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MAINTENANCE AND REPAIR OF CAR CARDAN SHAFT

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Annotation

General structure of cardan shaft, diagnosis of cardan shafts, technology of maintenance of cardan transmissions, repair of cardan shafts in sequence.

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The function of the cardan transmission is to transmit the torque between the shafts whose axes are not in the same line and their mutual location changes.

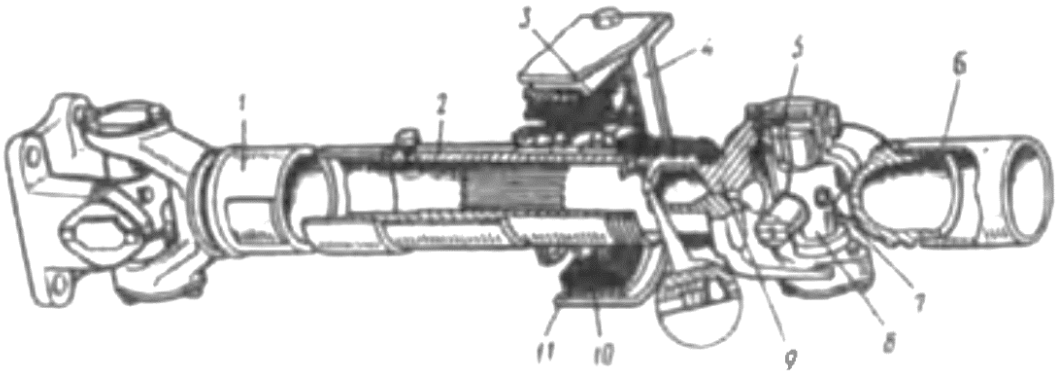

Figure 1. Cardan transmission

Cardan transmission of a car (Fig. 2) consists of intermediate (1) and main (6) cardan shafts connected to each other. The intermediate shaft rests on an intermediate support (3) consisting of a grooved bearing (11) surrounded by a rubber ring (10) with a metal bracket (4). The front end of the intermediate shaft is welded with a fork of the cardan joint, and its second end is made in the form of a slotted bushing (2), into which the slotted end of the cardan joint fork (9) to which the main shaft is connected is inserted. Due to the fact that the intermediate and main cardan shafts are mutually slidingly attached, their total length can be easily changed during the vertical movement of the driving bridges on uneven roads [1].

When diagnosing the propeller shaft, its vibration can be determined by a fixed mechanical indicator. This value should not exceed 1-1.5 mm. Corrosion of connecting bolts and slots of Karadan shaft hinges is determined by visual observation of the relative displacement during turning.

To measure the backlash on the cardan shaft, the handbrake is pulled to the end, and a backlash gauge (Fig. 2) is installed on the fork of the cardan plug connected to the main transmission. The lever of the lift meter is pulled to one side with the received torque, and the graduated disk is brought to the "zero" position by the liquid level. Then, with the same torque, the lever of the backlash is turned in the opposite direction and the backlash is measured. Its value should not exceed 2° [2].

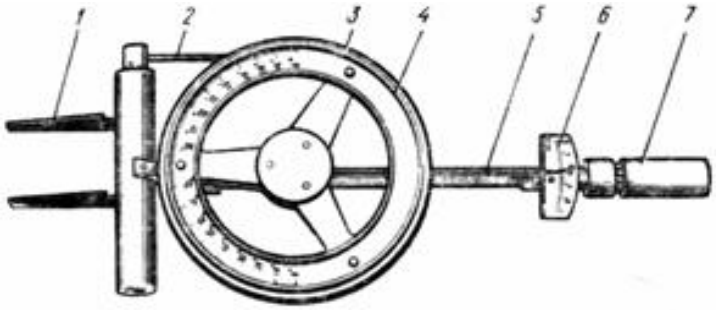

Figure 2. Luftometer model KI-4832.

1-fastening lips; 2-screwdriver; 3-graded disk; 4- semicircular polyethylene tube with colored liquid; 5-arrow; 6-dynamometric handle scale; 7-dynamometric handle

The malfunctions of the cardan transmission include its noisy operation (when the car is moving from one gear to another and the number of revolutions of the crankshaft increases, as well as when the car is braked and then accelerated), it heats up to a temperature above 1000C, it vibrates and so on. The above malfunctions are caused by the corrosion of cardan shaft holes, needle bearing, cross and cardan shaft splined joints, as a result of which the balance of the cardan shaft is disturbed and the impact stress on the needle bearing increases along the axis. Failure of the cardan shaft cross-joint will lead to wear of the needle bearing and retaining pin.

To cardan transmission from technical service (TSK) a diagnosis is made first, for this purpose, by turning the propeller shaft sharply in both directions with the help of a special tool, the backlash is determined. The degree of expansion of the joint of the cardan shaft and the slotted joint is determined by the amount of free rotation of the cardan shaft. After every 8-10 thousand km, the fastening of the cardan shaft flange bolted connections between the gearbox and the rear axle is checked. TSK during this, all the bolts (with a force of 80-10 Nm) securing the propeller shaft flange to the rear axle and the drive shaft of the gearbox are tightened. The needle-shaped bearing 84 of the cardan shaft is lubricated with liquid oil used for lubrication of transmission units (TAp10, TAp-15, TAp-15V, MT-16p) by sending it under pressure from the lubrication valve of the crosshead (until the oil comes out of the protection valve). Thick oils of slotted joints (US-1 and USS-1) are sent by pressure.

Cardan transmissions are checked at TSK while the car is moving. In this case, extraneous noises and knocks should not be observed when the order of torque transmission in the transmission changes from traction to braking or vice versa [2-3].

In the maintenance of cardan transmissions, the tightness of the flanges of the cardan joint is checked and tightened. During maintenance, bearings of cardan joints and splined joints of shafts are lubricated. No. 158, US-1 and other lubricants are used for this.

Cardan joints of passenger cars are lubricated with transmission oil, Litol-24, plastic lubricant or other materials according to the manufacturer's instructions. The oil is injected into the cardan crossbones using a special syringe. It is sent until the oil leaks past the transfer valve or under the bearing shells. If the car is equipped with snow joints that are not intended for oil filling, lubrication is carried out only when the parts are disassembled [4].

The oil level in the drive axle crankcase is checked at the 2nd TSK and filled to the edge of the oil filler hole. A complete oil change is carried out in accordance with the lubrication map and when the working season changes. The process of changing the oil in the drive axle crankcase is also performed on the basis of the technology adopted for other units of the transmission.

In order to maintain the balance of the propeller shaft starter removed from the car during the repair of the propeller shafts, it is necessary to mark with the help of paint the parts of the mutual location of the separating parts. During the repair, it is checked that the slots of the cardan shafts are not eaten. To check the drive shafts for knocking, they are mounted on a special device and rotated and checked using an indicator (Fig. 3).

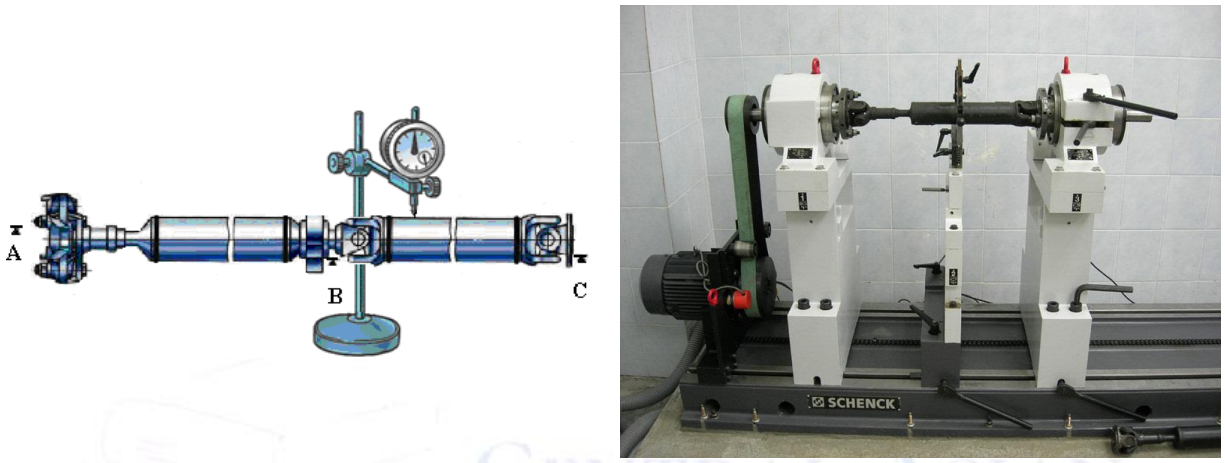

Figure 3. Cardan shaft beat check.

According to the standards, the amount of impact at a distance of 70 mm from the edge of the welded seams should be 0.55 mm, 0.35 mm in the center of the groove, 0.1 mm on the outer diameter of the front shaft slot. When parts of cardan hinges are replaced, it should be possible to move the crosspiece slightly along the axis, 0.01 - 0.04 mm. For this, the thickness is 1.53; 1.56; 1.59; 1.62 mm. fastening rings are used during assembly [2-4].

If parts of the cardan transmission are replaced during repair, it is required to balance it. Dynamic balancing of cardan shafts in the assembled state is performed on a special device (Fig. 3). At a frequency of 5500 rev/min, the maximum permissible unbalance in A, V, S supports should not exceed 1.75 Nm, and 2.2 Nm when checking the state of balance. Elimination of imbalance is eliminated by welding metal plates to the pipe [4].

One of the directions of the development of the structure of the cardan transmissions is to meet the requirements of increasing their durability and service life. For this reason, attention is being paid to the development of constructions with single-lubrication, high-performance compressors. Currently, great attention is being paid to the development of a new type of oil (containing disulfide molybdenum). This type of lubricant is more suitable for the working conditions of snow gears [3].

In recent years, tubular propeller shafts made of a composite of glass plastic and coal plastic materials have begun to be used. The density of composite materials is four times lower than the density of steel, and they are not inferior to it in terms of hardness.

With the increase in the power of vehicles and the speed of travel, high requirements are placed on the precise preparation of the drive gears and the quality of balancing.

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