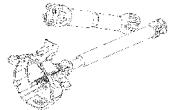


Fig. 2.20 Clutch booster - removal



02 Clutch and Propeller Shaft



d) Installation Procedure

1. In case of installation of a new clutch booster **3**, dismount the bleeding screw **2** from the clutch booster and install the neck **1** into the booster.

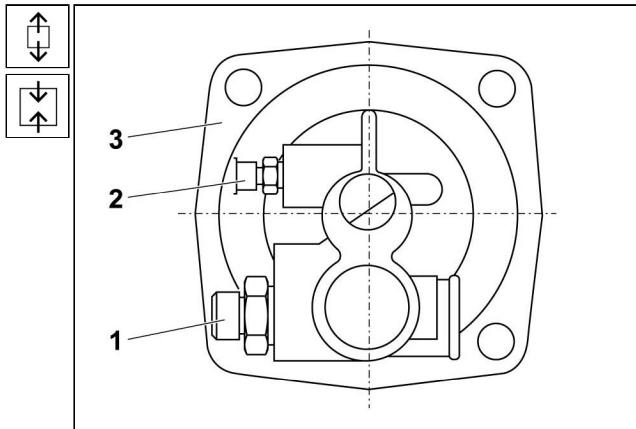


Fig. 2.21 Bleeding screw and booster neck

2. Apply the sealant to the bearing surface of the clutch booster **6**, install the clutch booster on the clutch housing so that its thrust pin would fit into a recess in the clutch release lever – to do so, partially press the booster push-button.
3. Use four nuts **5** c/w spring washers to attach the clutch booster **6** to the clutch housing.
4. Install the neck **10** c/w sealing ring **9** into the clutch booster **6**.
5. Dismount the technological plug and attach the fluid inlet manifold **1**.
6. Mount the hollow screw **3** to attach the bleeding hose **4**.
7. Attach the air pressure inlet manifold **2**.
8. Use the cable clip **7** to fix the fuel manifold **8** to the clutch booster **6**.
9. Top up the brake fluid into the equalizing reservoir and bleed the clutch fluid circuit according to a procedure mentioned in (See Subchapter 2.5.2).
10. Check the clutch button free travel and/or adjust it according to a procedure mentioned in (See Subchapter 2.5.3).
11. Start the engine and pressurize the pneumatic system to **800 kPa (8.0 kg/sq.cm)**.
12. Use the soap water to check the pneumatic part and the pressure air inlet manifold for leakage.
13. Check the clutch booster and the clutch release bearing for function and leakage.
14. Carry out a test run with the vehicle.

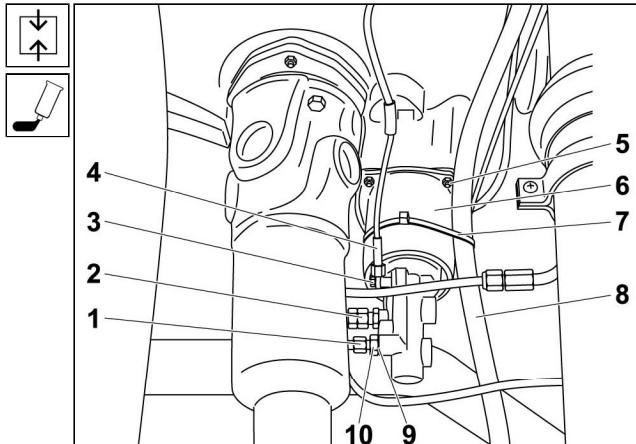
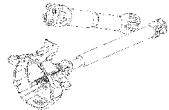


Fig. 2.22 Clutch booster - installation



2.5.7 Removal and Installation of the Clutch Release Bearing

a) Reasons for Removal and Installation

1. The clutch is too noisy during disengagement.
2. Faulty release bearing.

b) Technical Conditions

1. The position of the Belleville spring must be kept.
2. Replace the faulty retaining ring with a new one.
3. Both parts of the release sleeve must be free to rotate without signs of the increased play in the bearing.

c) Removal Procedure

1. Remove the clutch cover c/w release bearing in accordance with a procedure mentioned for the clutch removal (See Subchapter 2.5.8).
2. Remove the retaining ring **2**, thrust ring **3** and withdraw the release bearing (sleeve) **1** from the clutch cover.
3. Remove the pressure Belleville spring **5**.

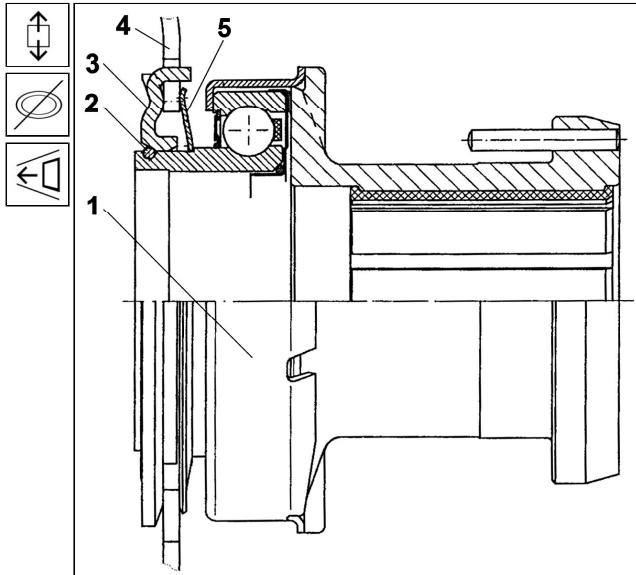
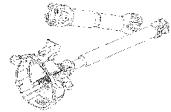


Fig. 2.23 Release bearing - installation



d) Installation Procedure

1. Install the pressure Belleville spring **5** on the release bearing **1**.
2. From outside, install the release bearing **1** c/w pressure Belleville spring **5** on the clutch Belleville spring **4**.
3. From inside, install the release ring with its rounded side on the sleeve towards the Belleville spring of the release mechanism.
4. Depress the sleeve spring and secure the thrust ring with retaining ring **2**, which must fit into a chamfering on the inner diameter of the thrust ring **3**.

Note:

To make the installation of the release bearing easier, you can use the press.

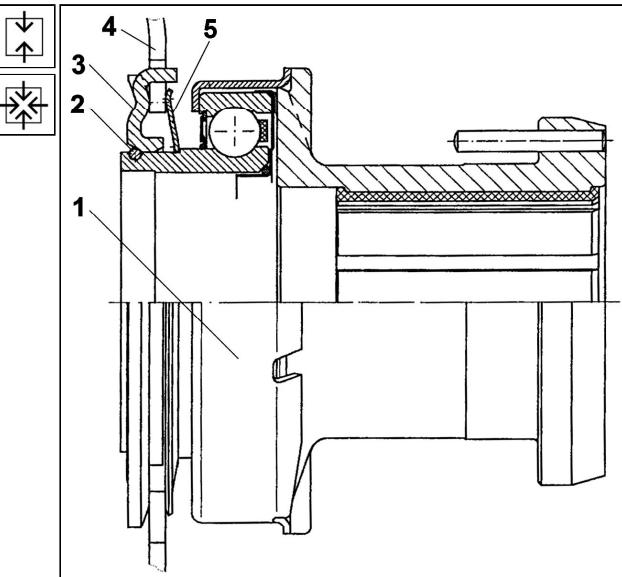
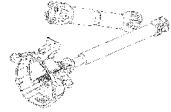


Fig. 2.24 Release bearing

5. Mount the clutch housing cover c/w release bearing in accordance with a procedure mentioned for the clutch installation (See Subchapter **2.5.8**).



2.5.8 Removal and Installation of the Clutch

a) Reasons for Removal and Installation

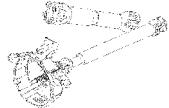
1. The clutch plate wear does not allow a reliable operation (a wear has reached the permissible limit of 18 mm).
2. The clutch is slipping (the clutch pedal free travel is correct). The fault lies in a wear or oil soaking of the clutch plate lining.
3. The clutch does not disengage and the gearbox is noisy during gear shifting (the fluid control is OK). The malfunction lies in a burnt or damaged clutch plate lining, a rubbing on the shaft splining or wear (seizure) of the crankshaft rear pin bearing.
4. The clutch is difficult to disengage and is grabbing. The clutch plate lining has been burnt, the clutch plate has been deformed, the clutch release mechanism has been damaged (thrust plate, return spring or Belleville spring); the shaft clearance, the damaged groove of the retaining ring.
5. The shaft bearings or the clutch release mechanism are too noisy during the clutch disengagement or during the operation.
6. Damaged clutch housing, lever, shaft, bushing or bearing.

b) Technical Conditions

1. Replace shaft seals and spring washers with new ones.
2. The thickness of a new clutch lining must be **3.5 mm**, the orientation dimension of a new clutch driven plate measured across the lining is **11.6 mm**, the clutch lining thickness after wear must be **2.0 mm** at least, the thickness of the clutch plate with a worn lining is **8.6 mm**.
3. The maximum allowable face run-out of the driven plate is **0.4 mm** as a maximum (orientation value).
4. No heated spots and surface cracks are allowed on the clutch thrust plate.
5. The clutch shaft bearing must be free to rotate without signs of the increased play, the clutch shaft must not move axially and no lubricant may leak from the bushing through the shaft seal.
6. The clutch shaft grooves must have no signs of battering in a place of the clutch plate and the clutch plate hub bearing must not show an excessive radial or a tangential clearance on grooves.
7. The friction areas of the thrust plate and the flywheel must be degreased.
8. The sliding surface of the internal bush and the contact surface for clutch lever rollers on the clutch release bearing, clutch shaft splining, outer and inner surfaces of rollers and supporting surface of the lens on the clutch lever must be smeared with the specified lubricant.
9. The bearing surface of the flywheel must have no signs of heated spots or damage. Machine the possible unevenness.
10. A free travel of the push-button after the clutch deaeration must be **1 ± 0.5 mm**.
11. Use the special tools for removal and installation of the clutch.



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c) Removal Procedure

1. Remove the engine c/w clutch in accordance with a procedure mentioned in (See Part 1).
2. Dismount four bolts **1** c/w spring washers and remove the lid **2** from the clutch housing **3**.
3. Dismount the bolt **12** c/w spring washer and remove the clip **11** from the hose **8**.
4. Unscrew union nuts **9** of the hose from the holder **10** and connection **15**.
5. Dismount four nuts **13** c/w spring washers and withdraw the clutch booster **14** from the clutch housing **3**.
6. Dismount three locking and three fastening nuts **6** c/w spring washers fixing the connecting exhaust manifold to the turbocharger bracket **7**.
7. Slacken and dismount four bolts **4** (M 8 x 35) and seven bolts **5** (M 12 x 100) c/w spring washers and washers and withdraw the clutch housing **3** from the flywheel housing.
8. Slide the clutch plate mandrel **PRM 2326.1** through the clutch release bearing and clutch plate splining into the bearing in the crankshaft pin.

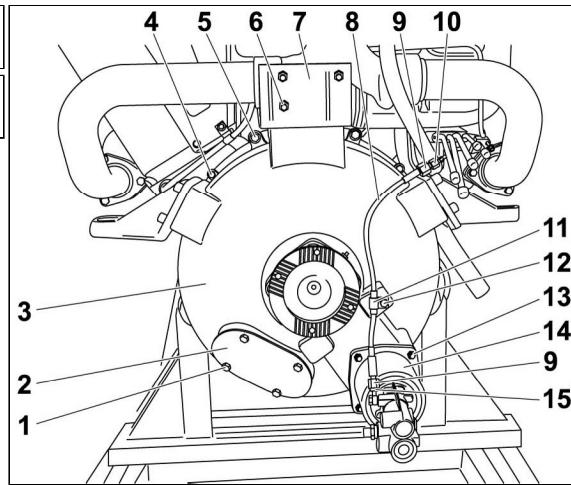


Fig. 2.25 Clutch housing - removal

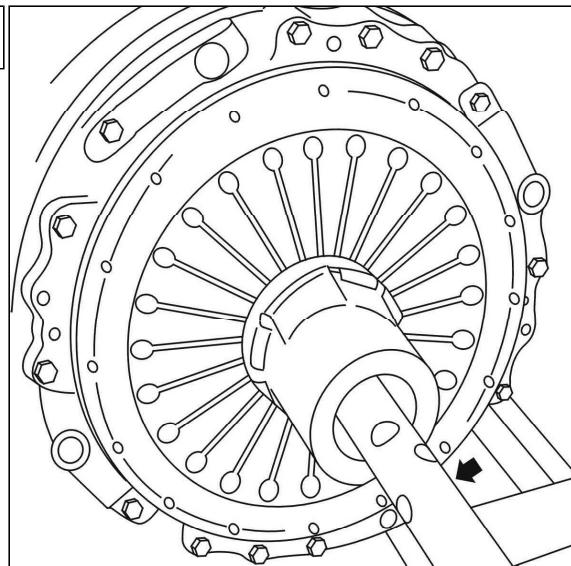
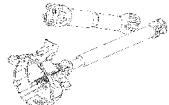


Fig. 2.26 Use of the tool PRM 2326.1 - removal



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9. Slacken and dismount bolts **4** c/w spring washers **3** and washers **2** fixing the clutch cover **5** to the flywheel **1** and mount the modified bolts **M10** (slotted bolts without head) instead.
10. Unscrew the remaining bolts **4** c/w spring washers **3** and washers **2** fixing the clutch cover **5** to the flywheel **1**.
11. Withdraw the clutch cover **5** from the flywheel centering **1**.
12. Remove the clutch plate mandrel **PRM 2326.1** c/w clutch plate from the crankshaft pin bearing and withdraw the clutch plate from the mandrel.

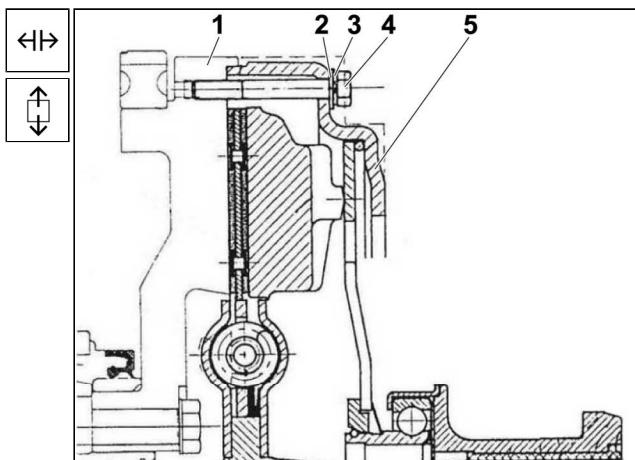


Fig. 2.27 Clutch cover - removal

13. Carry out the inspection of the bearing **3** in the crankshaft pin **2** (clutch shaft thrust bearing in the flywheel **1**). If defective (seized, excessive noise, damaged sealing rings or the radial clearance proved by touch), remove the lock ring **4** and use the universal puller **PRM 3354** c/w universal extractor **PRM 3322** to press out the bearing.

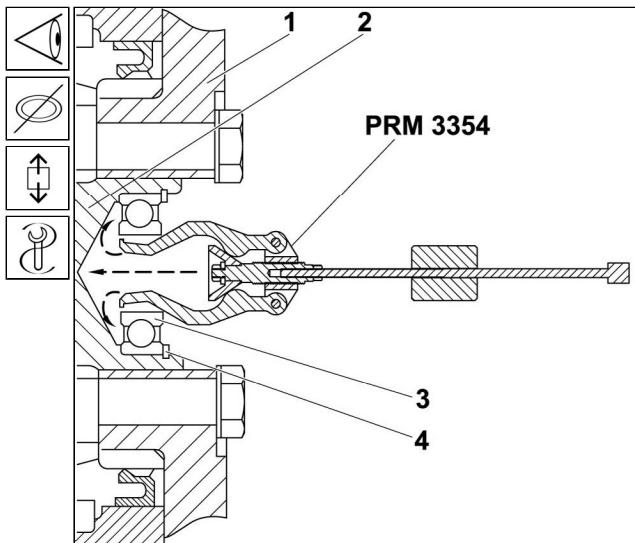
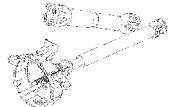


Fig. 2.28 Removal of the clutch shaft bearing



02 Clutch and Propeller Shaft



d) Installation Procedure

1. If removed, use the driver **PRL 0412.1** and pin **PRL 0922** to press the bearing **3** into a rear pin **2** of the crankshaft and secure it with a retaining ring. (See Fig. 2.28).

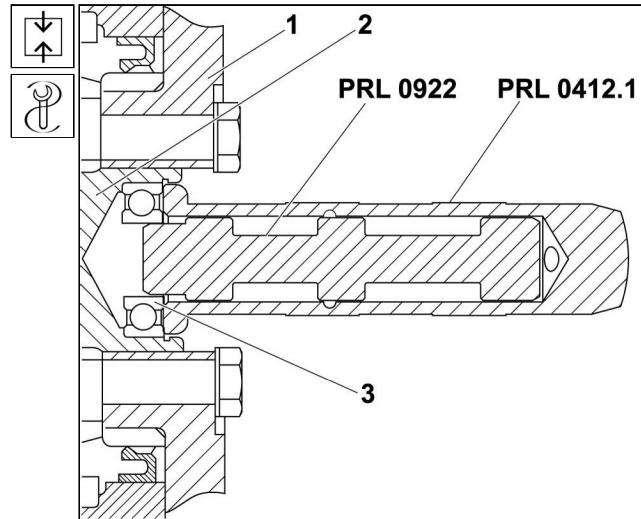


Fig. 2.29 Pressing-in the clutch shaft bearing

2. Clean and degrease the friction areas of the flywheel and clutch thrust plate.
3. Fit the clutch plate on the clutch plate mandrel **PRM 2326.1** and insert the mandrel c/w clutch plate into bearing in the crankshaft pin.

CAUTION:

The plate must be installed facing a shorter part of the hub the flywheel.

4. Fit the clutch cover on the clutch plate mandrel, auxiliary bolts M 10 and into the flywheel centering.

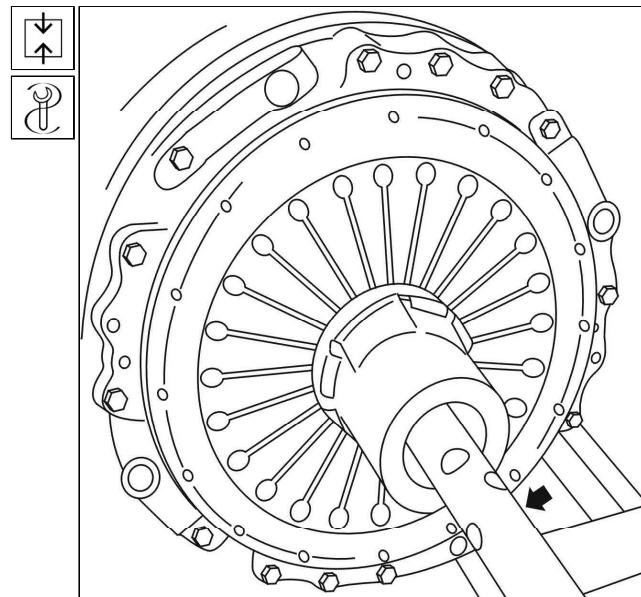
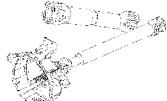


Fig. 2.30 Use of the tool PRM 2326.1 - installation



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5. Dismount auxiliary bolts M 10 and use bolts 4 c/w spring washers 3 and washers 2 to attach the clutch cover 5 to the flywheel 1. Tighten bolts to 34 ± 9 Nm.

CAUTION:

Cross-tighten the bolts and do not tighten them one after another along the circumference.

6. Remove the clutch plate mandrel PRM 2326.1.
7. Set the '0' mark on the flywheel facing the mark on the flywheel housing.

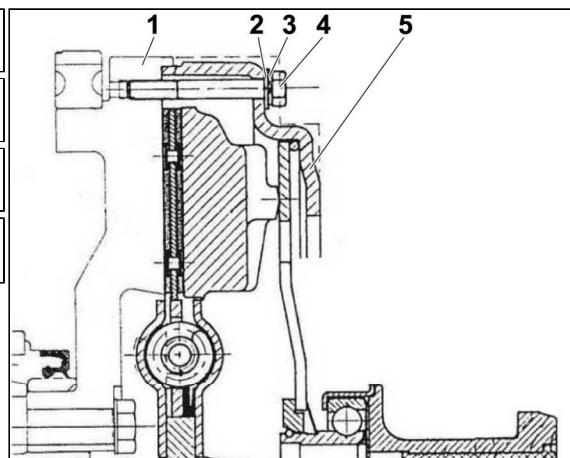


Fig. 2.31 Clutch cover - installation

8. Apply a thin continuous layer of the paste **Servo grease 'MP'** diluted with the engine oil in ratio 2 : 1 - 2 portions of paste, 1 portion of oil - to clutch shaft grooves and to the thrust area of the clutch lever lens.
9. Apply a thin continuous layer of the plastic lubricant to the sliding surface of the clutch release bearing bush and clutch shaft bush.
10. Apply a thin continuous layer of the plastic lubricant to rollers on all surfaces, to neighboring areas on the clutch lever and contact surfaces of rollers on the clutch release bearing.
11. Check whether the '0' mark on the flywheel faces the mark on the flywheel housing.
12. Apply the sealant to the bearing surface of the clutch housing 1.
13. Position the clutch housing 1 into grooves of the clutch plate and fit on the flywheel housing. While installing the housing, pull the clutch lever towards you. Install the arrestment dowel of the clutch release bearing between arms of the clutch lever through the left-hand hole in the clutch housing, place it in a correct position and check whether rollers of the clutch lever rest against the contact surface of the clutch release bearing.
14. Use a hammer to drive the clutch housing 1 in position and symmetrically tighten it using seven bolts 5 (M 12 x 100) c/w spring washers and washers to 58 ± 15 Nm and four bolts 4 (M 8 x 35) c/w spring washers and washers to 17 ± 4 Nm.

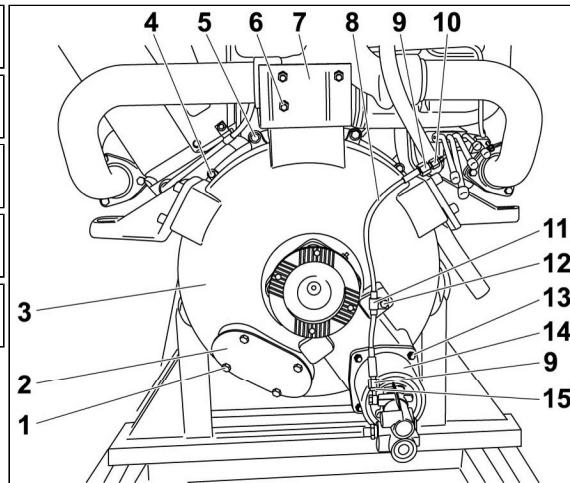
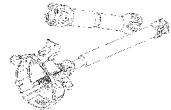


Fig. 2.32 Clutch housing - installation



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15. When the clutch housing needs to be replaced, stamp the mark with the accuracy of $\pm 15'$ (± 1 mm) on the clutch housing 1 facing the mark '0' on the flywheel.
16. Close the hole with a rubber plug 2.

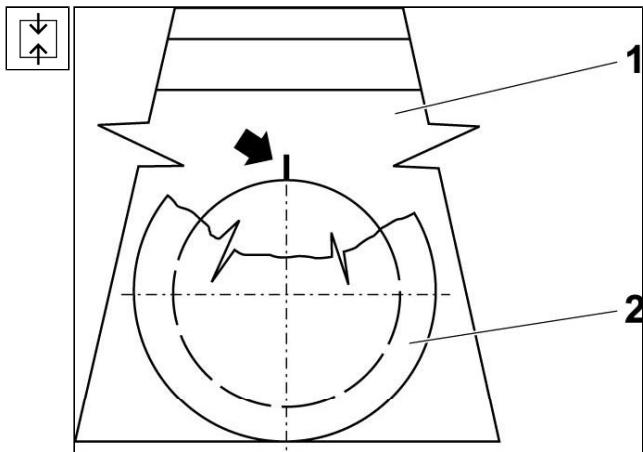
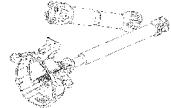


Fig. 2.33 Mark on the clutch housing

17. Use three nuts 6 c/w spring washers and three locking nuts to attach the connecting exhaust manifold to the turbocharger bracket 7 (See Fig. 2.32).
18. Apply the sealant to the bearing surface of the clutch booster 14 , fit the clutch booster on the clutch housing 3 so that its thrust pin fits into a recess in the clutch lever – while doing so, it is necessary to partially compress the booster thrust pin.
19. Use four nuts 13 c/w spring washers to attach the clutch booster 14 to the clutch housing 3.
20. Mount union nuts 9 of the hose 8 on the holder 10 and install the connection 15.
21. Use the clip 11 and screw 12 c/w spring washer to attach the hose 8 to the clutch housing 3.
22. Apply the sealant to the bearing surface of the cover 2 and use four bolts 1 c/w spring washers to fix the cover to the clutch housing 3.
23. Install the engine c/w clutch into the vehicle in accordance with a procedure mentioned in (See Part 1).
24. Carry out a test run with the vehicle.



2.5.9 Removal and Installation of the Propeller Shaft

a) Reasons for Removal and Installation

1. The universal joint has been deformed or broken.
2. The propeller shaft has been bent.
3. The propeller shaft splining has been damaged.
4. Needles, bearing bushes or gaskets have been damaged.
5. The propeller shaft seals have been damaged and the lubricant leaks.
6. Replacement or repair of the clutch.
7. Replacement or repair of the gearbox.

b) Technical Conditions

1. The plastic coat of the movable splining must not be damaged or polluted.
2. The shaft splining must be greased with a specified lubricant, and thus even on new shafts, which were stored for more than 6 months.
3. The installed parts must correspond to the initial pairing.
4. The mutual angle position between the splined hub and the shaft must meet the marking.
5. All bearing surfaces must be cleared of paint rests or corrosion and coated with the preserving oil; to repair possible damage to the surface, grind off or file them.
6. The flange of the slide carrier must be installed on the gearbox flange.

c) Removal Procedure

CAUTION:

A scope of the removal procedure is limited to a replacement of the propeller shaft as a whole only. In extraordinary cases (a necessity of the shaft splining cleaning), a full sliding-out of the movable carrier 3 is allowed. The plastic splining coats, sealing surfaces and spots around universal joint spider bushings must not be cleaned with chemical agents or aggressive solvents.

Only the manufacturer or its authorized repair location can perform a complete propeller shaft removal and repair. The shaft has been balanced dynamically. Should the balance be impaired, a damage to clutch bearings and gearbox can occur.

1. Secure a place enough in front of the vehicle to tilt the cabin.
2. Remove all loose objects from inside the cabin.
3. Unlock and tilt the cabin into the front position.
4. Remove the removable cover above gearbox on the cargo truck platform.
5. Dismount connecting bolts 1 c/w spring washers from flanges of universal joints at the clutch shaft flange and the gearbox flange.

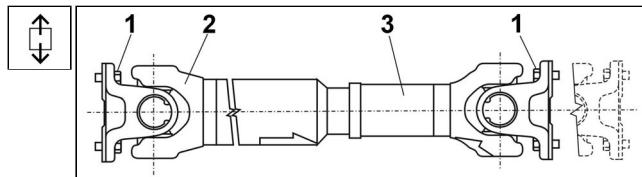
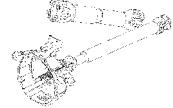


Fig. 2.34 Propeller shaft - removal



02 Clutch and Propeller Shaft



6. Use the lever to move the flanges out of mesh, swing out and remove the propeller shaft.
7. Make sure that a mutual position of both parts is marked visibly (with arrows), if not, mark it properly (non-erasably).
8. If need be, move the movable carrier **3** out of the shaft **2** splining.
9. Should you not intend to carry out the installation immediately, prevent a possible mutual confusion of paired parts with those of other shafts so that you connect them together (using a binding wire) and/or mark them properly.

d) Installation Procedure

1. Lubricate grooves and the carrier hub.
2. Follow the marks (arrows) when connecting both paired parts **2** and **3** of the propeller shaft together.
3. Apply the preserving oil to bearing surfaces of carrier flanges.
4. Use bolts **1** c/w spring washers to attach the propeller shaft to clutch and gearbox carriers flanges with the slide carrier facing the gearbox.
5. Tighten the bolts to the torque of **65** to **85 Nm**.
6. Tilt the vehicle cab into the operating position.
7. Install the removable cover above gearbox on the cargo truck platform.
8. Start the engine and make sure whether the propeller shaft is not running noisy and is rotating properly.
9. Carry out a test run with the vehicle.

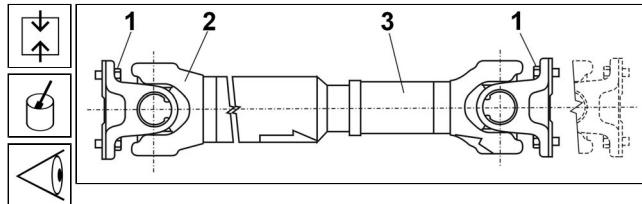
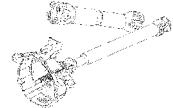


Fig. 2.35 Propeller shaft - installation



2.5.10 Disassembly and Assembly of the Clutch Housing

a) Reasons for Disassembly and Assembly

1. Mechanical damage to the housing.
2. Clutch shaft splining battering.
3. Faulty bearing 6212 A SO.
4. Lubricant leaks from the shaft seal.
5. Axial clearance of the shaft.
6. Damaged groove of the retaining ring.
7. Wear of bushing for the release-bearing sleeve.
8. Damage to the clutch lever; wear of its bushings and rollers.

b) Technical Conditions

1. Replace the shaft seals and spring washers with new ones.
2. The bearing 6212 A SO must be free to rotate without signs of the increased clearance.
3. No battered spots caused by the clutch plate hub, damaged groove for the retaining ring or signs of other damage (deformation, corrosion) are allowed on the clutch shaft.
4. Unilateral wear of the lever and roller bushings is not allowed.
5. The clutch release lever pin must have no signs of wear or corrosion.
6. Rinse the shaft seals in the engine oil for 30 minutes at least before installation.
7. Keep the same position of the grease nipple in the cover towards the clutch housing during installation of the assembled unit of the clutch shaft as before removal.
8. Use special tools for removal and installation.

c) Disassembly Procedure

1. Remove the clutch housing according to the procedure mentioned in: (See Subchapter 2.5.8).
2. Slacken and unscrew nuts **7** c/w spring washers **8** from stud bolts **10** of the clutch housing **2**.
3. Use the tool **PRL 0925** to press the clutch shaft **6** out of the clutch housing **2**.
4. Withdraw the bush **3** from the bearing **9**.
5. Remove the lock ring **11** from the bearing **9**.
6. Withdraw the bearing **9** c/w cover **4** from the clutch shaft **6**.
7. Press the bearing **9** out of the cover **4**.
8. Pry shaft seals **1** and **5** out of the bush **3** and cover **4**.
9. Dismount the grease nipple from the cover **4**.
10. If the clutch housing is replaced, dismount stud bolts **10**.

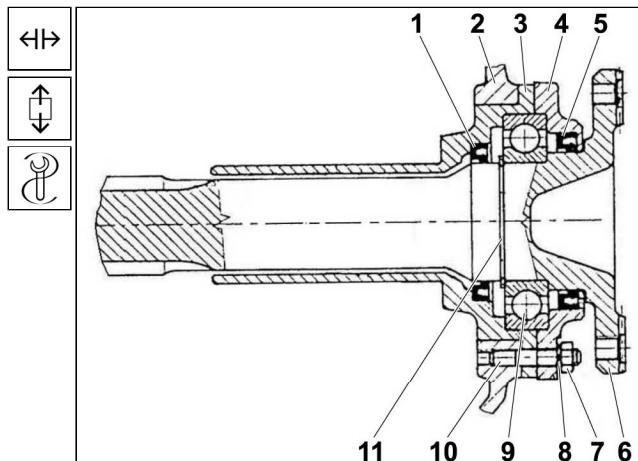
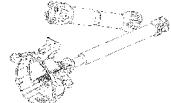


Fig. 2.36 Clutch shaft - removal



02 Clutch and Propeller Shaft



11. Unlock two lock washers **8** and dismount fastening bolts **9** from the pin **7** of the clutch lever **1**.
12. Remove the clutch lever **1** c/w pin **7** from the clutch housing.
13. Remove the pin **7** from the clutch lever **1**.
14. Remove rollers **6** from bushes **4**.
15. Remove rings **5** and bushes **4** from pins **3**.
16. Press the bushings **2** out.
17. Press pins **3** out of both sides of the lever **1**.

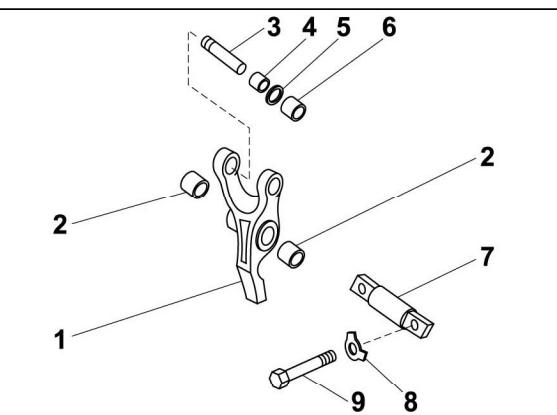
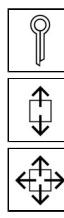


Fig. 2.37 Disassembly of the control lever

18. In case that the clutch housing **1** is replaced, slacken and dismount bolts **8** c/w spring washers **7**, withdraw the left-hand suspension bracket **9** and the right-hand suspension bracket **10** c/w bleeding manifold holder.
19. Remove dowels **11**.
20. Dismount nuts **5**, remove spring washers **4** and withdraw the turbocharger bracket **3**.
21. Dismount stud bolts **2**.
22. Dismount the plug **13** c/w sealing ring **12**.
23. Unscrew four stud bolts **6** fixing the clutch booster.

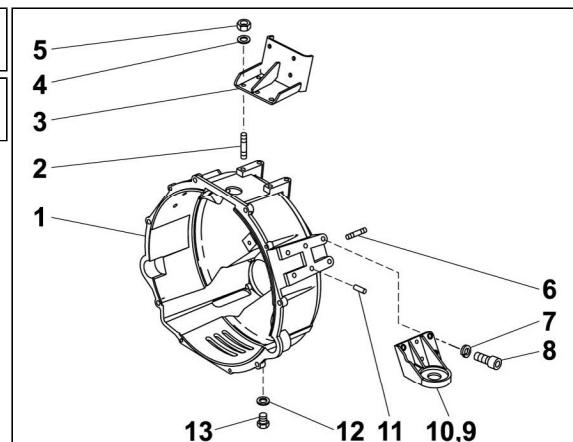


Fig. 2.38 Brackets on the clutch housing - removal

d) Assembly Procedure

1. In case of the clutch housing **1** replacement, mount four stud bolts **6** fixing the clutch booster.
2. Mount the plug **13** c/w sealing ring **12**.
3. Install stud bolts **2**.
4. Fit the turbocharger bracket **3** and attach it using spring washers **4** and nuts **5**.
5. Tap dowels **11** in position.
6. Fit the left-hand suspension bracket **9** and the right-hand suspension bracket **10** onto dowels **11** and attach them using bolts **8** c/w spring washers **7**. Attach the bleeding manifold holder beneath the upper bolt of the right-hand bracket. Tighten bolts to **58 + 15 Nm**.

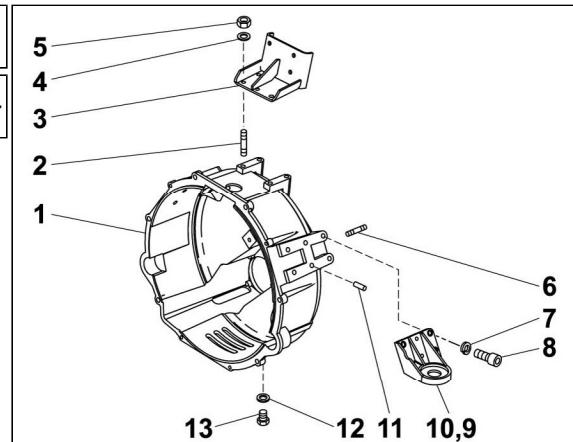
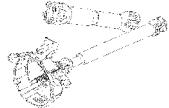


Fig. 2.39 Brackets on the clutch housing - installation



02 Clutch and Propeller Shaft



7. Press pins 1 to the clutch lever 2 to the dimension of $14,5^{+0,2}_{-0,2}$ mm.
8. Check the dimension of $84^{+0,54}_0$ mm.
9. Lock pins 1 with a punch 3x per 120° .

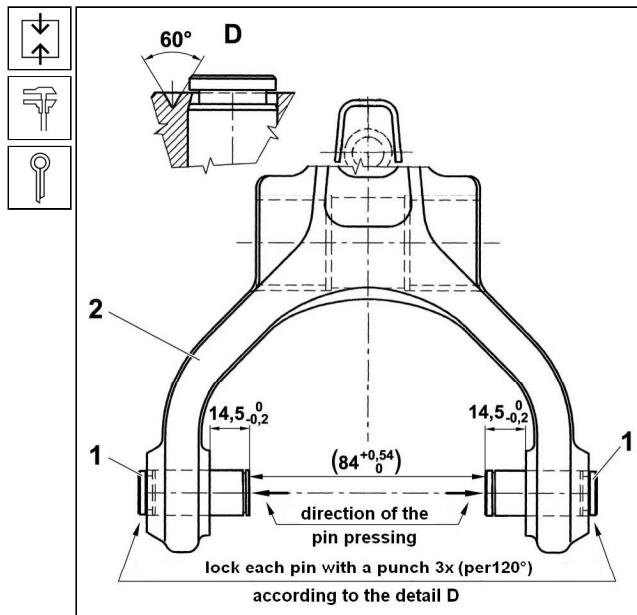


Fig. 2.40 Pressing the pins into the clutch lever

10. Press two bushings 2 into the clutch lever 1.
11. Press bushes 4 to be flush with rollers 6.
12. Fit rollers 6, with the side on which the bush 4 is flush with the roller, on pins 3 and lock them with rings 5.
13. Apply a thin continuous layer of the grease AK 2 to the sliding surface of the pin 7 and guide of bushes 2 and slide the clutch lever 1 onto the pin.
14. Use two bolts 9 c/w lock washers 8 to attach the pin 7 to the clutch housing.
15. Check whether the lever 1 is easy to move and lock it using bolts 9 c/w lock washers 8.

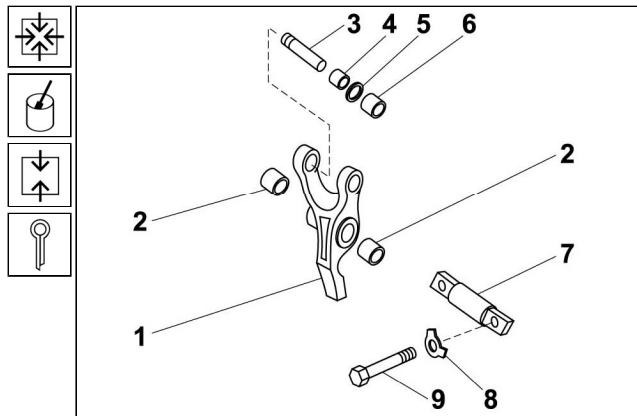
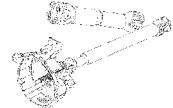


Fig. 2.41 Installation of the control lever



02 Clutch and Propeller Shaft



16. Use the tool **PRL 0988.1** to press the shaft seal **2** into bushing **1**.

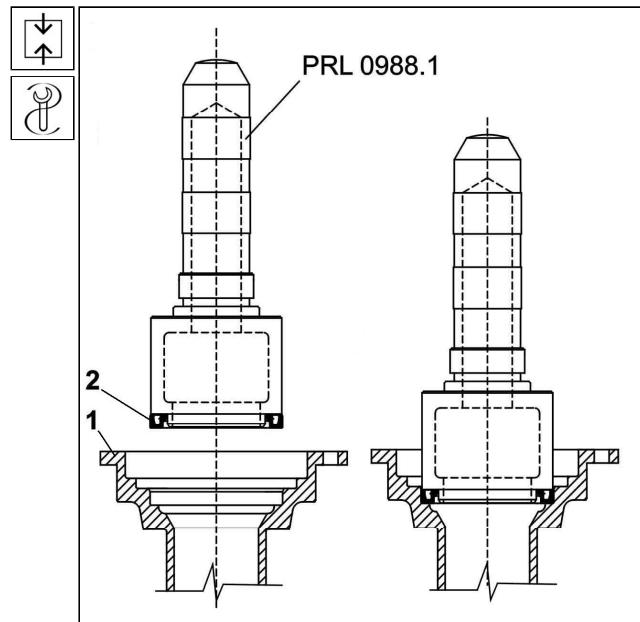


Fig. 2.42 Pressing-in the shaft seal 60x80x8

17. Use the tool **PRM 3116** to press the shaft seal **1** into the cover **2**.

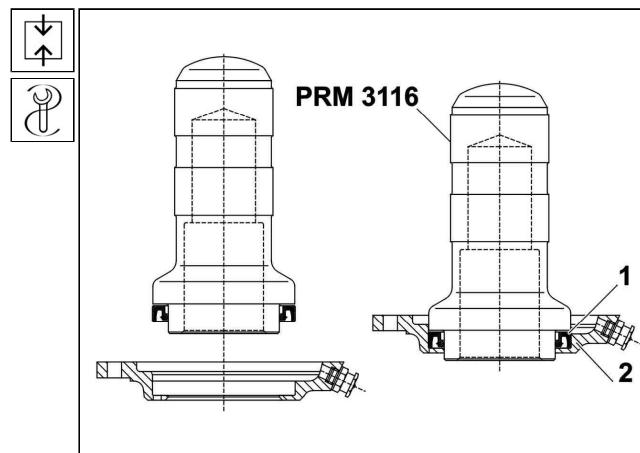
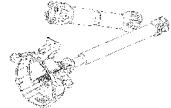


Fig. 2.43 Using of the tool PRM 3116



02 Clutch and Propeller Shaft



18. If the clutch housing **2** requires replacement, mount stud bolts **10**.
19. Fit the cover **4** c/w shaft seal **5** on the clutch shaft **6**.
20. Use the tool **PRM 3153** to press the bearing **9** on the clutch shaft **6** and lock it with the lock ring **11**.
21. Apply the sealant to the bearing surface of the bush **3**.
22. Press the clutch shaft **6** c/w bearing **9** into the bush **3**. Keep the position of holes for bolts during installation.
23. Apply the sealant to the bearing surface of the bush **3**.
24. Slide the assembled unit of the shaft **6** c/w cover **4** and bush **3** onto stud bolts **10** (if need be, slightly hammer it through the clutch shaft) and attach it using nuts **7** c/w spring washers **8** to the clutch housing. Cross-tighten the nuts.
25. Install the grease nipple to the cover **4** and fill about 30% of the space between shaft seals with the grease **AK 2**.
26. Apply the preservative oil to the machined areas of grooves and threads of the clutch shaft carrier **6**.

27. Install the clutch housing in accordance with the procedure mentioned in: (See Subchapter **2.5.8**).

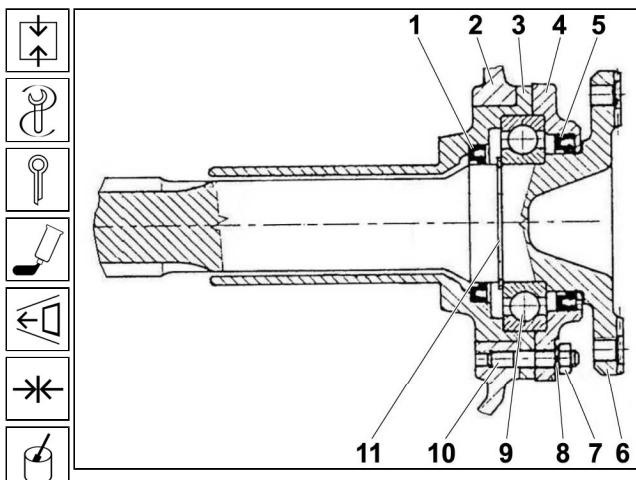
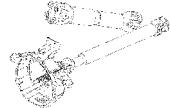


Fig. 2.44 Clutch shaft - installation



2.5.11 Disassembly and Assembly of the Clutch Booster

a) Reasons for Disassembly and Assembly

1. Damaged threads in the clutch booster body.
2. Damaged functional areas of the clutch booster.
3. The air gets into a fluid part of the clutch booster permanently.
4. The pneumatic part of the clutch booster is leaky and the air gets into a fluid part of the clutch booster.

b) Technical Conditions

1. Replace the damaged dust cups, gaskets and sealing rings of the clutch booster and the copper (aluminum) sealing rings and spring washers with new ones.
2. All connections must be tightened properly.
3. Apply a continuous thin layer of the plastic lubricant to the inner surface of the pneumatic cylinder before installation; apply the lubricant also to the seal collar of the pneumatic piston.

c) Disassembly Procedure

Note:

The procedure has been worked out to repair the clutch booster using the repair kit mentioned in the Spare Parts Catalogue.

1. Dismount screws from the cover sheet **9** of the collar and remove the dust cup **10**.
2. Remove the piston **2** c/w push rod **11** and spring **1**.
3. Loosen fastening bolts of the working cylinder in the pneumatic part and separate the working cylinder **6** from the body **3** of the clutch booster, withdraw the air blow-off pipe **7** c/w packing pieces **8**.
4. Remove sealing and spacer rings, dismount the inner retaining ring for the piston-packing piece and remove the packing piece.
5. After removal of the inner retaining ring, remove the hollow drain piece **5** and flap **4**.
6. Remove sealing rings from the hollow drain piece **5**, flap **4** and differential piston.
7. As need be, dismount the pneumatic piston after removal of retaining rings.

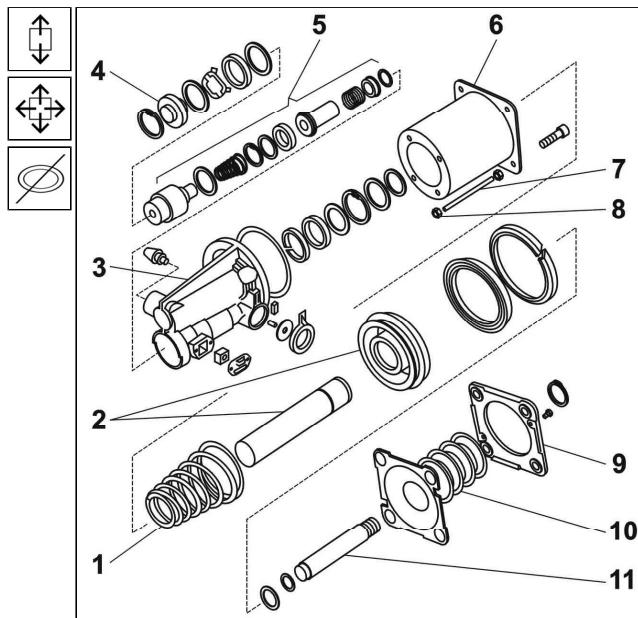
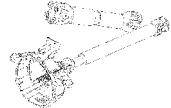


Fig. 2.45 Clutch booster - disassembly



02 Clutch and Propeller Shaft



d) Assembly Procedure

1. Fit sealing rings on the hollow drain piece 5, flap 4 and piston 2.
2. Install the hollow drain piece 5 and flap 4 into the clutch booster body 3 and secure it with a retaining ring.
3. Slide the piston-packing piece into the body and secure it with a retaining ring, fit the spacer and sealing rings.
4. Mount the air blow-off pipe 7 with packing pieces 8 on both ends and install the pneumatic cylinder 6 on the body.
5. Use four screws to attach the pneumatic cylinder 6 to the booster body 3.
6. Install the spring 1 and piston 2 into the pneumatic cylinder 6.
7. Fit the dust cup 10 on cylinder 6 c/w piston 2 and push rod 11. The recess in the packing must point towards a hole for the air blow-off. Mount the dust cup 10 c/w cover sheet 9 to the pneumatic cylinder 6.
8. Use the compressed air from the external source and the soap water to check the pneumatic part of the clutch booster for leakage.

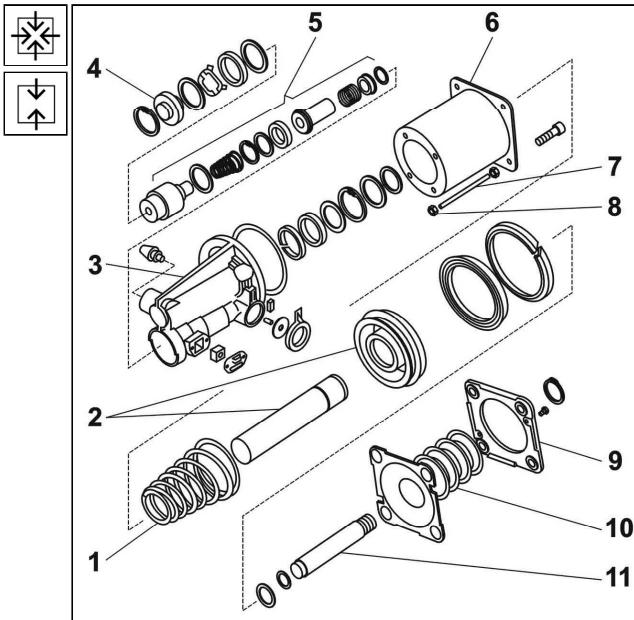


Fig. 2.46 Clutch booster - assembly

