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URAL-4320M TRUCK
and its Modifications



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URAL-4320M TRUCK
and its Modifications

Operation Manual
4320M-3902035-10 РЭ
(2nd edition, amended)

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The Manual is dedicated for drivers and motor transport workers connected with Ural tucks operation. The Manual gives technical specifications of the trucks, short description of their construction and operation of truck components, their adjustment and maintenance, reference data.

Due to constant modernisation of the product improving its reliability and operation conditions, the construction may be partially amended, and such amendments are not included in this Manual.

When operating URAL truckswith 4x4, 6x6 wheel arrangement and its modification with “Euro-4” engines and pneumatic brake system drive the following should be used:

Operation Manual “Ural-4320M trucks and its Modifications”;

Operation Manual “YAMZ-536, YAMZ-5362, YAMZ-5362, YAMZ-5363, YAMZ-5364 Engines”

Operation Manual for ZF 9S 1310 Gearbox (for power units with ZF gearbox);

Operation Manual for YAMZ-0905 Gearbox (for power units with YAMZ-0905 gearbox);

Operation Manual for YAMZ-1105 Gearbox (for power units with YAMZ-1105 gearbox);

Operation Manual for 9JS135TA Gearbox (for power units with FAST GEAR gearbox).

Operation Manual for the Engine Starting Heater;

Operation Manual (Instruction) for “Lead-acid, starter Storage Batteries”)

Installation and Operation Manual for Drawbar Coupling;

Operation Manual “URAL 73.3801-01 Combination of Devices” АДИГ.453895.012РЭ Элара.

The Tachograph Installation and Operation Manual.

In the second edition of the Operation Manual amendments relating to the tachograph installation (Chapter “Control Tools and Devices”); regulation of transfer box (Chapter “Transmission” paragraph “Transfer Box”); maintenance intervals (Chapter “Maintenance”, paragraphs “List of Trucks Maintenance Operations”, “Lubricants and Hydraulic Fluids Charts”) are made.

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Introduction

Modernized URAL trucks with 4x4 and 6x6 wheel arrangement and YAMZ-536 engine (emission class 4) are dedicated for cargo transportation (except hazardous cargo), people transportation and trailing on any kinds of roads and terrain.

URAL trucks are designed for operation at air temperatures from minus 45 to plus 50 °C (short time operation up to minus 50 °C is possible).

URAL trucks comply with TS 37.165.392-2011 requirements: “URAL trucks with 4x4 and 6x6 wheel arrangement and YAMZ-536 engine”.

First overhaul period at first operation category according to “The Regulation for Maintenance and Overhaul of Automobile Vehicles” (if all the rules specified in the Operation Manual are observed) should be at least 350 000 km.

During the said period separate units and devices with run predetermined renewal mileage, as well as bought-in components lifetime of which is less than the truck life according to technical documents and standards of the supplier can be replaced.

Product lifetime is 10 years minimum.

Trucks and chassis are manufactured in various configurations for design variants and components nomenclature.

The trucks are dedicated for operation with trailers having pneumatic transmissions according to GOST R 50023-92 and electric transmissions according to GOST 9200-76 (design variant II), pneumatic transmission of braking system, brake systems according to the United Nations Economic Commission for Europe No. 13-10, gross vehicle weight according to technical specifications of the truck, towing hitch:

- semi-trailers - fifth-wheel king pin type A according to GOST 12017-81 equal to 50.8 mm, and connecting dimensions according to GOST 12105-74 for fifth-wheel rated load over 83.3 kN (8.5 tf);
- trailers - trailer hitch (drawbar eye) should comply with D50 class according to GOST R 41.55-2005 (for antibacklash tow unit), basic eye dimensions should comply with GOST R 41.55-2005 and ISO 1102-75. **Application of other dimension eyes is forbidden.**

CAUTION! It is strictly forbidden to use toroidal drawbar eyes of L class according to GOST R 41.55-2005.

On customer’s request it is possible to install “hook-eye” drawbar couplings (delivered as spare parts for Ural trucks) for operation with trailers according to GOST 2349-75, standard size 3. Trailer hitch (drawbar eye) must comply with GOST 2349-75.

Basic trailer model is 82Б (2ПН-4М).

Installation of various equipment and devices to the truck and its chassis is allowed on approval with the Design Engineering Centre of the plant. If otherwise, the customer will have no right to claim early breakage of truck parts.

URAL trucksare not dedicated for hazardous cargo transportation without additional adaptation.

Ural truck and chassis are marked according to technical regulation of wheel vehicle safety.

Manufacturer’s tables are installed on the right panel of cab side, in lower part. The manufacturer’s table has the following information:

- Trade mark of the manufacturer;
- Identification number;
- Modification;
- gross vehicle weight rating;
- gross axle weight rating;
- gross road-train weight rating;
- gross fifth-wheel coupling load rating;
- Approval number of vehicle type (approval of chassis type).

Identification number is marked on the right frame girder in rear part.

Vehicle identification number structure and contents:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
X	1	P	*	*	*	*	*	*	*	*	*	*	*	*	*	*

*Variable information

Pos. 1-3: **X1P** - manufacturer's international identification code (WMI) - OJSC “The Automobile Plant “Ural”

Pos. 4-9: type and modification identification:

432000 is for 4320-?-7?

43203? is for 43203-1151-71,

432060 is for 43206-?11-71,

442020 is for 44202-0?11-7?,

555700 is for 5557-?-7?

555710 is for 55571-???1-7?

Pos. 10: Manufacturing year code

Pos. 11-17: Vehicle plant number

Figures used for identifying manufacturing year:

B - 2011, C - 2012, D - 2013, E - 2014.

Cab and engine are marked as components according to OST 37.001.269-96.

Cab as a vehicle component is marked on the right side as viewed in the direction of vehicle motion in the lower part of the door opening. The marking includes 14 signs.

Information on the engine marking is given in the Operation Manual for “YAMZ-536, YAMZ-5361, YAMZ-5362, YAMZ-5363, YAMZ-5364 Engines”.

The table with the conformity mark is located close to the manufacturer’s plate.

1. Safety and Warning Requirements

1.1 Safety Requirements

1.1.1 Before starting operation check the truck and its drawbars proper functioning.

1.1.2 **When driving a truck, the driver and the passengers must fasten safety belts.**

1.1.3 Do not start the truck engine without ensuring that the truck is put in neutral.

1.1.4 Maintain and repair the truck on a horizontal platform. Brake the truck with the parking brake, select first gear in the gearbox, switch off storage batteries.

1.1.5 Keep the engine and engine starting heater clean and properly functioning, avoid fuel and oil leakage: it can cause fire. Do not leave the truck unattended when the engine starting heater is in operation.

1.1.6 The engine starting heater must be switched off when fuelling the truck.

1.1.7 It is forbidden to heat the engine in closed rooms with poor ventilation.

1.1.8 Cooling (low-freezing) and hydraulic fluids are poisonous, and should be handled with care.

1.1.9 To climb and go down the truck bumper use the running board, central and the extreme left (as viewed in the direction of vehicle motion) grille fins having bushes on the internal part, as shown in figure 1.

1.1.10 When servicing the engine, fix the hood lift with safety hook 1 as shown in figure 2.

1.1.11 Before dismantling a wheel put additional blocks under the wheels of another axle that won't be lifted to avoid truck rolling. Unfasten wheel nuts, jack up the wheel or hoist it with any other lifting device.

To jack up the front axle put the jack head into the spring clip bed, to jack up the rear bogie put the jack head under the spring mountain bracket.

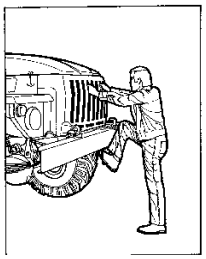
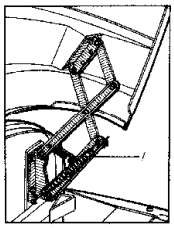


Figure 1 - Method of Using the Running Board and Grille Fins When Climbing and Going Down the Bumper



1-Safety hook

Figure 2 - Hood lift protector

1.1.12 It's forbidden to dismantle a truck wheel without preliminary tire deflating.

1.1.13 It is forbidden to install the assembled wheel with deflated tire and to inflate it with tire inflation system.

1.1.14 **The plant warns on strict compliance with safety rules at tire fitting (see paragraph** "**Wheels and Tires**"**).**

1.1.15 When lowering the rear wheel, keep away from the carrier tilting bracket operation zone.

1.1.16 Do not take out the key from the ignition switch before the truck is completely stopped, as it can lead to loss of vehicle control due to blocking the steering shaft by the anti-theft device.

1.1.17 The truck cannot be operated without snap ring of the lock, and storage batteries container cover butterfly nut*.

1.1.18 To avoid storage batteries drop when maintaining them on the truck, the batteries must be forwarded from the container to the container flap ensuring their secure fixation in the horizontal position*.

1.1.19 In case of skin exposure to battery fluid, wash the exposed skin with water during 5-10 minutes and sprinkle with 10% water ammonia spirit and then with diluted soda solution.

1.1.20 Check the condition of wire insulation from "+" terminal of the storage battery to the stator: insulation damage can cause fire.

1.1.21 Welding must be done with compliance with fire safety rules. When using electric welding, switch off the wires from the alternator, storage batteries and electronic control units, protect plastic pipes and fuel pipes form damage. Connect the general wire of the welding machine close to the weld area excluding current flow through bearings and friction pairs.

1.1.22 When grade climbing, choose the correct speed in advance.

1.1.23 When transporting passengers, lock the right cab door by turning the handle down.

1.1.24 Couple and disconnect the trailer (semi-trailer) on an even horizontal platform.

1.1.25 When operating the winch:

- do not stay under the carried load and close to pulled rope;
- do not bend and tie the rope, it can lead to its damage and breakage. When pulling the rope over a road, establish security and put access prohibitory signs.

1.1.26 When operating the autonomous heating unit it is forbidden to:

- sleep in the cab with the autonomous heating unit in operation;
- operate the heating unit with completely or partially closed intake and exhaust pipes;
- start and operate oiled heating unit;
- fuel the truck with the heat unit in operation;
- leave the heating unit unattended;
- operate the heating unit without gas outlet pipe.

When operating the heating unit remember that careless operation of the unit as well as its failures can cause fire and exhaust gas poisoning.

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* for conventional cab trucks

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1.2 Warnings

Normal truck operation and its long life can be only ensured, if complying with all the recommendations described herein.

1.2.1 Before operating the truck read the paragraphs “CAUTION”, “SAFETY REQUIREMENTS” and “ENGINE START, OPERATION AND STOP” of the Operation Manual for the engine.

1.2.2 To avoid air in the feed system, do not burn out the fuel tank.

1.2.3 To empty the engine cooling system completely, put the truck horizontally or with forward tilt.

1.2.4 Empty the coolant from the engine cooling system through the inlet pipe of the water pump when the cab heater valve is open and the radiator caps are open.

1.2.5 The truck is equipped with the automatic engine starting heater. For safety reasons oil is not heated in the oil reservoir. To avoid oil starvation when starting the engine at low temperatures, strictly comply with the recommendations of using engine oils described in the Operation Manual for “YAMZ-536, YAMZ-5361, YAMZ-5362, YAMZ-5363, YAMZ-5364 Engines”.

1.2.6 When driving the truck from the tracing rut, do not keep the truck with the steering wheel in its extreme position, as it can lead to oil overheating in the steer hydraulic system, and, consequently, to pump breakage.

For the same reason in case of engine power take off when operating in steady-state conditions, release the steering shaft load by turning the steering wheel until backlash.

Set the steering stem to the neutral position according to the following procedure:

- with the engine on, turn the front wheels to the extreme right or left position and release the steering wheel;
- stop the engine;
- when the front wheels partially return automatically, set the steering wheel in the middle within the backlash at the existing wheel position.

After the actions described above the engine can be started and operating in steady-state conditions can be started.

1.2.7 Select first gear to move the truck from a standstill. Reducing transmission “C” of ZF9S 1310 TO, 9JS135TA gearboxes can be used at manoeuvring at 10 km/h maximum. Do not use “C” transmission to climb a slope. Do not move the truck from a standstill by fierce release of the clutch pedal.

1.2.8 Before moving air pressure in the brake system must be 440 kPa (4.7 kgf/cm^2) at least. If low pressure indicator of the brake circuit is on, eliminate defects before moving.

1.2.9 When operating the truck in off-road (sandy, dirty roads and etc.) check the condition of the brakes and change brake pads on time.

1.2.10 Before moving check the operation of indicator lamps according to figures 25 and 29.

1.2.11 It’s forbidden to operate a dropside truck with the tail gate lowered, as it covers the rear signalling lights in such a position.

1.2.12 Use the cross-axle differential lock only in the conditions specified in paragraph “Truck Driving”.

1.2.13 Differential locks must be switched on and off only when the truck is completely stopped. If the lock is not actuated, move the truck from a standstill smoothly and move with maximal speed of 5 km/h until the lock is actuated, switching the differential lock on.

1.2.14 If the cross-axle differential lock is on, move straight line with maximal speed of 20 km/h.

1.2.15 If the engine hasn't started or has faded by any reason, turn the key to the initial vertical position and switch on the stator again in 1-2 minutes.

1.2.16 Remember that frequent engine start-ups and short operation will lead to quick storage batteries discharge.

1.2.17 It’s forbidden to move the truck by the stator, as it can cause stator breakage and quick storage batteries discharge.

1.2.17 To avoid alternator breakage, connect the stator wire to the “positive” terminal of the storage battery, and storage battery switch wire to the “negative” terminal.

1.2.19 Connect wires to the alternator and voltage regulator according to the marking.

1.2.20 Before removing the alternator from the engine switch off the storage batteries.

1.2.21 During long-term truck parking switch off the storage batteries by button 39 of the switch shown in figure 25 and by button 7 of the switch shown in figure 32.

1.2.22 When starting the engine from an external power source switch on the storage batteries. It’s forbidden to use a d.c. power supply with parameters exceeding 24V at 0 (zero) A and 18.3V at 1000 A, or storage batteries having rated storage capacity varying more than ± 20 Ah from 190 A.

1.2.23 If the seals are removed from the speedometer or any devices assembly, as well as from speedometer sensor during the guarantee period without the manufacturer’s approval, the customer will have no right to claim.

1.2.24 At the air temperature lower than minus 25°C it is allowed to use additional power takeoff after a short run only (approximately 15 km) or oil warm-up in the transfer box by any other method, e.g. by hot air application.

1.2.25 During the truck movement wheel valves of the tire pressure control system should be open. Close the wheel valves at long-term parking. At the air temperature lower than minus 35 °C open the wheel valves in 15-20 km after movement start. After opening the wheel valves air the tire pressure control system with tire air (see the paragraph “Tire Pressure Control System”).

1.2.26 When towing, switch the transfer box to neutral to avoid the gearbox breakage. Towing can be done with 50 km/h maximal speed.

1.2.27 When manoeuvring (especially reverse manoeuvring), avoid wide articulation angle of the road-train not to damage the towing device.

1.2.28 When using a trailer at the air temperature lower than minus 25 °C and before long-term parking do not leave the rubber buffer of the towing device loaded to avoid the compressed rubber buffer freezing and axial play in the towing device. When moving the truck forward and backward, uncouple the trailer or unload the rubber buffer.

1.2.29 If a front loader having gross vehicle weight more than 3200 kg is entering the truck platform, put boards (panels) under its wheels.

1.2.30 Heavy small-size cargoes that can cause local platform bend or damage the sides and seat parts must be put on sleepers (panels) and fixed securely. Place the cargo in a way to centre its weight on the platform at the front side.

1.2.31 If compressed air leaked completely after a long-term parking or due to excess air leakage, and the gearbox is put in a gear, release the gear (put in neutral) before starting the engine. By turning the engine shaft right and left 180° in a way described in the paragraph “Regulation of Valve Control Component” of the Operation Manual for the engine, or by filling the pneumatic system with compressed air from the auxiliary truck through the towing valve, release the clutch.

1.2.32 Transportation of a cargo or trailer (vehicle) towing exceeding maximal allowable weights described herein is forbidden.

1.2.33 Operation of the truck is forbidden with a trailer:

- with drawbar coupling according to GOST R 41.55-2005, if safety pin does not overhand the lever (see paragraph “Drawbar Control” of the Installation and Operation Manual for Drawbar Coupling. Such Manual is supplied with the truck);
- with drawbar coupling according to GOST 2349-75 with an unfixed latch of the towing hook by a lock pin (see paragraph “Undercarriage” hereof).

1.2.34 When operating the truck at air temperature lower than 30ºC, add ethyl alcohol to the hydraulic fluid of clutch linkage (20% of the total volume).

2 Technical Specifications

2.1 Technical Specifications of 6x6 Trucks with Conventional Cab.

2.1.1 Basic weight and load parameters of trucks are given in Table 1.

Table 1

Parameters	4320-0111-71, 4320-0111-73, 4320-0111-75	4320-0911-70, 4320-0911-72	44202-0311-70, 44202-0311-72, 44202-0311-74	44202-0511-70, 44202-0511-72, 44202-0511-74
Truck kerb weight including driver's weight, kg;	8655	9340	8125	8245
Kerb weight distribution, kg: - on front axle; - on rear bogie;	4040 4615	4315 5025	4115 4010	4165 4080
Gross vehicle weight, kg	15385	20070	20350	20470
Gross vehicle weight rating, kg	17300	22500	21300	21300
GVWR distribution, kg: - on front axle - on rear bogie;	5300 12000	6500 16000	5300 16000	5300 16000
Maximal trailer (semi-trailer) weight, kg	11500		19100*	
Maximal road-train weight, kg	28800	34000	27300	27420/37275*

* When driving on 1-4 category roads

2.1.2 Truck unit parameters are given in Table 2.

Table 2

Parameters	4320-0111-71, 4320-0671-71, 44202-0311-70, 44202-0511-70	4320-0111-73, 4320-0671-73, 4320-0911-72, 44202-0311-72, 44202-0511-72	4320-0111-75 44202-0311-74 44202-0511-74
Engine			
Model, type	YAMZ-53622-10 and its configurations	YAMZ-53642-10 and its configurations	YAMZ-53602-10 and its configurations
Cylinders quantity and location	6-row		

Break-over of Table 2

Parameters	4320-0111-71, 4320-0671-71, 44202-0311-70, 44202-0511-70	4320-0111-73, 4320-0671-73, 4320-0911-72, 44202-0311-72, 44202-0511-72	4320-0111-75 44202-0311-74 44202-0511-74
Working displacement, cm^3	6650		
Compression rate	17.5		
Maximum power, kW/min-[1]	176.5 (2300±25)	210 (2300±25)	229 (2300±25)
Maximum torque, Nm/min-[1]	900 (1300-1600)	1130 (1300-1600)	1226 (1300-1600)
Fuel Feed System	Accumulator-type with electronic control		
Air feed system for the engine	with carton replaceable-element dry air filter		
Transmission			
Clutch	Diaphragm, friction, dry, discharge-type, one disc, hydraulic drive with pneumatic booster		
Gearbox Number of gears	YAMZ-0905 5 - forward, 1 - reverse	YAMZ-1105 5 - forward, 1 - reverse	
YAMZ-0905, YAMZ-1105 axle ratios	Mechanical, three-way, with synchronizer assembly for the gears II, III, IV and V I - 5.22, II - 2.90, III - 1.52, IV - 1.00, V - 0.71, reverse - 5.22		
Transfer Box Number of gears	Mechanical, two-speed with cylindrical inter-axle locking differential 2		
axle ratios	1.04 2.15		
Main gear axle ratios	Dual-ratio, double reduction right-angle 7.49		
Undercarriage			
Frame	Riveted, with forged girders of variable sections		
Towing devices	Front - two rigid towing hooks, Rear - two-side drawbar coupling according to GOST R 41.55-2005, product type C50-5 (except Ural 44202)		
Truck suspension:			
front	Conventional, on two longitudinal half-elliptic springs, with hydraulic telescopic shock absorbers		
rear	Conventional, centre-pin-supported with torque arms, on two longitudinal half-elliptic springs		

Tires for modifications:	Model	Size	Load index	Speed category	Static radius, m
4320-0111-71, 4320-0671-71, 4320-0111-73, 4320-0671-73,	ОИ-25	14.00-20	146;147	G	0.585
	KAMA-URAL	390 /95R20	147	J	0.570
	KAMA-1260	425/85R21	146	J	0.590
	У-4, ИД-304	12,00R20	150/146	J	0.526

Break-over of Table 2

Tires for modifications:	Model	Size	Load index	Speed category	Static radius, m
44202-0311-70, 44202-0511-70, 44202-0311-72, 44202-0511-72	KAMA-1260	425/85R21	146	J	0.590
	У-4, ИД-304	12,00R20	150/146	J	0.526
4320-0911-70, 4320-0911-72	KAMA-1260, KA-MA-1260-1	425/85R21	156	G	0.585
	O-184	425/85R21	156	J	0.580
	У-4, ИД-304	12,00R20	150/146	J	0.526
Steering wheel					
Steer	RBL C-700V (Germany) “screw - ball screw nut - rod - quadrant” with installed hydraulic booster				
axle ratio	18.2...21.5				
Brake Systems					
Primary Brake System	Pneumatic dual-braking drive, with distribution on front axle and on rear bogie, with ABS, brake gears of all wheels are drum-type.				
Parking Brake System	Pneumatic drive with spring-type brake actuators braking the brake gears of middle and rear axle wheels				
Secondary Brake System	Engine retarder, installed				
Electrical Equipment					
Wiring diagram	Single-wire, negative terminals of current power supply are connected with truck battery. Nominal voltage is 24V				
Alternator	AAN 8172 AC alternator manufactured by ISKRA, 2800 W capacity, works with the installed voltage regulator				
Stator	AZF 4137 manufactured by ISKRA, electromagnetic, maximal capacity is 4.0 kW				
Storage Batteries	Two 6CT-190N3 batteries Other storage batteries can be installed, including batteries of 140 Ah capacity.				
Storage batteries switch	Leak-tight with remote control panel, with lock system				
Cab					
Cab	All-metal, two-doors, three-seats with a rest area (for 44202-0511-70, 44202-0511-72 models) and without a rest area (for 4320-0111-71, 4320-0911-70, 44202-0311-70, 4320-0111-73, 4320-0911-72, 44202-0311-72 models)				
Platform	Metal flat body, with rear and side dropsides, with canopy 4320-0111-71, 4320-0671- 71, 4320-0911-70, 4320-0111-73, 4320-0911-72, 44202-0311-70, 44202-0511-70, 44202-0311-72, 44202-0511-72				

End of Table 2

Fifth-Wheel Coupling	50-11 according to GOST 28247-89, two-degree-of-freedom. King pin locking arm jaws are closed with semi-automatic lock, hole diameter for the king pin is 50.8 mm (for semi-trailer trucks 44202-0311-70, 44202-0511-70, 44202-0311-72, 44202-0511-72, 44202-0311-74, 44202-0511-74)
Dedicated Equipment (is optionally installed)	
Power Takeoff	With a flange or a pump, pinion-type, single-speed, actuated by the gearbox
Additional Power Takeoff	Is actuated through a sliding sleeve from the main shaft of the transfer box
Winch	Drum-type with worm gearbox and belt brake, equipped with the rope guideplate

2.2 Technical Specifications of Chassis of 6x6 Truck with Conventional Cab

2.2.1 Basic weight and load parameters of trucks are given in Table 3.

Table 3

Parameters	4320-1151-71 4320-1151-73	43203-1151-71	4320-1951-70 4320-1951-72 4320-1951-74	4320-1972-70 4320-1972-72 4320-1972-74	4320-1982-70 4320-1982-72 4320-1982-74	5557-1151-70 5557-1151-72 5557-1151-74	55571-1151-70 55571-1151-72 55571-1151-74	55571-1551-70 55571-1551-72 55571-1551-74
Chassis kerb weight, kg	7630	7915	8155	8280	8455	7965	8040	8340
GVWR distribution, kg: - on front axle; - on rear bogie;	3950 3680	4095 3820	4315 3840	4380 3900	4495 3960	3760 4205	4105 3935	4265 4075
Gross vehicle weight rating, kg	17300		22500			22500		
GVWR distribution, kg: - on front axle; - on rear bogie;	5300 12000		6500 16000			6500 16000		

Break-over of Table 3

Parameters	4320-1151-71 4320-1151-73	43203-1151-71	4320-1951-70 4320-1951-72 4320-1951-74	4320-1972-70 4320-1972-72 4320-1972-74	4320-1982-70 4320-1982-72 4320-1982-74	5557-1151-70 5557-1151-72 5557-1151-74	55571-1151-70 55571-1151-72 55571-1151-74	55571-1551-70 55571-1551-72 55571-1551-74
Maximal trailer weight, kg	11500		11500			11500		
Maximal road-train weight, kg	28800		34000			34000		
Engine								
	4320-1151-71, 4320-1671-71, 4320-1951-70, 4320-1972-70 4320-1982-70, 5557-1151-70, 43203-1151-71, 55571-1151-70, 55571-1551-70,		4320-1151-73, 4320-1671-73, 4320-1951-72, 4320-1972-72 4320-1982-72, 5557-1151-72, 55571-1151-72, 55571-1551-72,				4320-1151-75, 4320-1671-75, 4320-1951-74, 4320-1972-74 4320-1982-74, 5557-1151-74, 55571-1151-74, 55571-1551-74	
Model, type	YAMZ-53622-10 and its configurations		YAMZ-53642-10 and its configurations			YAMZ-53602-10 and its configurations		
Cylinders quantity and location	6–row							
Engine capacity, cm^3	6650							
Compression rate	17.5							
Maximum power, kW/min-[1]	176.5 (2300±25)		210 (2300±25)			229 (2300±25)		
Maximum torque, Nm/min-[1]	900 (1300-1600)		1130 (1300-1600)			1226 (1300-1600)		
Fuel Feed System	Accumulator-type with electronic control							
Air feed system for the engine	with carton replaceable-element dry air filter							
Transmission								
Clutch	Diaphragm, friction, dry, discharge-type, one-disc, drive with air-oil booster							
Gearbox Number of gears	YAMZ-0905 5 - forward, 1 - reverse		YAMZ-1105 5-forward ZF 9 S 1310 TO 9 - forward, 1 - reverse					
YAMZ-0905, YAMZ-1105	Mechanical, three-way, with synchronizer assembly for the gears II, III, IV and V							
axle ratios	I-5.22, II -2.90, III-1.52, IV-1.00, V-0.71, reverse -5.22							
ZF 9 S 1310 TO	Mechanical, three-way with synchronizer assembly. Consists of the main four-gearbox and auxiliary gearbox, gearbox remote control							

Break-over of Table 3

Parameters	4320-1151-71 4320-1151-73	43203-1151-71	4320-1951-70 4320-1951-72 4320-1951-74	4320-1972-70 4320-1972-72 4320-1972-74	4320-1982-70 4320-1982-72 4320-1982-74	5557-1151-70 5557-1151-72 5557-1151-74	55571-1151-70 55571-1151-72 55571-1151-74	55571-1551-70 55571-1551-72 55571-1551-74
Axle ratios	I-9.48, II -6.58, III-4.68, IV-3.48, V -2.62, VI -1.89, VII -1.35, VIII -1.00, IX -0.75, reverse - 8.97							
Transfer Box Number of gears	Mechanical, two-speed with cylindrical inter-axle locking differential 2							
axle ratios	1.04 2.15							
Main gear axle ratios	Dual-ratio, double reduction right-angle 7.49							

Undercarriage

Frame	Pressed, riveted				
Towing devices	- front - shunting forks with king pins (cabover trucks); - rear - two-side drawbar coupling according to GOST R 41.55-2005, product type C50-5 (except Ural 44202)				
Truck suspension: front rear	 Conventional, on two longitudinal half-elliptic springs, with hydraulic telescopic shock absorbers Conventional, centre-pin-supported with torque arms, on two longitudinal half-elliptic springs				
Tires					
For modifications:	Model	Size	Load index	Speed category	Static radius, m
4320-1151-71, 4320-1671-71, 4320-1151-73, 4320-1671-73, 4320-1151-75, 4320-1671-75, 43203-1151-71	ОИ-25	14.00-20	146;147	G	0.585
	KAMA-URAL	390/95R20	147	J	0.570
	KAMA-1260	425/85R21	146	J	0.590
	У-4, ИД-304	12.00R20	150/146	J	0.526
4320-1951- 70, 4320-1972-70, 4320-1982-70, 5557-1151-70, 55571-1151–70, 55571-1551-70, 4320-5951- 70, 4320-5972-70, 4320-5982-70, 5557-5151-70, 55571-5151–70, 55571-5551- 70, 4320-1951- 72, 4320-1972-72, 4320-1982-72, 5557-1151-72, 55571-1151– 72, 55571-1551-72, 4320-1951- 74, 4320-1972-74, 4320-1982-74, 5557-1151-74, 55571-1151–74,55571-1551-74	KAMA-1260, KA-MA-1260-1	425/85R21	56	G	0.585
	O-184	425/85R21	156	J	0.580
	У-4, ИД-304	12.00R20	150/146	J	0.526

End of Table 3

Steering wheel	
Steer (type, marking)	RBL C-700 (Germany) ,“screw - ball screw nut - rod - quadrant” with hydraulic booster
Brake Systems	
Primary Brake System	Pneumatic dual-braking drive, with distribution on front contour and on rear bogie, with ABS, brakes of all wheels are drum-type.
Parking Brake System	Pneumatic drive with spring-type brake actuators braking the brakes of middle and rear axle wheels
Secondary Brake System	Engine retarder ,compressor-type, installed
Cab	
Cab	All-metal: two-doors, three-seat with rest area (for 4320-1671-71, 4320-1671-73, 4320-1671-75, 4320-1972-70, 4320-1972-72, 4320-1972-74; 55571-1551-70, 55571-1551-72, 55571-1551-74;) or without rest area (for 4320-1151-71, 4320-1151-73, 43203-1151-71, 4320-1951-70, 4320-1951-72, 4320-1951-74, 5557-1151-70, 5557-1151-72, 5557-1151-74, 55571-1151-70, 55571-1151-72, 55571-1151-74) or four-doors, six-seat (for 4320-1982-70, 4320-1982-72, 4320-1982-74)

2.3 Technical Specifications of 6x6 Cabover Trucks

2.3.1 Basic weight and load parameters of trucks are given in Table 4.

Table 4

Parameters	4320-3171-78 4320-3171-80, 4320-3171-82	4320-3971-78, 4320-3971-80, 4320-3971-82	44202-3511-78, 44202-3511-80, 44202-3511-82
Truck kerb weight including driver’s weight, kg;	9430	9730	8770
GVWR distribution, kg: - on front axle - on rear bogie;	 5020 4410	 4750 4980	 4905 3865
Gross vehicle (road-train) weight, kg	20080	20380	20920
Gross vehicle weight rating, kg	22500	22500	21800

End of Table 4

GVWR distribution, kg - on front axle - on rear bogie;	6500 16000	6500 16000	5800 16000
Maximal trailer (semi-trailer) weight, kg	11500		19100
Maximal road-train weight, kg	33300/34000		28020/38045*
* When driving on 1-4 category roads			

2.3.2 Truck unit parameters are given in Table 5.

Table 5

Parameters	4320-3171-78, 4320-3971-78, 44202-3511-78	4320-3171-80, 4320-3971-80, 44202-3511-80	4320-3171-82, 4320-3971-82, 44202-3511-82
Model, type	YAMZ-53622-10 and its configurations	YAMZ-53642-10 and its configurations	YAMZ-53602-10 and its configurations
Engine capacity, cm^3	6650		
Compression rate	17.5	1122 (1300-1600)	1226 (1300-1600)
Maximal capacity, kW (at engine torque, min^{-1})	176.5 (2300±25)	210 (2300±25)	229 (2300±25)
Air feed system for the engine	with carton replaceable-element dry air filter		
Gas Exhaust System	With muffler, end of the exhaust pipe is truck axle directed		
Transmission			
Clutch	ZF SACHS MFZ 430, YAMZ-182-76 or Hammer 43033, diaphragm, friction, dry, exhaust-type, one-disc, hydraulic drive with pneumatic booster		
Gearbox Number of gears	YAMZ-0905 5 - forward, 1 - reverse	YAMZ-1105 or ZF 9S 1310 TO or 9JS135TA 5-Forward, 1-reverse (for YAMZ-1105) 9 - forward, 1 - reverse (for ZF 9 S 1310 TO, 9JS135TA)	ZF 9 S 1310 TO or 9JS135TA 9 - forward, 1 - reverse
YAMZ-0905, YAMZ-1105 axle ratios	Mechanical, three-way, with synchronizer assembly for the gears II, III, IV and V I-5.22, II-2.90, III-1.52, IV-1.00, V-0.71, reverse -5.22		
ZF 9 S 1310 TO axle ratios	Mechanical, three-way with synchronizer assembly. Consists of the main four-gearbox and auxiliary gearbox, gearbox remote control I-9.48, II-6.58, III-4.68, IV-3.48, V-2.62, VI-1.89, VII-1.35, VIII-1.00, IX-0.75, reverse-8.97		

Break-over of Table 5

Parameters	4320-3171-78, 4320-3971-78, 44202-3511-78	4320-3171-80, 4320-3971-80, 44202-3511-80	4320-3171-82, 4320-3971-82, 44202-3511-82
9JS135TA axle ratios	Mechanical, nine-speed, three-way with synchronizer assembly. I-6.55, II-4.64, III-3.36, IV-2.46, V-1.95, VI-1.38, VII-1.00, VIII-0.73, reverse-11.52, L-11.52		
Additional reducing transmission	11.02		
Transfer Box Number of gears	Mechanical, two-speed with cylindrical inter-axle locking differential 2		
axle ratios	1.04 2.15		
Main gear axle ratios	Dual-ratio, double reduction right-angle 6.77 or 7.49		

Undercarriage

Frame	Riveted, with forged girders of variable sections				
Towing devices	- front - shunting forks with king pins (cabover trucks); Rear - two-side drawbar coupling according to GOST R 41.55-2005, product type C50-5 (except Ural 44202)				
Truck suspension: front	Conventional, on two longitudinal half-elliptic springs, with hydraulic telescopic shock absorbers				
rear	Conventional, centre-pin-supported with torque arms, on two longitudinal half-elliptic springs				
Tires for modifications:	Model	Size	Load index	Speed category	Static radius, m
4320-3171-78, 4320-3171-80, 4320-3171-82 4320-3971-78, 4320-3971-80, 4320-3971-82, 44202-3511-78, 44202-3511-80, 44202-3511-82	KAMA-1260, KAMA-1260-1	425/85R21	156	G	0.585
	O-184	425/85R21	156	J	0.580
	У-4, ИД-304	12,00R20	150/146	J	0.526

Steering wheel

Steer axle ratio	RBL C-700V (Germany) “screw - ball screw nut - rod - quadrant” with installed hydraulic booster 18.2-21.5 (for RBL C-700V)

Brake Systems

Primary Brake System	Pneumatic dual-braking drive, with distribution on front axle and on rear bogie, with ABS, brakes of all wheels are drum-type.

End of Table 5

Parameters	4320-3171-78, 4320-3971-78, 44202-3511-78	4320-3171-80, 4320-3971-80, 44202-3511-80	4320-3171-82, 4320-3971-82, 44202-3511-82
Parking Brake System	Pneumatic drive with spring-type brake actuators braking the brakes of middle and rear axle wheels		
Secondary Brake System	Engine retarder, installed		
Electrical Equipment			
Wiring diagram	Single-wire, negative terminals of current power supply are connected with truck battery. Nominal voltage is 24V		
Alternator	AAN 8172 AC alternator manufactured by ISKRA, 2800 W capacity, works with the installed voltage regulator		
Stator	AZF 4137 manufactured by ISKRA, electromagnetic, maximal capacity is 4.0 kW		
Storage Batteries	Two 6CT-190N3 batteries Other storage batteries can be installed, including batteries of 140 Ah capacity.		
Storage batteries switch	Leak-tight with distant control panel, with lock system		
Cab			
Cab	All-metal, two-doors, two-seat, with a berth, located over the engine		
Platform (for trucks 4320-3171-78, 4320-3171-80, 4320-3171-82, 4320-3971-78, 4320-3971-80, 4320-3971-82)	Metal flat body, with rear and side dropsides, with canopy		
Fifth-wheel coupling (for semi-trailers 44202-3511-78, 44202-3511-80, 44202-3511-82)	50-11 according to GOST 28247-89, two-degree-of-freedom. King pin locking device jaws are locked by semi-automatic lock, hole diameter for the king pin is 50.8 mm.		
Dedicated Equipment			
Power Takeoff	With a flange or a pump, pinion-type, single-speed, actuated by the gearbox		
Additional Power Takeoff	Is actuated through a sliding sleeve from the main shaft of the transfer box		
Winch	Drum-type with worm gearbox and belt brake, equipped with the rope guideplate		

2.4 Technical Specifications of Chassis of 6x6 Cabover Truck

2.4.1 Basic weight and load parameters of trucks are given in Table 6.

Table 6

Parameters	4320-4151-79, 4320-4151-81, 4320-4151-83	4320-4951-78, 4320-4951-80, 4320-4951-82	4320-4972-78, 4320-4972-80, 4320-4972-82	5557-4151-78, 5557-4151-80, 5557-4151-82	55571-4151-78, 55571-4151-80, 55571-4151-82	55571-4551-78, 55571-4551-80, 55571-4551-82
Chassis kerb weight, kg	8060	8370	8960	8275	8350	8595
GVWR distribution, kg - on front axle	4680	4360	4820	4315	4660	4890
- on rear bogie;	3380	4010	4140	3960	3690	3705
Gross vehicle weight rating, kg	17800	22500				
GVWR distribution, kg - on front axle	5800	6500				
- on rear bogie;	12000	16000				
Maximal trailer weight, kg	11500					
Maximal road-train weight, kg	29300	34000				

2.4.2 Truck unit parameters are given in Table 7.

Table 7

Parameters	4320-4151-79, 4320-4951-78, 4320-4972-78, 5557-4151-78, 55571-4151-78, 55571-4551-78,	4320-4151-81, 4320-4951-80, 4320-4972-80, 5557-4151-80, 55571-4151-80, 55571-4551-80,	4320-4151-83, 4320-4951-82, 4320-4972-82, 5557-4151-82, 55571-4151-82, 55571-4551-82,
Model, type	YAMZ-53622-10 and its configurations	YAMZ-53642-10 and its configurations	YAMZ-53602-10 and its configurations
Cylinders quantity and location	6–row		

Break-over of Table 7

Parameters	4320-4151-79, 4320-4951-78, 4320-4972-78, 5557-4151-78, 55571-4151-78, 55571-4551-78,	4320-4151-81, 4320-4951-80, 4320-4972-80, 5557-4151-80, 55571-4151-80, 55571-4551-80,	4320-4151-83, 4320-4951-82, 4320-4972-82, 5557-4151-82, 55571-4151-82, 55571-4551-82,
Engine capacity, cm^3	6650		
Compression rate	17.5		
Maximal capacity, kW (at engine torque, min^{-1})	176.5 (2300±25)	210 (2300±25)	229 (2300±25)
Maximal torque, Nm (at engine torque, min^{-1})	900 (1300–1600)	1130 (1300–1600)	1226 (1300–1600)
Fuel Feed System	Accumulator-type with electronic control		
Air feed system for the engine	with carton replaceable-element dry air filter		
Transmission			
Clutch	ZF SACHS MFZ 430, YAMZ-182-15 or Hammer 43033, diaphragm, friction, dry, exhaust-type, one-disc, hydraulic drive with pneumatic booster		
Gearbox	YAMZ-0905	YAMZ-1105 or ZF 9 S 1310 TO or 9JS135TA	
Number of gears	5 - forward, 1 - reverse	5-Forward, 1-reverse (for YAMZ-1105) 9 - forward, 1 - reverse (for ZF 9 S 1310 TO, 9JS135TA)	
YAMZ-0905, YAMZ-1105 axle ratios	Mechanical, three-way, with synchronizer assembly for the gears II, III, IV and V I-5.22, II-2.90, III-1.52, IV-1.00, V-0.71, reverse -5.22		
ZF 9 S 1310 TO axle ratios	Mechanical, three-way with synchronizer assembly. Consists of the main four-gearbox and auxiliary gearbox, gearbox remote control I-9.48, II-6.58, III-4.68, IV-3.48, V-2.62, VI-1.89, VII-1.35, VIII-1.00, IX-0.75, reverse-8.97		
9JS135TA axle ratios	Mechanical, nine-speed, three-way with synchronizer assembly . I-6.55, II-4.64, III-3.36, IV-2.46, V-1.95, VI-1.38, VII-1.00, VIII-0.73, reverse-11.52, L-11.52		
Transfer box	Mechanical, two-speed with cylindrical inter-axle locking differential		
Number of gears	2		
axle ratios	1.04 2.15		

Break-over of Table 7

Parameters	4320-4151-79, 4320-4951-78, 4320-4972-78, 5557-4151-78, 55571-4151-78, 55571-4551-78,	4320-4151-81, 4320-4951-80, 4320-4972-80, 5557-4151-80, 55571-4151-80, 55571-4551-80,	4320-4151-83, 4320-4951-82, 4320-4972-82, 5557-4151-82, 55571-4151-82, 55571-4551-82,
Main gear	Dual-ratio, double reduction right-angle		
axle ratios	7.49		

Undercarriage

Frame	Riveted, with forged girders of variable sections
Towing devices	- front - shunting forks with king pins (cabover trucks); rear - two-side drawbar coupling according to GOST R 41.55-2005, product type C50
Truck suspension: front rear	 Conventional, on two longitudinal half-elliptic springs, with hydraulic telescopic shock absorbers Conventional, centre-pin-supported with torque arms, on two longitudinal half-elliptic springs
Tires	

For modifications:	Model	Size	Load index	Speed category	Static radius, m
4320-4151-79, 4320-4151-81, 4320-4151-83	ОИ-25	14.00-20	146; 147	G	0.585
	KAMA-URAL	390/95R20	147	J	0.570
	KAMA-1260	425/85R21	146	J	0.590
		315/80R22.5	156/150	K	0.499
	У-4, ИД-304	12.00R20	150/146	J	0.526
4320-4951-78, 4320-4951-80, 4320-4951-82, 4320-4972-78, 4320-4972-80, 4320-4972-82, 5557-4151-78, 5557-4151-80, 5557-4151-82, 55571-4151-78, 55571-4151-80, 55571-4151-82, 55571-4551-78, 55571-4551-80, 55571-4551-82	KAMA-1260, KA-MA-1260-1	425/85R21	56	G	0.585
	O-184	425/85R21	156	J	0.580
	У-4, ИД-304	12.00R20	150/146	J	0.526

Steering wheel

Steer (type, marking)	RBL C-700V (Germany) “screw - ball screw nut - rod - quadrant” with installed hydraulic booster
Axle ratio	18.2-21.5 (for RBL C-700V)

End of Table 7

Parameters	4320-4151-79, 4320-4951-78, 4320-4972-78, 5557-4151-78, 55571-4151-78, 55571-4551-78,	4320-4151-81, 4320-4951-80, 4320-4972-80, 5557-4151-80, 55571-4151-80, 55571-4551-80,	4320-4151-83, 4320-4951-82, 4320-4972-82, 5557-4151-82, 55571-4151-82, 55571-4551-82,
Brake Systems			
Primary Brake System	Pneumatic dual-braking drive, with distribution on front axle and on rear bogie, with ABS, brakes of all wheels are drum-type.		
Parking Brake System	Parking brake system pneumatic drive with spring-type brake actuators braking the brakes of middle and rear axle wheels		
Secondary Brake System	Engine retarder, installed		
Cab			
Cab	All-metal: two-doors, two-seat with rest area (for 4320-4972-78, 4320-4972-80, 4320-4972-82 55571-4551-78, 55571-4551-80, 55571-4551-82) or without rest area (for 4320-4151-79, 4320-4151-81, 4320-4151-83, 4320-4951-78, 4320-4951-80, 4320-4951-82, 5557-4151-78, 5557- 4151-80, 5557-4151-82, 55571-4151-78, 55571-4151-80, 55571-4151-82)		

2.5 Technical Specifications of 4x4 Trucks and Chassis

2.5.1 Basic weight and load parameters of trucks are given in Table 8.

Table 8

Parameters for trucks	43206-0111-71	43206-0551-71	43206-3111-79	43206-3511-79
Truck kerb weight including driver's weight, kg;	7595	7795	8195	8365
GVWR distribution, kg - on front axle - on rear axle	 4235 3360	 4250 3545	 4875 3320	 5035 3330
Gross vehicle weight rating, kg	13300		13300	
GVWR distribution, kg - on front axle - on rear axle	5300 8000			
Allowable gross trailer weight, kg	7000		7000	
Gross road-train weight, kg	20300		20300	

End of Table 8

Parameters for chassis	43206-1151-71	43206-1551-71	43206-4151-79	43206-4551-79
Chassis kerb weight, kg	6565	6725	6565	6735
GVWR distribution, kg - on front axle - on rear axle	 4125 2440	 4245 2480	 4310 2255	 4515 2220
Gross vehicle weight rating, kg	13300		13800	
GVWR distribution, kg - on front axle - on rear axle	 5300 8000		 5800 8000	
Allowable gross trailer weight	7000		7000	
Gross road-train weight, kg	20300		20300	

2.5.2 Truck unit parameters are given in Table 9.

Table 9.

Parameters for trucks and chassis	43206-0111-71,43206-0551-71, 43206-3111-79, 43206-3511-79, 43206-1151-71, 43206-1551-71, 43206-4151-79, 43206-4551-79
Engine	
Model, type	YAMZ-53622-10 and its modifications
Engine capacity, l	6.65
Maximal torque, Nm (at engine torque, min-^{1})	900 (1300-1600)
Maximal capacity, kW (at engine torque, min-^{1})	176.5 (2300±25)
Fuel Feed System	Accumulator-type with electronic control
Gas Exhaust System	With muffler, end of the exhaust pipe is truck axle directed
Transmission	
Clutch	MFZ 430 SACHS manufactured by ZF Friedrichshafen AG or MFZ 430 Hammer manufactured by Dönmez Debriyaj, diaphragm, friction, dry, exhaust, one-disc, hydraulic drive with pneumatic booster
Gearbox Number of gears	YAMZ-0905 , mechanical, three-way, with synchronizer assembly for the gears II, III, IV and V 5 - forward, 1 - reverse
I- II- III- IV- V- reverse-	5.22 2.90 1.52 1.00 0.71 5.22

Break-over of Table 9

Parameters for trucks and chassis	43206-0111-71,43206-0551-71, 43206-3111-79, 43206-3511-79, 43206-1151-71, 43206-1551-71, 43206-4151-79, 43206-4551-79	
Transfer Box	Mechanical, two-speed with cylindrical inter-axle locking differential	
Number of gears	2	
axle ratios	high-1.04	
	low-2.15	
Main gear	Dual-ratio, double reduction right-angle	
axle ratio	6.77	
Undercarriage		
Frame	Riveted, with forged girders of variable sections	
Towing devices	Front - towing forks with king pins (cabover trucks) or two rigid towing hooks (conventional cab trucks); rear - two-side drawbar coupling according to GOST R 41.55-2005, product type C50	
Truck suspension:		
front	Conventional, on two longitudinal half-elliptic springs, with hydraulic telescopic shock absorbers	
rear	Conventional, on two longitudinal half-elliptic springs with additional springs, with hydraulic telescopic shock absorbers	
Tires	KAMA-1260 KAMA-1260-1	У-4, ИД-304
Size	425/85R21	12.00R20
Minimum allowable load index	156	150/146
Speed category	G	J
Static radius, m	0.585	0.526
Steering wheel		
Steer (Type, marking)	RBL C-700V (Germany) “screw - ball screw nut - rod - quadrant” with installed hydraulic booster	
Axle ratio	18.2-21.5	
Brake Systems		
Primary Brake System	Pneumatic double-circuit drive with distribution on the front and rear axle	
Parking Brake System	Parking brake system pneumatic drive with spring-type brake actuators braking the brakes of rear axle wheels	
Secondary Brake System	Engine retarder ,compressor-type, installed	

End of Table 9

Parameters for trucks and chassis	43206-0111-71,43206-0551-71, 43206-3111-79, 43206-3511-79, 43206-1151-71, 43206-1551-71, 43206-4151-79, 43206-4551-79
Cab	
Cab	All-metal, two-doors: -Three-seat (for 43206-0111-71, 43206-1151-71) or -Two-seat (for 43206-3111-79, 43206-4151-79) and with rest area (for 43206-3511-79, 43206-4551-79); all-metal, four-doors, six-seat (for 43206-0551-71, 43206-1551-71).
Platform	Metal flat body, with three dropsides, with canopy

2.6 Dimensions of 6x6 and 4x4 Trucks and Chassis are shown in figures 3-23.

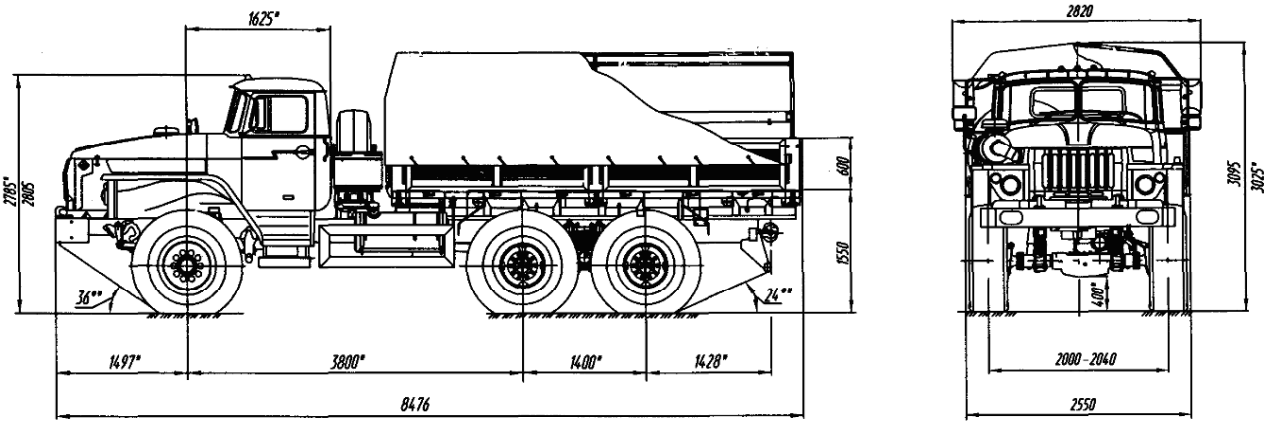


Figure 3 - Ural 4320-0111-71, Ural 4320-0111-73, Ural 4320-0111-75

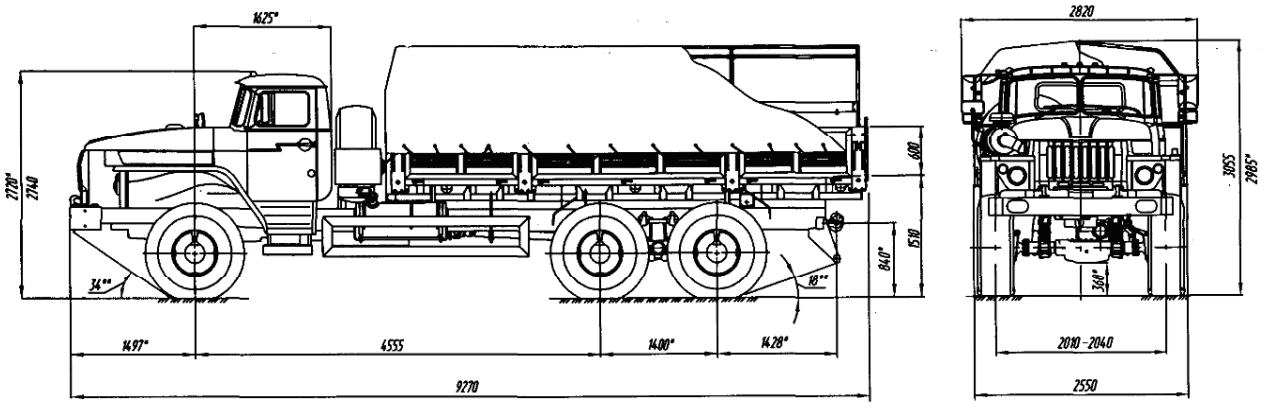


Figure 4 - Ural 4320-0911-70, Ural 4320-0911-72, Ural 4320-0911-74

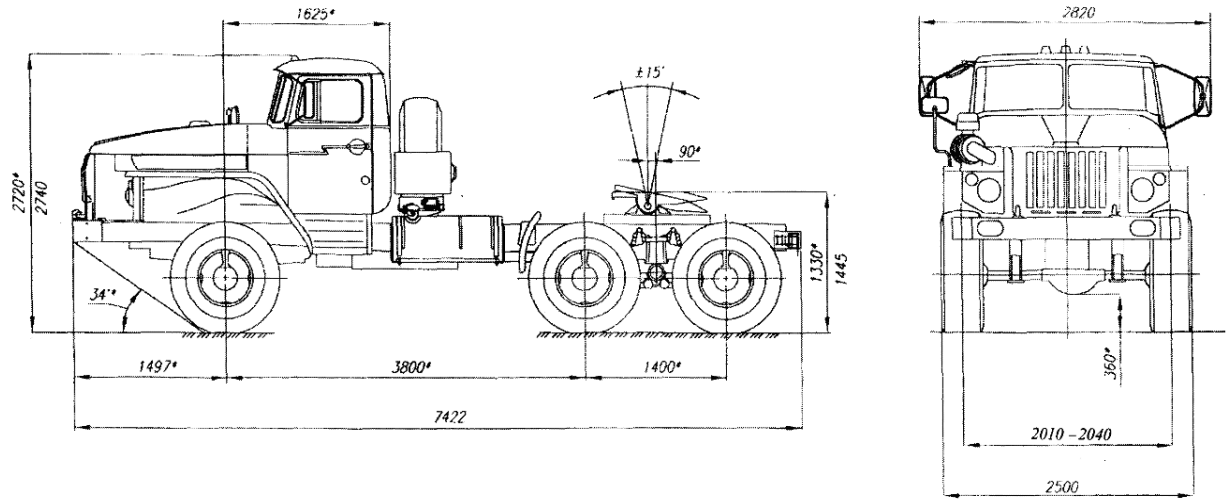


Figure 5 - Tractor units Ural 4320-0311-70, Ural 4320-0311-72, Ural 4320-0311-74

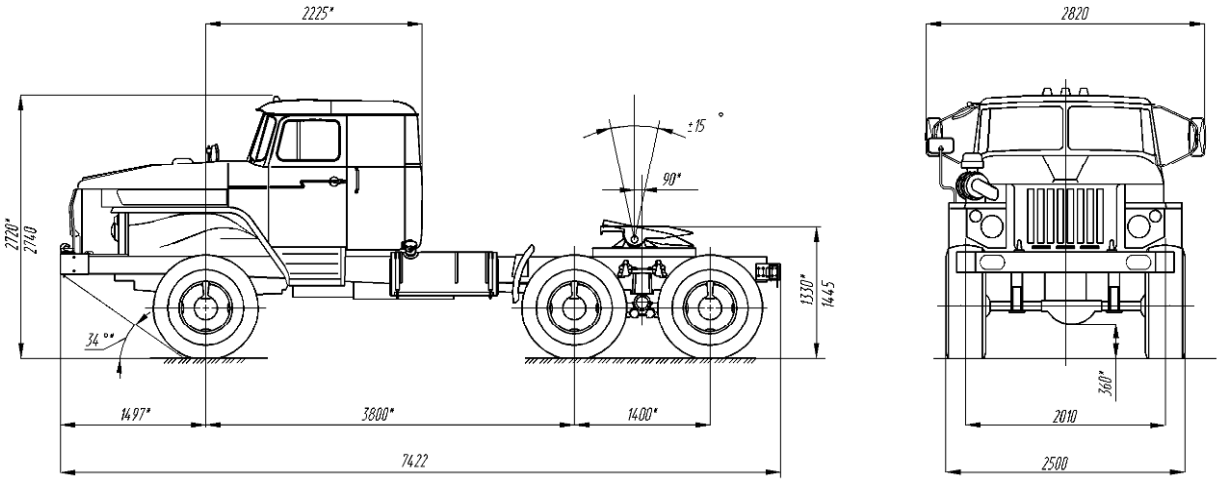


Figure 6 - Tractor units Ural 4320-0511-70, Ural 4320-0511-72, Ural 4320-0511-74

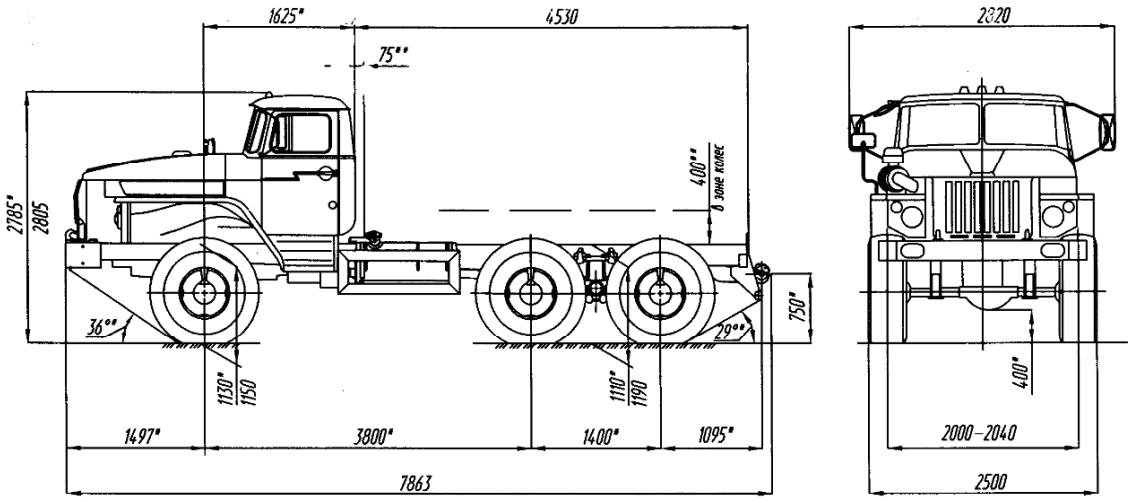


Figure 7 - Chassis Ural 4320-1151-71, Ural 4320-1151-73, Ural 4320-1151-75

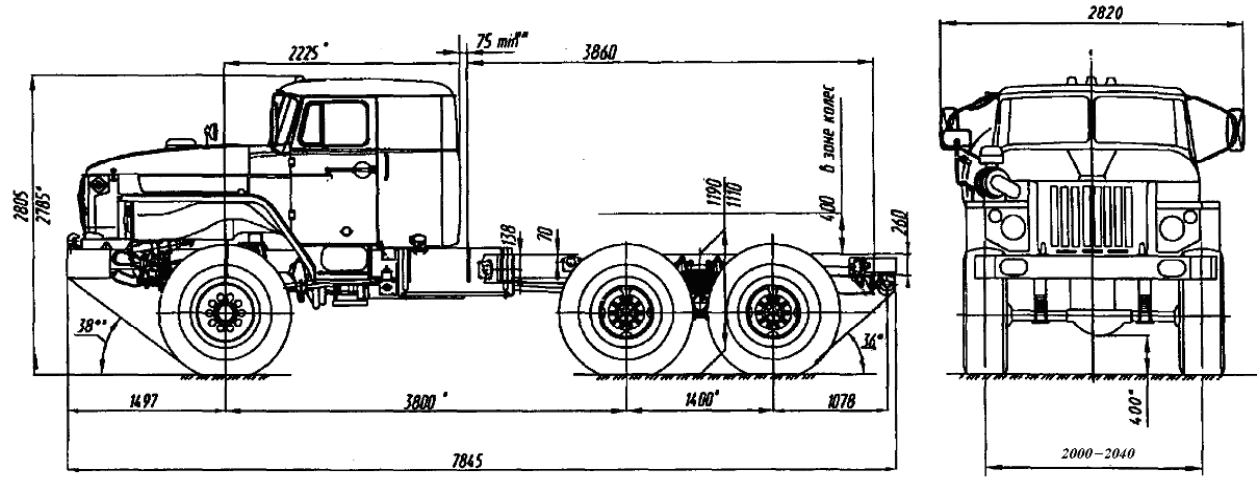


Figure 8 - Chassis Ural 4320-1671-71, Ural 4320-1671-73, Ural 4320-1671-75

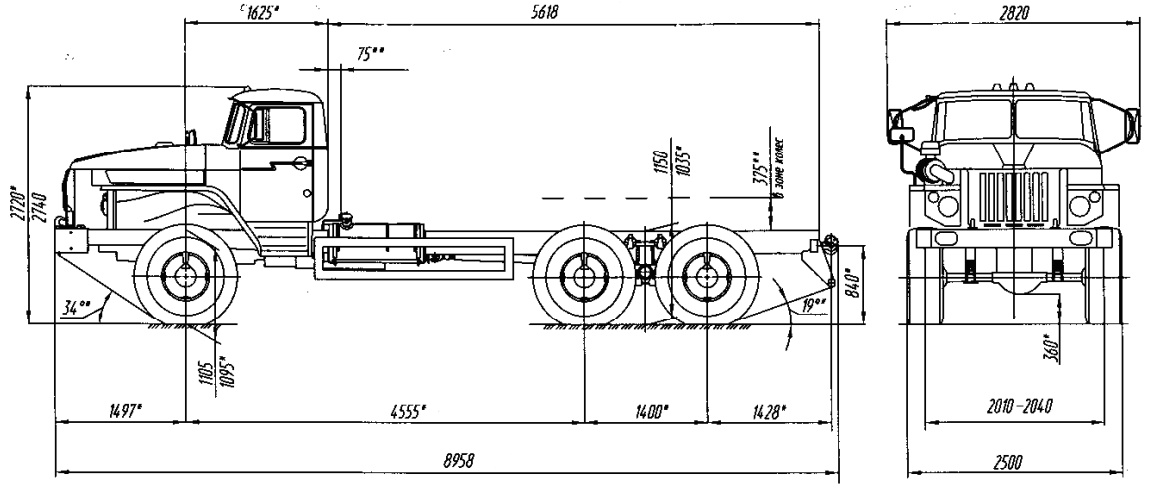


Figure 9 - Chassis Ural 4320-1951-70, Ural 4320-1951-72, Ural 4320-1951-74,

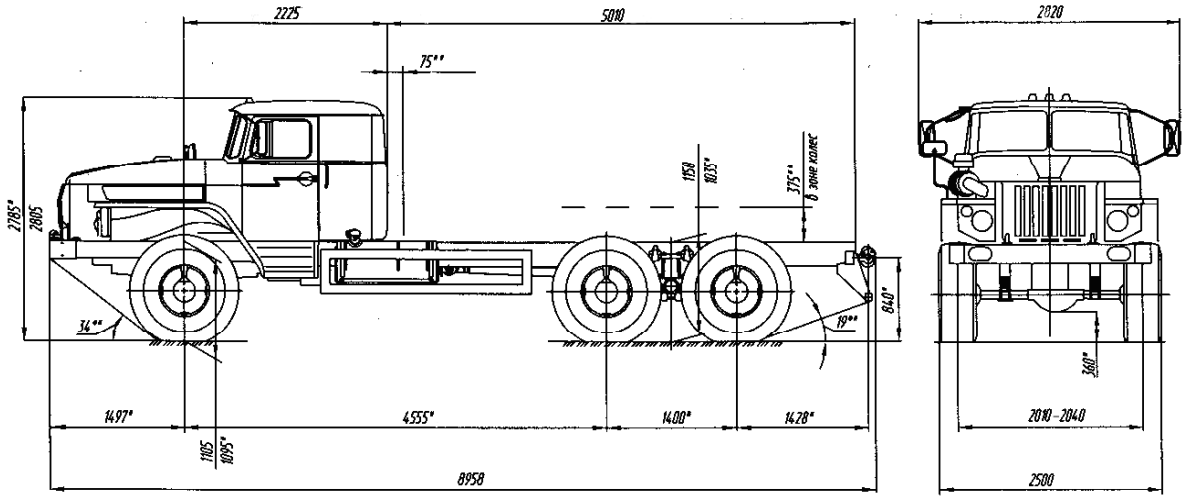


Figure 10 - Chassis Ural 4320-1972-70, Ural 4320-1972-72, Ural 4320-1972-74,

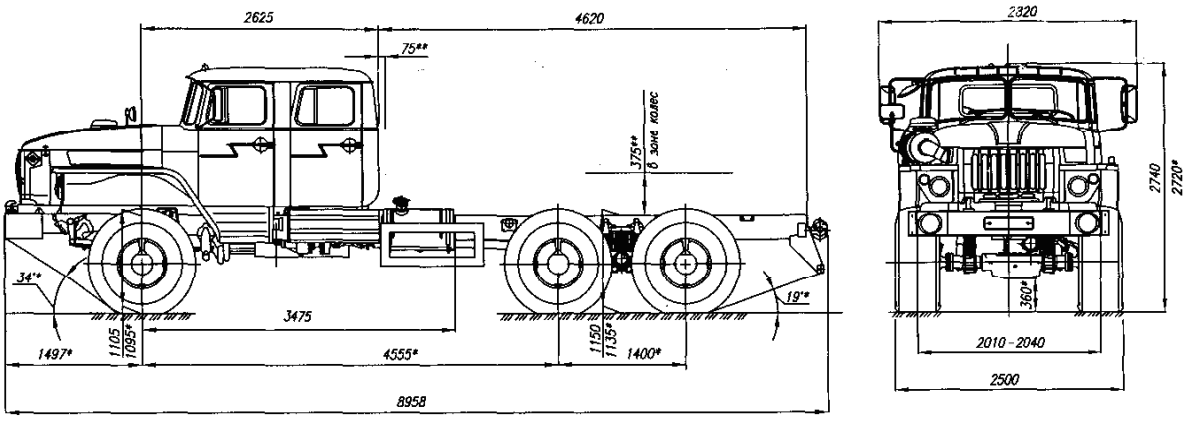


Figure 11 - Chassis Ural 4320-1982-70, Ural 4320-1982-72, Ural 4320-1982-74,

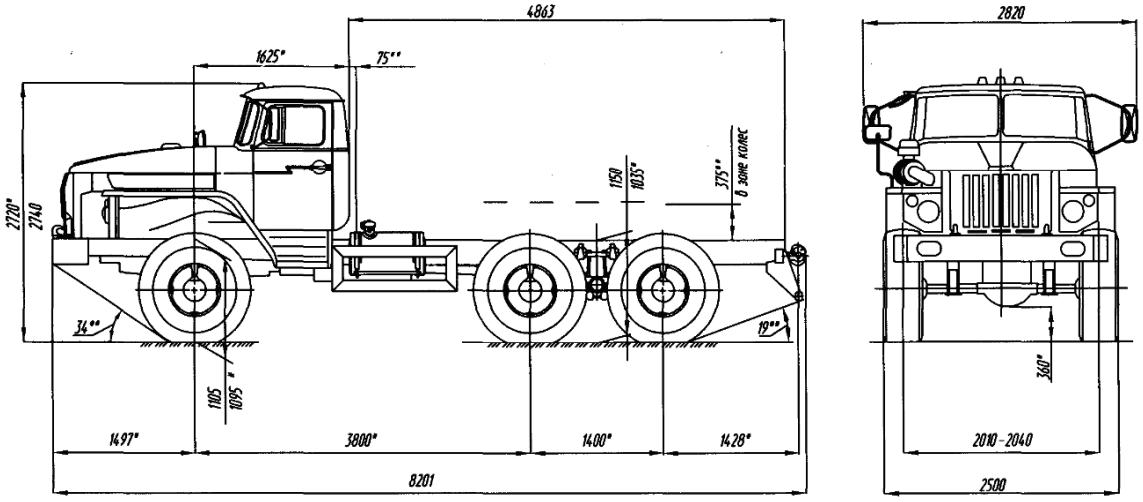


Figure 12 - Chassis Ural 5557-1151-70, Ural 5557-1151-72, Ural 5557-1151-74,

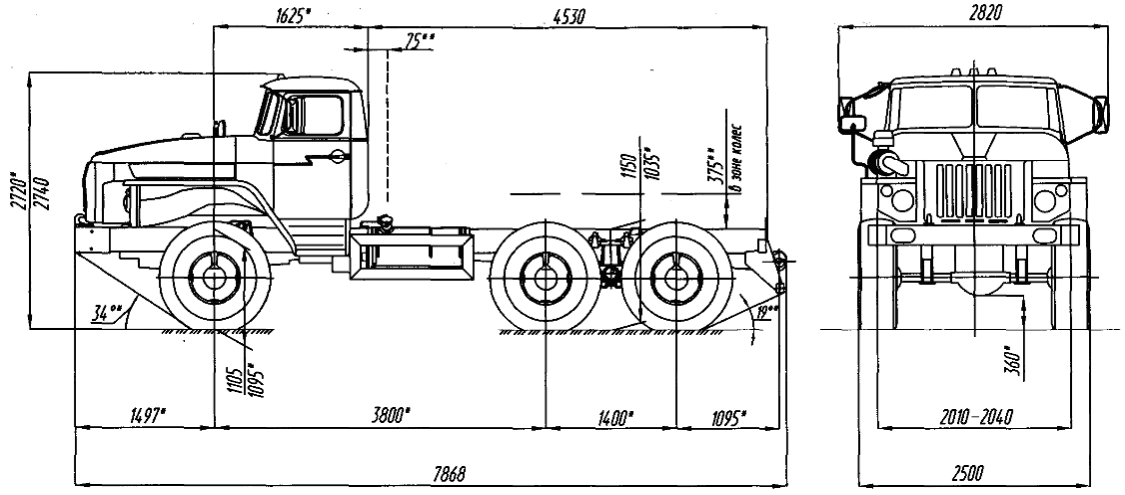


Figure 13 - Chassis Ural 55571-1151-70, Ural 55571-1151-72, Ural 55571-1151-74

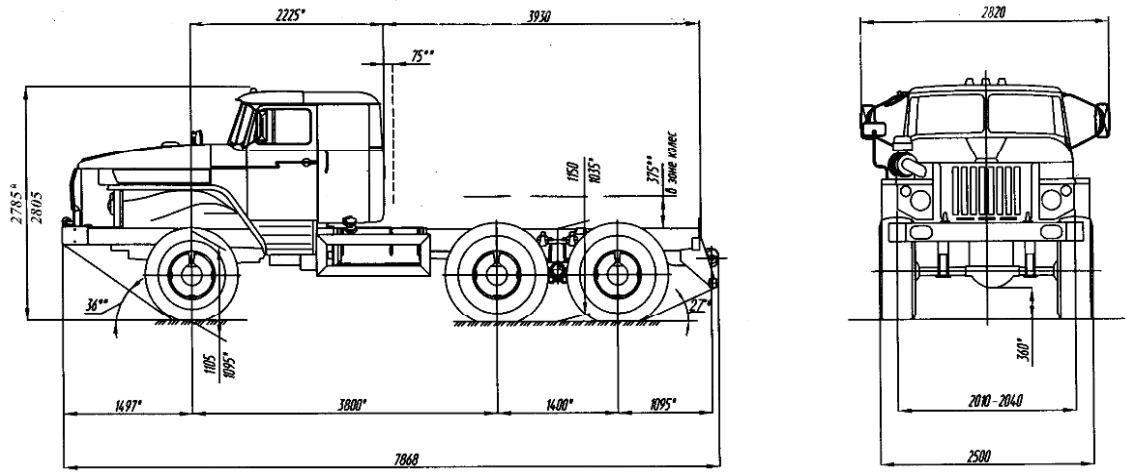


Figure 14 - Chassis Ural 55571-1551-70, Ural 55571-1551-72, Ural 55571-1551-74

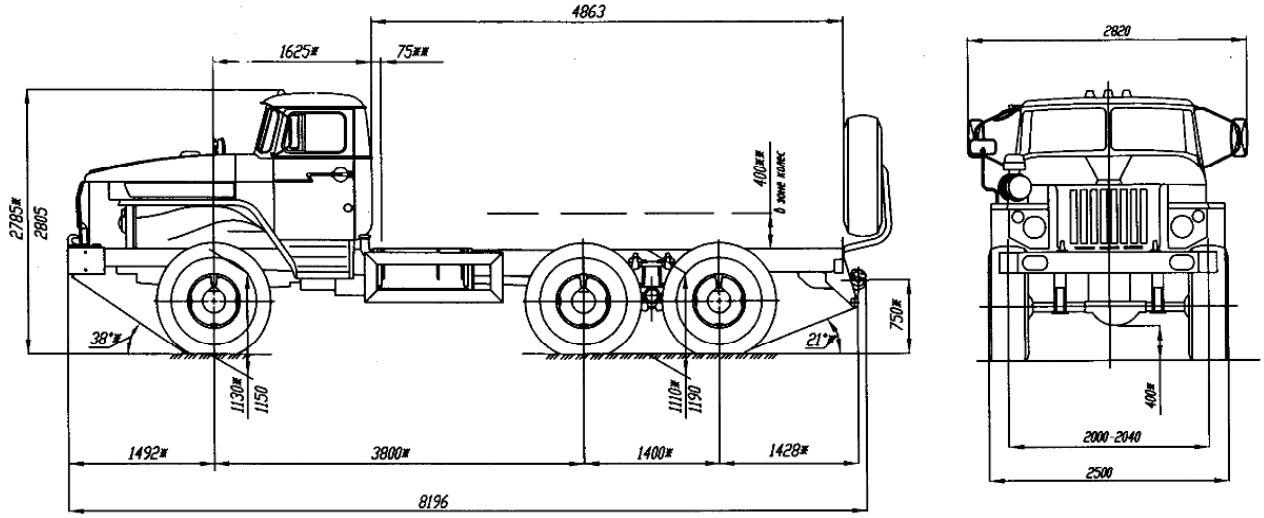


Figure 15 - Chassis Ural 43203-1151-71

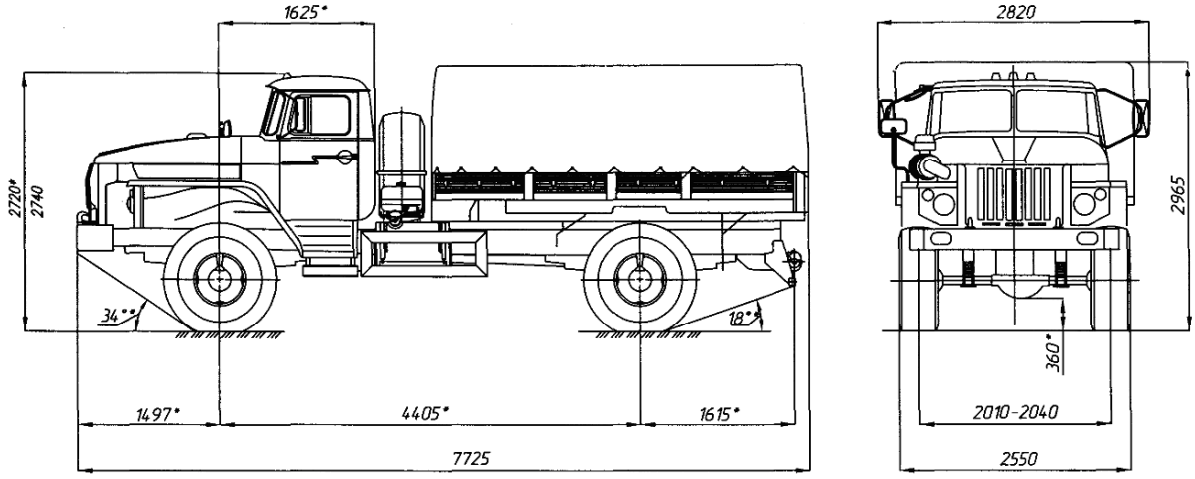


Figure 16 - Truck Ural 43206-0111-71

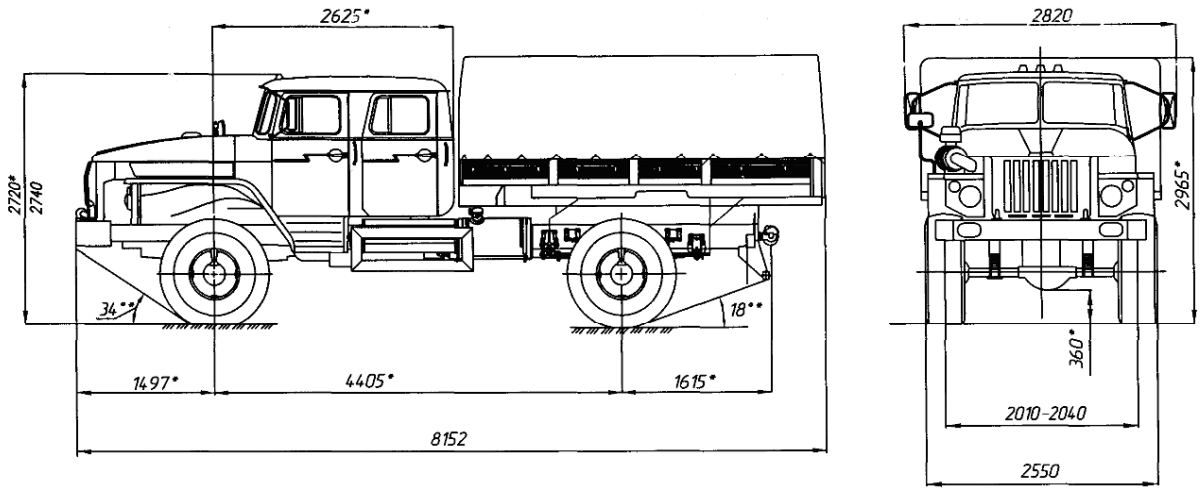


Figure 17 - Truck Ural 43206-0551-71

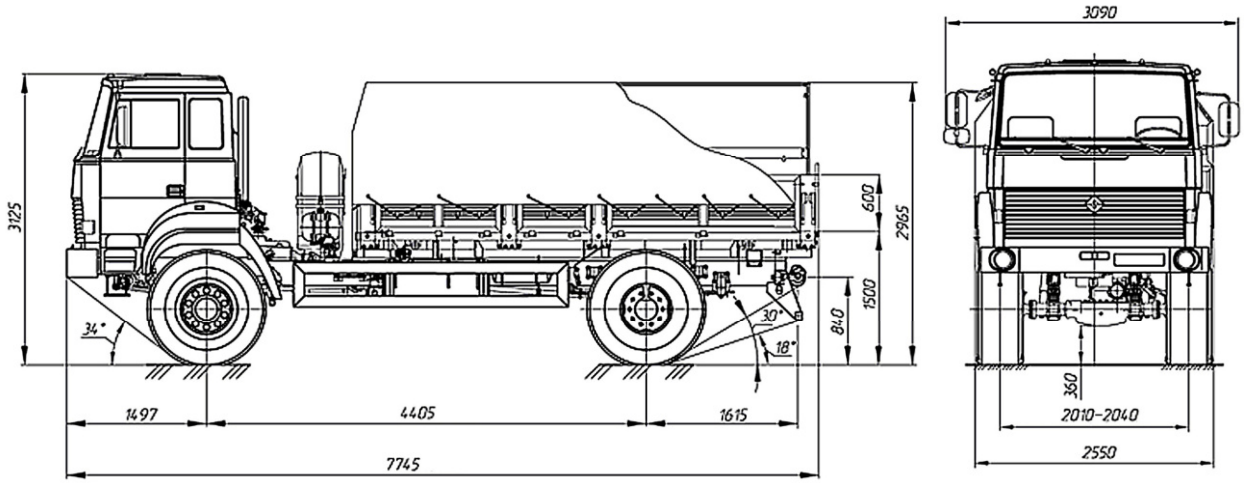


Figure 18 - Truck Ural 43206-3111-79

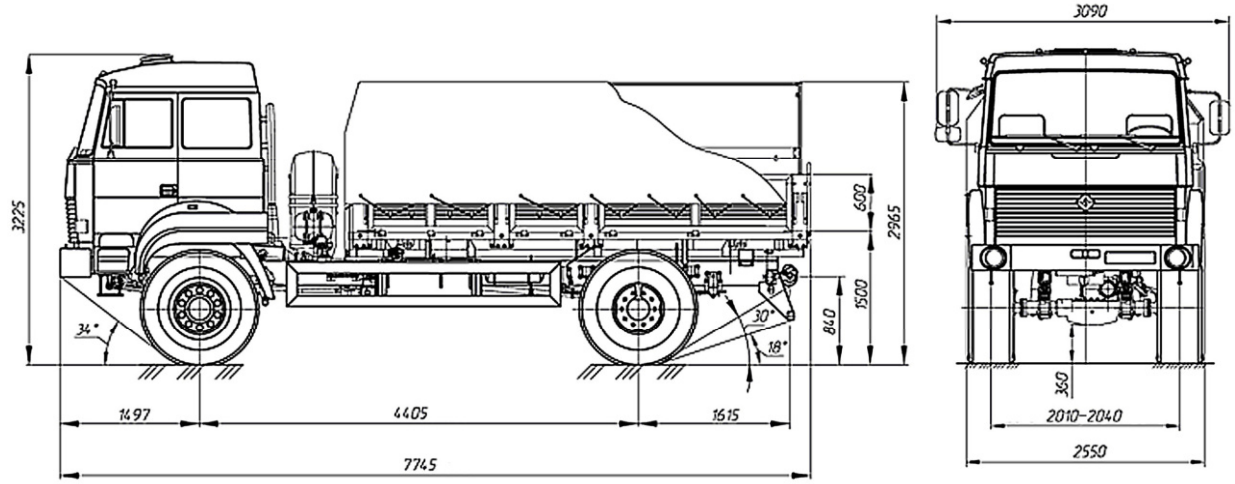


Figure 19 - Truck Ural 43206-3511-79

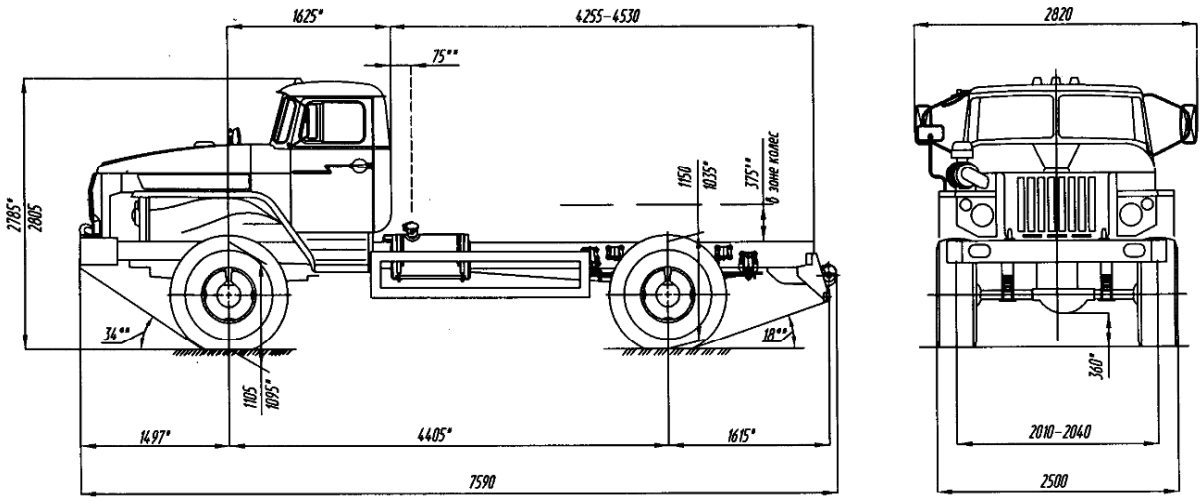


Figure 20 - Chassis Ural 43206-1151-71

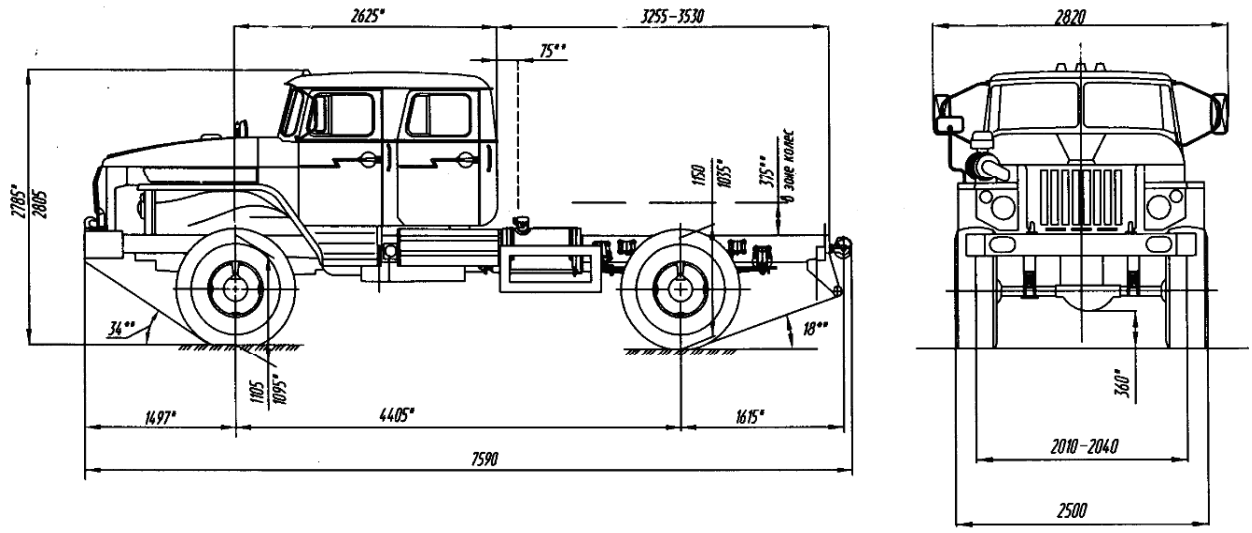


Figure 21 - Chassis Ural 43206-1551-71

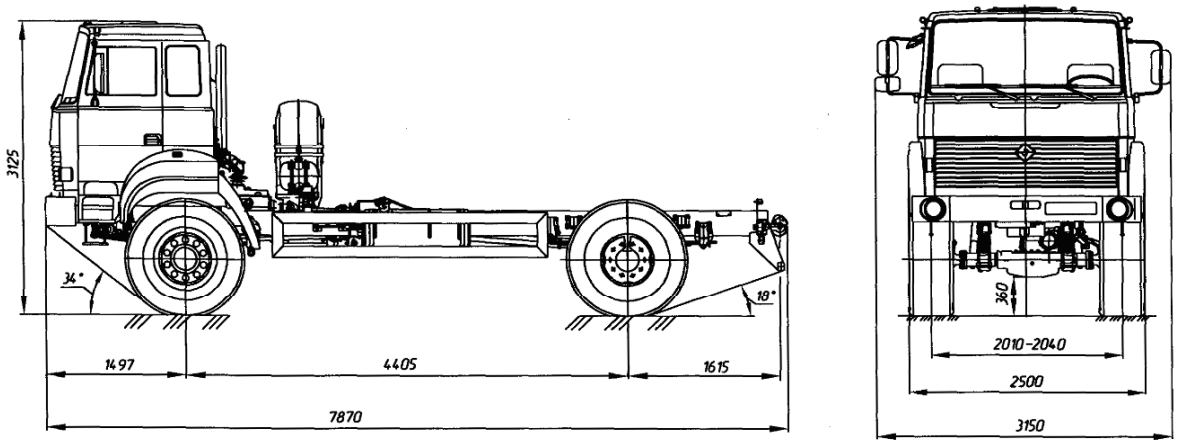


Figure 22 - Chassis Ural 43206-4151-79

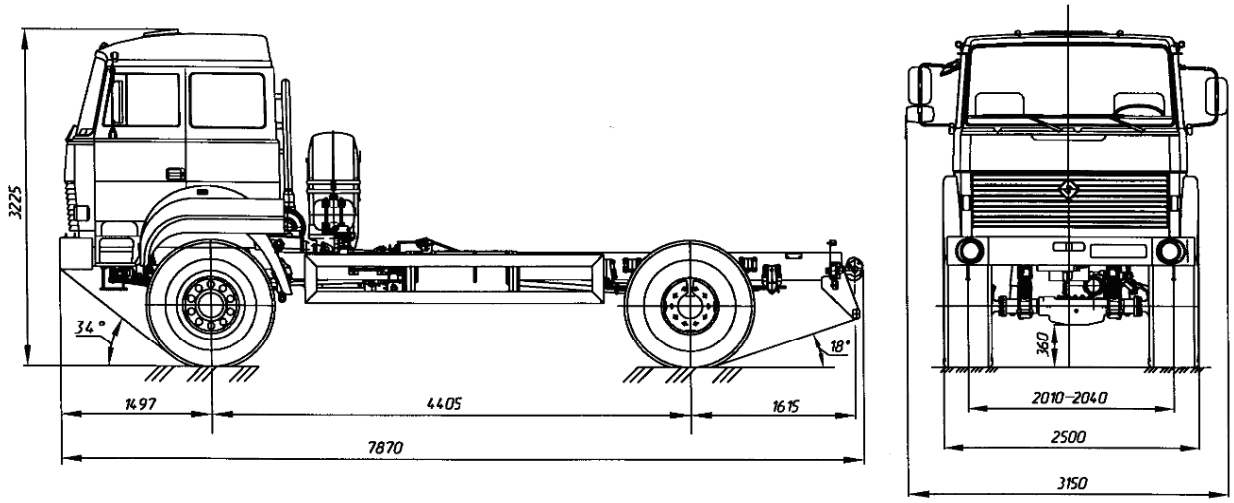


Figure 23 - Chassis Ural 43206-4551-79

The Operation Manual includes base configurations of trucks and chassis. Outside appearance and truck and chassis configurations can differ from the ones shown in figures 3-23.

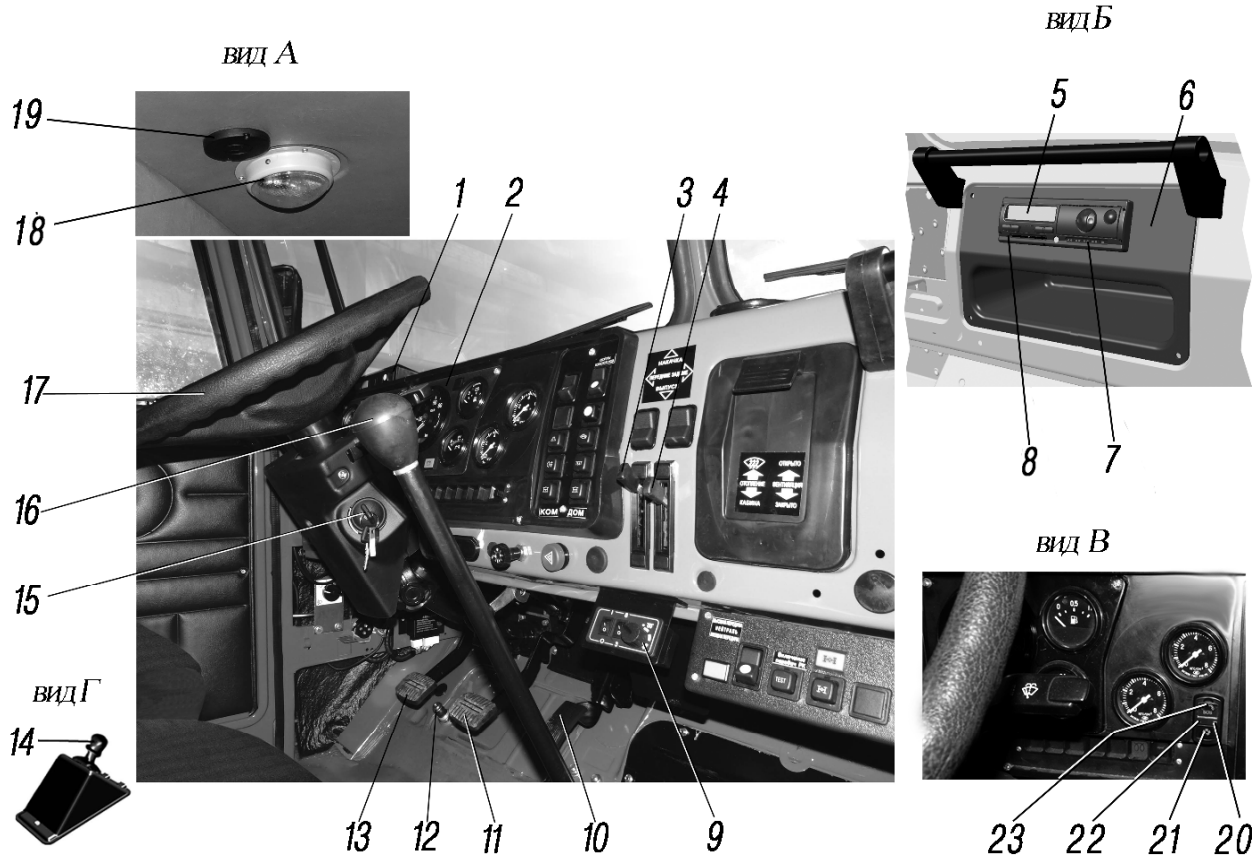
3 Control Tools and Devices

3.1 Control Tools and Instrumentation of Conventional Cab Trucks.

The trucks are equipped with the anti lock brake system (ABS). ABS is tested via switch and indicator located on the switchboard 1 according to figure 24.

When the arm 3 is up (see picture 24) the air comes through deflectors to blow windows, when the arm is down, the air heats driver's and passengers' legs.

When the arm 4 is up the internal hatch is open, when it is down - the hatch is closed.



1- antilock brake system (ABS) board; 2-control panel; 3-drive arm of air heating distribution gate; 4-internal hatch drive arm; 5-tachograph; 6-glove box, 7-reader 2; 8-reader 1; 9-control unit of the engine starting heater; 10-electronic accelerator pedal; 11-brake pedal; 12-secondary brake control button; 13-clutch pedal; 14-parking brake lever; 15-stator and tools switch; 16-gear lever; 17-steering wheel; 18-room light; 19-remote speaker; 20-state indicator; 21-"Service" button; 22-microphone; 23- "SOS" emergency button; view A-speaker is installed on the headlining; view B-tachograph is installed on the glove box panel; view B-parking brake lever is installed on the cab floor between driver's and passenger's seats; view C-user interface unit is installed on the control panel

Figure 24-Truck Control Tools

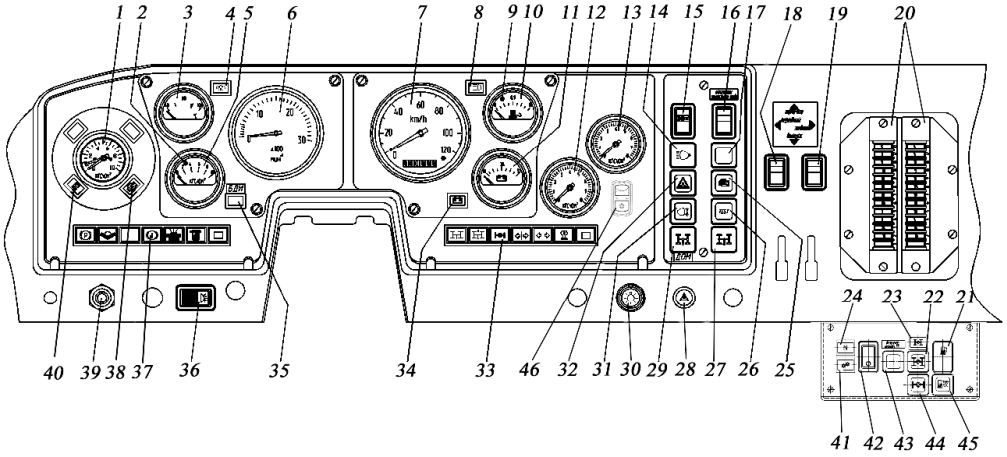
Stator and tools switch 15 is located on the steering mast and has three positions:

0-off, detented position, the key can be taken out;

I-tools are off, detented position, the key cannot be taken out;

II-the stator and tools are on, automatic return to position I, the key cannot be taken out.

The trucks are equipped with the tire pressure control system. A table of tire inflation system to select tire pressure value and speed depending on road type is located inside the cab on the front panel on the left.



1-two-pointer pressure gauge; 2-the cross-axle differential lock indicator; 3-coolant temperature indicator; 4-the air starting heater indicator; 5-oil pressure indicator; 6-electronic tachometer; 7-electronic speedometer; 8-high beam light indicator; 9-fuel reserve indicator; 10-low fuel notification; 11-voltmeter; 12-tire front circuit pressure gauge; 13-tire rear circuit pressure gauge*; 14-searchlight switch*; 15-cab heater mode actuator; 16-engine idle torque actuator; 17-engine idle torque fixation and regulation button; 18-front circuit tire inflation control button*; 19-rear circuit tire inflation control button*; 20-fuse block; 21-fuel selector*; 22-the interaxle differential lock switch; 23-the interaxle differential lock indicator; 24-transfer box N indicator; 25-engine diagnostics control (EDC) switch; 26-engine interface block diagnostics switch; 27-power takeoff switch*; 28-emergency brake light switch; 29-additional power takeoff switch*; 30-central dipswitch control; 31-rear fog beams switch: 32-road-train lights switch*; 33,37-right and left control lamp unit; 34-battery warning; 35-engine interface block diagnostics indicator; 36-master lighting switch; 38-engine diagnostics control (EDC) indicator; 39-batteries switch; 40- “air filter plugged” indicator; 41-transfer box low gear indicator; 42-transfer box gear selector; 43-transfer box gear on button; 44-the cross-axle differential lock switch*; 45-fuel suction heater switch; 46-user interface unit**

Figure 25-Dashboard

*Installed on several modifications.

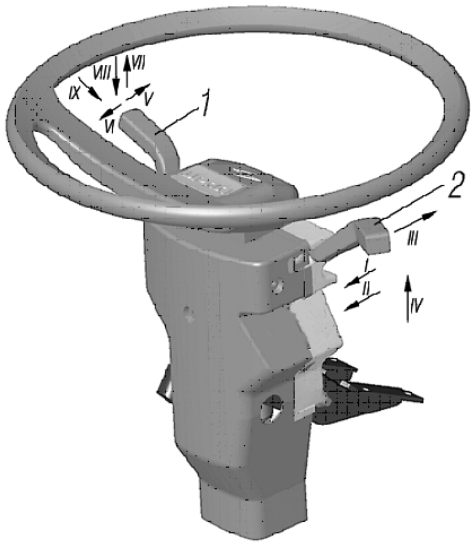
**Installed on the trucks after specification later than 01.01.2017 or on customer’s request.

Tire inflation is controlled by switches 18, 19 and regulated by pressure gauges 12, 13 according to figure 25. The swithes have three positions:

-tire inflation;

-medium-neutral, herein pressure gauges shown actual tire pressure;

-tire deflation.



1-dimmer, direction and horn switch; 2- wind shield wiper/washer switch; I,II,III-wind shield wiper speed selection; IV-wind shield washer switch; V,VI,VII,VIII-direction and dimmer switch; IX-horn on button.

Figure 26 - Shift Paddles Control

Direction and dimmer switch 1 (according to figure 26) has five positions: V-right turn, VI-left turn, VII (up) - high beam light (flashing), VIII (down)-high beam light, IX-horn. Wind shield wiper/washer are switched on with switch 2. Wind shield wiper position: 0-Neutral(off), position I-slow, II-fast, III-with an interval. Wind shield washer IV position (up) - on.

Anti-theft device principle consists in the fact that after the key is taken out from the ignition the lock rod is extended that enters the slot of steering shaft and locks the shaft.

Caution! By turning the steering wheel right and left **make sure that the steering wheel is locked when you took out the key.** If the steering wheel is unlocked at excess force when turning the key from “0” position, swing the steering wheel right and left.

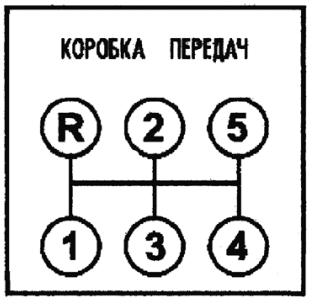
When stator and tools switch 15 is on (see figure 24), emergency oil pressure indicator in the oil pressure gauge 5 flashes red (see figure 25) and it dies out after the engine starts and minimal torque of the engine shaft is achieved.

Central dimmer switch 30 (see figure 25) has three positions:
-on;
-sidelights, herein dashboard lighting is on;
-sidelights and dimlight.
To switch on or off the storage batteries push button 39.

Emergency alarm is switched on by pushing button 28, herein all direction indicators and the lamp in the button start flashing.

The gearbox, transfer box, differential locks, power takeoff, additional power takeoff are switched on according to the tables inside the cab and according to the instructions in paragraph "Truck Driving".

YAMZ 0905 gearbox shifting diagram is shown in figure 27.



1-5-Gears; R-reverse

Figure 27 - Gear Shifting Diagram
for YAMZ-0905 Gearbox

Switch 22 switches on the interaxle differential lock of the transfer box (see figure 25) on the control panel to the right from the driver. Transfer box gears are shifted as follows: with switch 24 (has three detented positions: high gear, neutral, low gear) select the necessary gear, press button 23 during 5...7 seconds and the selected gear is on. The gears are not shifted without pushing button 23.

When turning the stator and tools key to the position I lamps 35 (interface block diagnostics indicator) and 38 (EDC) are flashing (see figure 25), herein the engine interface block and engine diagnostics control are tested). When lamps 35 and 38 fade out, it means that block diagnostics is finished.

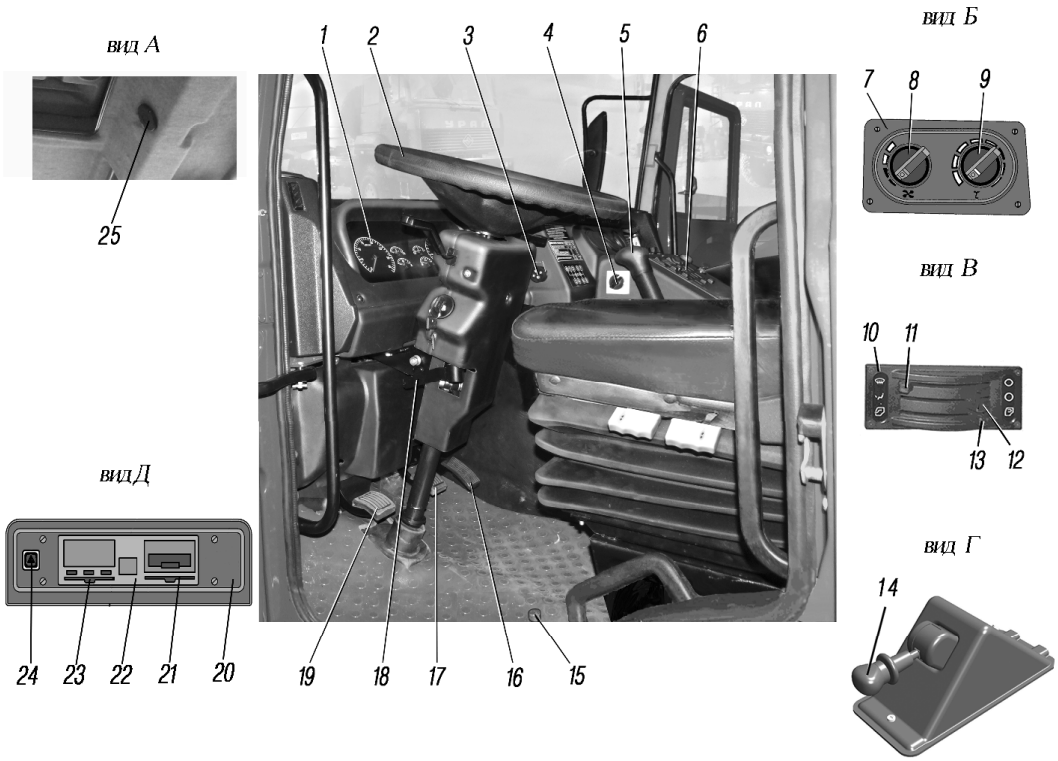
If lamp 35 is still flashing, it means that the engine interface block diagnostics has malfunctions. To diagnose and eliminate the malfunction it is necessary to push switch 26 shortly and read blind codes according to the Operation Manual for "Interface Engine Block".

If lamp 38 is still flashing, it means that EDC has malfunctions. To diagnose and eliminate the malfunction it is necessary to push switch 25 shortly and read blind codes according to the Operation Manual for "YAMZ-53622-10, YAMZ-53642-10, YAMZ-53602-10 Engines".

3.2 Control Tools and Instrumentation of Cabover Trucks

The truck can have assembly units ans systems differing from the ones described herein. Description of their structural features and maintenance peculiarities is given below.

Control tools and instruments located in the cab are shown in figure 28.



1-Combination of devices; 2-steering wheel; 3-24V jack; 4-headlamp corrector joystick; 5-gear lever; 6-switches panel; 7-heater control unit; 8-heater fan switch; 9-heater electric valve regulator; 10-cab heating distribution control unit; 11-wind shield defrost regulator; 12-driver's and passenger's legs heating regulator; 13-inside air circulation lever; 14-parking brake lever; 15-secondary brake control button; 16-electronic accelerator pedal; 17-brake pedal; 18-steering mast fixation joystick; 19-clutch pedal; 20-radio panel; 21-reader 2; 22-tachograph; 23-reader 1; 24-road-train sign switch; 25-remote speaker; view A-speaker is installed on the headlining; view B-heater control unit is installed on the dashboard; view C-cab heating distribution regulator is installed on the dashboard; view D-parking brake lever is installed on the engine compartment to the right of the driver; view E-tachograph is installed on the radio panel

Figure 28 Control Tools and Devices

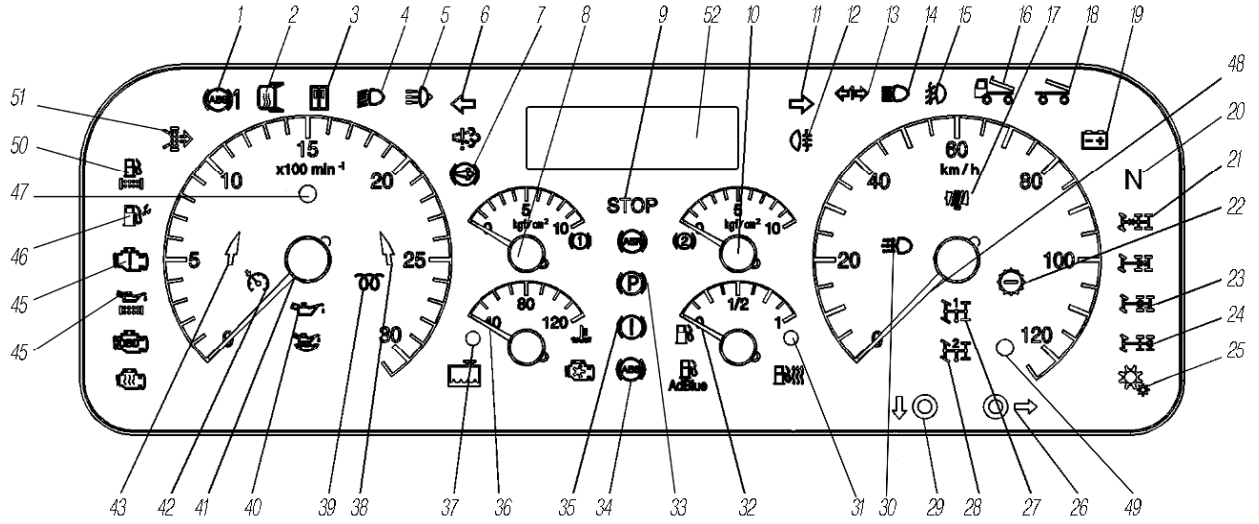
A table to select tire pressure value and speed depending on road type is located inside the cab.

When turning lever handle 14 up until fixed parking brake system is actuated – position BRAKED. To release the brake pull the valve handle from the fixed position and turn down against the stop - position RELEASED.

When pushing button 15 secondary brake is actuated, when the button is released braking is stopped.

Height and angle of the steering mast can be adjusted by handle 18. To change the position of the steering mast pull handle 18, position the mast as required and, holding it, return the handle in its initial position.

Shift paddles control is shown in figure 26 and is similar to the one described for conventional cab truck.



1- “trailer ABS” indicator; 2- “rear window defrost” indicator*; 3- “passenger door open” indicator; 4- “dimlight” indicator; 5- “searchlight” indicator*; 6- “tractor left turn” indicator; 7- “exhaust gases braking”; 8-first circuit pneumatic air pressure indicator; 9- “STOP” indicator; 10- second circuit pneumatic air pressure indicator; 11- “right turn” indicator; 12- “rear fog beams” indicator; 13- “trailer turn” indicator; 14- “high beam light” indicator; 15- “fog beams” indicator; 16- “flat body tipping” indicator; 17- “winch” indicator; 18- “trailer flat body tipping” indicator; 19- “battery warning” indicator; 20- “Neutral” indicator; 21- “the interaxle differential lock” indicator; 22- “low gear of the transfer box” indicator; 23- “the cross-axle differential lock of middle axle” indicator*; 24- the cross-axle differential lock of rear axle” indicator*; 25- “auxiliary transmission” indicator; 26- Kn2 control button; 27- “power takeoff” indicator*; 28- “additional power takeoff” indicator; 29- Kn1 control button; 30- “daytime running lights” indicator*; 31- “fuel reserve” indicator; 32- fuel gauge; 33- “parking brake” indicator; 34- “tractor ABS” indicator; 35- “brake system malfunction” indicator; 36- temperature indicator; 37- “emergency coolant temperature” indicator; 38- “fast rpm” indicator; 39- “electric torch” indicator; 40- “emergency oil pressure” indicator; 41- tachometer; 42- “cruise control” indicator; 43- “reduced rpm” indicator; 44- “oil filter blocked” indicator; 45- “engine malfunction” indicator; 46- “water in fuel” indicator; 47- “optimal rpm” indicator; 48- speedometer; 49- “high speed” indicator; 50- “fuel filter blocked” indicator; 51- “air filter blocked” indicator; 52- screen

Figure 29 - Combination of Devices

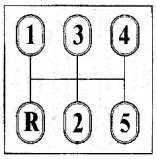
*Installed on customer’s request

Switch on the gearbox as shown in figures 30 or 31



1,2,3,4,5,6,7,8-gears; R-reverse;

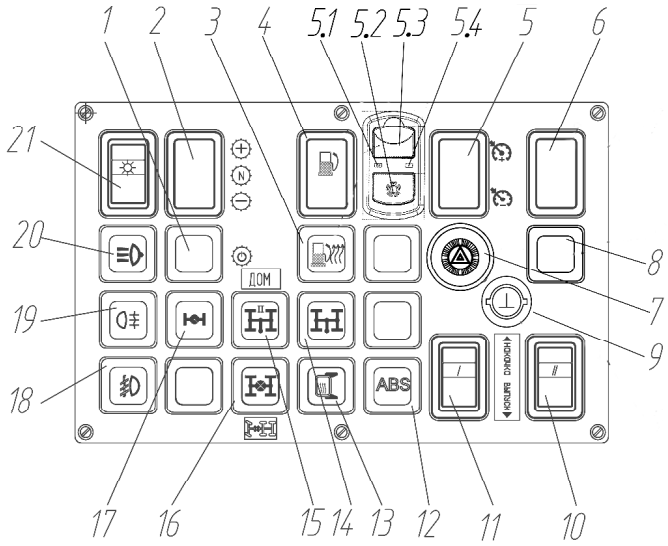
Figure 30 - Gear Shifting Diagram for ZF9S1310 and FG9JS135 Gearboxes



1-5-Gears; R-reverse;

Figure 31 - Gear Shifting Diagram for YAMZ 0905 and YAMZ 1105 Gearboxes

Instrumentation and indicators located in the combination of devices are shown in figure 29. Switches and selectors are shown in figure 32.



1-transfer box gear on button; 2-transfer box gear selection; 3-in-line fuel standpipe hating switch; 4-fuel selector*; 5.1-microphone**; 5.2- “service” button; 5.3 - “SOS” emergency button**; 5.4-state indicator**; 5-truck platform lifting indicator; 6-rpm selector; 7-emergency alarm switch; 8-rpm switch; 9-batteries switch; 10-rear circuit tire inflation switch; 11-front circuit tire inflation switch; 12-ABS test switch; 13-outside mirrors heating switch; 14-power takeoff switch*; 15-additional power takeoff switch*; 16-the interaxle differential lock of transfer box switch; 17-the cross-axle differential lock switch*; 18-front fog beams switch*; 19-rear fog beams switch; 20-searchlight switch; 21-external light selector

Figure 32 - Switches Board

*Installed on customer’s request

**Installed on the trucks after specification later than 01.01.2017 or on customer’s request.

To switch on or off the storage batteries press button 9 (see figure 32) located on the switches board.

Emergency alarm is actuated by pressing button 5, herein all direction indicators, lamp in the switch, indicators 6, 11 (see figure 29) and indicator 13 (if a trailer is connected) start flashing.

Sidelights, panel lighting and headlights are switched on by selector 21 according to figure 32:

- sidelights and panel lighting are switched on in position 1;
- headlights and indicator 4 (for dimlights) or 14 (for high beams) are switched on in position 2 according to figure 29;

Rear fog lights are on after switching headlights with switch 19 (see figure 32), herein indicator 12 is flashing (see figure 29).

To actuate the locks press the interaxle differential lock 16 first (see figure 32), then press press the cross-axle differential lock switch 15. Indicator lights 21, 23, 24 (see figure 29) should flash on and stay flashing while the differentials are locked. If the locks are switched and the differential are not locked and indicator lights are not flashing, move the truck from a standstill smoothly and wait until the differentials are locked and the indicators are on.

Low gear and neutral of the transfer box are switched on by selector 2 and switch 1 (see figure 32), when low gear is actuated indicator 22 starts flashing (see figure 29). Detailed description of gear shfting read in paragraph “Transfer Box” hereof.

The tachograph 5 (see figure 24) and the tachograph 22 (see figure 28) are installed on the truck (except chassis). Construction description and operation and maintenance instructions are given in the attached Tachograph Installation and Operation Manual.

3.3 Subscription Station

The trucks are equipped with subscription station dedicated for manual emergency operator call, transfer of minimum information describing the truck, its location coordinates, time and direction, severity of accident, as well as load speaking of the truck user with “ERA-GLONASS” (Russian state system of emergency response operation) state federal system operator.

The appearance of user interface unit in the cab is shown in figures 24 and 32. User interface unit consists of “service” button 21 (see figure 24) and 5.2 (see figure 32) with highlighting, it is used to go to test mode and to exit “Emergency call” mode initiated in manual mode. The “Microphone” button 22 (see figure 24) and 5.1 (see figure 32). The “State indicator” button 20 (see figure 24) and 5.4 (see figure 32). The “SOS” emergency button - 23 (see figure 24) and 5.3 (see figure 32).

The user interface unit switches on automatically when power supply is on.

3.3.1 Subscription Station has the following operation modes:

- “OFF” mode;
- “ERA” mode;
- “Emergency call” mode;
- test mode.

“**OFF**” **mode.**

The subscription station is in “OFF” mode when the ignition is on. Exit from “OFF” mode is done when the ignition is cut off. Switch to “OFF” mode from other modes is done when reserve battery is discharged.

“**ERA**” **mode.**

The subscription station in “ERA” mode is tracking and recording truck parameters and reacts to control commands of the user.

“**Emergency call**” **mode.**

“Emergency call” mode is dedicated to make a voice contact of the truck user with call centre operator and to transfer minimum information. “Emergency call” procedure should be initiated manually by pressing “SOS” button.

To exit “Emergency call” mode initiated manually, press “service” button; emergency call will be terminated at any stage of redial or established call.

Test mode.

Test mode is dedicated to check functioning of truck communication system by “ERA GLONASS” system operator.

To enter test mode simultaneously press and hold buttons “service” and “SOS” for 10 seconds.

In test mode user interface unit state indicator will be flashing yellow, “service” button will be lighted green and “SOS” button will be red.

To perform test follow voice prompts. Exit from the test mode is done:

-after transfer of minimum information with test results to the system operator;

-if external power supply is switched off;

-If the vehicle is too far from the point of test mode switch (distance is specified in the poduct settings).

3.3.2 Indication of the Subscription Station Operation Modes

To indicate the product operation user interface unit state indicator is used.

When power is supplied to the product, the indicator is flashing red during five seconds, if the radio station is properly functioning and self-testing is successful, the indicator fades out and the radio station starts standard operation.

If any malfunction of installed components is detected during the self-testing, the radio station indicates need for service.

Possible indications of user interface unit state are given in Table 10.

Table 10 - State Indication of User Interface Unit

User interface unit state	“SOS” button light (white/red)	“Service” button light (white/yellow)	Indicator state
Indication (switching on)	White	White	Red is on for five sec, then green flashes
“ERA” mode	White	White	Green flashes
“Emergency call” mode	Red	White	Green is on
Test mode	Red	Yellow	Yellow is on
Malfunction, internal storage is full	White	White	Red is on
Emergency call is impossible	White	White	Red is on
Redial in “Emergency call” mode	Red is flashing	White	Green is on
Transfer of minimum information in “Emergency call” mode	Red is flashing	White	Green is on
Voice connection in “Emergency call” mode	Red is on	White	Green is on
Reserve battery is discharged below set parameter	White	White	Yellow is flashing
No GLONASS/GPS signals	White	White	Yellow is on
No GPS signals	White	White	Red is on

If the system detected any malfunction of installed components, contact your regional service centre (read www.santel-navi.ru).

4 Truck Components' Structure and Operation Description, their Adjustment and Maintenance

4.1 Engine

An engine of Yaroslavl Engine Plant is installed to the truck. Engine construction description and operation and maintenance instructions are given in the attached Engine Installation and Operation Manual of Yaroslavl Engine Plant.

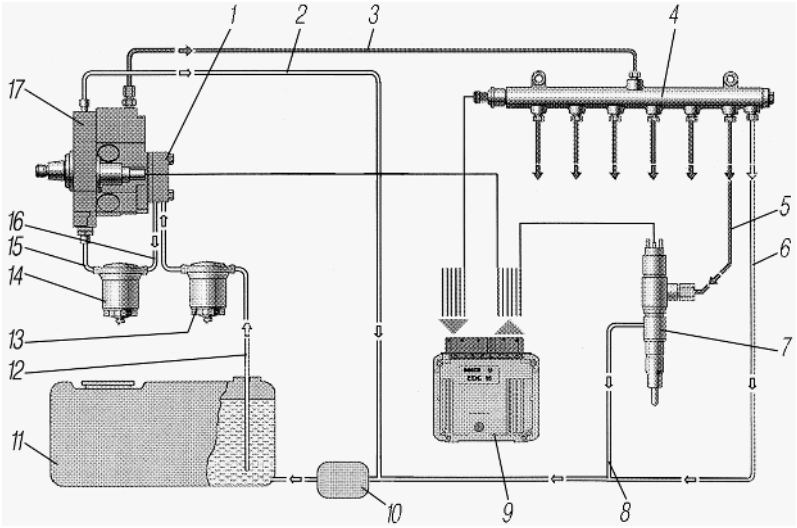
4.1.1 Feed System

4.1.1.1 Fuel Feed System Fuel from the main fuel tank 11 (see figure 33) is sucked by the fuel feed pump 1, and through coarse filter 13 and fine filter 14 it goes to high-pressure fuel pump 17. From the fuel pump fuel is fed under pressure to the common bank (rail) 4 and further on to discharge nozzles that inject fuel to cylinders. The injection is regulated by the engine electronic control unit. Excess fuel and air entered the system are exhausted through fuel lines to the fuel tank.

Fuel quantity in the main fuel tank is measured by electric level transmitter installed in the tank, and is controlled by the indicator on the dashboard.

Fuel tank is located on the left on the frame girder.

When the engine is started the hand-priming pump is used to pump fuel, it is installed in the PreLine-270 fuel coarse filter. To feed fuel to the high-pressure pump 17 when the engine is not running (after a long-term parking or dismantling of feed system fuel lines), fill the feed system by pressing the hand-priming pump button 2 as shown in figure 34.



1-Low-pressure fuel feed pump; 2,6,8-drain line fuel lines; 3,5-high-pressure fuel lines; 4-bank (rail); 7-discharge nozzle (6 pcs); 9-electronic control unit; 10-heater tank; 11-fuel tank; 12,15,16-low-pressure fuel lines; 13-fuel coarse filter; 14-fuel fine filter; 17-high-pressure fuel pump

Figure 33 - Engine Feed System Layout

PreLine-270 **fuel coarse filter** is installed on the fuel tank front support.

The order of filling fuel to the feed system:

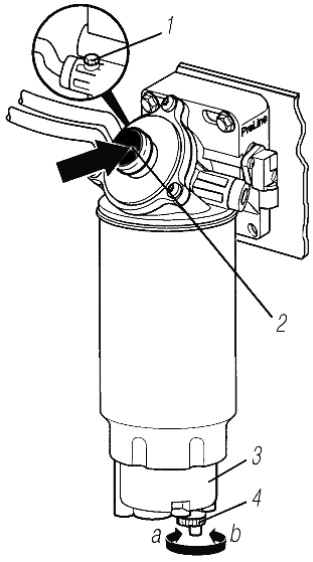
- open the screw plug of the vent hole 1 as shown in figure 34;
- use manual fuel feed pump 2 to pump fuel. Pump until air stops coming from the screw plug of the vent hole 1;
- fasten the screw plug of the vent hole 1 with a torque M_t=6±1 Nm.

Water discharge. Water should be discharged when the catch basin is full or when the replaceable filter element is changed.

Freezing Danger. Discharge water before possible freezing.

When discharging water from the fuel coarse filter:

- switch off the engine to avoid air entering the fuel system;
- unscrew the screw plug of the drain hole 4 on the bottom of the catch basin 3 and let the water flow;
- screw the screw plug of the drain hole 4 again.



1-vent hole plug; 2-manual fuel feed pump; 3-water catch basin; 4-drain hole plug; a-opening; b-closing

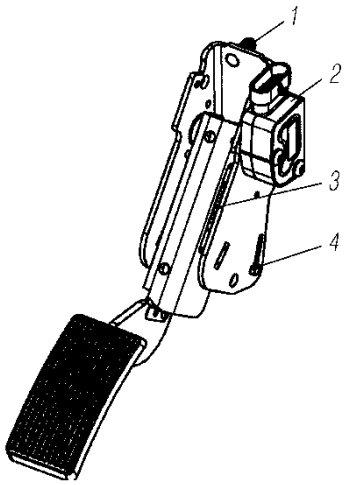
Figure 34 - Fuel Coarse Filter

Filter replacement:

- switch off the engine;
- dismantle the old replaceable filter. The old replaceable filter can be set tight on the filter head. Use the appropriate tools.
- oil the gasket in the new filter with some engine oil drops;
- screw the filter manually until the gasket is tightly adjacent.
- fasten manually so that the filter was tight (approximately 3/4 torque);
- unscrew the screw plug of the drain hole 1;
- use manual fuel feed pump 2 to pump fuel. Pump until air stops coming from the screw plug of the vent hole 1.
- fasten the screw plug of the vent hole 1 with a torque 6±1 Nm.

Electronic throttle pedal is shown in figure 35. The pedal has right sensor 2 which provides signal to the engine fuel system pro-rata angular pedal motion.

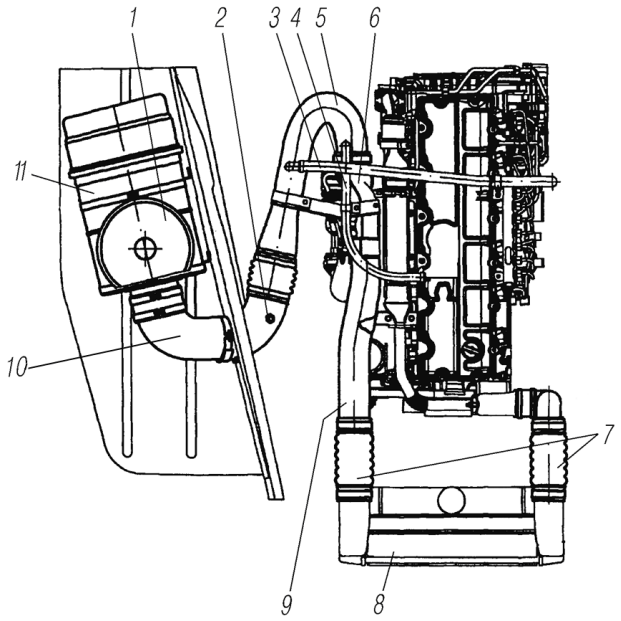
To fix the pedal there are two pins 1. Pedal spring 3 returns the pedal to its initial position. Pedal motion angle at engine idle is 18º. Pedal motion is restricted by the bumper 4.



1-Pins; 2-pedal sensor; 3-return spring; 4-bumper

Figure 35 - Electronic Throttle Pedal

4.1.1.2 Engine Air Feed System for the Conventional Cab Trucks is shown in figure 36, it is dedicated for air intake and air cleaning before feeding it to the engine. It consists of two-stage dry-type air filter, intake pipes, connection hoses and fasteners.



1-Air intake tube; 2-clogging sensor; 3,4-chutes; 5,9-air ducts; 6-turbocharger; 7-connection hoses with rings; 8-inlet air cooler; 10-air duct from filter; 11-air filter

Figure 36 - Air Feed System for the Engine

Air filter is installed on the right wing and fixed with brackets and clamps. Air intake tube is fixed on the filter.

Air is fed to the air filter through air intake tube 1 according to figure 36. The air entering the filter 11 and going through the inertial grid starts rotating in the ring gap between the casing and the filtering element, due to centrifugal force dust particles are thrown to the casing wall and collected in the hoper through the partition opening. Then the cleaned air goes through the filtering element where it is finally cleaned. The clean air goes to the turbocharger 6 from the air filter through the air ducts 10,5. From the turbocharger the air is pumped through the air duct 9 to the inlet air cooler 8, where it is cooled and then goes to the engine cylinders. The air feed system has a chute 4 to discharge crankcase fumes from the engine and a chute 3 to supply air to pneumatic compressor.

To increase air cleaning efficiency entering the engine and to prolong life of the filtering element pre-cleaner is installed to the air cleaner.

The air filter first stage is maintained periodically basing on the truck operation condition. Air filter maintenance necessity is defined by the clogging indicator located on the dashboard. When the indicator is on (the clogging sensor 2 is actuated), maintain the air filter.

To maintain the first stage disconnect the air ducts, remove cover, unfasten the fastener, remove carton filtering element, remove the air filter, remove dust from the hoper lid. Clean the casing and the cover in diesel fuel or in hot water, air with compressed air and dry.

Inspect the filtering element. Dust on the internals of the filtering element proves that the filtering element and the sealing gaskets are not tight, replace the filtering element.

Seal quality is checked by integrity of its impression on the gasket.

To maintain the filtering element, remove the pre-cleaner and clean it from dust by shaking or airing it. If there is dust without soot and smoke on the carton (the filtering element is grey), air it with dry compressed air until dust is completely removed. To avoid carton damage compressed air pressure should not exceed 200-300 kPa (2-3 kgf/cm^2). Direct air blow at the angle to the surface, regulate blow force by changing the distance between the hose and the element.

If there is soot, oil, fuel on the carton or if air blowing does not help, replace it or clean the element in warm water (40-50 °C) with detergent (e.g. laundry powder) diluted: 20-25 g of detergent for 1 l of water. Clean the element immersing it in the solution for half an hour and then rotate it intensely or dip it in the solution during 10-15 minutes. After cleaning in the solution rinse the filtering element in clean warm water and dry it. It is forbidden to dry it on open flame or with hot air (over 70 °C).

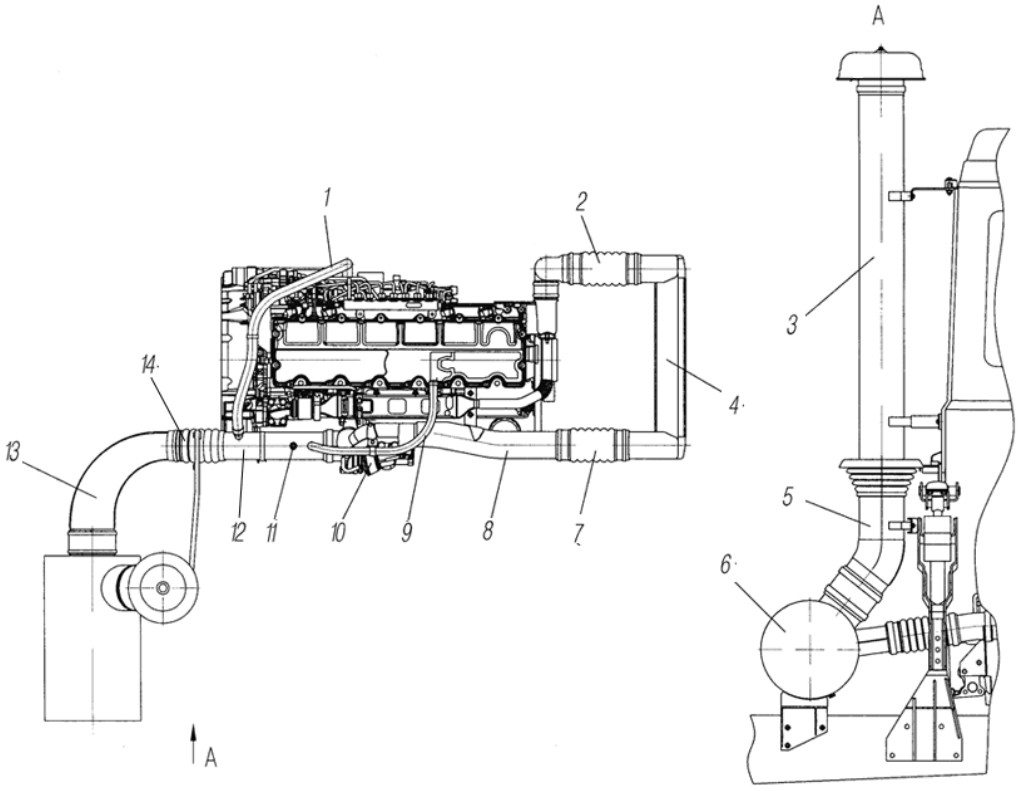
After each maintenance or when a new filtering element is installed, check it visually lighting it from the inside.

Replace the filtering element if it is damaged, if carton goffer is broken, if carton is peeling off, if sealing gaskets are torn.

Approximate life of carton filtering element is 30 000 km. Too intense cleaning of the filtering element reduces its life, because the total number of element maintenance is restricted (5-7 times, max. 3 washings including) as the carton can be ruined.

Inspect connection rubber crinkled and smooth chutes periodically. If defects such as cracks, cuts, tears and etc. are detected, replace them.

4.1.1.3 Engine Air Feed System for the Cabover Trucks is shown in figure 37



1-Chute to the compressor; 2,7,14-connection hoses with rings; 3-air intake tube; 4-inlet air cooler; 5-branch; 6-air filter; 8,13-air ducts; 9-crankcase fumes vent chute; 10-turbocharger; 11-clogging sensor; 12-air duct to the turbocharger

Figure 37 - Air Feed System for the Engine

4.1.2 The Engine Starting Heater System is shown in figure 38

The truck is equipped with the automatic engine starting heater 2 (see figure 38) dedicated for engine and cab heating. Heater's construction and application instructions as well as possible malfunctions are described in the attached Operation Manual for the heater.

The engine starting heater system provides the following modes:

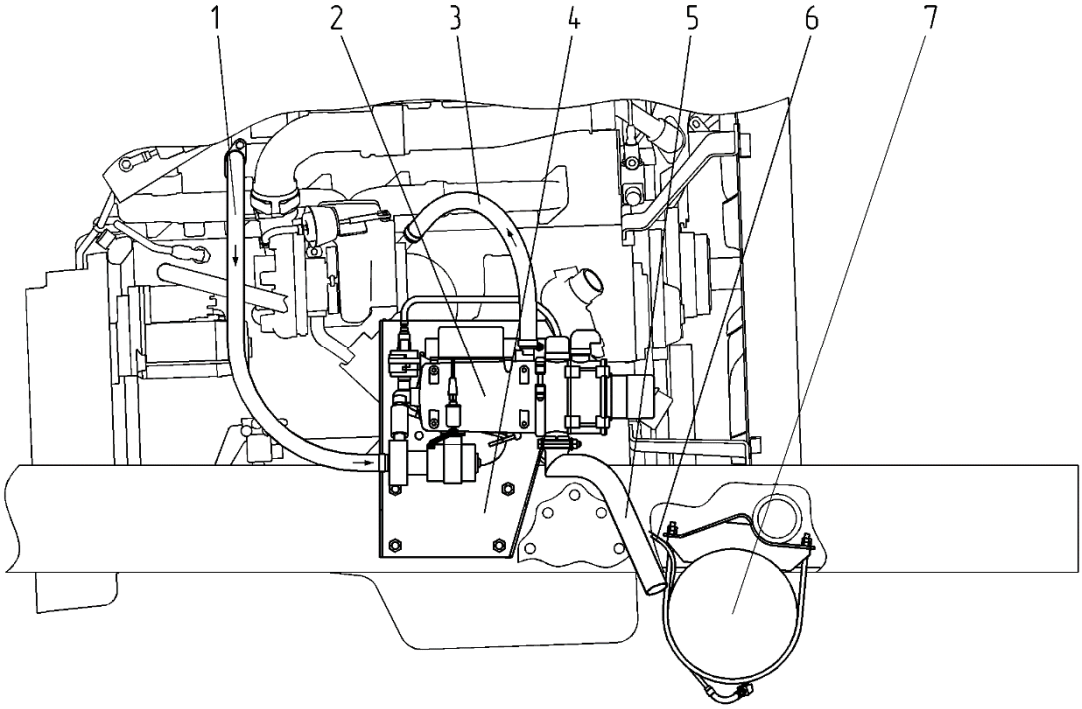
I - engine starting heating (heater valve is closed);

II - common operation of the engine and the heater (heater valve is open);

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III - stand-by mode - maintaining the engine temperature and cab heating during long-term parking (heater valve is open).

When the truck is parked for a long term, stop the engine, switch on the heater, turn the cab fan thermal regulator handle on the heater remote control to the proper position (cab heater switch should be “OFF”).



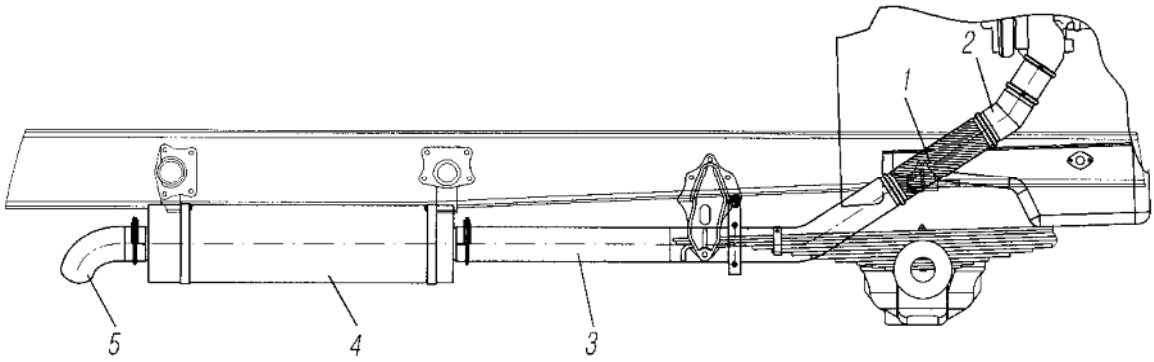
1-engine fluid outlet hose; 2-engine starting heater; 3-engine fluid inlet hose; 4-heater bracket; 5-heater exhaust pipe; 6-fuel line; 7-heater fuel tank

Figure 38 - Engine Starting Heater System

4.1.3 Gas Exhaust System

Gas exhaust system is dedicated to discharge emissions and to reduce exhaust noise.

The exhaust system uses wear-resistant secondary brake (installed into the engine) that is connected with metal pipe 1 by the outlet pipe 2 (see figure 39). Metal pipe 1 aims to compensate temperature changes of part dimensions and mutual movement of the engine and the muffler. The muffler 4 is fixed by the brackets welded to the frame cross members. End of the muffler outlet pipe 5 is directed to the truck base.



1-Metal pipe with flanges; 2-discharge branch; 3-muffler headpipe; 4-exhaust muffler; 5-oulet pipe

Figure 39 - Gas Exhaust System

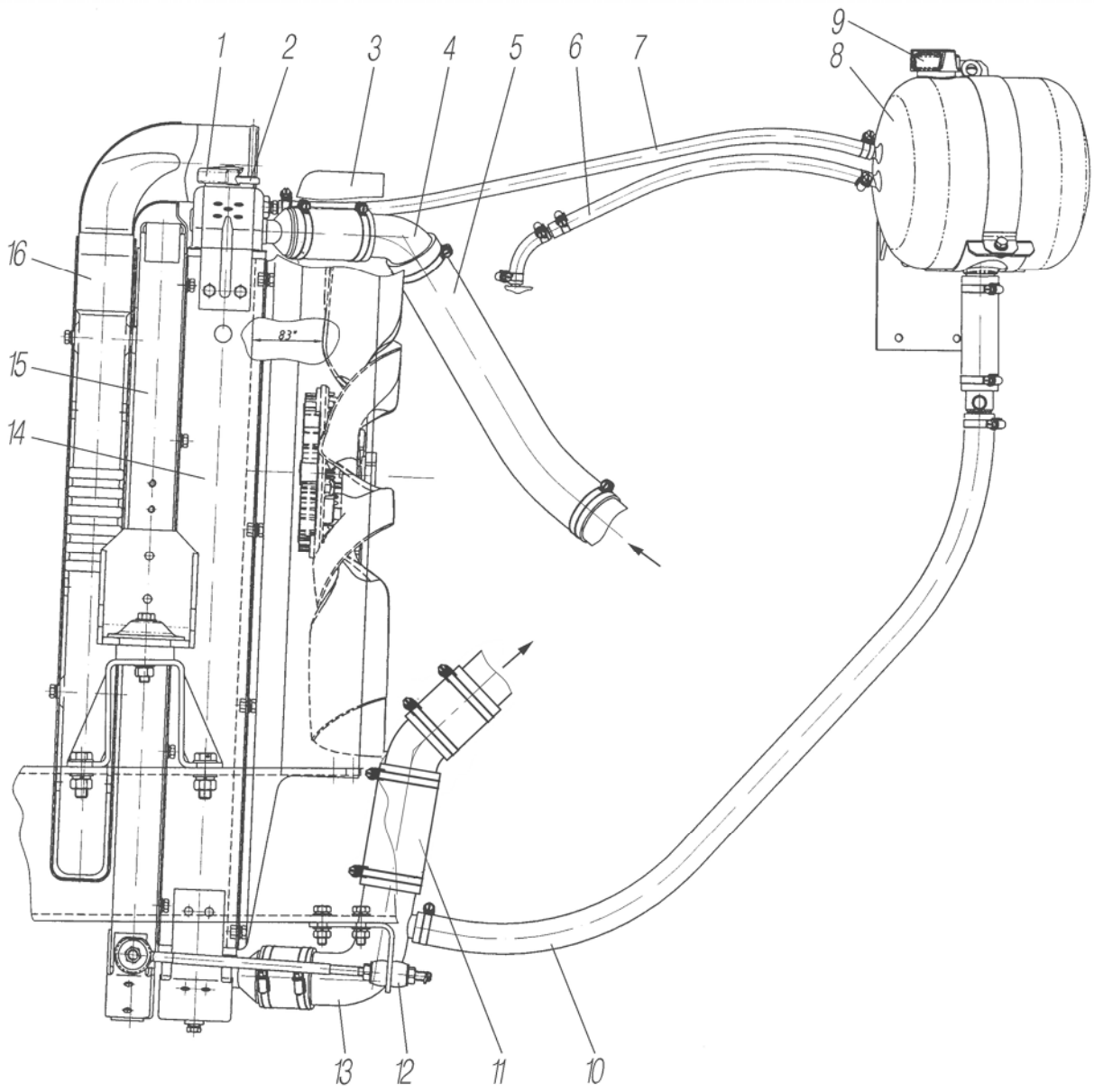
4.1.4 Cooling System

The cooling system is dedicated to ensure optimal and stable engine temperature in any operation mode by forced heat elimination from its parts.

The cooling system automatically ensures normal thermal condition of the engine operation in the pre-set operation conditions within full range of speed and load modes.

The engine cooling system is liquid, closed, with the installed viscous fan clutch, actuated on incoming air temperature, with forced coolant circulation; it is designed for all-season application of antifreeze solutions. For conventional cab trucks it is shown in figure 40 and for cabover trucks it is shown in figure 41.

Radiator14 (see figure 40) and radiator 10 (see figure 41) is tube-belt-type, tree-row, with a filler neck. The filler neck 2 (see figure 40) and the filler neck 8 (see figure 41) has a leak-proof plug 1 (see figure 40) and plug 9 (see figure 41). The bottom radiator tank has a drain plug. For conventional cab trucks the radiator is installed on the frame 15 (see figure 40) being a carrier. Casing 3 and casing 15 (see figure 41) is installed on the radiator.



1-radiator cap; 2-radiator filler neck; 3-fan casing; 4-water outlet connection; 5-outlet chute; 6-engine steam outlet chute; 7-radiator steam outlet chute; 8-reserve tank; 9-reserve tank cap; 10-water inlet pipe to the engine water pump; 11-water inlet pipe; 12-radiator rod; 13-water inlet connection; 14-radiator; 15-radiator suspension frame; 16-charged air cooler

Figure 40 - Cooling System

The reserve tank 8 (see figure 40) and the reserve tank 2 (see figure 41) is dedicated for coolant volume compensation at heating, for air and steam from the coolant removal. The cap 9 (see figure 40) and the cap 1 (see figure 41) of the reserve tank has two valves. Draining valve opens at excess pressure in the system 65 kPa (0.65 kgf/cm^2) and blows excess steam off to the ambient air. Draining valve opens at negative system pressure of 1.0-1.2 kPa (0.01-0.012 kgf/cm^2).

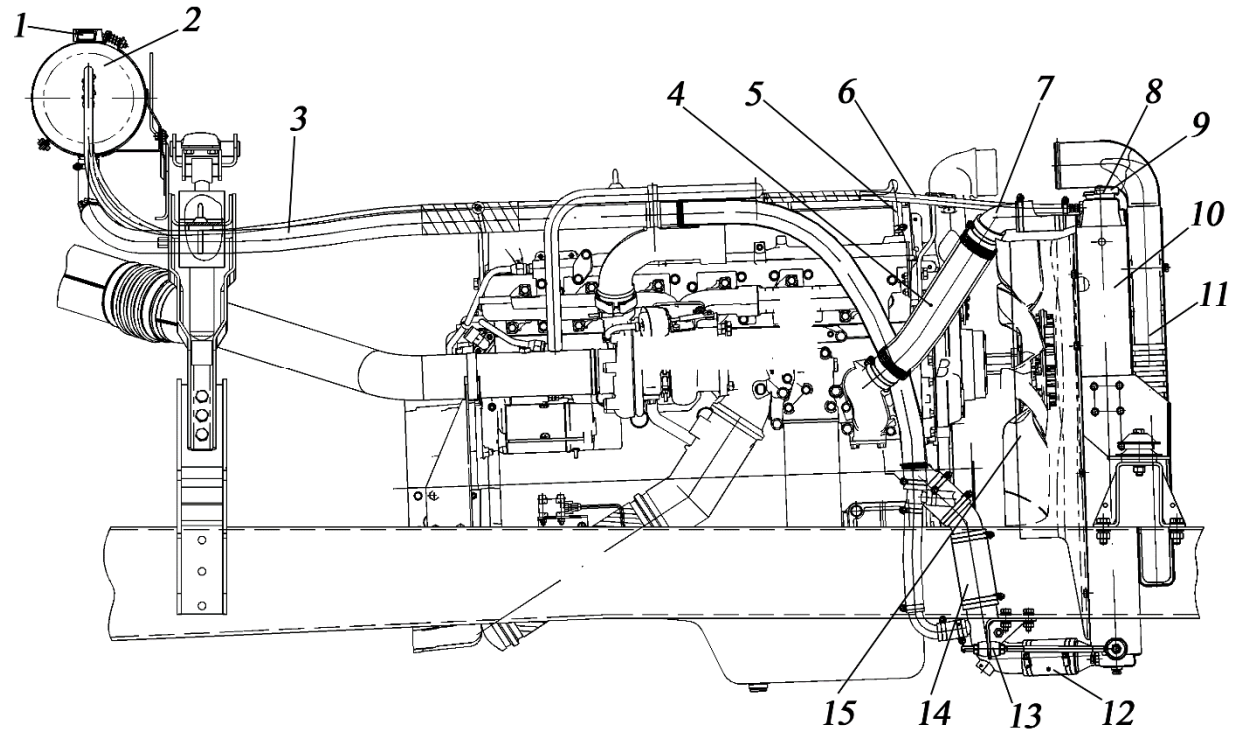
4.1.4.1 Cooling System for the Conventional Cab Trucks is shown in figure 40.

Before filling the engine cooling system open the hood, pour coolant through the radiator neck until the lower edge of the neck while the cab heating system valve is open. Start the engine for 1-2 minutes to evacuate air from the system. After engine stop add the coolant up to the lower edge of the neck if necessary and close the cap tightly. Then add coolant through the reserve tank neck up to “MAX” mark on the tank surface, and close the cap tightly.

Operation of the truck without reserve tan cap is forbidden!

For visual inspection the reserve tank is made transparent.

4.1.4.2 Cooling System for the Cabover Trucks is shown in figure 41



1-reserve tank cap; 2-reserve tank; 3-water inlet connection to the engine water pump; 4-outlet chute; 5-engine steam outlet chute; 6-radiator steam outlet chute; 7-water outlet connection; 8-radiator filler neck; 9-radiator cap; 10-radiator; 11-charged air cooler; 12-water feeding connection; 13-radiator rod; 14-water feeding pipe; 15-casing

Figure 41 - Cooling System

Before filling the engine cooling system lift the cab, pour coolant through the radiator neck until the lower edge of the neck while the cab heating system valve is open. Lower down the cab, start the engine for 1-2 minutes to evacuate air from the system.

After engine stop list the cab, add the coolant up to the lower edge of the neck if necessary and close the cap tightly. Lower down the cab, add coolant through the reserve tank neck up to “MIN” mark (on the tank surface) while the cab eating system valve is open. Start the engine for 1-2 minutes to evacuate air from the system.

After engine stop add coolant to the reserve tank if necessary. Coolant level should be between “MIN” and “MAX” marks.

Coolant system temperature is controlled by the sensor installed on the engine. When cooling system temperature rises above 100 °C, coolant overheating indicator flashes on. Herein temperature increase up to 105 °C (for maximum 10 minutes) is allowed, and the truck can move further with strict temperature control. If the temperature is not lowering, find the cause of engine overheating and eliminate it.

To drain the coolant from the cooling system put the truck on a horizontal platform or forward declined, and unscrew the plug located on the bottom radiator tank, open cab heater and heater boiler valves.

Herein filler neck reserve tank cap should be open. Undrainable coolant volume at opened cab heater valve should be approximately 2 litres.

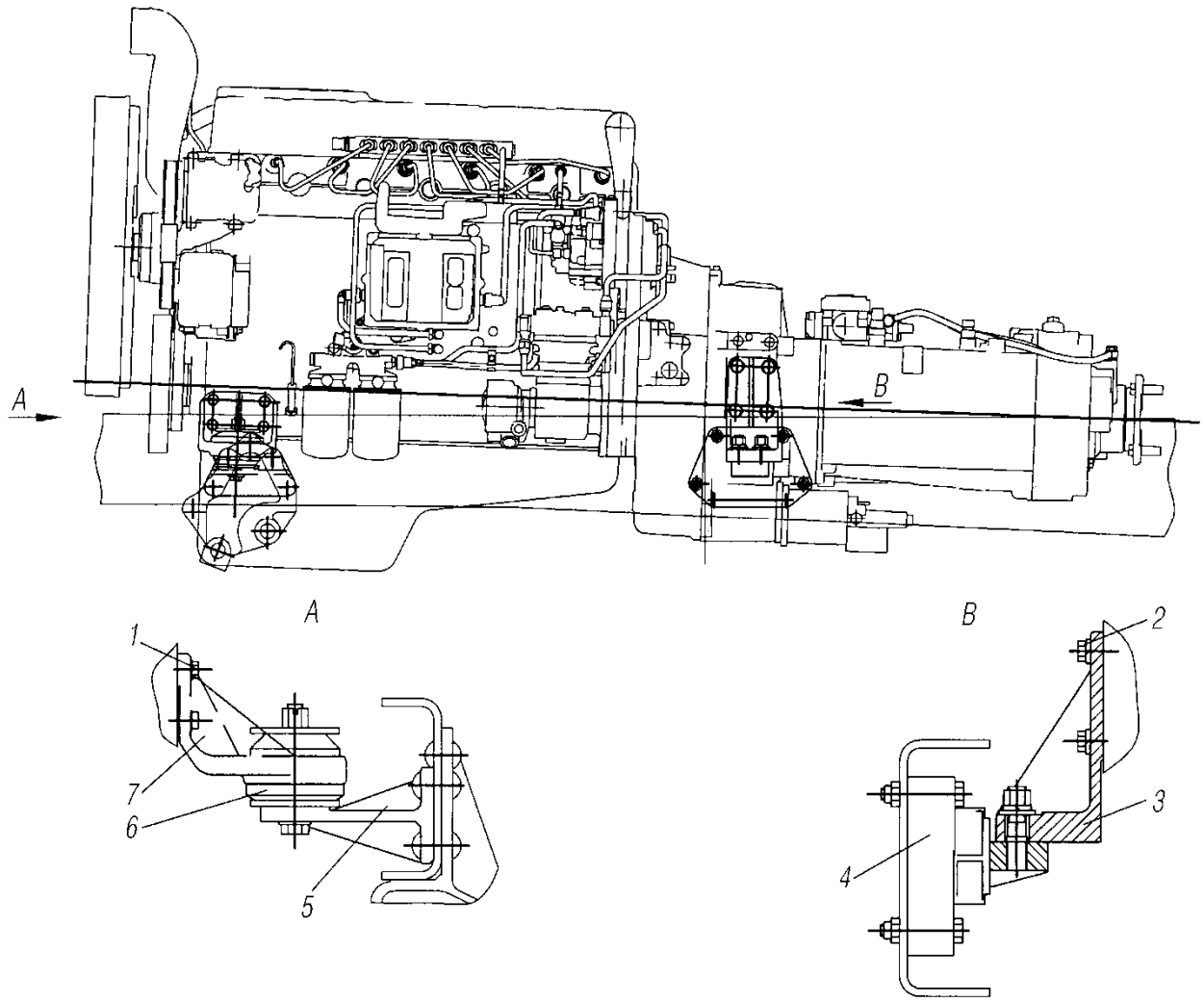
Do not start the engine after the coolant is drained to evacuate its residue from the system: it can lead to cylinder sealing rubber rings damage, valve seat falling out, heat burn and scorch.

4.1.5 Power Unit Suspension

The power unit is installed on four piers: two front and two side piers.

Each of the front piers consists of an upper engine front pier bracket 7, lower engine front pier bracket 5 and a pad 6 shown in figure 42. The bracket 7 is fastened to the engine. Lower bracket 5 is fastened to the frame by rivets. The pads 6 reduce shock stress and absorb reaction torque.

Rear side piers consist of side engine supports 3, installed on the clutch housing, and rear supports 4 installed on the frame. Rear engine support 4 functions as an absorber.



1,2-bolts; 3-side engine support; 4-rear engine support; 5-lower engine front support bracket; 6-pad; 7-upper engine front support bracket

Figure 42-Power Unit Suspension

4.1.6 Engine Idle Adjustment

Engine idle adjustment allows changing engine rpm for the trucks with YAMZ-536 engines in the range from 700 to 1400 rmp at a pitch of 50-100 rpm, and saving the set rpm (up to 1000 rpm) in the engine electronic control unit memory.

To actuate engine idle adjustment mode, press and hold switch key 6 (see figure 32) for about 5 seconds. When this mode is actuated engine rpm become equal to 700 rpm, if the accelerator pedal is not pressed. Idle rpm can be increased/decreased by clicking the switch 4, one click changes rpm by 50 (100) rpm in the pre-set range. After each click switch 4 should return to neutral position.

Exit from the adjustment mode is possible with saving maximum rpm of 1000 rpm, for that hold the switch 6 (see figure 32) for about 5 seconds. The pre-set value (1000 rpm maximum) of the engine idle will be saved in the engine electronic control unit and will be recorded to the electronic control unit memory after cutting off the ignition in standard mode (power supply for the electronic control unit continues after the ignition is cut off for minimum 30 seconds). Next engine start idle value will come back to the pre-saved value. To restore minimal engine idle rpm repeat the adjustment mode with saving 700 rpm value.

Exit from the adjustment mode without saving new value of engine idle rpm can be done in two ways:

- press the accelerator pedal (by increasing rpm for more than 1500 rpm);
- stop the engine.

4.2 Transmission

Coupling mechanism and gearbox construction description and operation and maintenance instructions are given in the Operation Manual of Yaroslavl Engine Plant.

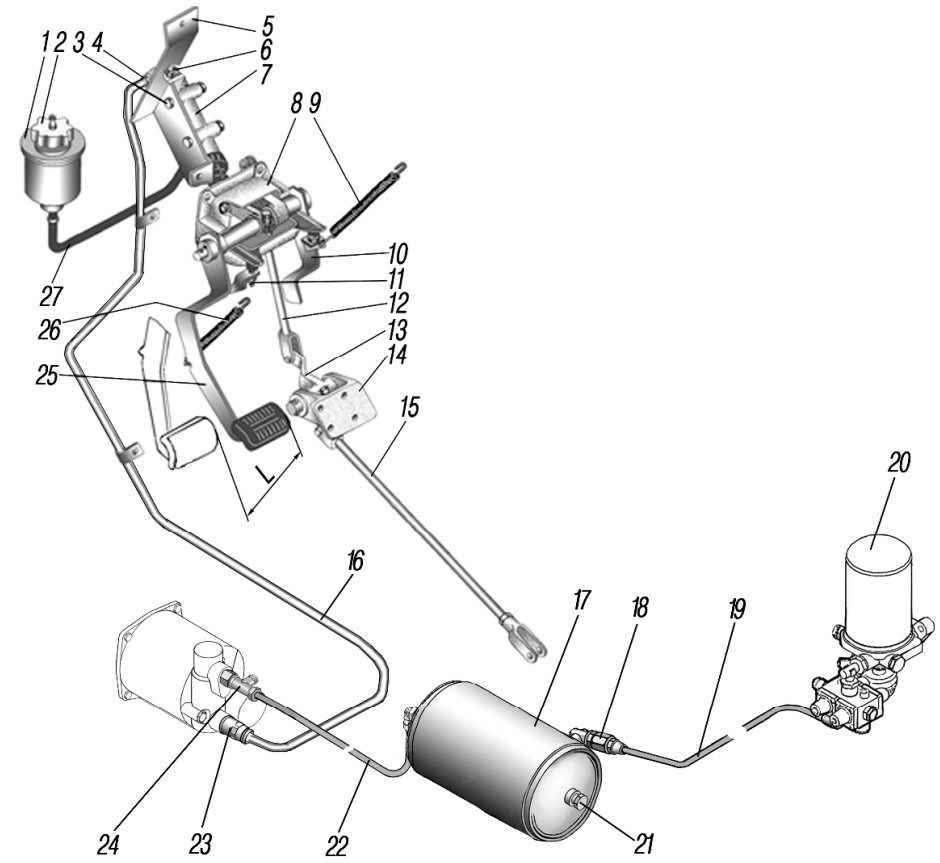
4.2.1 Clutch Control with Air-Over Hydraulic Booster

4.2.1.1 Air-Over Hydraulic Booster for Conventional Cab Ural Trucks

Master cylinder 7 (see figure 43) is installed in the engine compartment and is fixed by the bracket to the cab front plate.

When pressing clutch pedal, fluid pressure from the master cylinder is transferred through the tube 16 to the air-over hydraulic booster. Fluid in the air-over hydraulic booster puts pressure on the rod, opening the pneumatic system valve.

Pneumatic part consists of 10 l tank 17 installed inside the left girder, check valve 18, pipelines. Feeding is done from a separate pneumatic system circuit.

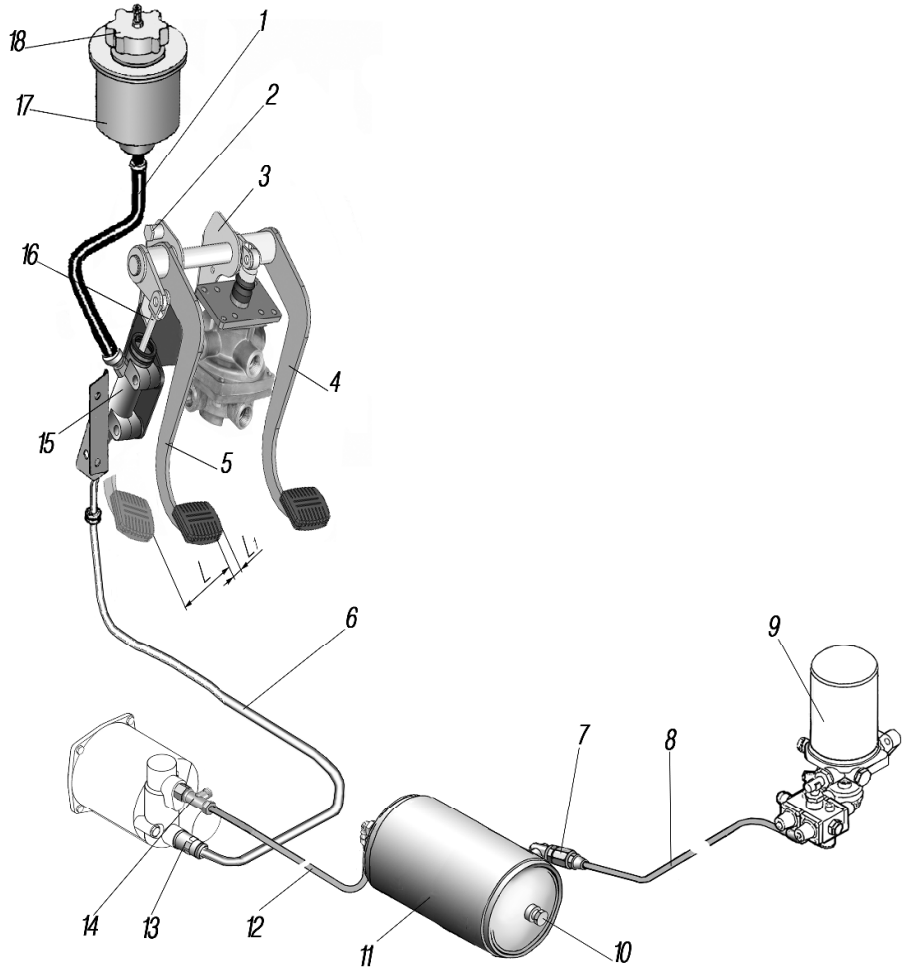


1-reserve tank; 2-tank lid; 3-bolt; 4-nut; 5,14-brackets; 6-cylinder stop; 7-clutch master cylinder; 8-foot mechanism; 9, 26-springs; 10-brake pedal; 11-clutch pedal stop; 12,15-brake pedal links; 13-brake valve control lever; 16-hydraulic gear pipeline; 17-non-brake consumer tank; 18-check valve; 19,22-pipeline; 20-oil separator with 4-circuit valve; 21-plug; 23-hydraulic fitting; 24-tee; 25-clutch pedal; 27-chute; full pedal motion L=185-190mm

Figure 43 - Clutch Release Linkage

Check valve 18 is installed on the tank and is dedicated for dividing the air line coming from the separate pneumatic system circuit to the tank and for maintaining pressure in the system independent of pressure failure in the main circuits. Air is fed to the air-over hydraulic booster by the tube 19.

4.2.1.2 Air-Over Hydraulic Booster for the Cabover Ural Trucks is shown in figure 44.



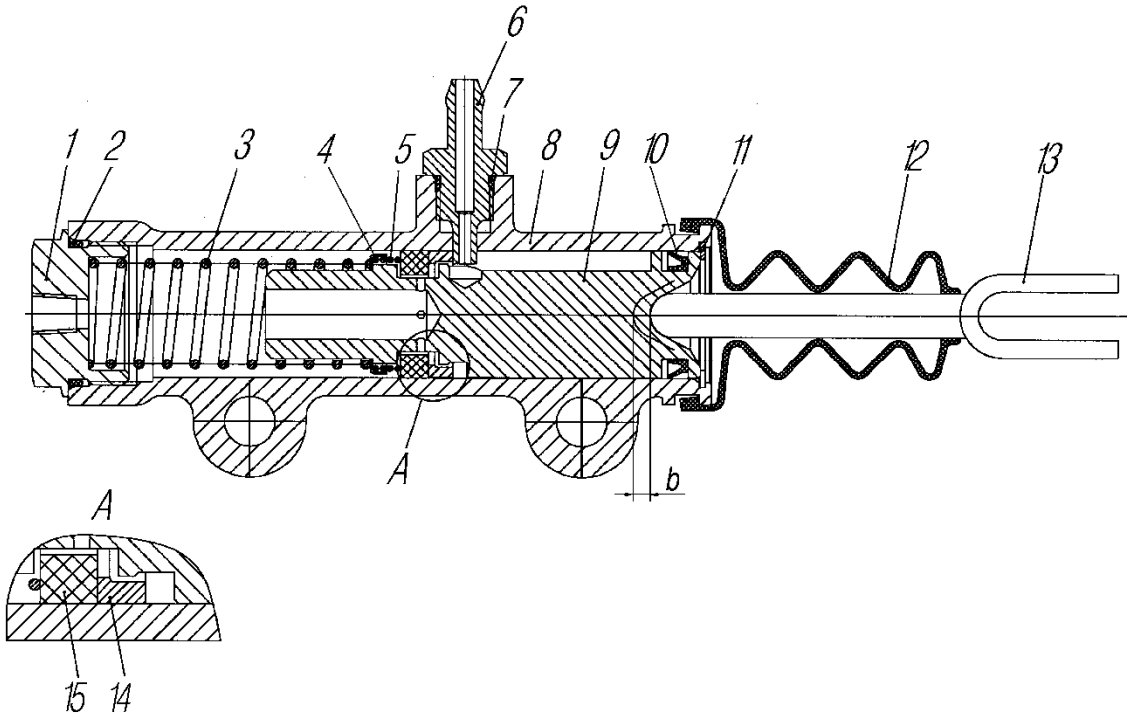
1-chute; 2-adjusting eccentric; 3-foot mechanism; 4-brake pedal; 5-clutch pedal; L-full pedal motion equal to 105-115mm; L1-free play equal to 5-10 mm; 6-hydraulic gear pipeline; 7-check valve; 8,12-pipeline; 9-oil separator with 4-circuit valve; 10-plug; 11-non-brake consumer tank; 13-hydraulic fitting; 14-tee; 15-clutch master cylinder; 16-tappet; 17-reserve tank; 18-tank lid.

Figure 44 - Clutch Release Linkage

4.2.1.3 Clutch Master Cylinder Master cylinder construction is shown in figure 45. In case of repair and assembly install the ring 14 according to figure 45.

Oil with brake fluid the internal surface of the cylinder, rubber rings and seal when assembling.

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1-plug; 2,7-rubber rings; 3-pull-off spring; 4-contact spring cap; 5-contact spring; 6-feeding union; 8-cylinder body; 9-piston; 10-seal; 11-retaining ring; 12-protective casing; 13-tappet; 14-ring; 15-O-ring; b-clearance

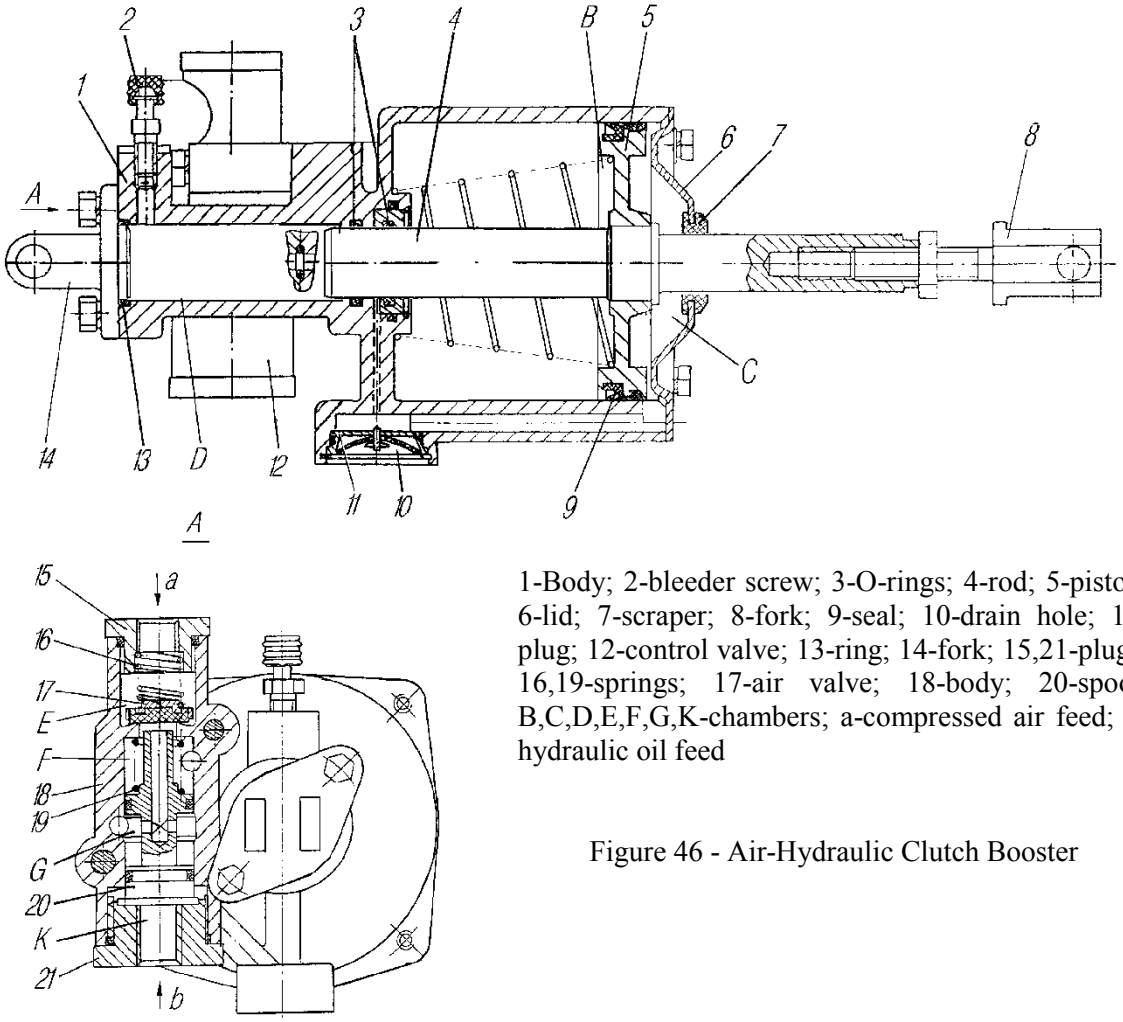
Figure 45 - Master Cylinder

4.2.1.4 **Clutch Air-Over Hydraulic Booster** consists of the body 1 (see figure 46) having the piston 5 and the rod 4 inside. The piston with the rod is flexibly sealed in the body and can move in the axle direction. The piston is sealed in the body by rubber seal 9, and the rod is sealed by two rubber O-rings 3.

The body from the piston side is covered by the lid 6 where the rod enters. A fork 8 is fixed on the rod end; the booster is fixed to the clutch release fork lever with it. Rubber scraper 7 which cleans the rod from dirt and prevents its access to the body is installed in the centre of the lid 6.

On the other side of the body 1 fork 14 is installed; the booster is fastened to the gearbox trough the bracket and the fork. The fork 14 has a flange sealed in the body with the rubber ring 13. Body bottom has a drain hole 10 having rubber valve. The valve protects the body from dirt access.

The upper part of the body has a valve 2 to evacuate air from D chamber. Air-over hydraulic booster control valve is bolted to the body 1 with two bolts; the control valve consists of the housing closed by the plugs 15 and 21 from both sides. Spool 20 and air valve 17 are located inside the body 8. The spool is flexibly sealed in the body with two rubber rings and spring loaded to the body by a coil cylindrical spring 19. The spring 19 moves the spool 20 from the air valve until contact with the plug 21. The spool has axial and radial holes connecting F and G chambers.



1-Body; 2-bleeder screw; 3-O-rings; 4-rod; 5-piston; 6-lid; 7-scraper; 8-fork; 9-seal; 10-drain hole; 11-plug; 12-control valve; 13-ring; 14-fork; 15,21-plugs; 16,19-springs; 17-air valve; 18-body; 20-spool; B,C,D,E,F,G,K-chambers; a-compressed air feed; b-hydraulic oil feed

Figure 46 - Air-Hydraulic Clutch Booster

The air valve 17 is pressed to the seat made inside the body by the spring 16, and it separates E chamber from F chamber. B chamber is connected with F chamber by holes, C and G chambers are connected with the drain hole. K and D chambers are interconnected by holes. K chamber is connected with the clutch release master cylinder through the connection hole in the lid 21 and pipelines. E chamber is connected with the air tank through the connection hole in the lid 15 and pipelines. E chamber has compressed air outlet for the booster control gear.

4.2.1.5 Clutch Pedal Motion Adjustment Carry out adjustment when the system is completely run with fluid and there is no compressed air in the pneumatic part of the drive as follows:

- loosen the pedal stop 11 lock nut (see figure 43) and screw it into the pedal against stop;
- put the clutch master cylinder 7 in the upper position in oval holes of the bracket 5;
- fix the master cylinder by the stop 6 and bolts 3;
- put the clutch pedal to metal;
- check the correctness of clutch release (the clutch should not “play”);
- if the clutch “plays”, make the clutch released by moving the master cylinder down with 1/2 torque pitch until the stop 6 and releasing the bolts;

- fasten the fixation bolts 3 of the master cylinder 7 with 44-56 Nm torque (4.4-5.6 kgfm);
- regulate pedal free play by the stop 11; clearance between the tappet 13 (see figure 45) and the piston -b should be 0.2-0.6 mm, it corresponds to pedal motion of 1-3 mm;

Regulate clutch and brake pedals on cabover trucks with eccentrics (see figure 44).

4.2.1.6 Bleeding. When changing brake fluid or repairing gear hydraulic part bleed the system as follows:

- fill the reserve tank 1 (see figure 43) with brake fluid;
- remove valve protective cap 2 (see figure 46), put on bleeding hose on the valve, unscrew the valve 1/2-3/4 torque and immerse the hose end into a clean, transparent vessel with brake fluid;
- loosen the nut 4 (see figure 43), and when first liquid drops appear, fasten it;
- yank the clutch pedal 25 at the open valve and smoothly release it at the closed valve until air bubbles stop exiting the hose. If air bubbles with liquid stop exiting, fasten the bleed valve.

Follow that liquid level in the reserve tank is always more than a half and hose end is constantly in the liquid during bleeding, so that no air is sucked by the master cylinder.

The criteria of completed bleeding is force spur increase on the pedal when it moves for L_2 value equal to 35-40 mm after selection of free play.

Quick clutch hydraulic gear bleeding is possible by using external compressed air, for that:

- fill the reserve tank with brake fluid;
- remove valve protective cap 2 (see figure 46), put on bleeding hose on the valve, unscrew the valve 1/2-3/4 torque and immerse the hose end into a clean, transparent vessel with brake fluid;
- put on the hose of the external compressed air to the lid head 2 (see figure 43) of the reserve tank 1;
- supplying compressed air with the pressure not exceeding 200-250 kPa (2.0-2.5 kgf/cm^2) and wait until air bubbles stop exiting the tube.

4.2.1.7 Maintenance of clutch gear is performed by periodical inspection of gear components, cleaning them and checking:

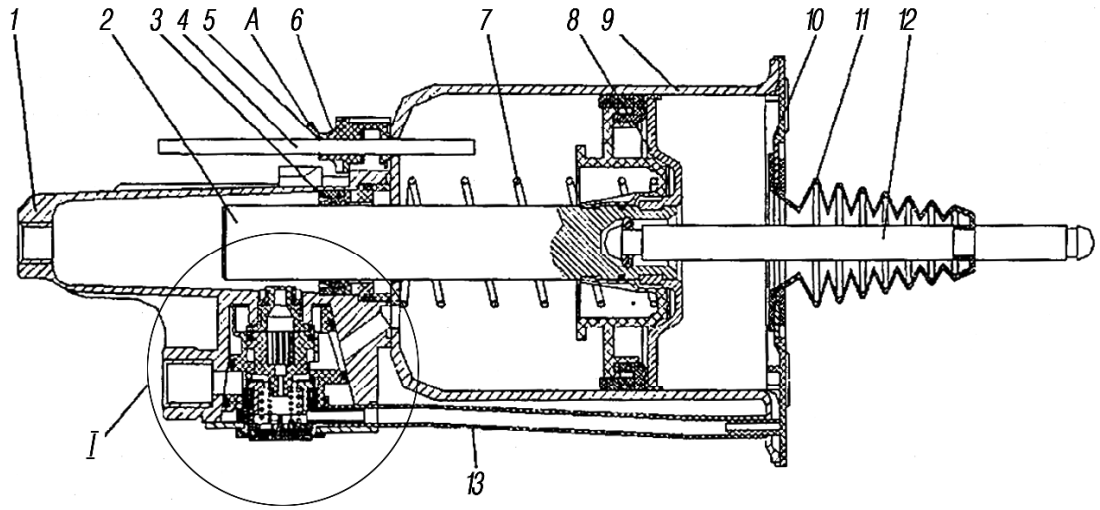
- air tightness of the hydraulic and pneumatic parts;
- liquid level in the reserve tank and fastening screws;

4.2.2 Wabco Air-Over Hydraulic Booster Construction and Operation

Wabco air-over hydraulic booster is installed to the power unit. The clutch is released by Wabco air-over hydraulic booster.

Air-over hydraulic booster consists of three main parts: pneumatic slave cylinder, servo system and clutch lining wear indicator.

Air-over hydraulic booster construction is shown in figure 47.



1-hydraulic body; 2-hydraulic piston; 3-hydraulic seal; 4-lining wear indicator; 5-wear indicator washer; 6-indicator housing; 7,10-contact springs; 8-air piston; 9-air cylinder; 11-casing; 12-rod; 13-drain tube; A-clearance when linings are worn; I-booster servo system

Figure 47 - Wabco Air-Over Hydraulic Booster

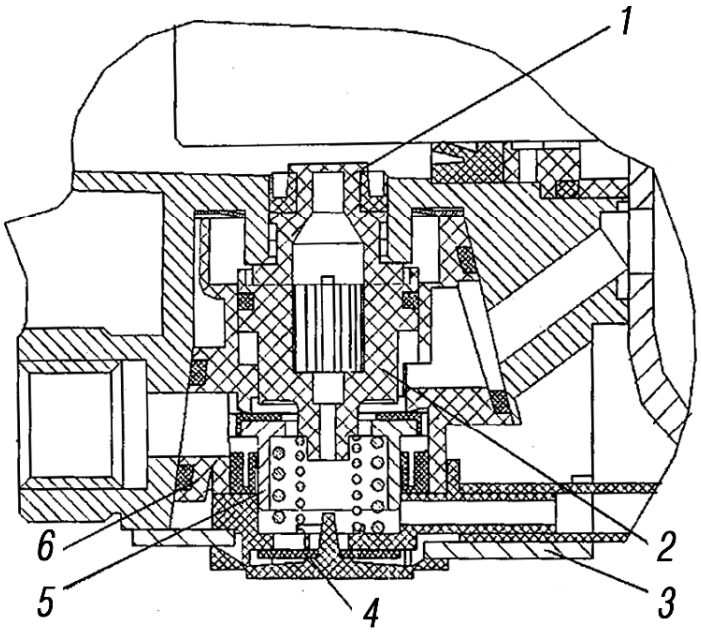
When pressing the clutch pedal liquid pressure from the master cylinder is transferred through the pipelines to the air-over hydraulic booster, where it impacts the hydraulic piston 2, air-over hydraulic booster and the piston 1 (see figure 48) of the servo system.

Under the servo system piston the air piston 2 (see figure 48) moves and impacts the servo system valve 5. The valve opens air feed to the air cylinder 9 (see figure 13), the air-over hydraulic booster increasing booster rod 12 force to the clutch release fork. Incoming air pressure is changed with the servo device automatically depending on the force applied by the driver to the clutch pedal.

After pedal release booster liquid pressure falls down, servo system air valve closes, air-over hydraulic booster piston returns to its initial position.

Through the contact spring the piston 8 (see figure 47), booster with the rod 12 are always connected backlash-free with clutch fork, with the coupling, the diaphragm spring and contact clutch plate. When clutch linings are worn out backlash-free connection provides following of lining wear by the booster piston - when wearing the piston goes deeper inside the booster and impacts the lining wear indicator.

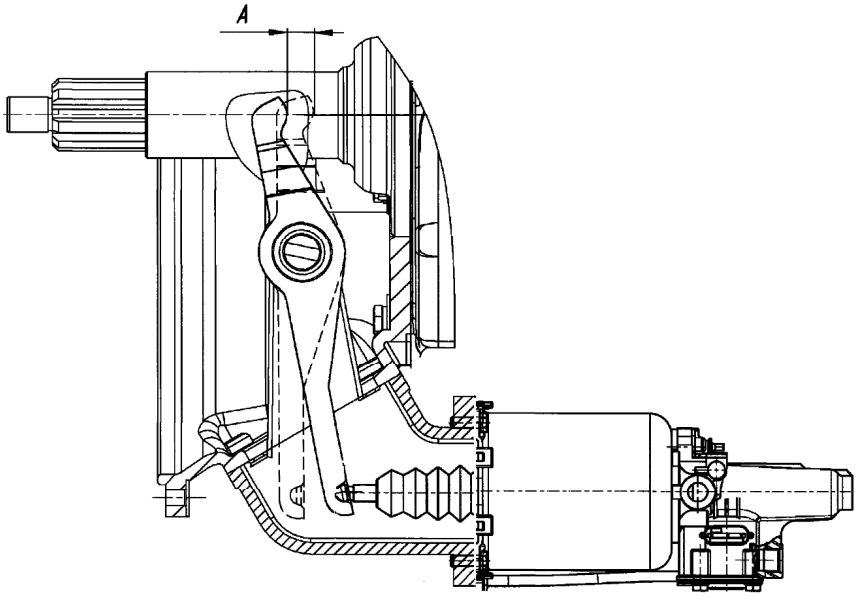
Wear indicator 4 is extending more and more under the piston impact, the indicator washer 5 extends away from the indicator body 6, and when the clearance between the washer and the body becomes 23 mm, lining wear is critical and it is necessary to replace the linings urgently or to replace the driven disc assembly.



1-hydraulic piston; 2-air piston; 3-lid; 4-saloon; 5-valve; 6-servo system housing.

Figure 48 - Air-Over Hydraulic Booster Servo System

Measure the stroke of thrust bearing at air pressure of 850 kPa (8.5 kgf/cm2) that corresponds to the regulator mark that should be within A limits (from 12 to 14 mm) (see figure 49).

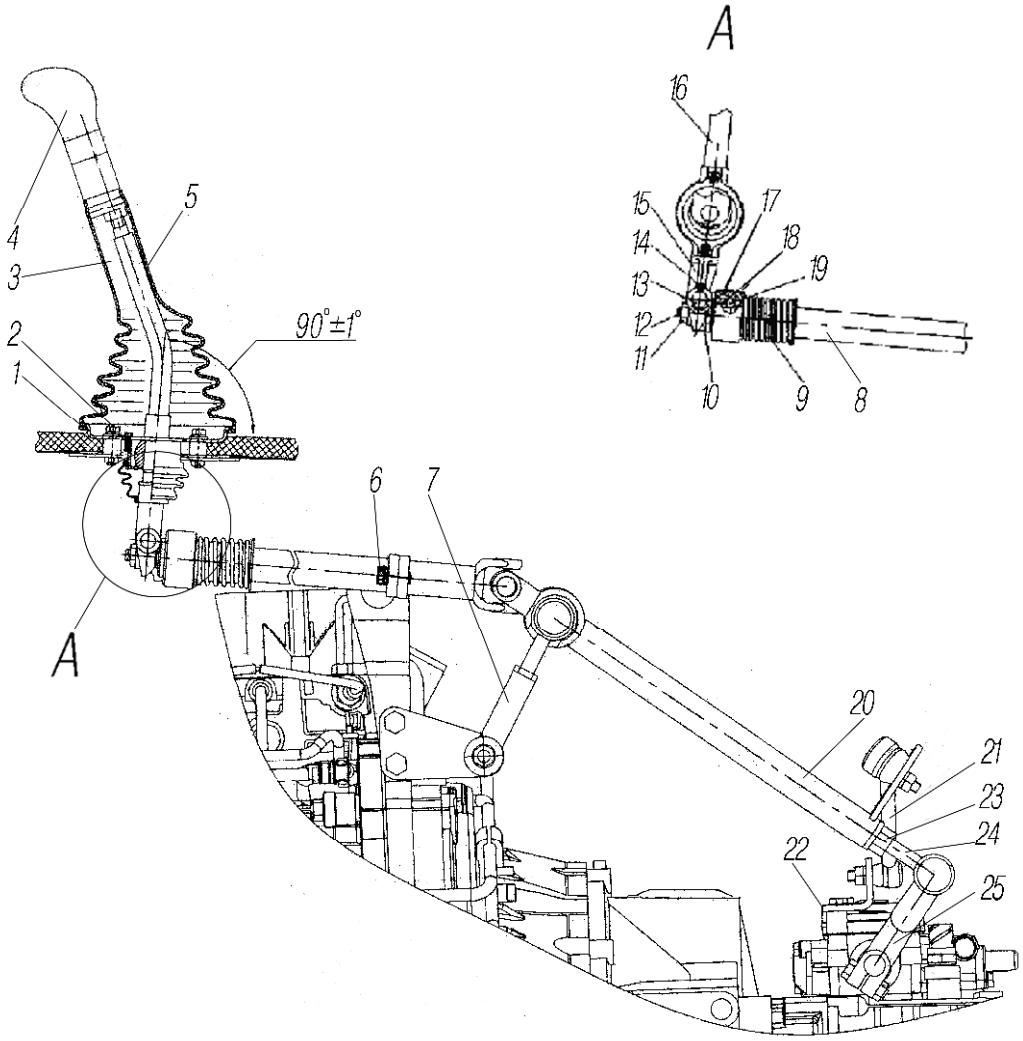


A-thrust bearing stroke regulation limit

Figure 49 - Clutch Linkage

4.2.3 Gearbox

Gearbox control for cabover trucks
Gearbox control is mechanical, remote, telescopic.
During the operation the following is done if necessary:
- regulation of lever 3 position is shown in figure 50 of gear shift;
- regulation of telescopic elements locking device.



1-Lining; 2-bolt; 3,16-lever; 4-joystick; 5-seal casing; 6-bolts; 7-intermediate support; 8-telescopic rod; 9-spring; 10-yoke; 11-nut; 12-internal flexible rod end (extension); 13-stud; 14-split pin; 15-fork; 17-locking bushing; 18-rod end; 19-balls; 20-shank; 21-extension rod; 22-extension rod bracket; 23-nut; 24-end; 25-ear shift roller lever

Figure 50 - Gearbox Control

To regulate lever 3 angularity in the longitudinal direction:

- loosen bolts 2 at the gearbox being in neutral, by moving the lining 1 set lever angle at $90^0 \pm 1^0$. If the lining moves insufficiently, loosen the nut 23 and change end length 24;

-Put the gear lever in the cab in the transverse plane vertically by regulating the rod 21 length. Difference of exposed thread of rod ends should not exceed 2 mm.

Regulate the telescopic elements locking device when the cab is lifted as follows:

-Unpin the stud 13 and disconnect the telescopic rod 8 from the fork 15;

- push in the internal flexible rod end (extension) until completely blocked;

- loosen the nut 11 when the mechanism is blocked and unscrew the end 12 of the internal flexible rod against stop;

- unblock the mechanism by moving the bushing 17 right, overcoming the spring 9 force, and extending the internal flexible rod for 20-30 mm, push in against yoke 10 in the end 18 grooves. Herein the bushing 17 must move against stop in the lower yoke peak. If the bushing moves insufficiently, screw the internal flexible rod end 12 until it moves completely;

- fasten the end nut 11 avoiding its propping-off.

When connecting the rod 8 to the fork 15 fork hole for the stud 13 must be over the rod 8 transverse plane.

By lifting and lowering the cab check workability of the locking mechanism. In unlocked position (bushing 17 is moved right) the rod extension should smoothly move, should jam, and the locking device should ensure secure fixation of the gear rod extension in confined space.

Extension and external rod bend and dent are not allowed.

After lowering the cab rod is blocked by setting the gear lever into neutral.

4.2.4 Transfer Box

The transfer box is shown in figure 51- mechanical, two-speed, with asymmetric interaxle differential, installed on the truck frame on four rubber pads.

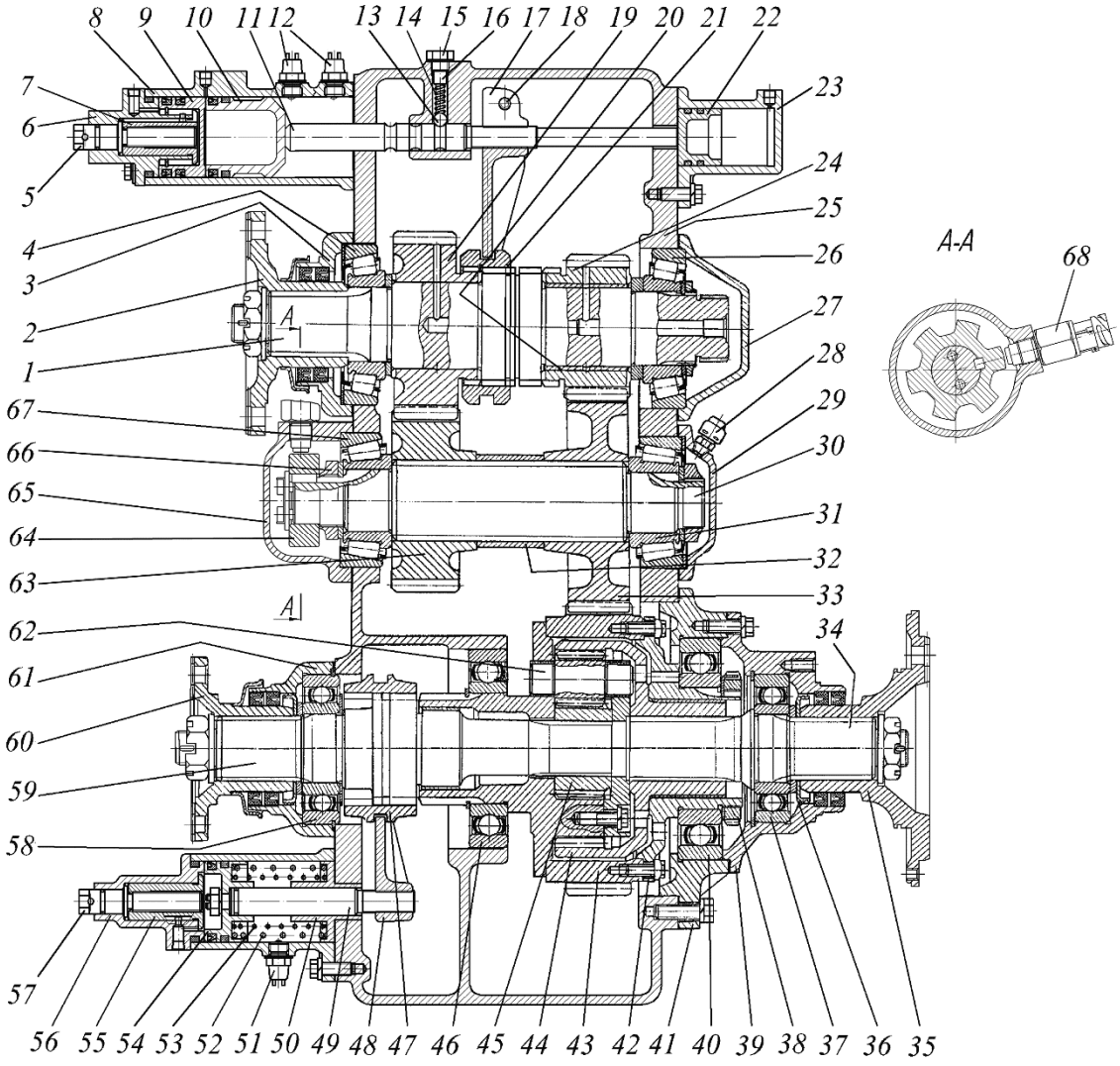
The differential is planetary with four satellites, with sun 45 and crown 44 gears. Torque is transferred from the sun gear 45 to the front axle drive shaft 59, and from the crown gear 44 to the rear axle drive shaft.

When differential is actuated (unlocked) even drafting of all axles is provided, and transmission additional loads are eliminated. Depending on the road conditions differential can be switched off (locked), and front and rear axle drive shafts are moving as a unit.

Front and rear axle drive shafts have obturator rings 36. External surface of the obturator rings have spiral grooves directing oil from seals to the crankcase when the shafts are moving. Spirals of the grooves have various directions: left-hand-directed for the front axle drive shaft, and right-hand-directed for the rear axle drive shaft. The obturator rings have «П» (forward) and «З» (backward) marks depending on their dedication.

When assembling the transfer box check that the obturator rings are installed correctly, otherwise oil leakage through the seals is inevitable.

The transfer box having additional takeoff with 100% of engine takeoff, has longer main shaft and modified crankcase in the part of the additional takeoff fixation.



1-main shaft; 2,35,60-flanges; 3,27,29,39,61,65–bearing caps; 4,26,31,67-roller bearings; 5,57-bolts; 6,56-air cylinder lids; 7,55-bushings; 8-shift mechanism housing; 9-piston of the neutral; 10, 22,54–pistons; 11,49–rods; 12-low speed indicator switch; 13-ball; 14-spring; 15-plug; 16-pin; 17-gear shift fork; 18-bolt; 19,63-high speed gears; 20-bushing; 21-gear shift coupling; 23-cylinder; 24,33-low gears; 25-crankcase; 28-breather; 30-lay-shaft; 32-spacer; 34-rear axle drive shaft; 36-obturator ring; 37,40,46,58–ball bearings; 38,66-bearing nuts; 41-differential rear bearing casing; 42-differential cage; 43-differential cage with lower shaft gear; 44-crown gear; 45-sun gear; 47-differential lock coupling; 48-differential lock fork; 50-piston stop; 51-differential lock indicator switch; 52-outer spring; 53-internal spring; 59-front axle drive shaft; 62-satellite; 64-speedometer drive sprocket; 68-pulse sensor

Figure 51 - Transfer Box

4.2.4.1 Transfer Box Adjustment Taper bearings are adjusted by changing the number of gaskets under the caps when the transfer box is dismantled. Before adjusting the bearings put the box in a way that the upper door is horizontal, and remove lid from it. Control the main and lay shaft axial movement with a dial test indicator.

To adjust main shaft bearings:

- check the flange nut tightening and, if necessary, fasten [tightening torque is less that 200 Nm (20 kgf*m)]
- put the dial gage holder on the crankcase door in a way that its foot abuts the kerf of the main shaft medium part;
- using the tire iron as a lever move the main shaft trough the gear against the indicator hand complete stop, reduce the thrust force applied on the lever length (0.5 m) smoothly to 2-5 N (0.2-0.5 kgf) and fix the indicator value;
- applying thrust force in the opposite direction fix the second indicator value in the same way.

Overall shift of the indicator foot must be from 0.03 to 0.08 mm; if the value is bigger, add adjusting plates under the front bearing cap.

To adjust lay shaft bearings:

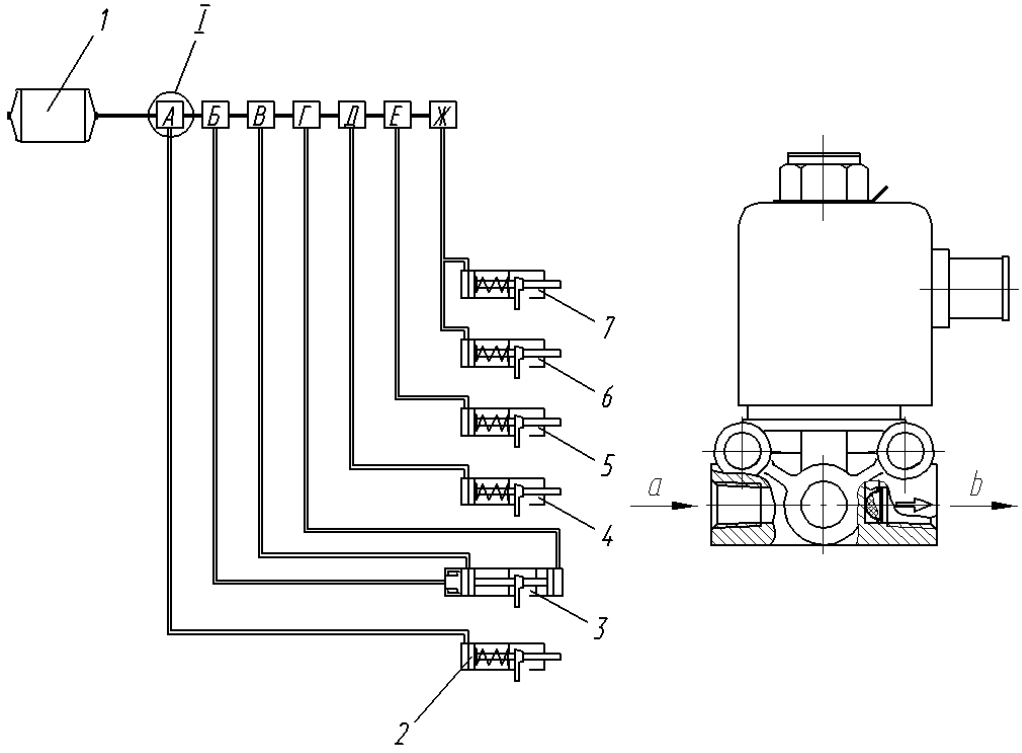
- remove the rear lay shaft bearing cap;
- unlock and tighten lay shaft bearing nut by clamping the gears distance bushing;
- lock the nut and put the cap;
- check the axial movement of the lay shaft in the same way as for the main shaft, herein the indicator foot should but one of the gears; overall shift of the indicator foot must be from 0.03 to 0.08 mm;
- adjust the bearings by adding adjusting plates under the rear lay shaft cap. To avoid mistakes during measurement check the shafts axial movement before and after the adjustment two-three times with prior shafts rotation.

Check and adjust, if necessary, the differential lock clutch and gear shift clutch. Adjust the differential lock clutch 47 position by rotating the rod. Check the clutch position by rotating the front axle drive shaft flange, herein the rod should be in the extreme front position. If the clutch touches the cage, move it by rotating the rod clockwise.

To check the gear shift clutch position 21, supply air with the pressure of 0.4-0.6 MPa (4-6 kgf/cm^2) both to the gear shift cylinder through the lid hole 6 and to the cylinder 23, after that define the kerf length difference from both clutch sides. Kerf unsupported length difference of the main shaft from both clutch sides must be 1 mm maximum. Adjust the clutch position by turning the rod 11, loosening the bolt 18 of the fork 17 before adjustment and tightening it after adjustment. Violation of adjustment instructions can lead to gears self-disengagement due to incorrect locks operation of the front shaft part.

4.2.4.2 Transmission Devices Control is remote, electrical and pneumatic, consisting of the transfer box gears shifting mechanism, the transfer box differential lock mechanism, the additional power takeoff switch*; power takeoff switch*; the cross-axle differential lock mechanism of the medium and the rear axles, solenoid valves installed on the right frame girder, pipelines and switches in the cab.

Electric and pneumatic control scheme of transmission devices is given in figure 52.



1-non-brake consumer tank; 2-transfer box differential lock mechanism; 3-transfer box gears shifting mechanism; 4-additional power takeoff switch; 5-power takeoff switch; 6 and 7-the cross-axle differential lock mechanism of the intermediate and the rear axles.
solenoid valves: A-transfer box differential lock; B-neutral; C-low speed; D-hight speed; E-additional power takeoff*; F-power takeoff*; G-the cross-axle differential lock*; a-air supply; b-for switching on.

Figure 52 - Electric and Pneumatic Control Scheme of Transmission Devices

When pressing the transfer box gear shift, the necessary gear is selected on the cab switch board (has three fixed positions: high speed, neutral, low speed), but the gears are not shifted. To shift the gear, press the transfer box gear switch button and hold it for 5...7 seconds, herein solenoid valves will supply air to the transfer box gears shifting mechanism and the gears are shifted.

*Installed as an option

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The indicator flashes when low speed is switched on. When switching on neutral, the indicator with Ⓝ symbol flashes. When releasing the button, solenoid valves switch off, and the actuated gear is maintained with spring ball clamper13 (see figure 51).

Neutral is switched on, when both solenoid valves “B” and “C” are actuated (see figure 52) and neutral piston 9 moves (see figure 51) against stop to the bushing rim 7, and piston 22 moves against stop of piston 10 to the neutral piston 9. Low speed is switched on when the piston 10 moves against stop to the part 25. High speed is switched on when the piston 22 moves against stop of the piston 10 to the neutral piston 9.

On the trucks equipped with the additional power takeoff neutral speed is switched on after switching on the power takeoff only. For that press the clutch pedal on a stopped truck before switching on and wait for 5 seconds until the transfer box main shaft is stopped, press the button of the additional power takeoff, move the transfer box gears switch to neutral position. For the neutral to be switched on, press the transfer box switch button and hold it for 5...7 seconds until the indicator Ⓝ slashes. The additional power takeoff is switched off only after the transfer box gear shift to high or low speed.

If there is no pressure in the truck pneumatic system, the previous transfer box gear is constantly switched on, and the differential is unlocked. When high speed is switched on, neutral of low speed can be actuated by rotating the bolt 5 (see figure 51) counter-clockwise. The bushing installed in the lid, moving slidingly, sets neutral in the transfer box defined by rotating the coupling shaft manually, when the gearbox control lever is in neutral position. If continue rotating the bolt, low speed is switched on. The differential is locked in the same way by rotating the bolt 57.

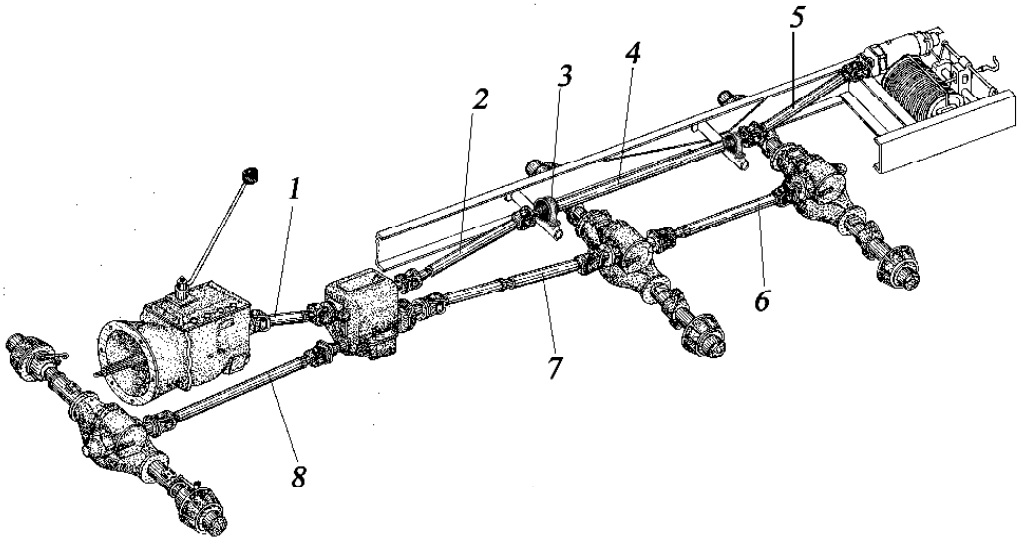
When pressing the switch in the driver's cab (the transfer box control panel, see figures 25 and 32) of the transfer box differential lock with «» symbol, solenoid valve A is actuated; of power takeoff with «» symbol, solenoid valve E is actuated; of the additional power takeoff with «» symbol, solenoid valve E is actuated; of the cross-axle differential lock with «» symbol, solenoid valve G is actuated. The solenoid valves supply air to the transfer box differential lock mechanism, the additional power takeoff, the power takeoff, the intermediate and rear axle mechanisms, herein indicators flash on, and they are switched.

When disassembling clean all the parts of electric and pneumatic control from dust and dirt, wash them in kerosene. Wear work faces of gear switch mechanism, the transfer box differential lock, the additional power takeoff and power takeoff, the cross-axle differential lock mechanism oil with ЦИАТИМ-201 lubricant before assembling, fill in the internals of the seals with the same lubricant. Seal all cone threads with АН-8К TS 6-02-6-88, АН-17М TS 6-01-2-728-86 or LOCTITE 577, oil sealing discs with КЛТ-75ТМ TS 2513-069-00151963-2000.

Pay special attention to air tightness of connecting tubes and flexible hoses during operation and when assembling the control system. Place of strong leakage is audible; weak leakage is detected with soapy emulsion. Air leakage is not allowed.

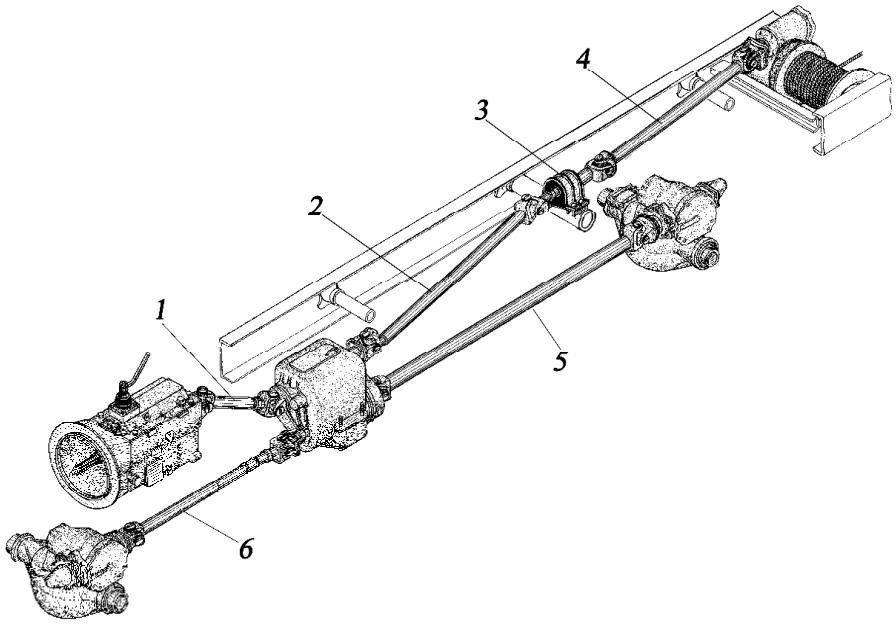
4.2.5 Driveline

Torque from the gearbox to the transfer box and to the truck drive axles is given by the propeller shafts as shown in figure 53. Open propeller shafts with all-round sealing of needle bearings in joints.



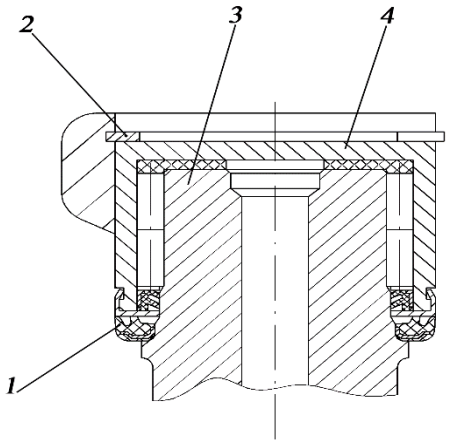
1-Front drive shaft; 2,4,5-propeller shafts of the winch drive; 3-intermediary support; 6,7,8-propeller shafts of axle drive

Figure 53-Transmission Prop Shafts and Winch Drive Layout
(For 6x6 wheel arrangement trucks)



1-Front drive shaft; 2,4-propeller shafts of the winch drive; 3-intermediary support of the winch drive; 5-propeller shaft of rear axle drive; 6-propeller shaft of front axle drive

Figure 54-Transmission Prop Shafts Layout
For the winch drive (for 4x4 wheel arrangement trucks)

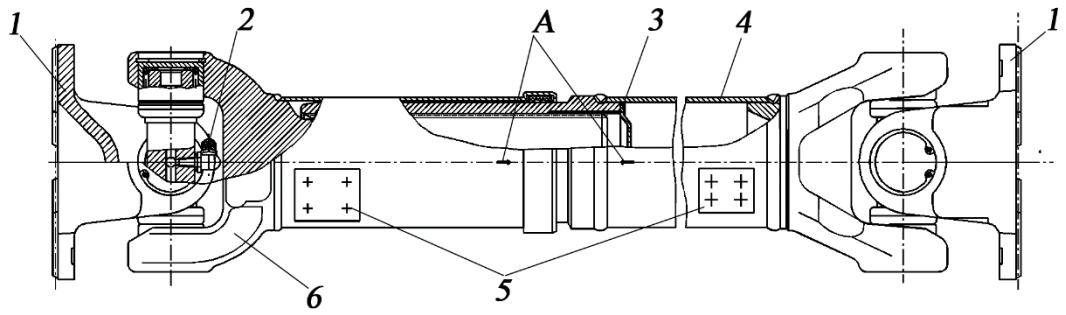


1-End seal; 2-retaining ring; 3-cross; 4-needle bearing

Figure 55- Needle Bearing All-Round Seal

When operating the truck:

- check prop shaft flanges fixation shown in figures 56 and 57 systematically;
- if the radial (over 0.25 mm) and butt (over 0.35 mm) backlash in yoke bearings is too large, disassemble the joints and change yoke bearings if necessary. When disassembling, do not damage the seals; damaged seals should be replaced.



1-Carrier plate; 2-oil press greaser cap; 3-blind plug; 4-propeller shaft tube; 5-balancing plates; 6-slide yoke; A-adjusting arrows

Figure 56 - Front and rear axle drive propeller shaft;

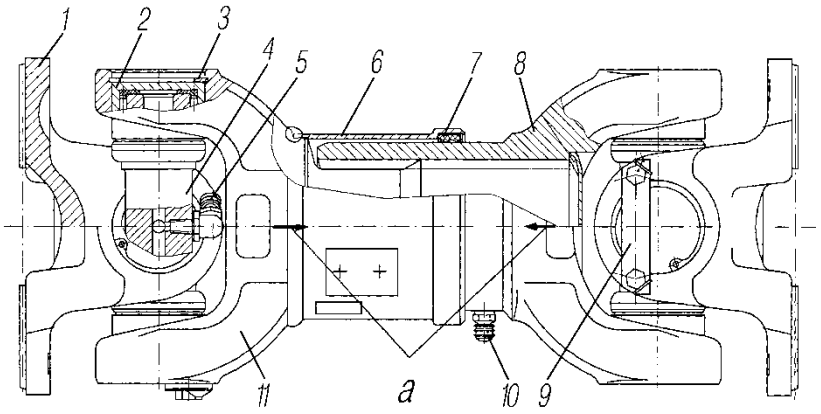
Front drive shaft and intermediate axle drive shaft construction is shown in figure 57.

Before assembling the joints grease the cavity between the work rims of the butt seal. After assembly yokes must rotate in the bearings smoothly, without jams.

Check spline joint backlash systematically. If the backlashes are over 1.2 mm (drive shaft of the front and rear axles is shown in figure 56) and 0.55 mm (lay shaft and rear axle drive shaft are shown in figure 57), change the shafts.

When assembling the propeller shaft check that the arrows marked on the tube shaft and the slide yoke are one opposite another, flanges and yokes must be in the position they were before disassembly. To do this, mark propeller shaft parts before disassembly.

After changing the flanges, welded and slide yokes the propeller shafts must be dynamically balanced again. Disbalance causes shafts vibration, that has negative impact on transmission operation.

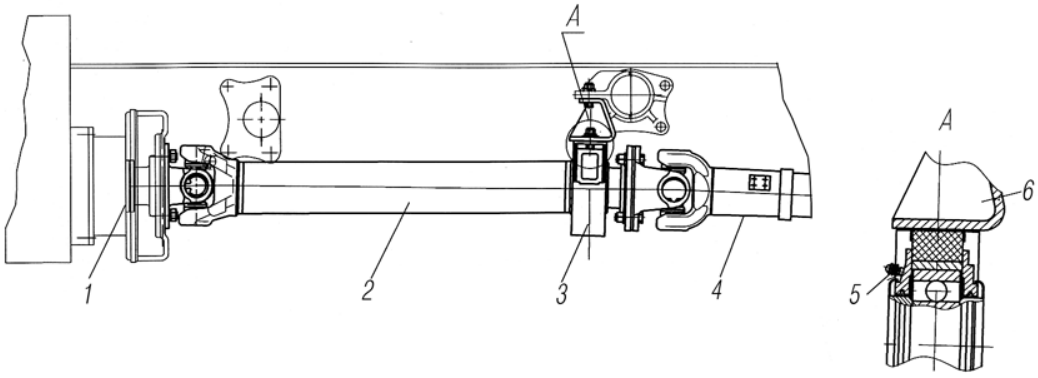


1-Flange; 2-needle bearing; 3-locking plate; 4-yoke; 5,10-press greasers; 6-seal cage; 7-seal; 8-spline yoke; 9-balancing plate; 11-spline shaft; a-mounting arrows

Figure 57- Front Drive Shaft with Face Splines

4.2.5.1 Driveline of trucks and special chassis with long base differs from the main truck by the changed intermediate axle drive being a driveline consisting of the front shaft 2 with an intermediary support and rear propeller shaft 4 (see figure 58) with spline joint balanced as a unit.

Intermediary support bearing should be oiled according to the lubrication scheme. Prop shaft maintenance corresponds to the one prescribed for the truck.



1-transfer box;2-driveline shaft; 3-intermediary support; 4-rear propeller shaft; 5-press greaser; 6-insert

Figure 58 - Driveline of Trucks and Special Chassis with Reinforced Base

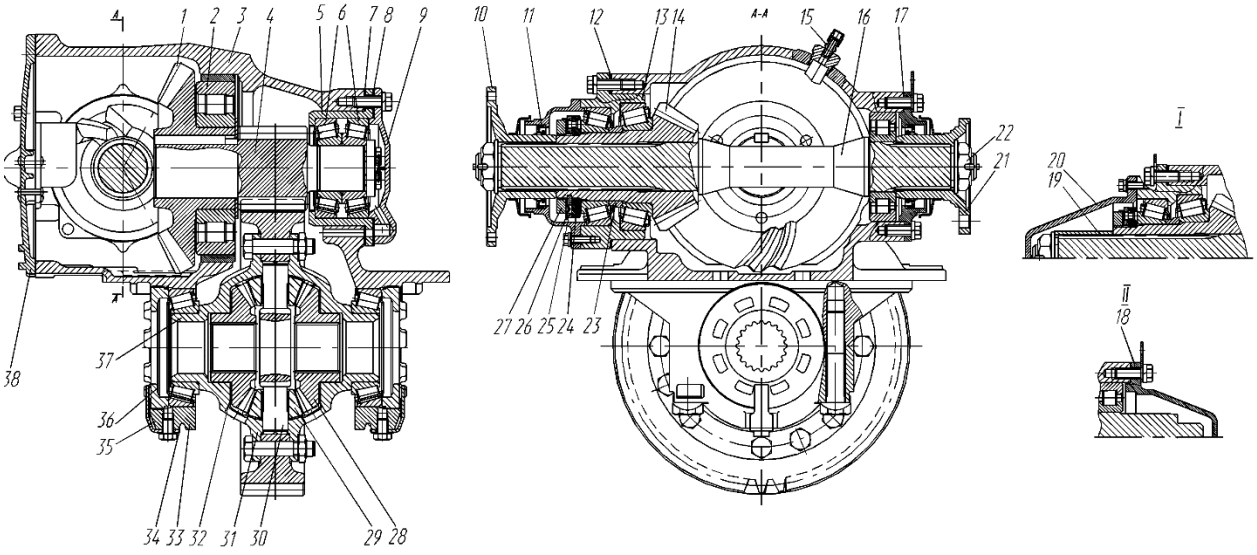
4.2.6 Driving Axles

Truck driving axles are throughfeed-type with upper main gear location.

4.2.6.1 Intermediate axle **main gear** is double-type, consisting of a couple of conical gears 1 and 14 (see figure 59) with spiral teeth and a couple of cylindrical gears 4 and 31 with oblique teeth. Symmetrical conical differential with four satellites is bolted to the conical idler gear.

Main gears are marked by a plate identifying the axle ratio, which is installed under the main cylindrical gear bushing sleeve cover bolt. Main gear pinions have marks on the pinion and idler gear shown in Table 11.

The main gear is installed in the axle case 10 (see figure 60) through the paronite gasket 9 0.8 mm thick, and is fastened with thirteen bolts and two pins.



1-Idler gear; 2-cylindrical roller bearing; 3-main gear crankcase; 4-cylindrical pinion; 5-bushing sleeve; 6-conical roller bearings; 7,8,12-adjusting gaskets; 9-bushing sleeve cover; 10-rear axle drive flange; 11-seal; 13-drive conical gear bushing sleeve; 14-driving conical pinion; 15-breather; 16-pinion shaft; 17-seal; 18-rear bearing cap; 19-separating bushing; 20-front bearing cap; 21-front axle drive flange; 22-flange nut; 23-adjusting washer; 24-nut; 25-lock washer; 26-key hole washer; 27-lock nut; 28-axle shaft gear; 29-differential satellite; 30-differential cross; 31-cylindrical idler gear; 32-back-up washer; 33-differential bearing cap; 34-lock plate; 35-keyhole plate; 36-differential bearing adjusting nut; 37-differential carrier; 38-crankcase cover; I-for the front axle; II-for the rear axle

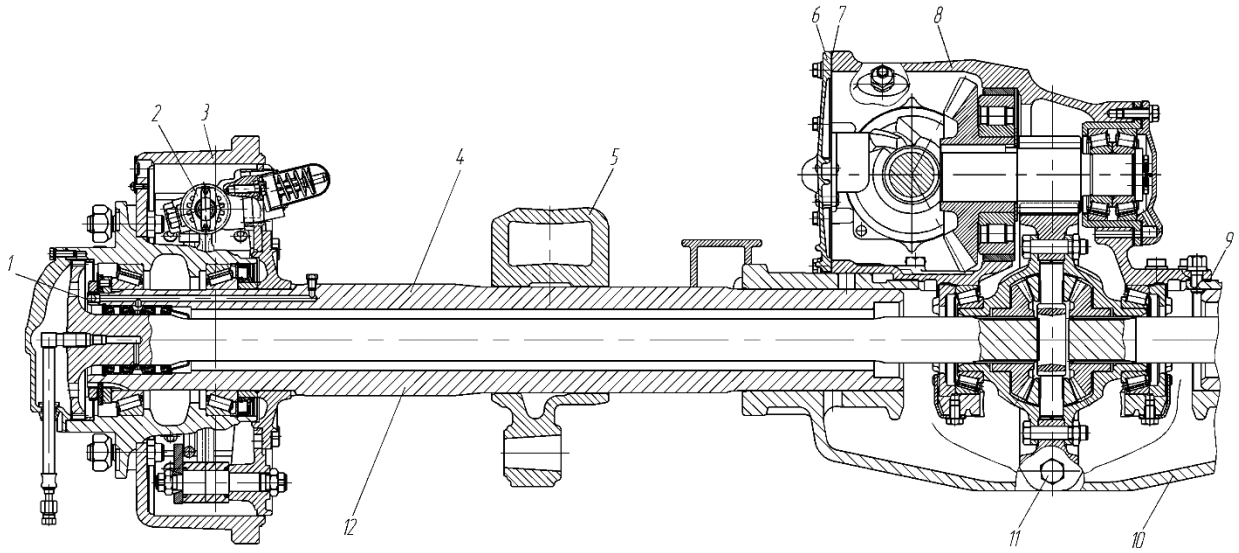
Figure 59 - Main Gear

Table 11

Axle ratio	Marks on the butt of the driving cylindrical pinion from the conical gear side	Mark on the idler gear
7.49	No marking	One drill under the crown 5 mm long and 3 mm deep
6.77	Three 10 mm holes on the 65 mm journal butt 2 mm deep	Two drills under the crown 5 mm long and 3 mm deep at the distance of 10 mm

Eleven bolts and pins are installed outside, and two bolts are installed in the conical gears chambers. Internal bolts can be accessed only when the side lid 6 is removed. Spring washers are installed under the outer bolts and pin nuts. Internal bolts are forelocked with wire.

Main gear wheels and bearings are oiled with the axle case oil going through the main gear crankcase up to the inspection door level. The oil is captured by the wheels and goes to the main gear crankcase chamber through the roller bearing 2, and then it flows to the axle case. Conical pinion bearings are oiled from the conical gears chamber, oil then goes to the bushing sleeve through the crankcase cover tray and oil feeding connector.



1-Air supply gaskets; 2-wedger; 3-brake drum; 4-axle shaft; 5-spring mountain bracket; 6-crankcase cover; 7,9-seals; 8-main gear; 10-axle case; 11-drain plug; 12-differential axle case

Figure 60 - Rear Driving Axle

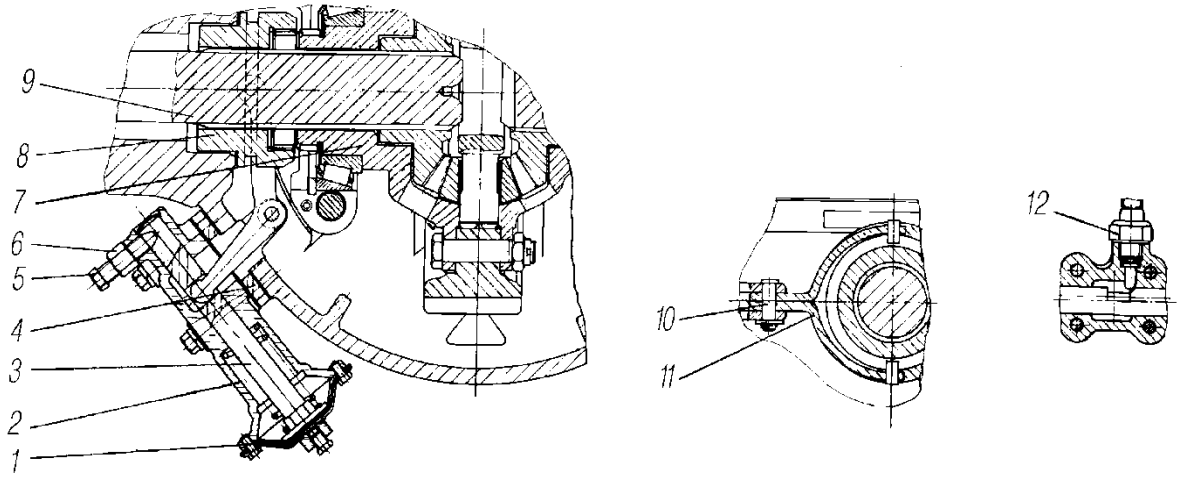
4.2.6.2 Intermediate and Rear Axles. Cross-axle differentials with positive locking* are installed on the medium and rear (see figure 61).

* Installed on request.

Cross-axle differential distributes torque equally between the axle wheels, including truck driving on an uneven road and on turns, when the truck wheels rotate with different sequence. When driving the truck off-road with a big difference of left and right wheels clutch, the cross-axle differential can help sliding of one axle wheel.

So that to improve off-road performance on such roads the cross-axle differentials of the intermediate and rear axles can be locked. When the differentials are locked, the axle shafts are rotating as a unit.

The cross-axle differentials should be locked in exceptional cases only on a stationary vehicle, when all other measures to improve off-road performance have already been taken (the necessary tire pressure is set, the transfer box cross-axle differential lock is switched on).



1-Curtain; 2-lock switch housing; 3-rod; 4-bracket; 5-stopper; 6-nut; 7-differential carrier; 8-clutch; 9-axle shaft; 10-stud; 11-connector; 12-switch

Figure 61 - Intermediate and Rear Cross-Axle Differential with Positive Locking

The differentials are locked by the spline crown on the butt end of the left carrier 7 and spline clutch 8 installed on the left axle shaft splines 9.

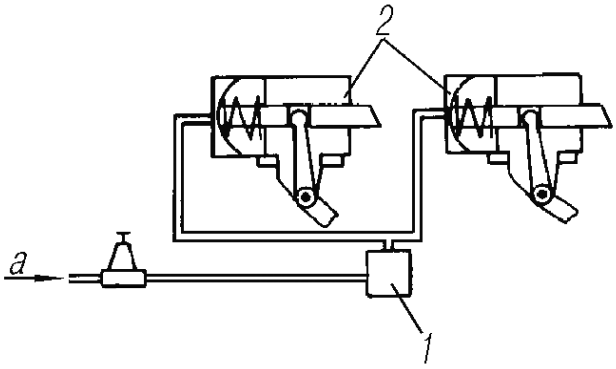
The cross-axle differential lock drive of the intermediate and rear axles is electro-pneumatic.

To ensure differential lock of the intermediate and rear axles, press switch 21 with «⊢✠⊢» symbol (see figure 25) on the cab dashboard. Herein, pressed air is fed to pneumatic chambers of locking devices 2 (see figure 61) and impacting the curtain 1, moves the rod 3.

The rod trough the connector 11 moves the clutch on the axle shaft splines, clutching it with the carrier journal.

Pneumatic control scheme of the cross-axle differential lock is shown in figure 62.

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1-Solenoid valve of the intermediate and rear axle cross-axle differential locks; 2-switches of the intermediate and rear axle cross-axle differential locks; a-from the tank

Figure 62 - Pneumatic Control Scheme of the Cross-Axle Differential Lock

The rod actuates the switch 12 (see figure 61) installed in the intermediate and rear cross-axle differential lock switch housing, herein indicators installed on the dashboard flash.

When closing the switch valve, pneumatic chamber is vented to atmosphere, air is discharged, and the mechanism returns to its initial position under the spring force, indicator lamps flash out.

After maintenance involving disassembly or replacement of locking mechanism parts, adjust it. To do that, cock the axle, brake one drum and rotating the other drum, lock the axle shaft with the differential carrier by feeding the air to the pneumatic chamber.

Screw the rod travel stop 5 against its contact with the rod butt, switch off the differential lock, screw the stop one more torque and lock it with the nut 6 at 49.0-60.8 Nm (5.0-6.2 kgfm) torque.

4.2.6.3 Front axle main gear differs from the rear axle main gear by the drive flange. Bushing 19 with a cover 20 is installed on the front end of the front axle pinion shaft, and flange 21 is installed on the rear end (see figure 59). Rear axle main gear has a flange from the conical pinion side. The opposite side of the shaft can have no splines.

Axle crankcases 10 (are shown in figure 60) are combined, consist of cast medium part and tubular housings of differential axles pressed in it. The axle shafts are off-loaded; axle connection with the boss is spline-type.

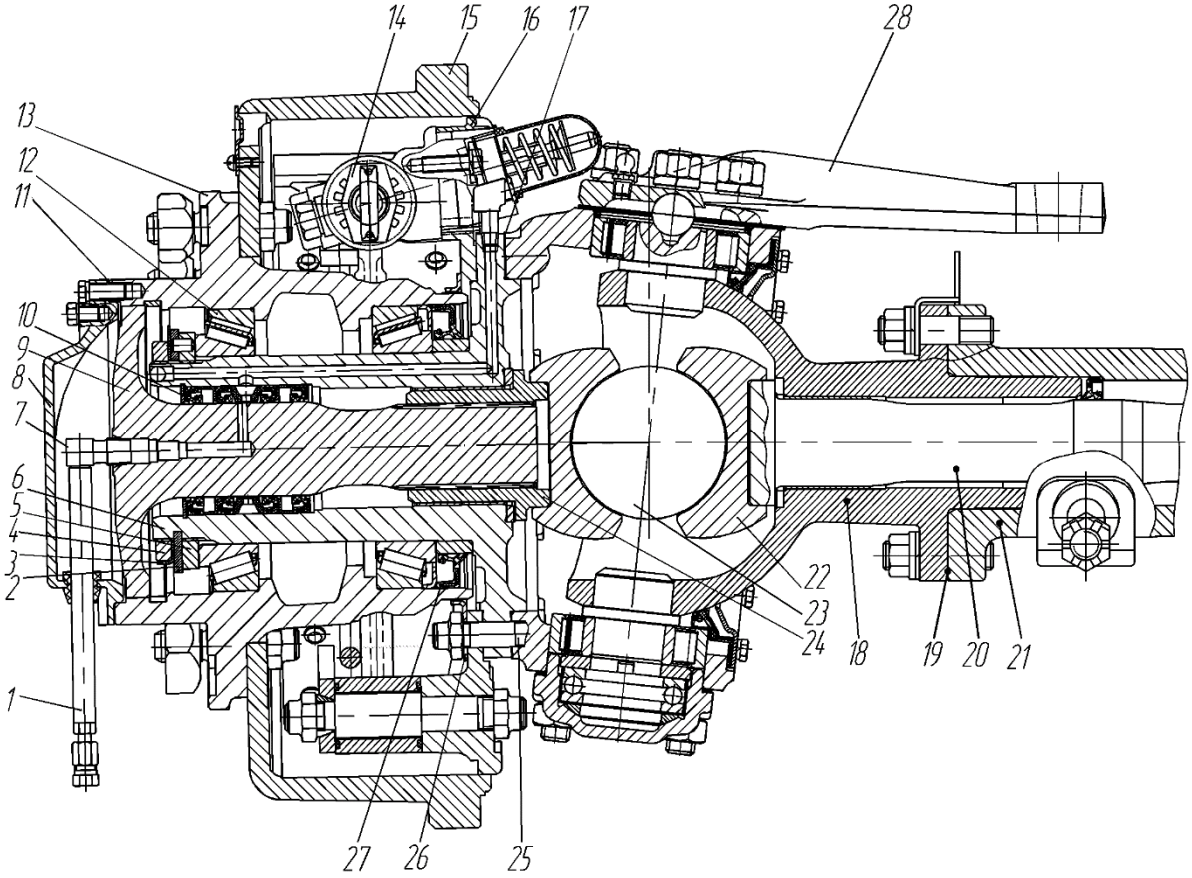
4.2.6.4 Truck front axle is driving, controlled. Construction of the king pin assembly is shown in figure 63. Torque to the front driving wheels is transferred through the axle shafts and the constant velocity joints (see figure 64).

For reliable and long-term operation of the driving axles use lubricants described in the Lubricants and Hydraulic Fluids Charts and maintain the proper level in the crankcases. To replace lubricant in the front differential axle joints, remove the wheel, brake drum with the boss, brake calliper, stub axle. Clean the lubricant and wash constant velocity joints parts.

If it is necessary to disassemble the ball unit from the front axle crankcase, use the puller bolts from the big tool kit. To do that, install them in the screw-threaded bores of the ball unit flange and torqueing them evenly, disconnect the ball unit root and the axle shaft housing.

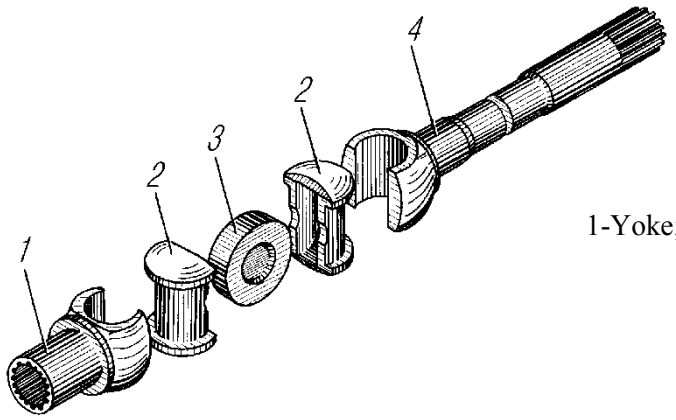
Check the tightening of main gear fixation bolts to the axle case regularly. Bolts loosening leads to crankcase bend.

When adjusting the main gear, adjust the preload of conical bearings and check bearing pattern of main gear conical couple. Adjusting works should be done when the main gear is removed from the truck. Interference should be controlled by the torque necessary for shaft rotation. Anti-torque moment is measured by force meter.



1-Air feed hose; 2-keyhole washer; 3-lock washer; 4-lock nut; 5-wheel bearing nut; 6-trunnion; 7-air feed angle; 8-wheel hub cover; 9- outer axle shaft; 10-gasket assembly; 11,17,19-seals; 12-bearing; 13-boss; 14-wedger; 15-brake drum; 16-brake caliper; 18-ball pivot; 20-inner axle shaft; 21-differential axle housing; 22-joint cam; 23-joint disc; 24-external differential axle yoke; 25-pin; 26-reflector; 27-gasket; 28-swivel member lever

Figure 63 - Drive to the Front Driving Axles Steering Wheels



1-Yoke; 2-cam; 3-disc; 4-inner axle shaft

Figure 64 - Constant Velocity Joint

Measure the shaft moment by rotating it smoothly in one direction, and minimum after five full turns. Mind that incorrect bearing adjustment can lead to destroy of bearings as well as main gear wheels.

4.2.6.5 Adjust the main gear as described below:

1. Put the main gear into the tool, remove the differential and the flanges. Unscrew the bolts of bushing sleeve fixation to the conical pinion. Remove pinion shaft with the bushing sleeve and the pinion.

Clamp the pinion by its rim in vice. Unscrew cover bolts and remove it. Unlock the lock nut and unscrew it. Remove lock and keyhole washers. Tighten the nut with 450-500 Nm (45-50 kgfm) torque.

If there is no backlash after the nut is tightened, there is no need to adjust the sleeve bearings.

Calculate the adjusting washer 23 thickness decrease according to figure 59 (backlash value plus 0.03-0.05 mm of preload). Unscrew the nut, remove the bearing and the adjusting washer. Grind (or choose) the washer to proper size, install the washer and assemble the bearing unit of the conical pinion. Nut torque moment is 450-500 Nm (45-50 kgfm). Lock the lock nut by bending the washer to one of its planes. Torque necessary for rotating the conical pinion in the bearings must be 0.6-1.4 Nm (0.06-0.14 kgfm). Force meter should indicate 7.5-17.5 N (0.75-1.75 kgf) when unwinding the wire (see figure 65).

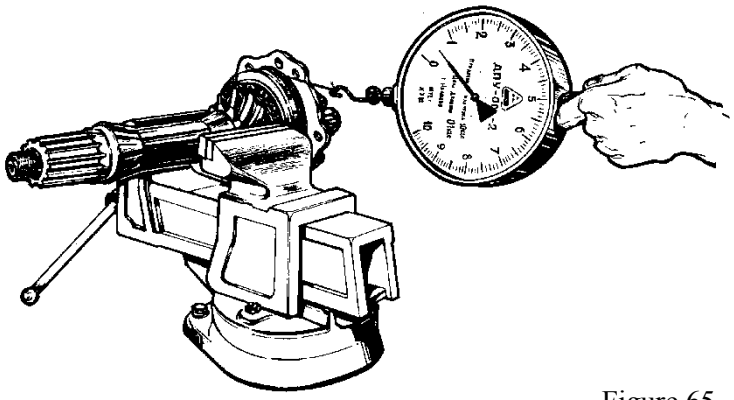


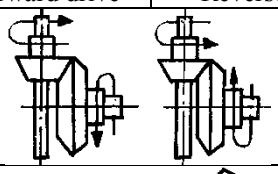
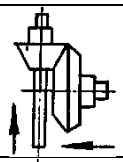
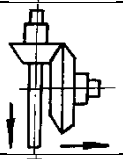
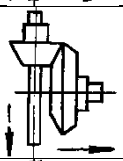
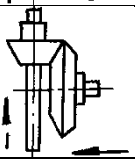
Figure 65 - Conical Pinion Bearing Adjustment Check

2. Adjust preload of lay shaft bearings. Adjust the bearings by selecting the seal package 8 (see figure 59) under the bushing sleeve 5 cover 9. Torque necessary for rotating the lay shaft must be 0.9-1.5 Nm (0.09-0.15 kgfm).

When measuring the torque with force meter, wind the wire to the cylindrical gear crown, the force meter should indicate within
18.3-30.5 N (1.83-3.05 kgf). Mind that the idler gear is moved to reduce side backlash when the seals from the sleeve cover during bearing adjustment are removed, so to maintain the backlash, install additional seals under the bearings bushing sleeve 5.

3. Install the sleeve with the conical pinion to the main gear crankcase. Tighten sleeve fixation bolts with 60-80 N (6-8 kgf). Check conical gears engagement with paint. Stamp length should be minimum 60% of tooth length (see Table 12).

Table 12 - Contact Regulation of Conical Gears Engagement of Main Gear

Tooth contact pattern of the conical driven spur wheel		Methods of achieving proper conical gears engagement	Conical gears movement direction
Forward drive	Reverse		
			
		Proper contact	
		Move the idler gear towards the pinion. If the side backlash between teeth is too small, distance the pinion	
		Distance the idler gear from the pinion. If the side backlash between teeth is too large, move the pinion	
		Move the pinion towards the idler gear. If the side backlash is too small, distance the idler gear	
		Distance the pinion from the idler gear. If the side backlash is too large, move the idler gear	

The print should not be closer than 5 mm to the tooth edge. Herein, side backlash in the teeth (near the wide part) must be 0.1-0.4 mm. To change the side backlash of conical gears without contact impairment, move both gears to the distance pro-rata the teeth number of each gear, i.e. move the idler gear 2.2 times (24:11) farther than the pinion.

4. Install the differential and adjust the differential bearings. Tighten differential bearing cover bolts with 250-320 Nm (25-32 kgfm) torque. Adjust the differential bearings with nuts 36 (see figure 59). After nut tightening distance between differential bearing covers must increase for 0.04-0.14 mm. During the adjustment rotate the differential to install rollers inside the bearings. Idler gear crown must be symmetrical to the pinion crown.

Due to technological improvement of differential gears manufacturing, tooth profile of the satellite axle shaft gear has changed. The new gears cannot replace the old ones, and must be replaced as an assembly. To distinguish between them, marks on the small module are made: axle shaft gear has 90 mm grooves and the satellite has graded butt end.

Adjust swivel member king pin bearings during sixth maintenance-15 000 as follows:

- remove the wheels and put supports under the swivel member lower covers.
- remove left swivel member lever and right swivel member upper cover;
- remove two seals from the seals package: one seal 0.05 mm thick and one seal 0.1 mm thick; lubricate lever cavities with 50 g of Litol-24 according to GOST 21150-87 and mantle the lever and the cover; tighten the nut with 160-200 Nm (16-20 kgfm) torque.
- take away supports and remove lower covers;
- remove from each cover seal package 0.15 mm thick [(0.05+0.1) mm];
- mantle the covers Tighten the nut with 160-500 Nm (16-20 kgfm) torque;
- mantle the wheels.

4.2.6.6 Wheel Boss Bearing Adjustment

- jack the axle from the dirigible wheel;
- remove the cover;
- disengage the axle shaft splines and the boss and remove the axle shaft;
- unscrew the outer nut and remove lock and keyhole washers;
- rotating the wheel manually, make sure that the brake drum does not rub the pads;
- tighten the nut with 300-350 Nm (30-35 kgfm) torque, when tightening the nut, turn the boss so that rollers mounted the bearing, after that loosen the nut for about 1/5-1/6 torque. Install the keyhole washer.

If the nut pin does not coincide with the keyhole, the nut can be loosened for the value not exceeding the distance between two adjacent holes. Mantle the lock washer, tighten the lock nut with 400-500 Nm (40-50 kgfm) torque
nut and lock it.

To provide tire inflation hose connection to the wheel valve, install the axle shaft with boss cover in a way that the tire inflation hose is in the wheel valve direction symmetrically between the wheel pins.

Having finished the assembly, check wheel bearings adjustment during 10-20 km driving. if the adjustment is correct, the boss should be cold or a little bit warm. If the boss is hot, check bearing adjustment.

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4.3 Undercarriage

4.3.1 Frame

The truck frame is riveted, consisting of two pressed girders of variable sections, joined together with cross members and the front bumper.

Cabover trucks have two towing forks with king pins for towing a vehicle in the front frame part. Conventional cab trucks have two rigid towing hooks for towing a vehicle in the front frame part.

A drawbar coupling is installed in the back part of the frame for trailer towing.

To protect from running under the vehicle a rear under-run protection in the rear frame part is installed.

Ural-44202-80M tractor unit has no rear under-run protection. Maintenance of the frame consists of inspection of screw and riveted joints. It is necessary to check the geometry of the frame and integrity of its components. If the rivets are loose, cut them and replace by new ones. It is allowed to replace loose and cut rivets by bolts of 8.8 strength class with a nut and lock nut or friction nut.

4.3.1.1 Drawbar Coupling

A drawbar coupling according to GOST R 41.55-2005 is installed, item class is C50-5 (see the Installation and Operation Manual for “Drawbar coupling 21-202”).

On customer’s request it is possible to install “hook-eye” drawbar coupling (delivered as spare parts for Ural trucks) for operation with trailers according to GOST 2349-75, standard size 3. Basic dimensions of the towing hook must comply with GOST 2349-75 for standard size 3.

The drawbar coupling is installed on the unified mounting places in the special towing cross member.

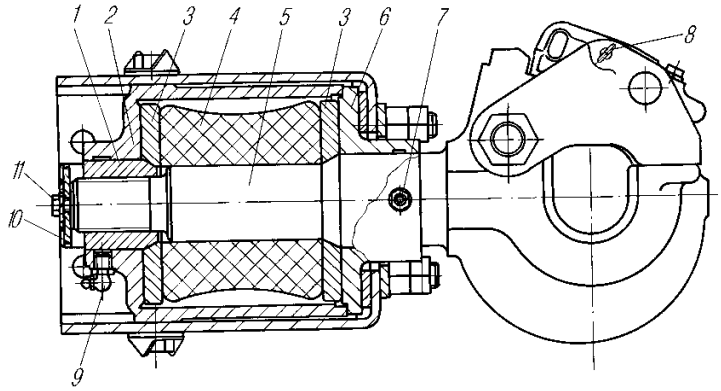
Maintenance of the towing device consists in its greasing and cleaning.

The guiding rods of the towing hook are lubricated through the oil cups during truck maintenance. The hook in the housing support 2 (see figure 66) and in the bushing 6 must be easily manually rotated.

Hook axial displacement in the housing is allowed for 0.5 mm maximum. To provide this, fasten the nut 1 until backlash between the housing 2 and the locking ring 3 due to the elastic element deformation (determined by free travel of the towing hook). Then unfasten the nut to prevent hook axial displacement and fix it with a locking plate and a bolt. The locking plate 10 together with the bolt 11 screwed in its hole as wells as the towing hook rod can move as far as backlashes in the joint.

When with a trailer put the lock pin 8.

It is forbidden to drive the truck with a trailer without locking plate 10 and with unfastened lock pin 8 of the towing hook.



1-Nut; 2-housing; 3-locking rings; 4-elastic element; 5-towing hook; 6-guiding bushing; 7,9-oil cups; 8-lock pin; 10-locking plate; 11-bolt

Figure 66 - Towing Device

When driving the truck with a trailer check the hook work area (hook mouth) wear. The maximum allowed hook mouth wear must be not more than 58mm in diameter (new towing hook is Ø $48^{+1.9}$mm). Towing device usage with a trailer drawbar eye having work area cross section over 43.9 mm is forbidden.

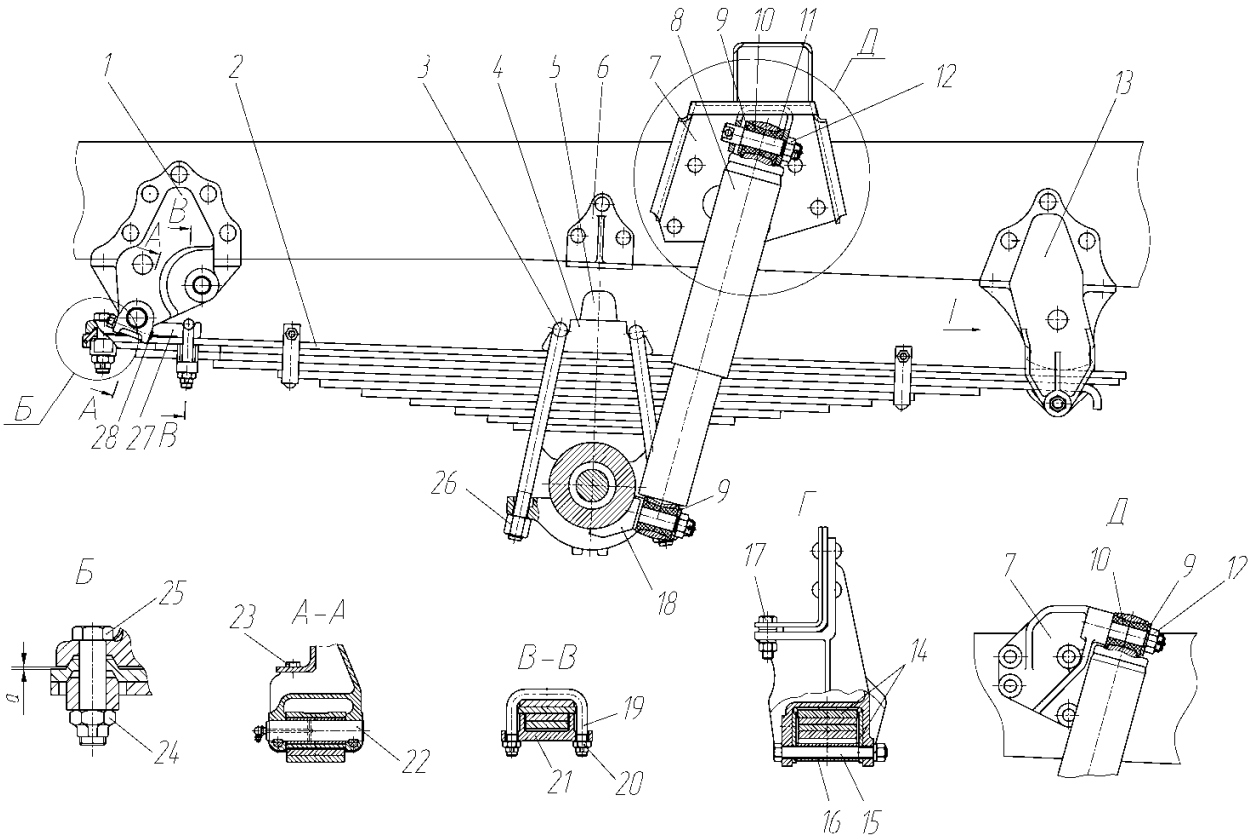
4.3.2 Truck Suspension

4.3.2.1 Front suspension group of 4x4, 6x6 trucks is shown in Figure 67, consisting of two longitudinal half-elliptic springs 2, working together with hydraulic two-tube telescopic shock absorbers 8. Upper eyes of the shock absorbers are fixed to the brackets 7 through rubber bushings 10, that are, in their turn, fixed to the frame girders, lower eyes are fixed to the brackets 18 welded to the axle case.

The springs are fixed to the axle case in the middle through u-bolts 3. Axle upstroke is restricted by rubber buffers 5 fastened in the spring clamp plates 4. Axle down stroke is restricted by coupling of third spring sheet bent ends with the tie bolts 15 of rear spring brackets, where distance pieces 16 are mounted.

Eyes 27 are fixed on the front spring ends with bolts 25 and u-bolts 19 through eye trims 21. The springs are joined with the front brackets 1 through the eyes with pins 22, which are fixed by wedges 28 in the brackets. Spring rear ends enter freely the eyes of rear brackets.

Depending on the front axle load the trucks can have various front springs differing by the sheet thickness. Herein, front spring u-bolts and other fasteners are not changed.

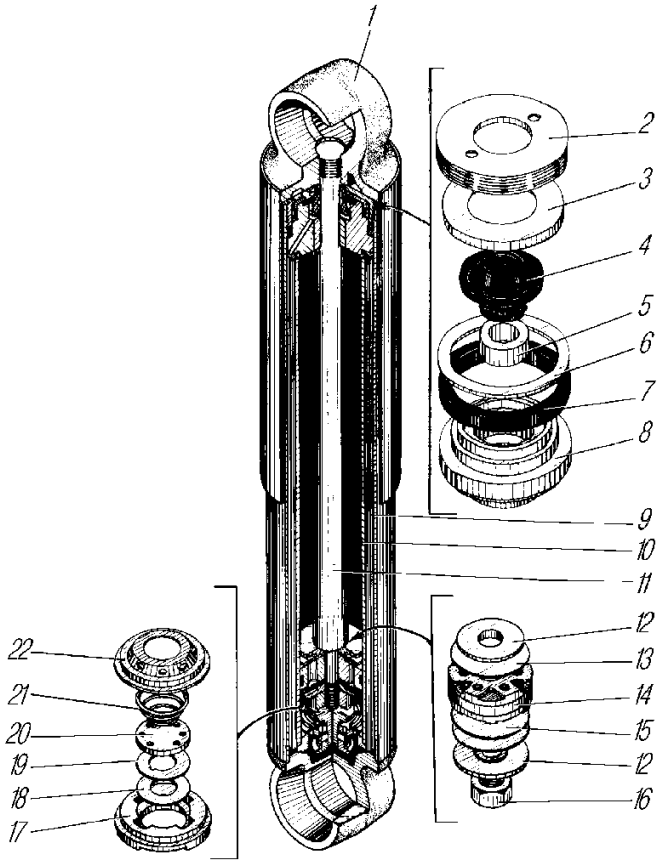


1,13-Spring brackets (front, rear); 2-spring; 3-spring u-bolt; 4-spring clamp plate; 5-spring buffer; 6-buffer bracket; 7,18-shock absorber brackets (upper, lower); 8-shock absorber; 9-washer; 10-shock absorber bushings; 11-shock absorber stud; 12-shock absorber retaining nut; 14-bush (upper, side); 15-bracket tie bolt; 16-distance piece; 17-fixing bolt of rear bracket to the amplifier; 19-eye u-bolt; 20-eye u-bolt nut; 21-eye trim; 22-spring eye stud; 23-fixing bolt of front bracket flange attachment; 24- eye fixing bolt nut; 25-spring eye fixing bolt; 26-u-bolt nut; 27-spring eye; 28-wedge; D-modification - upper shock absorber bracket of cabover trucks; a = 1-2.5 mm.

Figure 67 - Front Suspension of Trucks with 4x4, 6x6 Wheel Arrangements

4.3.2.2 Hydraulic shock absorbers are dedicated to damper oscillation caused by elastic strain of truck shock absorber components when driving along uneven surface. Hydraulic shock absorber principle of operation shown in Figure 68 is the following: at relative movement of spring and non-spring truck components the liquid in the shock absorber flowing from one chamber to another chamber through small holes offers resistance to vertical rod movement and dampers truck oscillation.

Usage of shock absorbers prolongs spring life and improves truck stability and steerability. Shock absorber stroke is 300 mm.

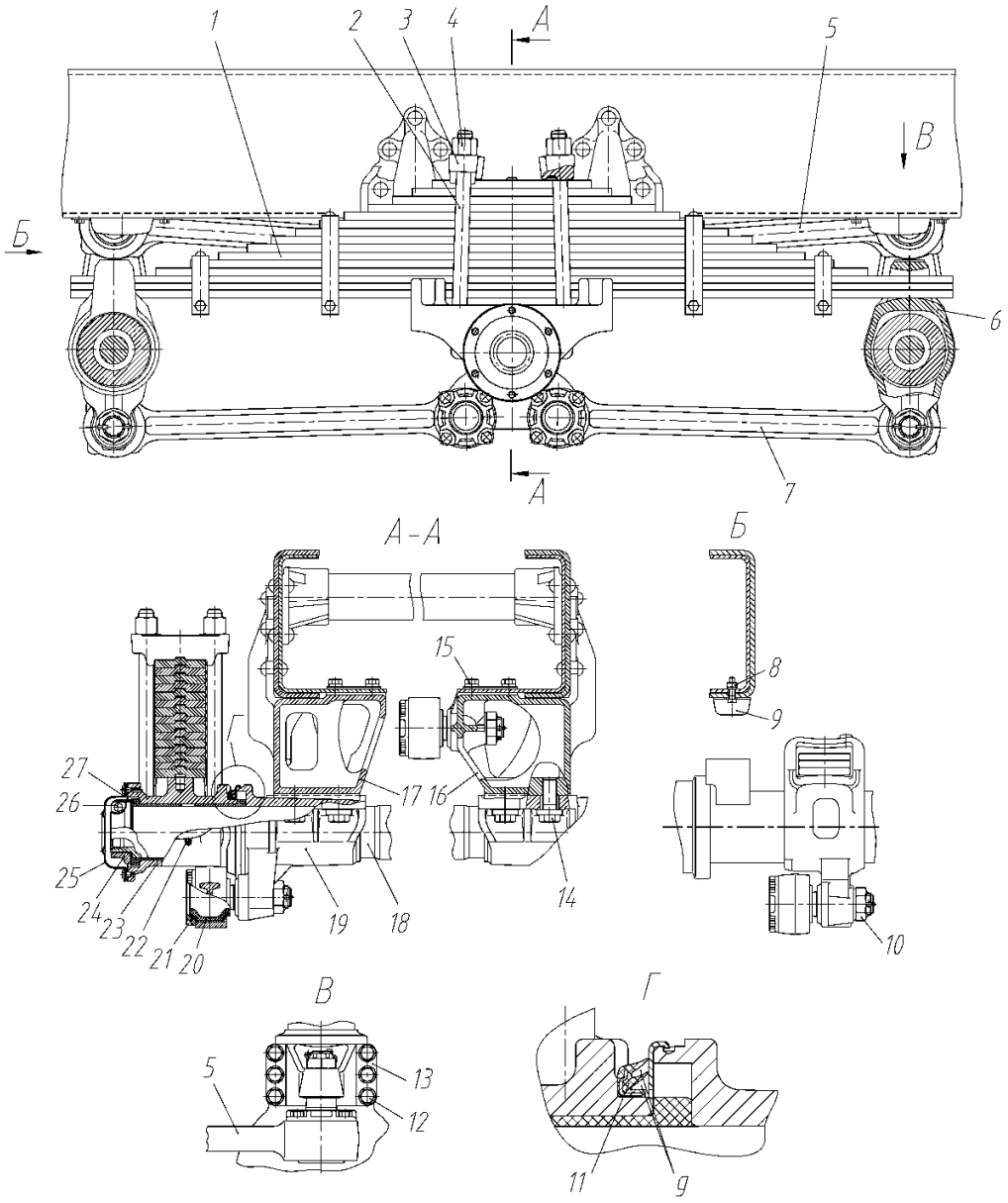


1-Upper head; 2-housing nut; 3-washer; 4-rod seal; 5-housing bushing; 6-washer; 7-O-ring; 8-seal housing; 9-shock absorber housing; 10-cylinder; 11-piston rod; 12-limiting discs; 13,15,18-valve discs; 14-piston; 16-piston nut; 17-valve housing; 19-compression throttle disc; 20-pressure plate; 21-spring; 22-cover

Figure 68 - Shock Absorber (manufactured by BAAZ)

4.3.2.3 Rear suspension group of 6x6 trucks is of equalizing type and is shown in Figure 69. Spring ends enter the eyes of support brackets 6. The springs are fixed to the equalizing beams 23 sweeping on the axle 18 of the equalizing beam through u-bolts. The brackets 19 are pressed to the axles, through them the axle 18 is fastened to the equalizing beam brackets 16 and 17 by bolts 14. Pushing and braking force is transferred from the axles to the frame through two upper 5 and four lower 7 torque arms. Side force is transferred through the springs.

Torque arm linkages 20 are rubber and metal. They enter freely the arm head and pressed by cast lid 21. Upper torque arms have shortened taper studs from the axle side.

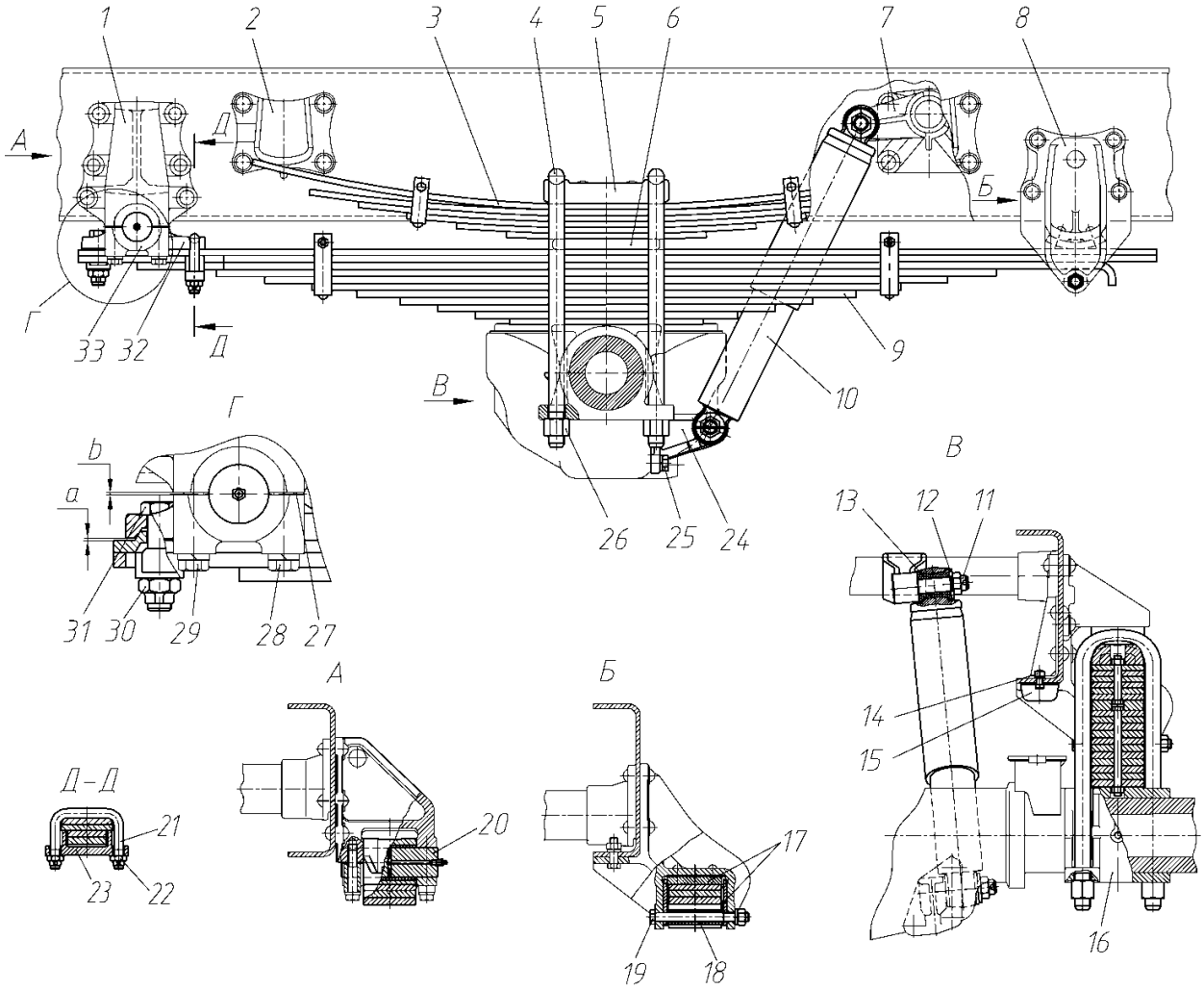


1-Spring; 2-u-bolt; 3-trim; 4-u-bolt nut; 5,7-torque arms (upper, lower); 6-spring support bracket; 8-buffer retaining nut; 9-buffer; 10-torque arm stud nut; 11-protective ring; 12-bracket fixing bolt of the upper torque arm to the axle case; 13-upper torque arm bracket; 14-balance shaft fixing bolt; 15- balance shaft bracket fixing bolt to the amplifier; 16,17-balance shaft brackets (right, left); 18-equalizing beam axle; 19-axle bracket; 20-rubber and metal linkage; 21-torque arm head lid; 22-oil cup; 23-equalizing beam; 24-equalizing beam retaining nut; 25-equalizing beam cap; 26-equalizing beam fixation tie bolt; 27-equalizing beam bushing; g-cavities under the protection ring edges

Figure 69 - Rear Suspension of Trucks with 6x6 Wheel Arrangement

Axle upstroke is restricted by rubber buffers 9 fastened to the bottom spar cap. Axle down stroke is restricted by spring end jamming in the support bracket 6.

Truck suspension with various load to the rear bogie differs by springs and u-bolt length.



1,8-Spring brackets (front, rear); 2-auxiliary spring bracket; 3-auxiliary spring; 4-spring u-bolt; 5-trim; 6-block; 7,24-shock absorber brackets (upper, lower); 9-spring; 10-shock absorber; 11-shock absorber retaining nut; 12-washer; 13-shock absorber bushings; 14-buffer retaining nut; 15-buffer; 16-spring support bracket; 17-bush (upper, lower); 18-distance piece; 19-bracket tie bolt; 20-stud; 21-eye u-bolt; 22-eye u-bolt nut; 23-eye trim; 25-shock absorber bracket fixing bolt; 26-u-bolt nut; 27-seal; 28,29-bracket lid fixing bolts; 30-spring eye bolt nut; 31-spring eye fixing nut; 32-spring eye; 33-front bracket lid; a = 1-2.5 mm, b = 1-2 mm

Figure 70 - Rear Suspension of Trucks with 4x4 Wheel Arrangement

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4.3.2.4 Rear suspension of 4x4 trucks consists of two main 9 and two auxiliary springs 3, see Figure 70. Eye fixation to the spring sheets and spring fixation to the frame of the front and rear suspensions are similar. Unlike the front spring, rear spring eye stud 20 of rear spring is fixed by removable lids 33. Axle upstroke is restricted by buffer 15 fastened to the bottom spar cap. Axle down stroke is restricted by coupling of third spring sheet bent ends with the distance pieces 18 mounted on the bolts 19. Rear suspension shock absorbers are similar to front suspension shock absorbers.

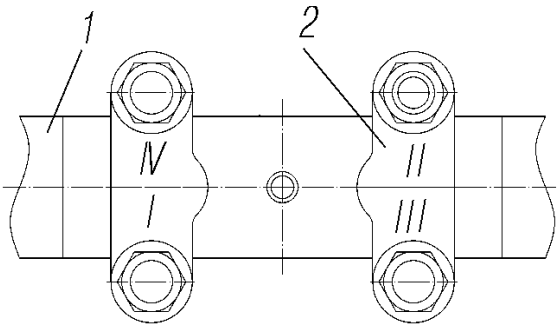
4.3.2.5 Maintenance. Suspension maintenance consists in lubricating the parts and assembly units, adjusting and checking their fixation. Loosening of suspension bolt joints is forbidden.

To prevent cut of front spring centre bolt and fixing pins in rear suspension equalizing beams, as well as early breakage of front and rear springs, fasten u-bolt nuts of front springs at 6x6 and 4x4 trucks and rear springs of 4x4 loaded trucks and rear spring u-bolt nuts of 6x6 unloaded trucks on time. If the springs start squeal, lift the truck by the frame, and lubricate the backlashes appeared between the sheets. With each spring disassembly grease the sheets, preliminary removing the old grease, mud and corrosion traces. Clean and lubricate spring eyes and studs.

When assembling, lubricate the u-bolt threads of front and rear springs by graphite lubricant or TSgip-type lubricant.

Fasten spring u-bolt nuts according to Figure 71:

- front springs (loaded trucks): first with 200-250 Nm (20-25 kgfm) torque, then finally with 400-500 Nm (40-50 kgfm) torque;
- rear springs of 6x6 trucks (unloaded) and 4x4 trucks (loaded): first with 250-300 Nm (25-30 kgfm) torque, then finally with 580-660 Nm (58-66 kgfm) torque;



1-Spring; 2-rear spring clamp plate of 6x6 truck (front axle beam collar of 6x6, 4x4 trucks, rear axle beam bracket of 4x4 truck); I-IV-u-bolt nuts fastening scheme

Figure 71 - Spring U-Bolt Nuts Fastening Scheme

Fasten the front spring eye retaining nuts of 4x4 and 6x6 trucks and rear spring of 4x4 trucks as follows: first fasten eye fixing bolt nut with 400-500 Nm (40-50 kgfm) torque, then fasten eye fixing u-bolt nuts on one branch with 100-140 Nm (10-14 kgfm), then the nut on the second branch with 180-220 Nm (18-22 kgfm) torque and fasten again the first nut with the same torque. Violation of nut fastening scheme can lead to deformation of the trim and eye u-bolts.

If there is no backlash (less than 0.2 mm) between the eye and the upper sheet in the eye fixing bolt area, repair or replace the eye (both front spring of 4x4 and 6x6 trucks and rear spring of 4x4 trucks).

When mounting rear spring for a truck with 4x4 wheel arrangement after repair or replacement, pay special attention to spring stud proper fixation. Mount the seal 27 between the spring bracket 1 and the lid 33 from rear bolt 28 side, see Figure 70.

CAUTION! DO NOT MOUNT SEALS ON THE FRONT BOLT 29 SIDE.

Before mounting the bolts 28, 29 lubricate their threads with УГ-6 sealer ("Loctite-243", "Loctite-262", "Anakrol-202," or "Fixator-6" are allowed).

Fasten the bolts 28 with 180-220 Nm (18-22 kgfm) torque, under which the seal 27 is mounted, and then fasten bolts 29. Bolts 28 and 29 fastening in another sequence is forbidden.

There must be a backlash between spring bracket 1 and the lid 33 from bolt 29 side within 1-2 mm, that will guarantee joint efficiency. When rear spring first sheet ends of 6x6 trucks are half worn, swap first and second sheets. Do not swap the sheets of the spring of the truck having over 12000 kgf load on the rear bogie.

To remove u-bolts 2 (see Figure 69) of rear springs at 6x6 trucks, jack the truck without disconnecting the torque arms, put the support under the equalizing beam axle 18 or under the frame. Unscrew u-bolt 4 nuts and remove spring clamp plates 3. Lower the truck to the support so that there is backlash between the spring 1 and the equalizing beam 23. Turn the equalizing beam for a small angle and remove the u-bolt.

With each equalizing beam boss disassembly remove the old grease, mud and corrosion traces. Replace worn parts (equalizing beam bushings 27, protection rings 11), if necessary. When assembling the equalizing beam boss, fill g cavities under the protection ring 11 edges with Litol-24, put the equalizing beam in its place, dry clean and lubricate retaining nut 24 thread of the equalizing beam and the balance shaft with УГ-6 sealer ("Loctite-243", "Loctite-262", "Anakrol-202," or "Fixator-6" are allowed). Fasten the nut 24 with 80 Nm (8 kgfm) torque, and then unfasten it $^{1}/_{6}$ torque back. Sealer leakage to the backlash between the retaining nut 24 butt ends of the equalizing beam and the equalizing beam bushing is forbidden. Fasten the tie bolt 26 with 44-56 Nm torque (4.4-5.6 kgfm).

Lubricate the equalizing beam bosses with Litol-24 by injecting it through the oil cup 22 according to the Lubricants and Hydraulic Fluids Charts. Inject the grease until it appears from the protection ring 11.

When assembling lubricate bolt 14 thread and threaded holes of the equalizing beam brackets with УГ-6 sealer ("Loctite-243", "Loctite-262", "Anakrol-202," or "Fixator-6" are allowed).

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Check the fixation of the torque arm brackets and studs. The torque arm stud nuts fastening torque should be minimum 600 Nm (60 kgfm), if the hole for split pin does not coincide with nut slots, fasten the nut and forelock it.

Rubber and metal linkages of the rear suspension torque arms doen't need maintenance during operation.

Repair and maintain shock absorbers in specialized workshops, keeping their cleanness. Protect rod, servo cylinder and other part polished surfaces from scoring and other damages.

Fill the cylinder with damping fluid according to Lubricants and Hydraulic Fluids Charts. It is forbidden to fill the shock absorber with fluid of any quantity and to use other fluids as operating ones: when the fluid is not enough, the shock absorber does not generate forces, when there is excess of fluid it can break.

When extending and contracting the shock absorber should offer uniform resistance. New shock absorber force in rebound must be within 5.95-8.05 kN (595-805 kgf), during contraction - 1.52-2.28 kN (152-228 kgf); contraction and rebound force reduction for more than 25% during operation is forbidden. Force is measured on a press with the rod stroke of 100 mm and 100 rpm. Shock absorber free play denotes its failure.

If there is liquid leakage from the shock absorber, fasten the nut of the shock absorber housing.

Shock absorber gap along the fixing stud or along its axle is forbidden. Change the shock absorber bushings 10 (see Figure 67) and 13 (see Figure 70), if necessary. Fasten the shock absorber retaining nut with 40 Nm torque (4 kgfm). If the split pin hole does not coincide, fasten the nut and forelock it.

The truck can be equipped with shock absorber of various manufacturers (BAAZ, Baranovichy town, GZAA, Grodno city, PAAZ, Pervouralsk town), valve system construction and properties of them differ a little bit. That is why when changing shock absorbers, install shock absorbers of one manufacturer (information on the manufacturer is marked on the lower part of the shock absorber housing or casing).

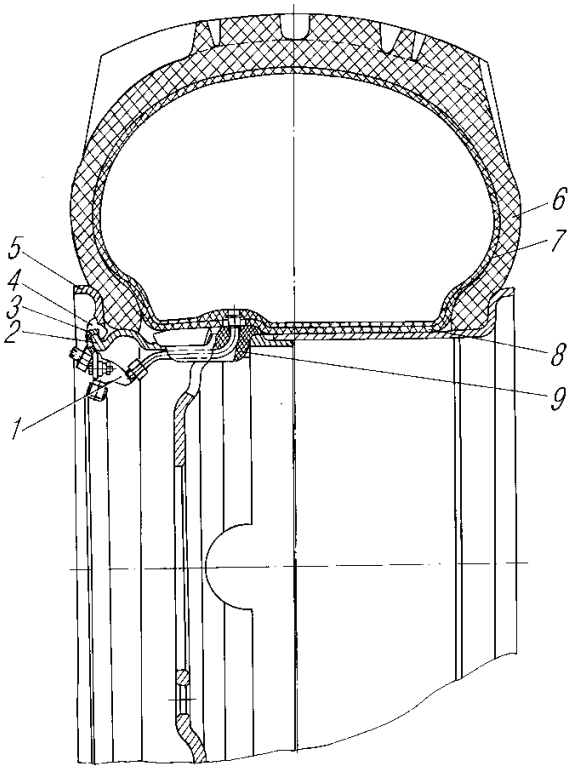
4.3.3 Wheels and Tires

The truck is equipped with disc wheels of regulated pressure.

The wheel assembly includes: wheel valve 1 (see Figure 72), rim base assembly 2 with disc and lock ring stop plate 3, lock 4 and bead 5 rings.

Structural feature of the wheel is toroidal seats ensuring secure tire mounting on the rim along all air pressure regulation range. To provide wheel assembly and disassembly with tire on rim base rim well is designed.

Wheels can have removable and non-removable safety shoulder on the side opposite to lock part.



1-Wheel valve; 2-rim base with disc; 3-lock ring stop plate; 4-lock ring; 5-bead ring; 6-tire; 7-inner tube; 8-tire flap; 9-vent slot seal

Figure 72 - Wheel with Tire Assembly

Bead and lock rings of the wheels are mounted in the certain position with the help of lock ring welded to the rim, and the extrusion B (see figure 75) on the lock ring entering the corresponding hole (slot) A of the bead ring. The second slot of the bead ring is used for wheels disassembly. One of lock ring ends has a slot to grasp the ring when it is removed from the rim lock groove.

Lock ring stop plate serves to prevent ring barring during operation, when the truck is running with low air pressure in the tires and also serves as a bracket where wheel valve 1 (see Figure 72) is fixed and additional support for air inlet hoses protection cases.

The wheel valve is mounted on 254Г-508 wheel from the outer side of stop bracket, and on 533-310 and 400Г-508 wheels - from the inner side.

Rubber seal 9 of wheel vent slot prevents tire internals from dirt and ensures chamber valve installation in certain position.

Wheels retaining nuts and pins from right and left sides have right-hand thread.

Tire and Wheel Maintenance

Most completely wheel and tire resource utilisation and their safe operation can be ensured only at regular maintenance and compliance with tire operation requirements, road safety rules requirements, health and safety requirements of motor vehicles.

The following requirements must be observed:

-Strictly comply with load norms and tire air pressure norms;

-Maintain wheels and tires on time;

-Maintain the undercarriage, steering wheel and brake units properly functioning;

-Follow road safety rules and apply efficient driving methods considering road conditions, strictly comply with operation norms of tires with regulated air pressure described in “Warnings” and “Truck Driving” paragraphs.

4.3.3.1 Maintenance.

Check tire air pressure every day before driving, and pump it to the norm, if necessary.

Tire air pressure is set (designated) for completely loaded truck and is checked in cold tires.

Check tire, wheel and fasteners conditions at daily maintenance. Tires should not have damages, non-repaired local damages (bottoming, cuts), local thread and side wall separation, and wheels should not have mechanical damages, corrosion or cracks. Wear of tires should suit for operation. Remove foreign objects stuck in the thread and side wall. Tire tube valves must be fault-free.

Check that fuel, oil and other petrochemicals do not get to the tires, because they destroy rubber.

If any faults are detected in tires and wheels, take measures to repair or replace the parts.

When strong or uneven thread wear is detected, which is usually caused, apart from wrong driving, by truck undercarriage failure, steering wheel or brake failure, find its causes and remedy the failure.

Wheel fasteners loosening and truck operation is forbidden, if at least one wheel fixation nut or pin is absent or fixing holes of discs are worn.

Every time when mounting the wheel on boss, independent of disassembly reason, fasten wheel retaining nuts twice: first time after 100-150 km and second time after 200-300 km.

When performing second truck maintenance, check general wheels and tires condition, if any defect is detected, repair or replace it, swap, fasten wheel retaining nuts, if necessary and if wheels with tires were not disassembled from the truck. Besides, when wheels are worn and steering lever is repaired or replaced, toe-in angle adjustment should be checked, all pipelines and hoses of tire pressure control system should be aired.

4.3.3.2 Tire Fitting When assembling and disassembling tires follow the rules:

- completely deflate the tires;
- fit the tires in a special area with dedicated equipment, tools and devices; when in field conditions, use the tools from the driver’s tool kit, herein, take measures to avoid sand and dirt coming inside the tires;
- tire casing and tire flaps should be clean and dry;

- finish equipping the truck with tires of the same size, model, ply rating, pay special attention to correct fitting of the tires relative to the axles (in terms of wear);

- warm the tires that have been stored at temperatures below 0°C to above-zero temperature in a warm room;

- wheel rotation direction should coincide with the thread pattern direction;

- rims and their components should not have any defects and bends, cracks, sharp ends and fins, corrosion both on internal and external surfaces, especially in the area of welds and in the area where the tire contacts worn clamping holes;

- when fitting a tire in a workshop, check the rim radial and axial play, they should not exceed 4 mm.

4.3.3.3 Before wheel assembly check technical state of the tire, tube, tire flap, rim, lock and bead rings.

Inspect the tire from outside and inside with the help of tire expander and remove foreign objects (sand, small stones, etc.) from the inside, clean the internal and mounting surfaces of the tire, repair defects and scores of the beads; flush rubber striations and burrs with the bead base surface. Face the tire inside, and face tube and rim flap from outside.

To simplify assembly and ensure complete tire seat on the rim mounting surface, it is recommended to lubricate tire beads with soap solution, glycerine or paraffin. Do not use mineral oils (cup grease, engine oil, etc.) as a lubricant.

If any manufacturing or operational flaws of the tires are detected, do not fit such tires.

Check tubes and valves for tightness, do not use tubes with delamination on the joints or damaged valve.

Clean wheel surface from dirt, rust and rubber waste, especially from rim surface, bead and lock rings facing the tire and in the area of welds. Paint the areas with defective coating with quick-drying enamel, removing fins and scores before.

Check lock ring seat on the rim or test cylinder of the same diameter:

- backlash between ring ends should be 45-55 mm, and ring ends should be 1.5 mm away from the rim and up to 50 mm along the arc length;

- local backlashes between the lock ring and the rim should not exceed 1.5 mm, and they should continuously lessen in both directions on the arc 1/4 of its perimeter maximum;

- twisting (“screw”) of the lock ring should not exceed 15 mm.

If backlashes and twisting of the lock ring exceeds the norms set above, the ring cannot be assembled and should be planished and crimped or replaced by a new one.

Wheel parts having defective forms, geometry or cracks should also be rejected.

Only proper wheels and tires can be fit (operated).

4.3.3.4 When assembling and disassembling, follow the next safety rules:

- fit and take down the wheel with a tire from the truck hub, when the truck is elevated. Loosen and tighten wheel retaining nuts when the wheels are down and the truck is braked. Tighten the nuts finally “in a criss-cross manner”;

- do not take down a wheel with a tire from the hub and do not remove the tire from the rim before checking that it is completely deflated.

- do not use club hammers, crows, defective or improper installation tool not specified in the technical documentation which can lead to wheel parts deformation or mechanical damage, tire cuts and breaks, tube or tire flaps damage;

- do not fit tire to the rim that does not match the size of this tire;

- do not use bead and lock rings from wheels of other type, as they can have different dimensions (diameter, tire section) even at trucks of the same model but different manufacturing date with wheels of different construction;

- do not mount additional bead rings to the rim to reduce its width;

- do not use rims, bead and lock rings with damaged surfaces, out-of-roundness, partial dimples, cracks, dirty, corroded rings with paint runs;

- do not drive a truck, if at least one nut or other wheel fastener (pin, etc.) is absent, if wheel discs have wide stud hole, if the wheels have large runout;

- do not use tires with limitedly worn thread pattern (sett remaining height should be 1.6 mm minimum) or tires with laminated carcass, pealing thread pattern or side wall, non-repaired partial damages or breaks to cord and open gaps, tire bead ring metal lids damage;

- do not fit tires, which side walls have rubber runs, rubber buffing and burrs of the toe, scores and damages preventing their fitting;

- assemble and disassemble without harsh force applied to tire irons, force applied should not lead to their sliding or breaking;

- do not start inflating a tire without making sure that the lock ring is in the correct position in the rim base groove and that it matches the tire being inflated;

- do not inflate a tire without special guard and fit on the truck, when fitting in field conditions, use special safety devices protecting from parts being burst, if the tire is self-dismantled or the wheel is broken;

- do not inflate tires from compressed air or gas tanks, as it can cause tire damage and hurt people around.

Inflate a tire in two steps. First step - until 0.05 MPa (0.5 kgf/cm_2) and check the position of the lock ring, then inflate the tire until nominal value. If the lock ring is installed incorrectly, deflate the tire, correct ring position and repeat inflation up to 0.05 MPa (0.5 kgf/cm_2).

If tire beads are not tightly seated on the rim after being inflated, deflate the tire, dismantle it and eliminate the cause of bad seat, after that mount the tire again on the rim, inflate the tire and check tire beads tightness;

- do not change the position and do not hammer lock and bead rings when tires being inflated or deflated, as well as when a tire is under pressure.

Remember that correct procedure of wheel fitting and dismantling ensures safety and reduces labour efforts, allows prolonging tire, wheel and mounting tool life.

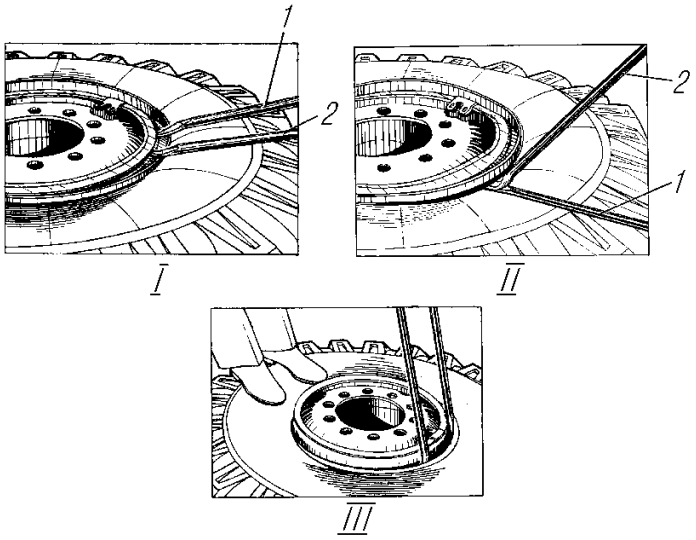
4.3.3.5 Wheel Disassembly

1. Put the wheel on an even clean surface lock part facing up, check that the tire is completely deflated, disconnect the gate from the wheel valve and sink it together with the seal in the tire cavity, remove the wheel valve. Mark the position of balance weights on the balanced wheel, on the rim and on the tire, and remove the balance weights.

2. Take down tire side wall from the rim seat, to do that insert flat end of a tire iron to the special slot between the bead and lock rings, and press the bead ring down, in the backlash appeared insert the flat end of a second tire iron (see Figure 73,I). Press both irons and moving them one by one along the tire at the distance of 50-100 mm from each other, upset the bead ring together with the tire side wall down, and then using hook-end of a big tyre iron completely remove (upset) tire side wall along the rim seat.

If it is difficult to remove tire side wall from the rim seat after long operation, as well as if it is removed from non-removable rim outboard flange, remove the side wall from its seat directly pushing it with tire irons. To do that:

- insert flat end of a tire iron as far as possible between the tire side wall and the wheel bead ring, upset the iron down;
- then put the hook-end of a big tire iron between the first iron and the rim outboard flange (bead ring) so that flat end of the short tire iron comes to the slot (hammer can be used), and resting one tire iron on the other one and safely grasping the bead ring with the hook-end of the iron and pressing both irons at the same time (see Figure 73, II) upset tire side wall down;
- repeat this method turning round the wheel and remove tire side wall from the rim seat. At the beginning distance between points of tool application should not exceed 100 mm.



I, II - tire beads disassembly from the seat; III - tire bead dismantling from the rim; 1,2-tire irons

Figure 73 - Wheel Disassembly

Toroidal form of the rim seat does not allow quick local dismantling of tire beads that is why it is necessary to upset tire bead in two-three steps moving around the wheel.

3. Take out the lock ring by inserting the flat end of the tire iron into the dismantling slot of the lock ring and drive out its end from the rim, moving it after with the second tire iron up and moving continuously round the wheel, uncouple the ring completely from the rim.

4. Remove the bead ring from the rim.

5. Dismantle tire bead.

- step on the tire from the side opposite to the tube valve, upset the tire to the rim well and insert a part of tire bead in it;

- insert flat ends of tire irons between the rim and the bead in the gate at 200-250 mm from each other (see Figure 73, III) and pressing them move bead part to the rim seat (output it from the rim). Herein, the opposite side of the tire bead must be in the rim well;

- holding the dismantled part of the tire bead with one tire iron, move the bead along its full length with another iron by serial insertion of the iron flat end between the rim and the tire 70-100 mm to the right and to the left from the point where tire bead is going out of the rim. To avoid bead damage insert tire irons as far as the bead width.

6. Turn the tire with the wheel lock part facing down and remove tire bead from the second rim seat in the same way as described in cl.2.

7. Put out the rim from the tire:

- put the wheel with the tire vertically lock part away from yourself so that tube valve is down, sink the valve with the seal in the tires.

- holding the tire by one hand vertically or resting it on a support, shift the rim towards yourself not moving it, so that tire bead enters the rim well;

- holding the disc or rim upper surface, take out the rim from the tire avoiding its falling down.

If the tire flaps stick to the rim, separate it by a tire iron.

4.3.3.6 Wheel Assembly

1. Put the tube and tire flaps inside the tire and slightly inflate the tube so that it becomes of normal form but not fits tight to the tire. For the tires with regulated air pressure put the tube inside the tire taking into account wheel rotation direction and mount a seal on the valve in a way that its stem comes inside the seal case.

2. Mount one of bead rings with rim shoulder facing down to the rim, its lock part facing up.

3. Fit the tire to the rim

- put the tire inclined to the rim so that its bottom part with the valve facing up is a little bit apart from the rim. Direct the valve (with the seal) opposite the wheel valve slot and insert the stem and nut into the valve slot moving the tire to or from the rim, if necessary;

- lift bottom part of the tire from the valve slot side and move it to the rim so that bottom bead entered the rim well, herein, the tire will fit the rim under its own weight. If the tire is hung on the rim seat, pull it down shaking it slightly, check that there is no valve cocking in the valve slot and there is no tire flaps jamming.

- insert the guiding part of the seal with the valve into the rim slot preliminary sinking the bottom part of the seal with the tire iron in the tire.

4. To fit the second tire bead to the rim, step on the tire from the side opposite the valve, and sink this part of the bead in the rim well, herein tire bead should be over the rim in the stop block area. If it is difficult to do, upset tire bead part behind the rim seat using the tire irons (see Figure 74).

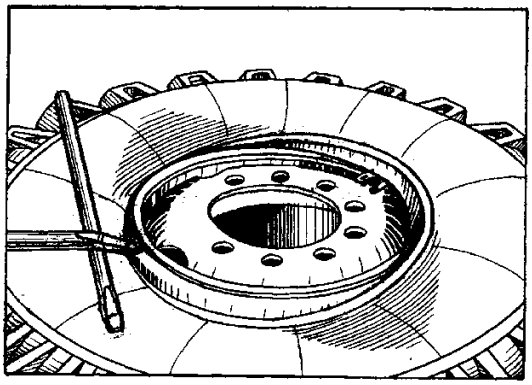


Figure 74 - Tire Bead Fitting into the Rim Well

Holding the bead with the short tire iron first in the bracket area so that it cannot move to the centre, and then holding it in the rim well with the other iron, starting from the opposite to the bracket side, move the bead along its round into the seat by using flat and hook-ends of the iron in turn. Upset the tire bead close to the valve the last, a little bit lower the rim edge to the level providing installation of the lock ring, otherwise, the valve slot seal will be displaced and further assembly will be impossible.

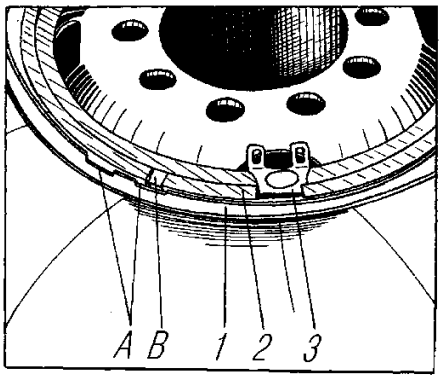
5. Mount bead and lock rings, herein matching forge B (see Figure 75) on the lock ring with one of slots A on the bead ring, and matching the lock ring cut with the stop block on the rim.

6. Check the position of the valve and its seal in the valve slot and correct them, if necessary, connect the tube valve to the wheel valve. Mount the valve on the internal side of the lock ring stop block, and after valve connection and tire inflation fix it in the farthest position from wheels centre.

7. Inflate the tire as described below:

- align the bead and lock rings relative to each other;
- inflate the tire up to 50 kPa (0.5 kgf/cm^2) and check that there is no displacement of lock and bead rings from their active position. It is recommended to inflate a tire when the wheel is put horizontally.

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1-bead ring; 2-lock ring; 3-bracket; A-bead ring slots; B-forge on the lock ring

Figure 75 - Position of the Lock and Bead Rings

If the wheel is installed incorrectly, deflate the tire, correct rings position and repeat inflation up to 50 kPa (0.5 kgf/cm$_2$). When deflating the tire, disconnect air inlet hose from the compressed air source and not from the wheel. The hose can be disconnected from the wheel only when the tire is completely deflated.

If the rings are repeatedly mounted incorrectly, replace the defective parts and checking the correctness of lock and bead rings inflate the tire at 50 kPa (0.5 kgf/cm^2) ensuring tire beads seating on the rim seats, then set nominal pressure of the tire.

Unlike popular conical rim seats fitting tire beads on toroidal rim seats under growing internal pressure is not gradual but quick, usually at 450-500 kPa (4.5-5.0 kgf/cm^2).

8. Mount the wheel on the hub and fix it, wheel retaining nuts tightening torque should be 400-500 Nm (40-50 kgfm).

To provide tire inflation hose connection to the wheel valve, put the wheel relative to the hub cover so that it is symmetrically positioned between the wheel pins from wheel valve side.

When fitting the wheels tighten disc retaining nuts to the hub as described below:

- manually thread all nuts on the studs;

- tighten the nuts preliminary when the wheel is elevated. Herein, tighten the nuts next but one or in a criss-cross manner. When tightening first five nuts, check that the nuts align their spherical chamfers with spherical chamfers of wheel disc mount holes. Nuts should be completely tightened, because insufficient and uneven fastening can lead to side wheel wobble.

4.3.3.7 Wheel Assembly Balancing. Allowable out-of-balance is 5.2 kgm. During operation when the tires become worn and due to other reasons (tire refitting) initial balancing is disturbed, that is why during truck driving one can feel oscillation and vibration, front wheels especially.

Out-of-balance can lead to quick thread wear, to steering wheel parts and suspension parts wear, as well as it complicates truck steering. Static wheel balancing should be done when the wheel is with tire. Out-of-balance is eliminated by putting balance weights retained on the bead ring with leaf spring. One balance weight with the spring weighs 0.38 kg. To eliminate out-of-balance from 5.2 to 15.2 kg*cm one balance weight should be mounted, from 15.2 to 25.2 kg*cm - two balance weights should be applied, from 25.2 to 35.2 kg*cm - three balance weights should be used. **Allowable out-of-balance is 5.2 kg*cm.**

Before balancing clean the wheel and the tire from dirt and foreign objects.

Tire pressure should be nominal. During balancing position the wheel with the tire on a dedicated device along disc surface for spherical chamfers of mount holes.

Balance weights mounting scheme:

1. -Deflate tires.

2. Force the tire bead away from the bead ring in the area where balance weight is mounted until 1-2 mm backlash appears using the tire iron.

3. Mount the weight with the spring on the bead ring, and holding it with your arm slightly hammer the spring into the bead ring edge and upset it completely. If the spring is inserted incorrectly, it can suddenly slide from the bead ring, that is why it is important to be careful.

4. Inflate the tire to nominal pressure.

5. Correct the position of balance weights if they are displaced along the perimeter or tumbled out the bead ring radius.

To remove balance weights insert a screw driver between the spring and the weight, force the spring away from the bead ring until the weight is free, remove the weight and the spring.

Balance and swap the wheels when necessary. Tires swapping scheme is given in Figures 76 and 77.

When using the tires conform with “Tire Operation Rules” (Moscow, Chemistry, 1983)

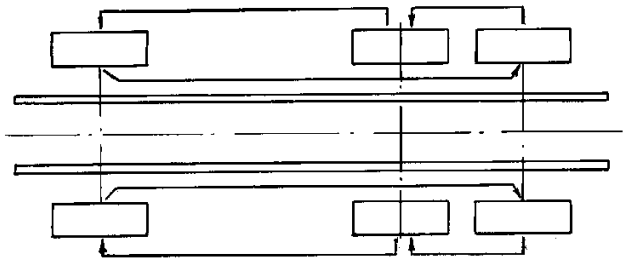


Figure 76 - Truck Tires Swapping Scheme (for 6x6 trucks)

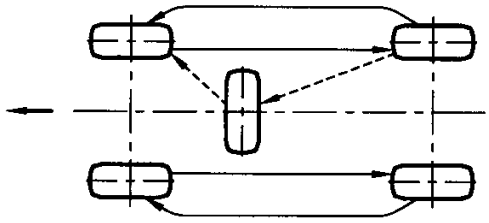


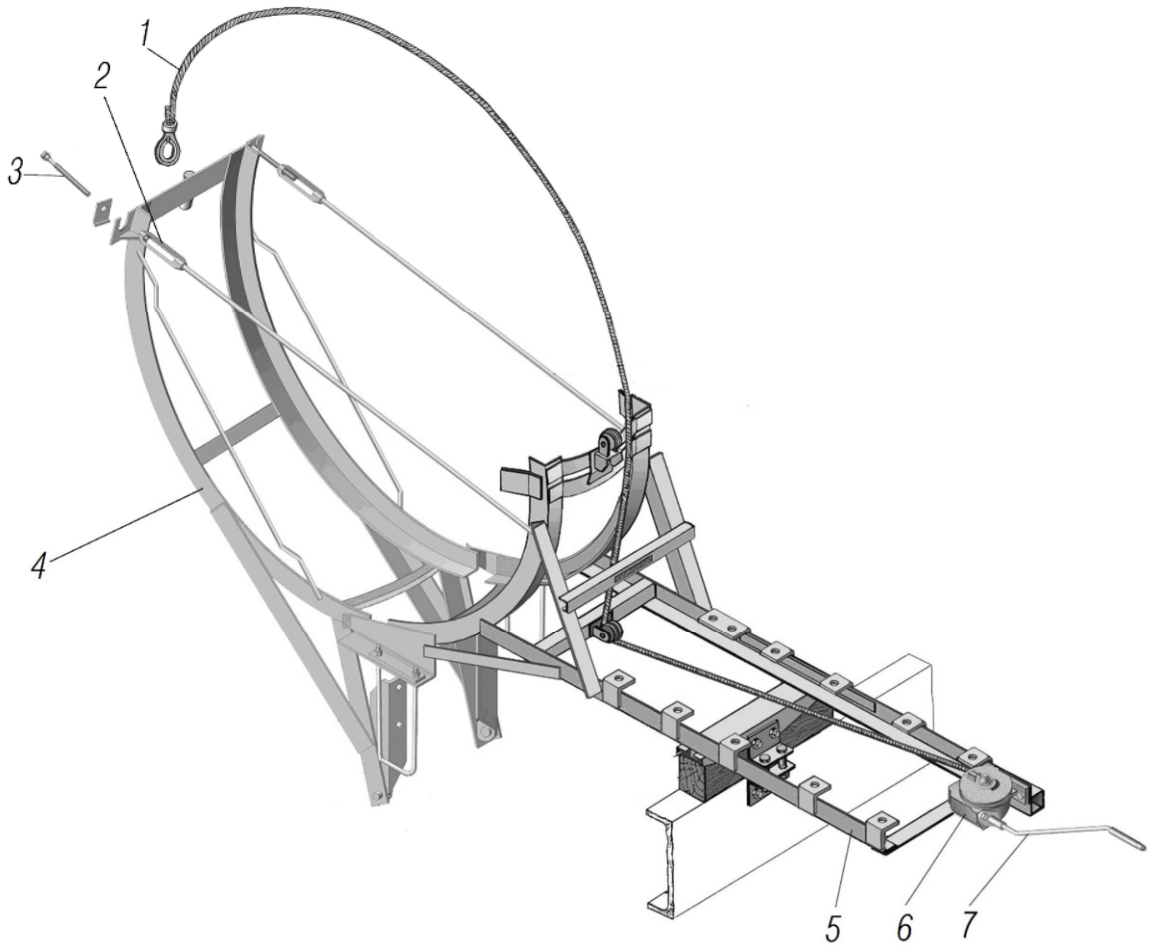
Figure 77 - Truck Tires Swapping Scheme (for 4x4 trucks)

4.3.4 Spare Wheel Holder

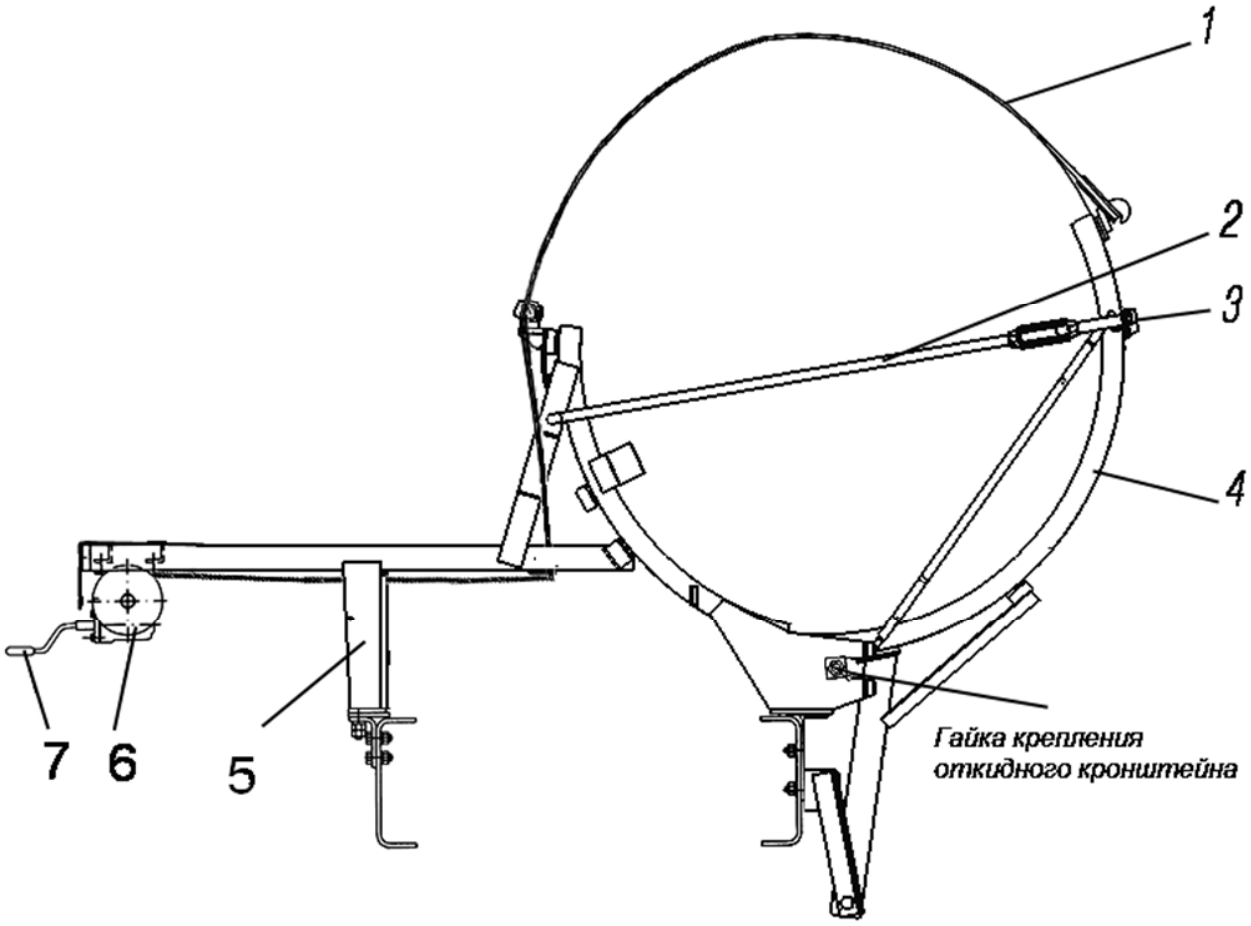
Spare wheel holder constructions are shown in Figure 78.

Spare wheel holder base and removable bracket are made of rolled sections welded to each other.

Spare wheel elevation and lowering is done with worm gearbox 6. When driving the truck spare wheel is fixed by buckles 2 and bolts 3. Removable bracket of spare wheel holder at a cabover truck is additionally fixed by nuts. Before lowering the spare wheel dismantle the side guard (read clause 4.7.3.2 Side Guards) and check cable 1 clamp to the removable bracket, after that unfasten the removable bracket 4 from the buckles 2 and loosen removable bracket retaining nuts (for cabover trucks). Put removable handle 7 on the gearbox shaft



Spare wheel holder variant for a conventional truck:
1-Gearbox cable; 2-bucket; 3-bolt; 4-removable bracket; 5-holder base; 6-gearbox; 7-removable handle



Spare wheel holder variant for a cabover truck:
1-Gearbox cable; 2-bucket; 3-bolt; 4-removable bracket; 5-holder base; 6-gearbox; 7-removable handle.

Figure 78 - Spare Wheel Holder

By rotating the handle lower the removable bracket with the spare wheel. When the wheel is down remove cable 1 from the spare wheel not disconnecting it from the removable bracket 4, if possible, and wheel it out.

If the removable bracket with the spare wheel cannot be lowered when the handle 7 is first rotated (it can be seen because cable 1 tension is poor), use the tire iron to uncouple the removable bracket 4 from the holder base 5.

Spare wheel in transport is elevated in reverse order, after that, loosen cable tension.

Spare wheel holder maintenance consists in checking holder fixation on the truck frame and wheel fixation in the holder.

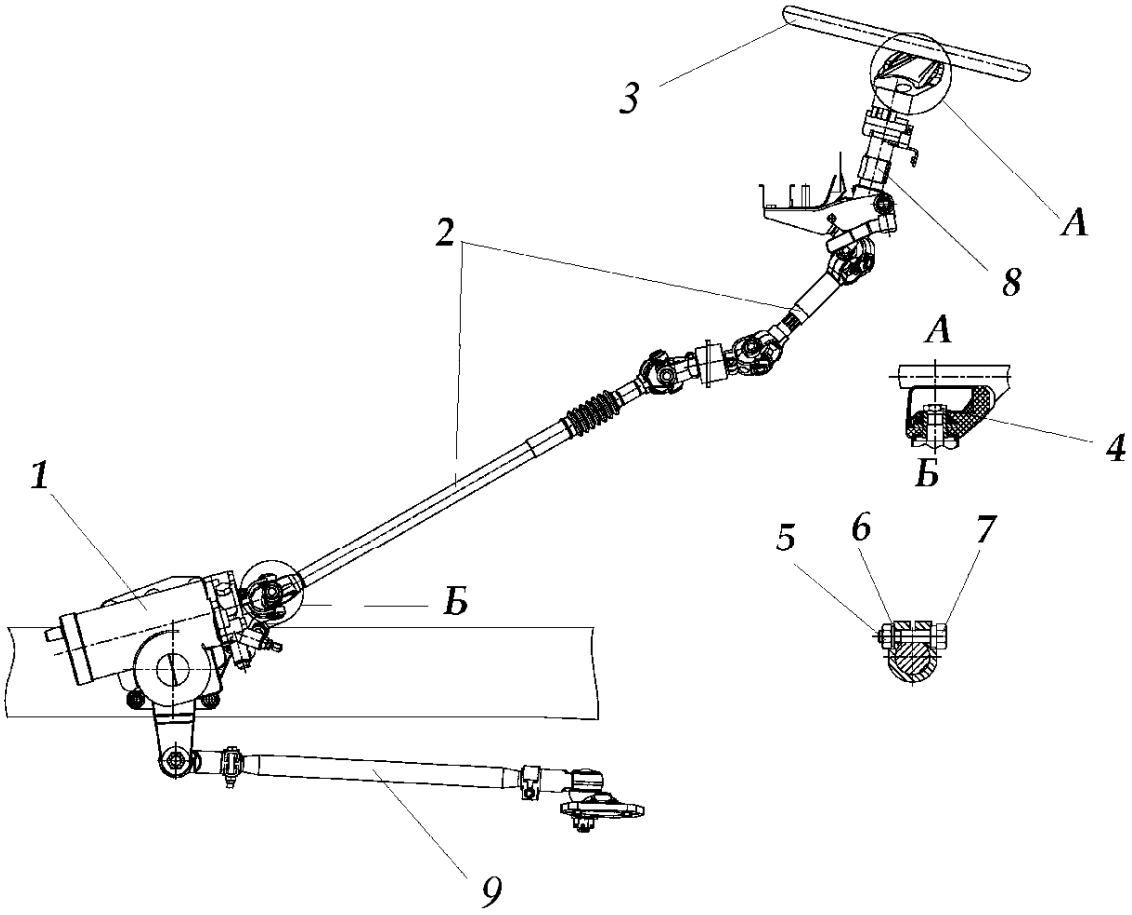
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4.4 Steering wheel

4.4.1 Steer

The steering consists of the steering gear and the hydraulic booster. The steering gear includes the steering column, the mechanical part of the steer, the drop arm, the pull-rod of the drop arm, the pull-rod of the steering linkage, the lever of the swivel member and levers of the steering linkage.

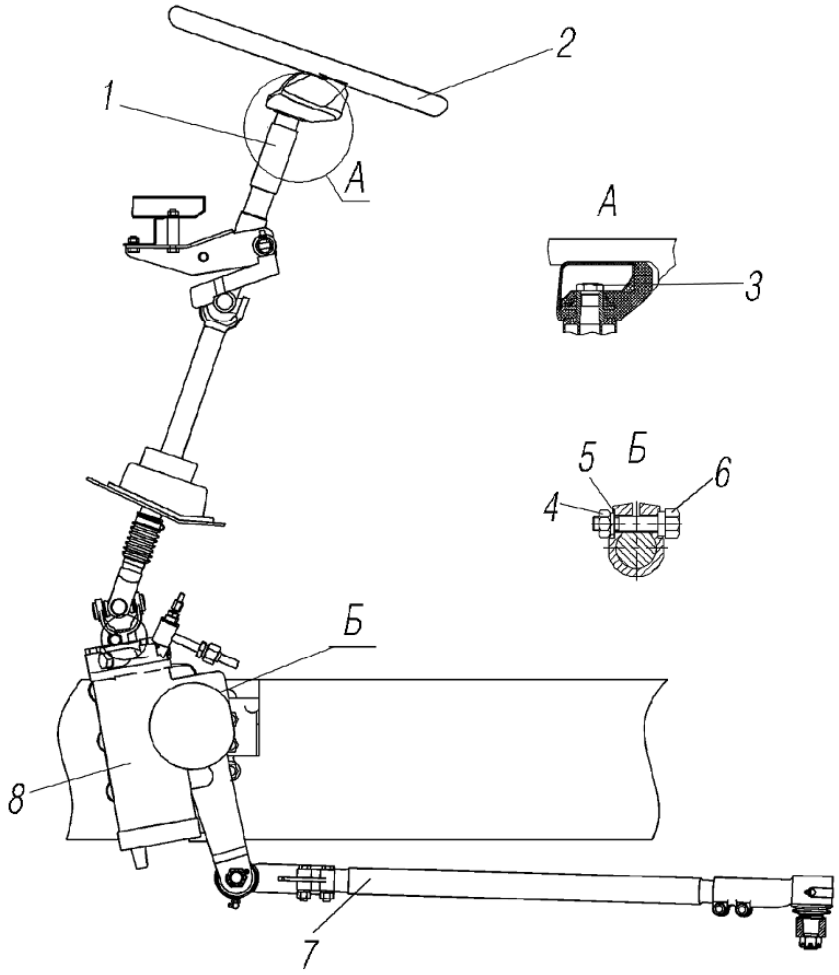
4.4.1.1 Steer for conventional cabin trucks is shown in figure 79.



1-steer with arm; 2-propeller shafts; 3-steering wheel; 4,5-nuts; 6-washer; 7-bolt; 8-steering column; 9-pull-rod of drop arm

Figure 79 - Steering wheel of the conventional cabin truck

4.4.1.2 Steer for cabover trucks is shown in figure 80.



7-steering column; 2-steering wheel; 3,4-nuts; 5-washer; 6-bolt; 7-pull-rod of drop arm; 8-steer with arm

Figure 80 - Steering wheel of the cabover truck

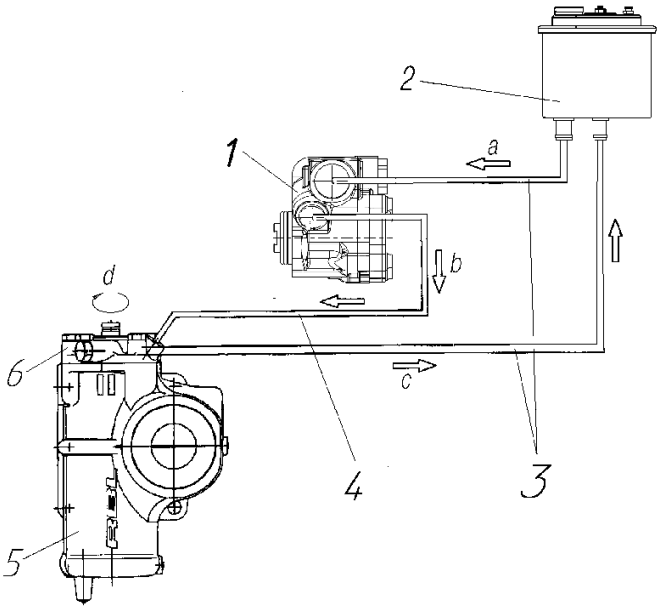
4.4.2 Booster

4.4.2.1. Hydraulic circuit of the steering wheel (booster) is shown in figure 81.

4.4.2.2 Steer with the built hydraulic booster of the integral type. Operational gear-crew-ball nut-rod-sector. The rod is simultaneously the booster piston.

The axle gear wheel of the drop arm and the rod in the middle position does not have the side clearance.

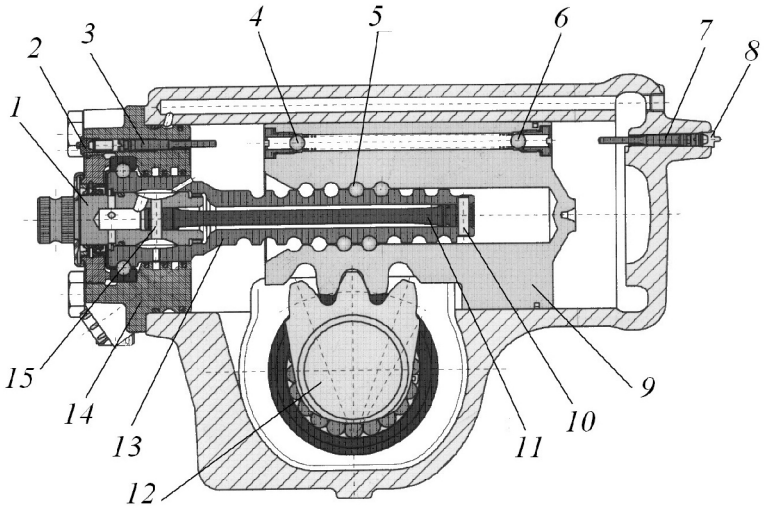
The device has the valve with the rotating spool, which consists of the operating in the wormscrew 11 the rotating spool 1, as shown in figure 82. The rotating spool 1 and the worm-screw head 11, located in the valve housing 12, have dosing grooves, located in radial directions.



1-pump; 2-oil tank; 3-low-pressure pipe-lines; 4-high-pressure pipe-lines; 5-steer; 6-hydraulic distributor; a-flow line; b-high-pressure line; c-drain line.

Figure 81 - Hydraulic circuit of the steering wheel (hydraulic booster).

The spool and the torsion bar, the torsion bar and the wormscrew are perforated together and tightened with pins 8 and 13. When effect on the steering wheel is absent, the torsion bar keeps spool in the neutral position. When using pressure to the steering wheel, the torsion bar screws and turns the spool in the direction of correspondent dosing grooves.



1-Spool; 2,8-plugs; 3,7-adjusting screws of pressure limitation; 4,6-pressure limitation valves; 5-balls; 9-piston; 10,15-pins; 11-torsion bar; 12-drop arm shift (sector); 13-wormscrew; 14-valves housing

Figure 82 - Steer

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Oil from the pump enters one of the head ends of the steer, depending form turning direction, and enhances turning movement of the drop arm due to hydraulic pressure on the piston face.

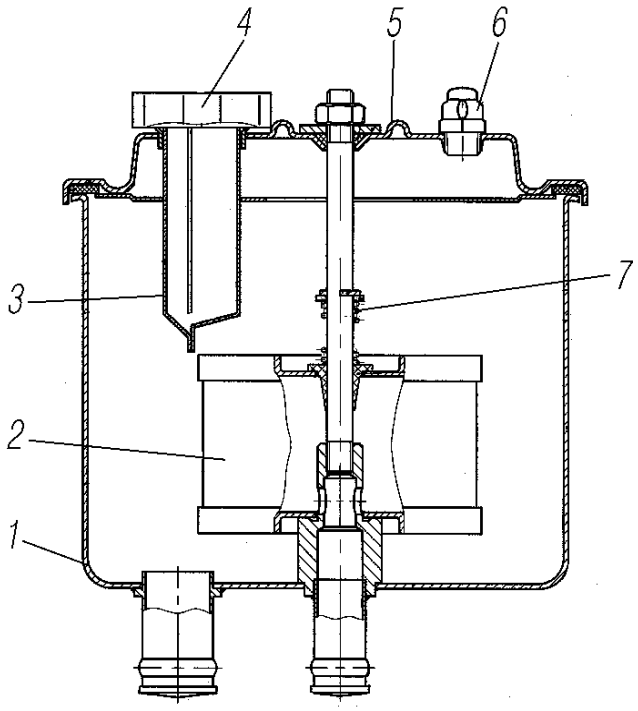
Turn of the spool in reference to the wormscrew head is limited with blocks.

The steer is equipped with hydraulic rotating locks, which partially bypasses oil for draining, before wheels do not turn to the full stop. The following turn of directive wheels will be implemented with additional effort on the steering wheel.

4.4.3 Steering Wheel Oil Tank

The tank is installed separately from the pump. In the tank there is the filling strainer 3, shown in figure 83. Oil, returning in the tank, runs through the filter 2. If the filter 2 is contaminated, the last raises the little, clenching the spring 7, and oil runs to the tank passing over the filer. Oil level in the tank is controlled with indicator upon the unscrewed plug 4.

Oil level shall fall within the limits of marks in the indicator.

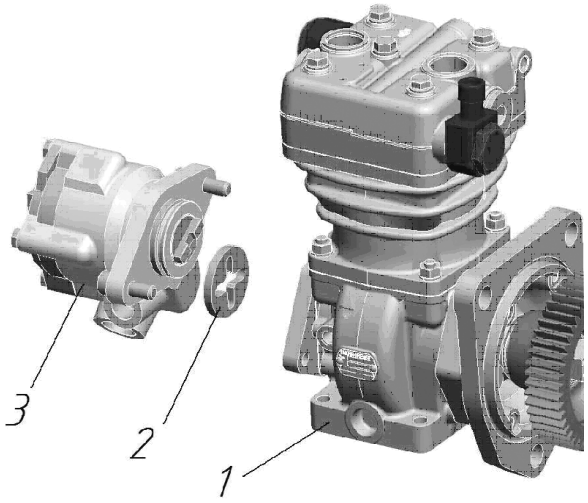


1-Housing; 2-filter; 3-filling strainer; 4-plug of the filler neck with oil level indicator; 5-lid; 6-breather; 7-spring

Figure 83-Steering wheel oil tank

4.4.4 Steering wheel hydraulic booster pump is shown in figure 84 – vane type, pump drive from the compressor by means of washers with the cross-shaped hole. Flow-limiting and pressure limitation valves are installed in the pump. The pressure limitation valve is regulated for the actuation pressure within the limits of 150-165 kgf/sm^2. Established nominal performance of the pump is 16-20 l/min.

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1-Compressor; 2-washer; 3-pump

Figure 84 - Power steering pump

4.4.5 Tie Rods

Tie rod ends of the non-assembled and non-serviceable construction. Durability of tie rod ends depends on protective clutches conditions, so damaged in the operation process clutches shall be replaced. When a significant clearance has appeared in end joints, ends shall be replaced.

4.4.6 Maintenance of the steering wheel

Maintenance of the steering wheel means periodic inspection of fastening of the steering wheel, pipe lines, steer free play, and also upon maintenance of hydraulic system units. Repair of units, such as the pump and the steer, shall be implemented in designated service centres.

4.4.6.1 Oil change in the steer hydraulic system

1. Warm oil up in the hydraulic system not below 20°C.

2. Rise the front part of the truck so, that wheels do not the ground or establish front wheels of the truck on rolling circles.

3. Detach the drain pipeline from the tank, preliminary bring the container for the drained oil.

4. Start the engine for no more than 10 sec in order to oil has run out of the tank and the pump.

5. Stop the engine for the couple of times and turn the steering wheel to the left for several times to remove the rest of oil.

6. Clean the tank outside. Remove the old filter, establish the new one.

Before system charging with oil adjust and fasten all hydraulic connections.

7. Pour oil in the tank below the upper mark on the oil gage of the filler neck tank plug.

8. Start the engine for no more than 5 sec., and then pour more oil. Continue to pour oil, not allowing air to enter in the hydraulic system due to the decreasing oil level during the pumping process.

9. When oil reaches the highest mark on the oil gage, turn the steering wheel in both sides several times until air bubbles stop float up. If necessary, refill oil.

Implement the oil level control upon the unscrewed plug of the filler neck.

4.4.6.2 Setting adjustment of steer valves.

Provide (if necessary) checking and setting adjustment of restriction valves in the steer after replacement of the arm or the drop arm pull-rod, or the steer.

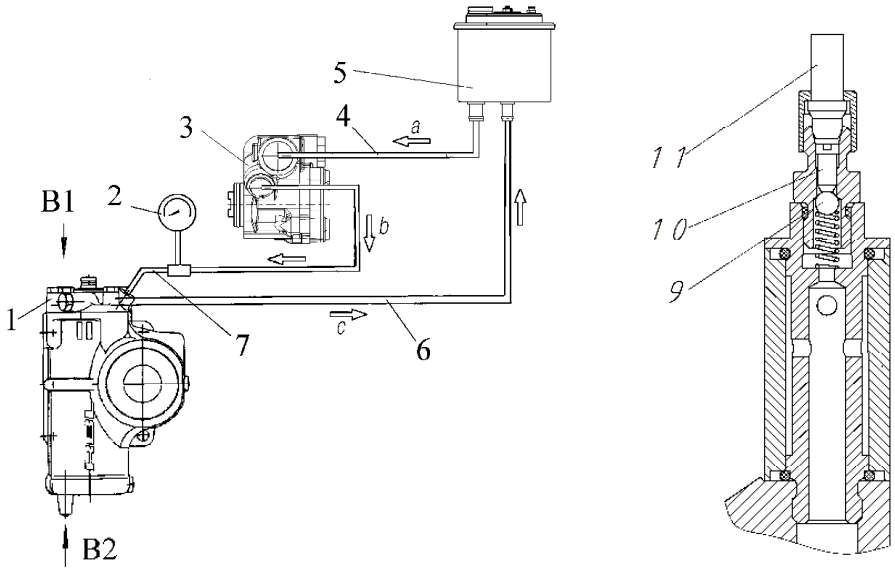
Performance description

Implement performance on the equipped truck, which stays above the inspection pit on the horizontal hard and flat bearing area. It is recommended to establish the rolling circle or two metal plates with lubricant grease between them under every steering axle wheel.

Before performance start fill the hydraulic system with oil and remove air out of it. Regulate the hydraulic pressure-limiting valve in the steer upon the maximum steering wheel position, when the engine does not operate:

- remove plugs 2 and 8 as shown in figure 82;
- reverse with the screw driver, not applying significant efforts, adjusting screws 3 and 7 for 3-5 rotations as shown in figure 82;
- adjust the pressure gauge to the output on the pivoted union of high pressure in the steer, preliminary remove the cover plug from the stub dual;

Define pressure in the hydraulic system in the maximum steering wheel position when the slewing limiter is locked in the platform. Always implement the pressure control upon nominal rate of the engine crankshaft (beginning with approximately 1200 rpm).



1-steer; 2-pressure gauge; 3-pump; 4-intake pipeline; 5-oil tank; 6-drain pipeline; 7-pressure pipeline; 9-ball-actuated valve; 10-tappets; 11-cover plug; B1-adjusting screw of pressure limitation when turning to the left; B2-adjusting screw of pressure limitation when turning to the right

Figure 85 - Hydraulic circuit of adjustment test of steer valves

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Caution! Effort, implemented to the steering wheel rim on all stages of regulating, shall not go beyond 100H (10 kgf). It is not recommended to hold the steering wheel in the extreme position more than 5 sec.

For left and right steering wheels implement the following procedure:

- reach drop in pressure till 75-85 kgf/sm^2 upon contact of the wheel turning limit stops by sequential securing of screws B1 and B2 in accordance with figure 85.

When regulating, take into account, that upon insufficient pressure drop, it is necessary to screw adjusting screws, and upon excessive drop - unscrew.

Caution! **Implement the displacement of adjusting screws in neutral position of the spool (release the steering wheel) and at the engine idle speed.**

After operation, place all removed cover plugs to its sites.

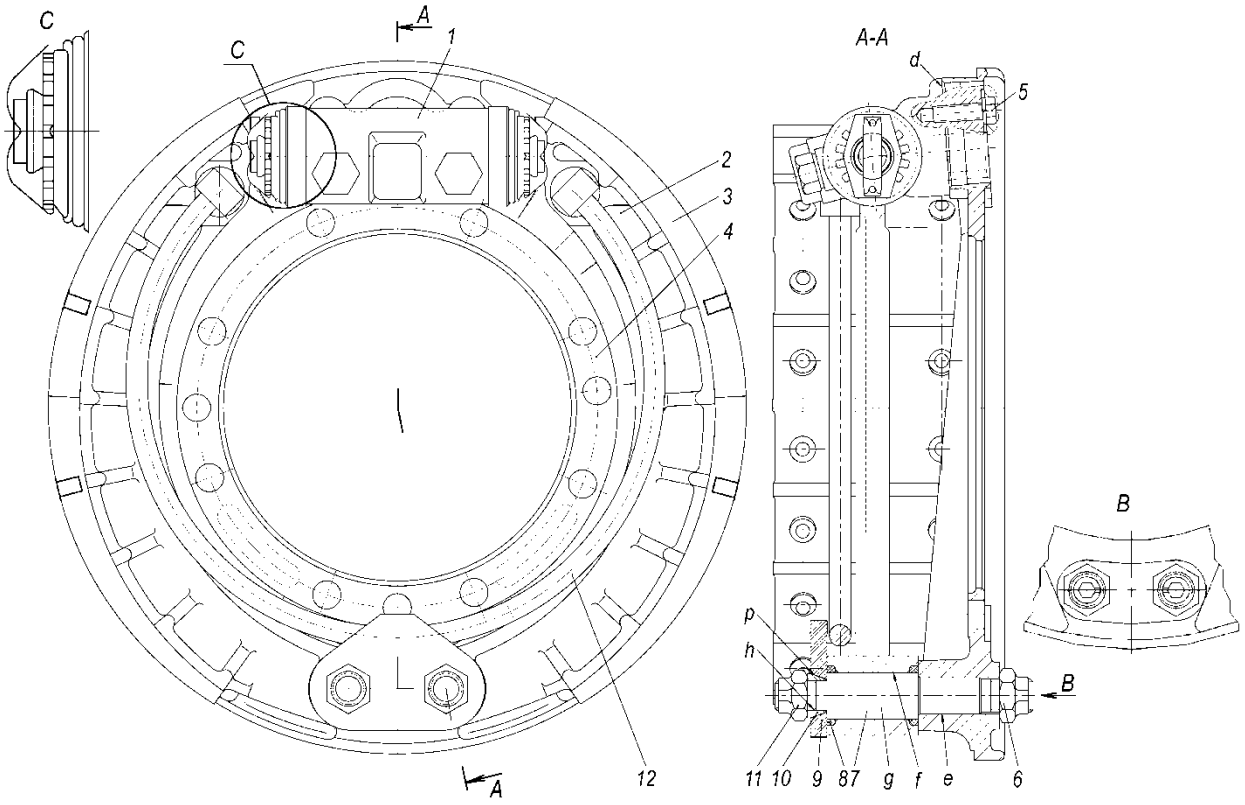
4.5 Brake Systems

4.5.1 Primary Brake System

Primary Brake System is dedicated to reduce speed and to stop the truck regardless its speed, load and road slope which it is designed for.

Drive of braking gears is pneumatic, two-contour, with separate braking of front and rear wheels. The truck is driven by the pedal located in the driver's cab, the pedal is connected with the brake valve through levers and drag links.

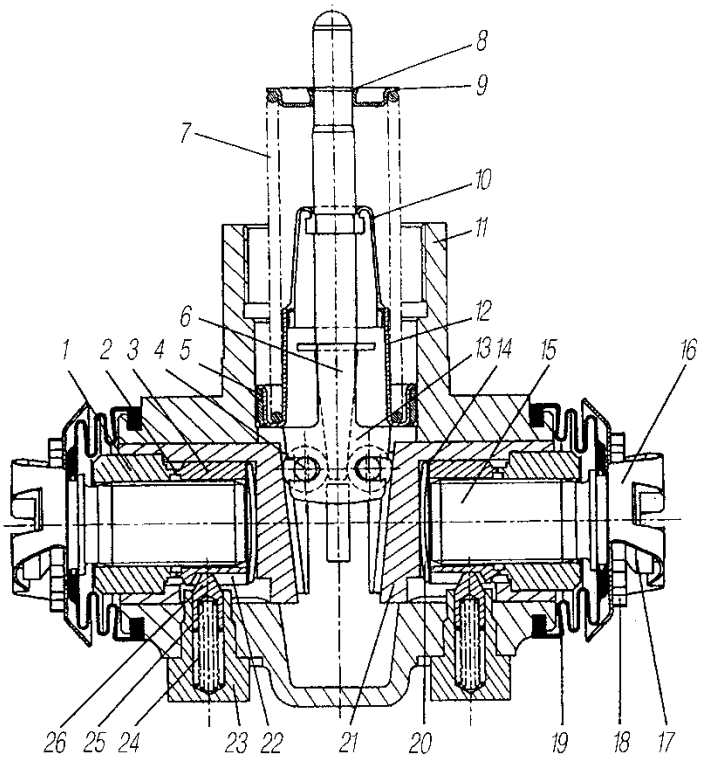
Primary brake (see Figure 86) is drum-type brake with inner brake pads 2. Each brake has a pinch clamp 1 with automatic backlash regulation between the pad 3 and the drum. Friction pads are mounted on the bearing axes 7.



1-pinch clamp; 2-brake pad; 3-brake lining (friction); 4-support; 5-bolt; 6,11-nuts; 7-brake pad axis; 8-ring; 9-brake pad axes lining; 10-expanding bushing; 12-brake pad spring; d, e, f, g, h, p-surfaces

Figure 86 - Primary Brake

4.5.1.1 Pinch clamp is shown in Figure 87.



1-Adjusting nut; 2-tooth coupling; 3-adjusting ring; 4-rollers; 5-O-ring; 6-cleat wedge; 7-belleville spring; 8-lock ring; 9,12-spring cap; 10-sleeve; 11-housing; 13-roller cage; 14-washer; 15-adjusting bolt; 16-leaf spring; 17-calotte cone; 18-gear member; 19-protective gasket; 20-spiral spring; 21-pistons; 22-helical groove; 23-shouldered screw; 24-compression spring (short); 25-compression spring (long); 26-pin

Figure 87 - Expanding Pinch Clamp

4.5.1.1.1 Automatic Pinch Clamp Adjustment. The pinch has an automatic adjustment mechanism for each piston, its task is to control backlash between the brake drum and brake linings continuously.

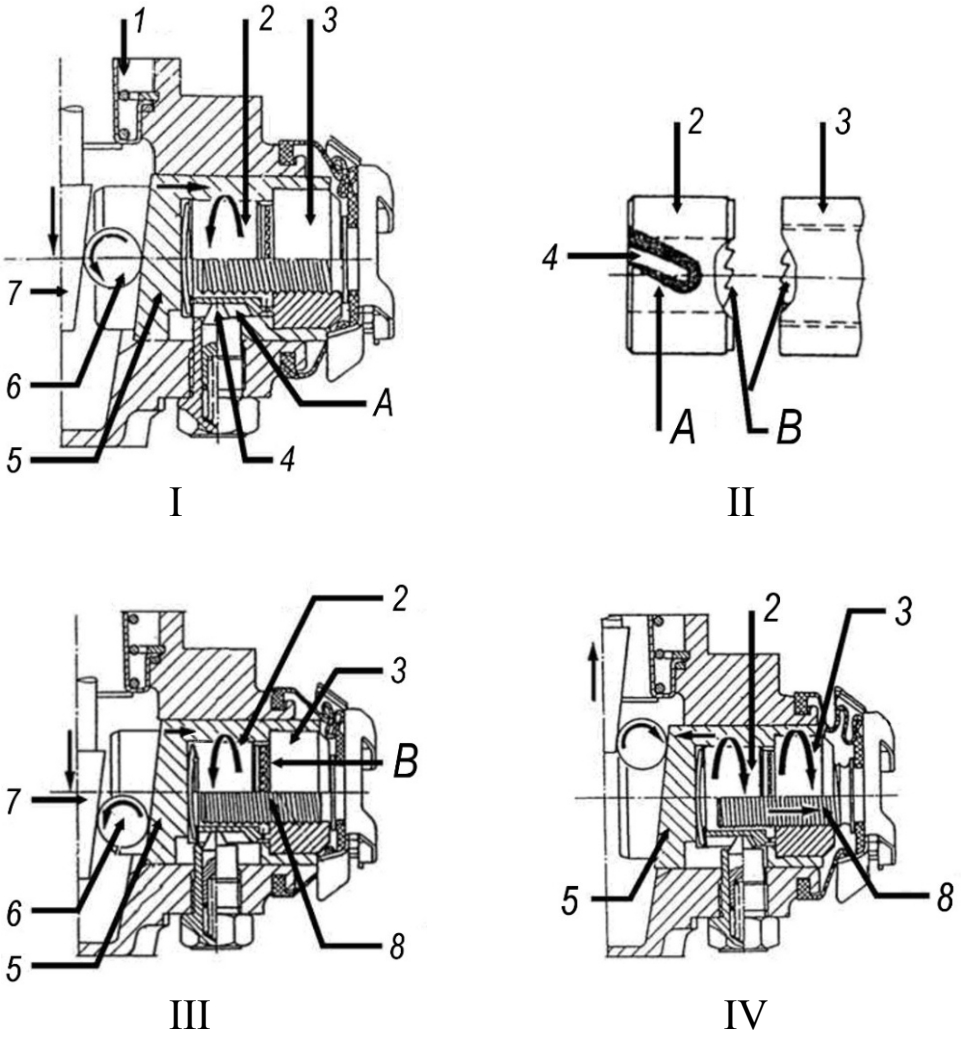
When braking, the cleat wedge 7 (see Figure 88) overcoming the belleville spring 1 resistance presses the rollers 6 which rotate downwards the wedge 7 surface and piston 5. Herein, piston 5 together with gear ring 2 and adjusting nut 3 moves outside and, consequently, braking process starts. Due to longitudinal displacement of the piston 5 special resilient pin 4 bumps up the gear ring 2 through the helical groove “A” and rotates in a way that its rotation degree depends on the piston 5 stroke.

When braking stops the whole mechanism returns to its initial position.

When backlash increases due to linings wear, the cleat wedge 7 squeezes down and piston stroke increases. As soon as gear ring 2 rotation exceeds tooth pitch of tooth coupling “B” the gear ring 2 and the adjusting nut 3 automatically align: tooth coupling skips one tooth and the adjusting nut 3 and bolt 8 do not rotate.

When releasing the brake the bolt 8, the adjusting nut 3, the gear ring 2 and the pistons 5 squeeze back inside. As the pin 4 bumps the helical groove “A”, the adjusting nut 3 and the gear ring 2 turn for one tooth coupling pitch. The adjusting nut 3 moves the bolt 8 outside through the thread, thus decreasing backlash appeared due to brake lining wear.

Through the tooth coupling “B” adjustment is made with very little speed - evenly with the pitch of 0.03 mm.



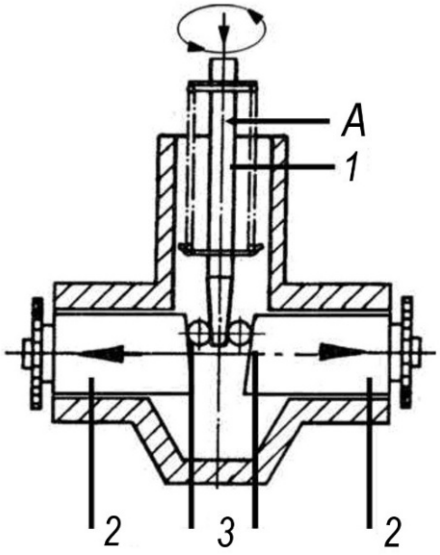
I-pinch;
II-tooth;
III-start of automatic adjustment;
IV-finish of automatic adjustment.
1-belleville spring; 2-gear ring; 3-adjusting nut; 4-pin; 5-pistons; 6-rollers; 7-cleat wedge; 8-adjusting bolt; A-helical groove; B-tooth coupling

Figure 88 - Automatic Adjustment of the Pinch Clamp

4.5.1.1.2 Installation of the Pinch Clamp. When installing the pinch clamp follow the main rule: free end of the cleat wedge 1 (see Figure 89) should be in the housing exactly on the axis A and should not get out of alignment. If there is no alignment the installed cleat wedge can be damaged.

When assembling the unit strictly obey the following: insert the cleat wedge 1 in the housing as shown by the arrow. **Herein, rollers 3 must face pistons 2.**

How to check the correctness of installation: when pressing wedge end with your hand, try to circle it. If the wedge can move, i.e. if it goes down, it means that the rollers have not been properly installed between the pistons.

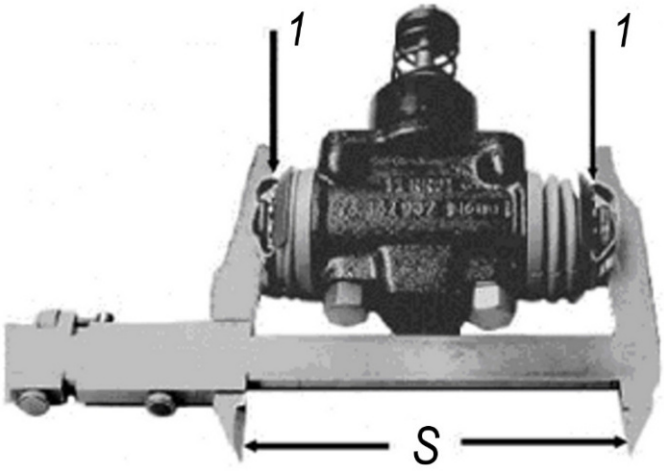


1-cleat wedge; 2-pistons; 3-rollers

Figure 89 - Cleat Wedge Installation

When installing the pinch clamp, strictly check that the cleat wedge assembly was in correct position.

When assembling the pinch clamp "S", distance between seats for friction pads should correspond to those shown in Figure 90.



1-Adjusting bolt; S=165mm

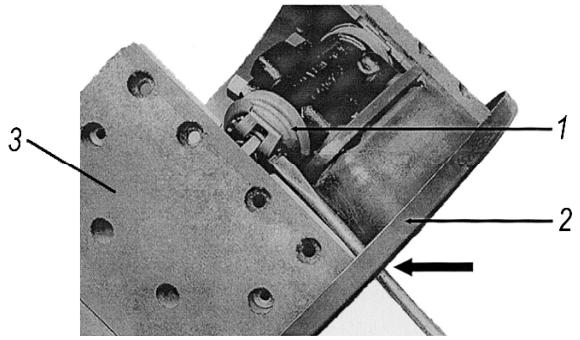
Figure 90 - Adjustment During Pinch Clamp Assembly

Adjust “S” distance as follows: screw the adjustment bolt 8 (see Figure 88) with force until you hear a click when “B” coupling teeth skip between the gear ring 2 and the adjusting nut 3, then unscrew the bolt 8 one revolution.

When assembling the pinch clamp all internal parts should be lubricated. Before installing the cleat wedge 6, (see Figure 87, put 22-25 cm^3 of lubricant in the mechanism? As well as fill it with lubricant under the protective gaskets 19.

DEA-PARAGON EP2 lubricant is used in the pinch clamp.

4.5.1.2 Brake Drum with Wheel Hub Dismantling. If the brake lining is dig into brake drum surface preventing it from being dismantled due to the edge appeared, and power stroke is not enough to distance them properly, distance them manually with a screw driver (see the Operation Manual, Appendix I Spare Parts, Tools and Accessories). Through the holes (shown by arrows) in the support 2, (see Figure 91,) gear members 1 rotate until dismantling of the brake drum together with the wheel hub becomes possible.



1-Gear members; 2-support; 3-brake pads

Figure 91 - Manual Distancing of Brake Pads

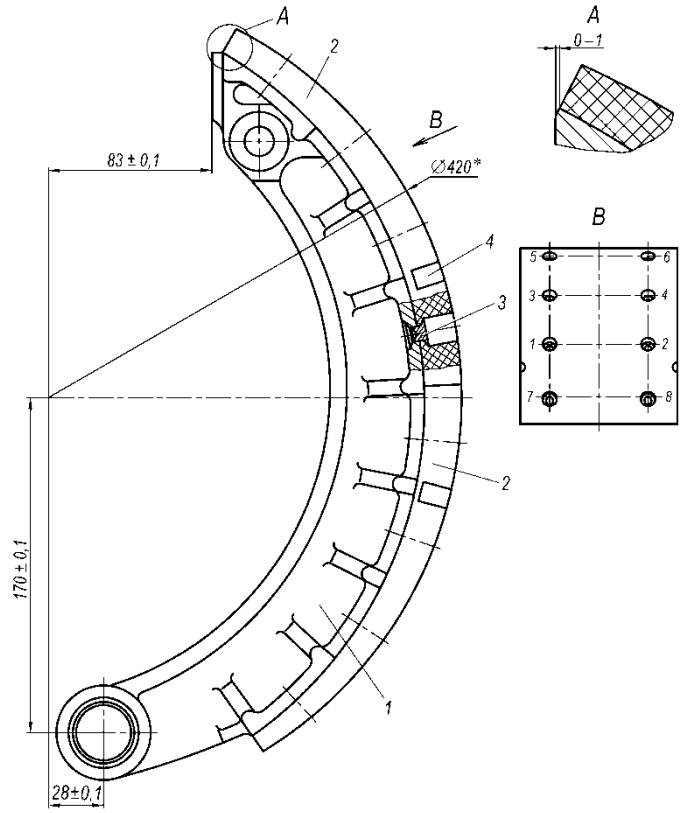
4.5.1.3 Brake Lining Replacement

When brake linings are worn, they should be replaced according to Figure 92. Lining wear degree is determined by wear indicator. To ensure tight adherence of a brake lining to the pad it is recommended to peen rivets from central holes of the brake lining as shown in View B (1-2, 3-4, 5-6, 7-8).

If the brake linings are oily, wash them in petrol.

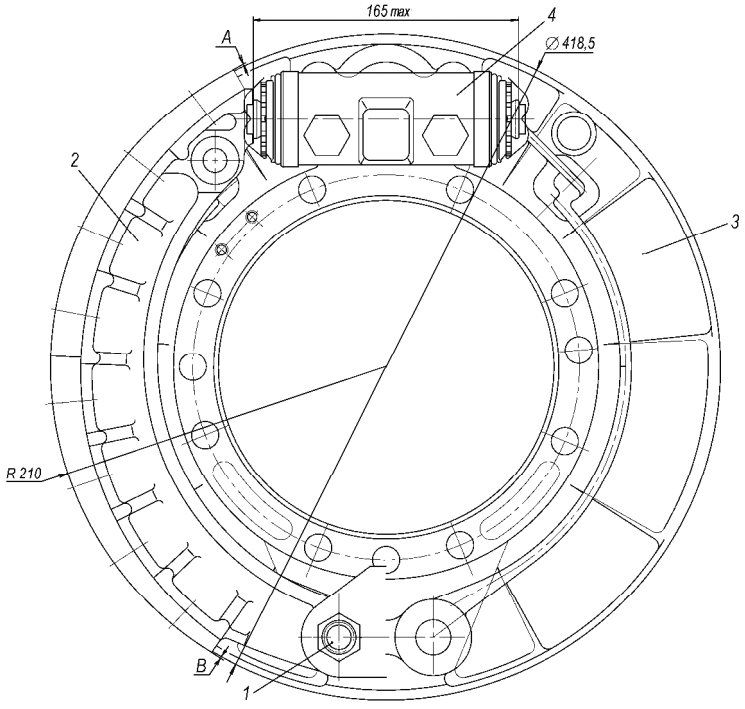
4.5.1.4 Primary brake adjustment after replacement of brake pads or friction linings

When assembling the primary brake (see Figure 93) brake pad 1 axes should be initially installed with marks toward each other, brake pads with brake linings 2 should be installed with distance between seats equal to $166^{+0.2}$ mm (see Figure 92), the wedge mechanism should be installed according to Figures 90 and 86 (View C). Distance between support outer diameter and brake linings (A and B) should not exceed 0.75 mm, difference between the distances A and B should not exceed 0.2 mm. If the difference between distances A and B exceeds the allowable value, adjust it by brake pad axes.



1-Brake pad; 2-brake lining; 3-rivet; 4-wear indicator; *-diameter without including brake drum wear

Figure 92 - Brake Lining Adaptation Scheme



1-Brake pad axes; 2-brake pad with brake linings; 3-support; 4-wedge mechanism; A,B-distances between support outer diameter and brake linings

Figure 93 - Brake Pads with Brake Linings Adjustment Scheme

According to Figure 86:

- tighten the bolt 5 with 75-85 Nm (7.5-8.5 kgfm) torque. Lubricate “d” surface with AMC-3 grease - GOST 2712-75

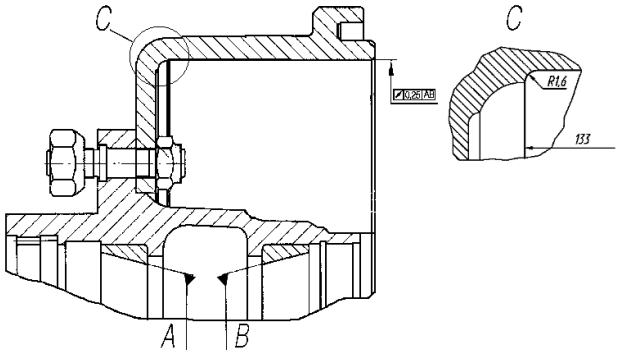
- before assembling lubricate “g” surface of axis 7 and “f” surface of brake pads with graphite grease - GOST 3333-80. Lubricate “e”, “h” and “p” surfaces with AMC-3 grease - GOST 2712-75.

Tightening scheme for brake pad axes nuts: first tighten nut 6 with 431-490 Nm (44-50 kgfm) torque, then nut 11 with 274-313 Nm (28-32 kgfm).

If the drum is worn, if there are annular grooves deeper than 1mm, bore drum work surface according to Table 13, basing on outer hub bearing rings (see Figure 94). Drum work surface runout should not exceed 0.25 mm.

Table 13 - Brake Drum Internal Surface Diameter After Boring

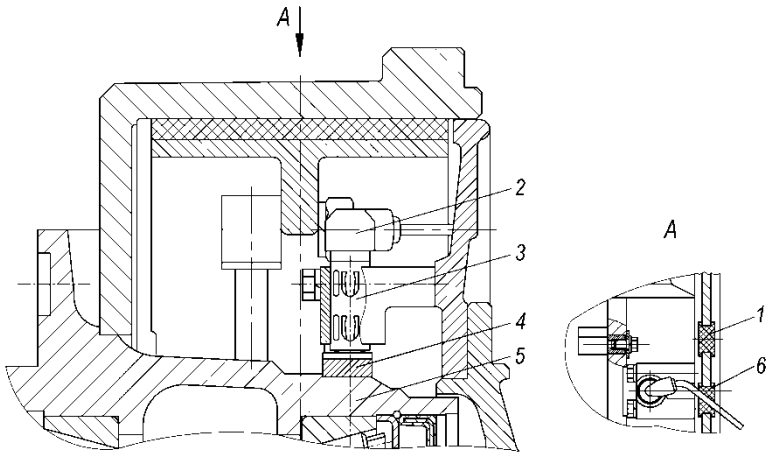
Diameter after first boring, mm	Diameter after second boring, mm	Maximal diameter of boring, mm
421.5	423	424.38



A, B - base surfaces

Figure 94 - Brake Drum Adaptation Scheme

4.5.1.5 Speed Sensor. Brakes of front and rear wheels have inductive sensors 2 (see Figure 95).



1-Cap; 2-inductive sensor; 3-clamping sleeve; 4-sensor target gear ring; 5-wheel hub; 6-rubber bushing

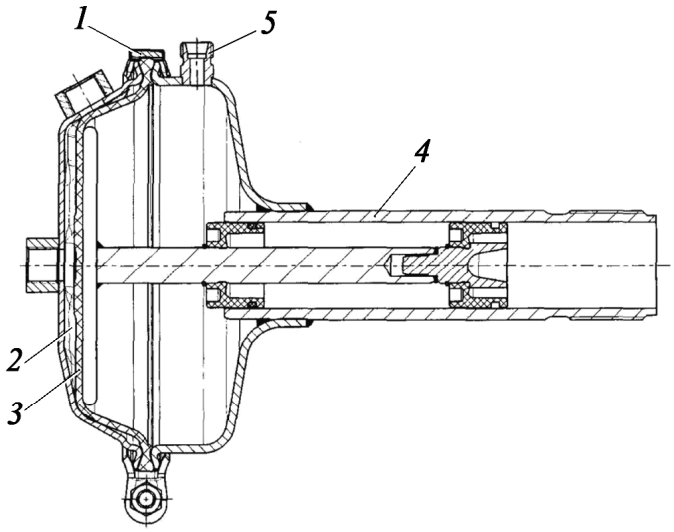
Figure 95 - Speed Sensor

Before installing the hub with the brake drum it is necessary to sink in (from the centre) the inductive sensor 2 to protect it from damage. Then slightly push the sensor against stop to the target ring.

The inductive sensor 2 consists of a permanent magnet with round stem and a coil. Rotating motion of the sensor target gear ring induces potential pulse in the coil, frequency of which is pro-rata wheel rotation speed. the sensor is fixed in a special bushing.

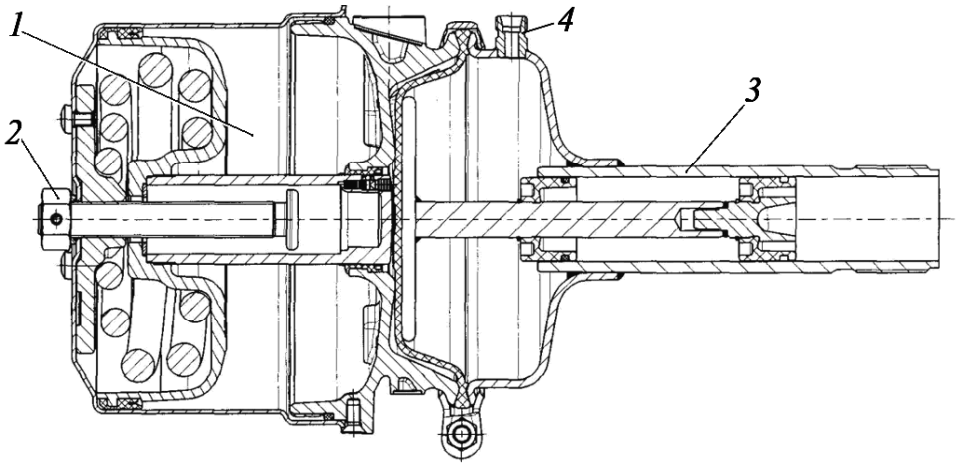
Individual angular velocity sensors are installed in front axis and rear axle wheels, are working with the target gear ring pressed to the hub 5 and are used for continuous reading of wheel speed. The signal received is then transferred via cables to the control unit. For normal sensor operation backlash between the rotor and the sensor should not exceed 0.7 mm.

4.5.1.6 Brake Chambers. Brake chambers installed on the trucks are shown in Figures 96 and 97.



1-Binding clamp; 2-cavity; 3-diaphragm; 4-tube; 5-encapsulation fitting

Figure 96 -Brake Chamber

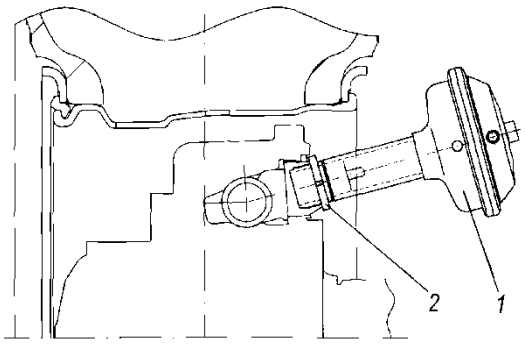


1-Spring-type brake actuator; 2-brake releasing bolt; 3-tube; 4-encapsulation fitting

Figure 97 - Brake Chamber with Spring-Type Brake Actuators

See Figures 98, 99 how to install brake chambers.

The brake chamber 1 twisting depth (see Figure 98) is 25 mm. The chamber is twisted in against stop and then is turned back until system suzie are looking back. For joint encapsulation it is necessary to use silicon-based or rubber-based sealant. Tighten the lock nut 2 300±20 Nm (30±2 kgfm) with KK 2327 wrench.



1-brake chamber; 2-nut

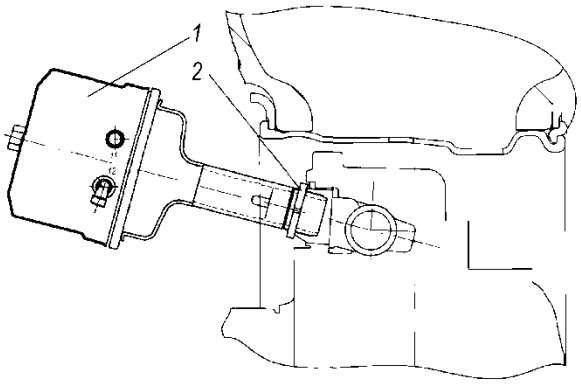
Figure 98 - Brake Chamber Installation

Install the chamber with spring-type brake actuators according to Figure 99:

- twist the chamber against stop (twisting depth is 25 mm);
- turn it back and install outlets 11, 12 looking back;
- tighten the nut with 300-500±20Nm (30±2 kgfm) torque.

Seal the brake chamber and pinch clamp joint with silicon-based or rubber-based sealant.

Check wear and damage of the pinch clamp and brake chambers within up to two years after start-up. Damaged units should be completely replaced. If rubber components of a unit are damaged, they should be immediately replaced.



1-brake chamber with spring-type brake actuator; 2-nut

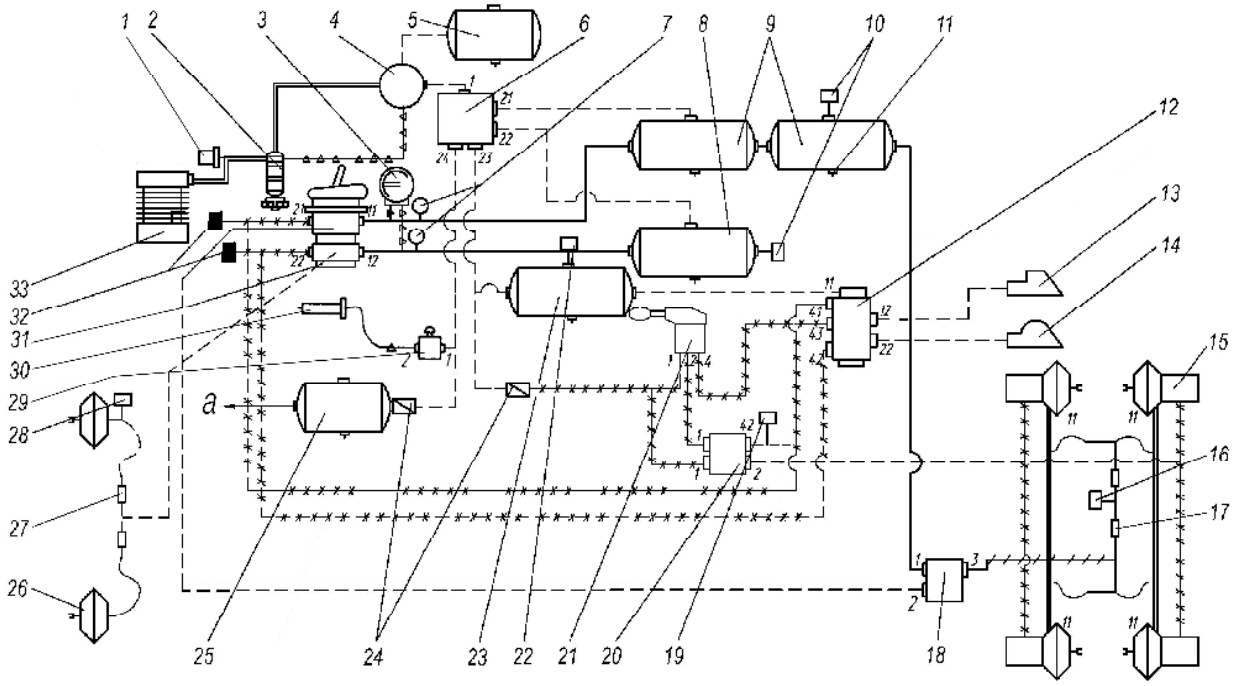
Figure 99 - Brake Chamber with Spring-Type Brake Actuator Installation

4.5.1.7 Encapsulation System

The brake chambers have encapsulation system. The Fitting 5 (see Figure 96) and fitting 4 (see Figure 97) are connected to the pipe exiting at the girder level.

4.5.2 Pneumatic Brake System Drive

Brake system drive schematics of 6x6 trucks with trailer outlets is shown in Figure 100. Brake system drive schematics of 4x4 trucks differs from the above that there is no intermediate axle.



1-towing device; 2-oil separator; 3-two-pointer pressure gauge; 4-pressure controller with adsorption tank; 5-adsorption tank cylinder; 6-4-circuit protective valve7-loss of pressure detector; 8-front axle brake can; 9-rear bogie brake cans; 10,16,19,22,28-pneumatic system air bleed valves; 11-condensed water drain valve; 12-trailer valve with cut valve; 13-feeding coupling head; 14-control coupling head; 15-brake chambers with spring-type brake actuator; 17,27-ABS modulators; 18-primary brake relay valve; 20-parking brake relay valve; 21-parking brake valve; 23-trailer and CTC brake cylinder; 24-check valve; 25-non-brake consumers can; 26-brake chambers; 29-parking brake pneumatic valve; 30-engine stop air cylinder; 31-brake valve; 32-brake actuation sensor; 33-compressor; a-to the air-over hydraulic booster

Figure 100 - Scheme of Pneumatic Brake System Drive with Trailer Outlets

Compressed air from the compressor comes to the oil separator 2, pressure controller with adsorption tank 4, four-circuit protective valve 6 and adsorption tank cylinder 5. Water, oil is separated from air and air is distributed to the circuits.

First circuit consists of can 8, lower section of brake valve 31, modulators 27, brake chambers 26.

The second circuit consists of cans, upper section of brake valve 31, primary brake relay valve 18, brake chambers 15, modulators 17.

Third circuit consists of air cylinder 23, control valve of trailer brakes 12 with two-wire drive, automatic coupling heads 13,14 to couple trailers with two-wire brake drive.

When footing brake pedal first and second circuits of truck brake drive are actuated, as well as third circuit of trailer brake drive.

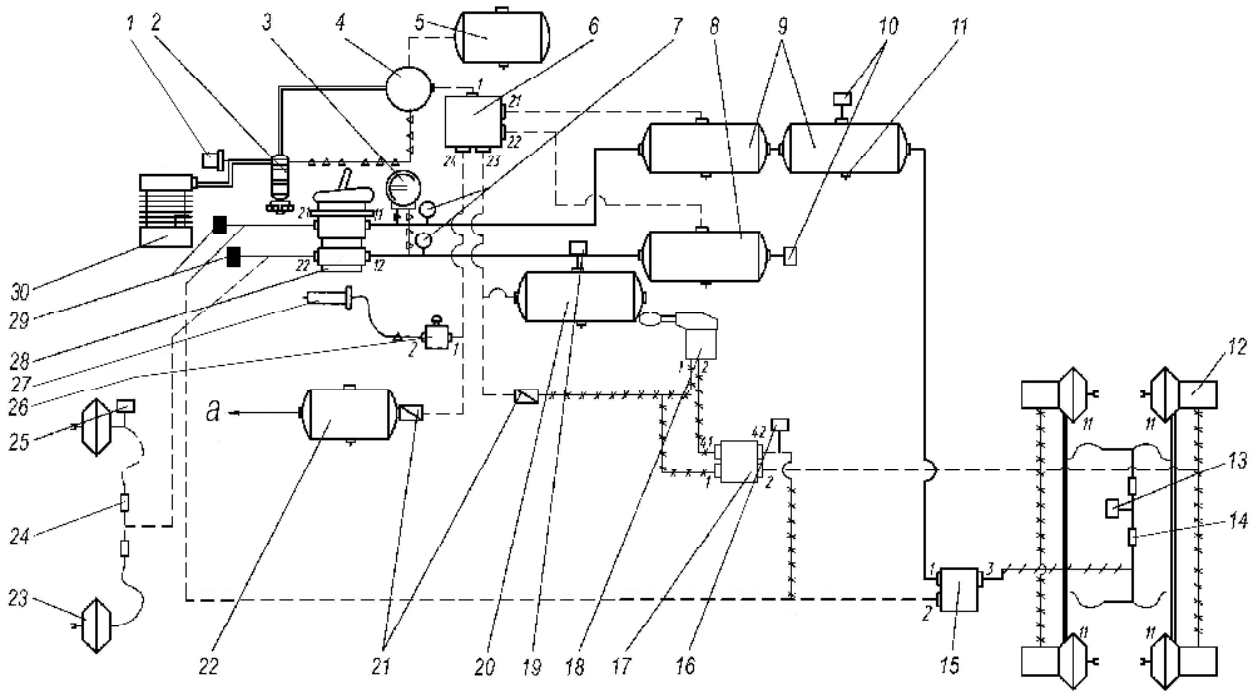
If one of the circuits is broken, others stay in operation.

To test the system all circuits are equipped with pneumatic system air bleed valve.

All air cylinders are equipped with condensed water drain valves.

Pneumatic brake system drive devices serve to create compressed air reserve of the truck and to actuate truck and trailer brakes.

Brake system drive schematics without trailer outlets is shown in Figure 101.



1-towing device; 2-oil separator; 3-two-pointer pressure gauge; 4-pressure controller with adsorption tank; 5-adsorption tank cylinder; 6-4-circuit protective valve; 7-loss of pressure detector; 8-front axle brake can; 9-rear bogie brake cans; 10,13,16,19,25-pneumatic system air bleed valves; 11-condensed water drain valve; 12-brake chambers with spring-type brake actuators; 14,24-ABS modulators; 15-primary brake relay valve; 17-parking brake relay valve; 18-parking brake valve; 20- CTC cylinder; 21-check valve; 22-non-brake consumers can; 23-brake chambers; 26-parking brake pneumatic valve; 27-engine stop air cylinder; 28-brake valve; 29-brake actuation sensor; 30-compressor; a-to the air-over hydraulic booster

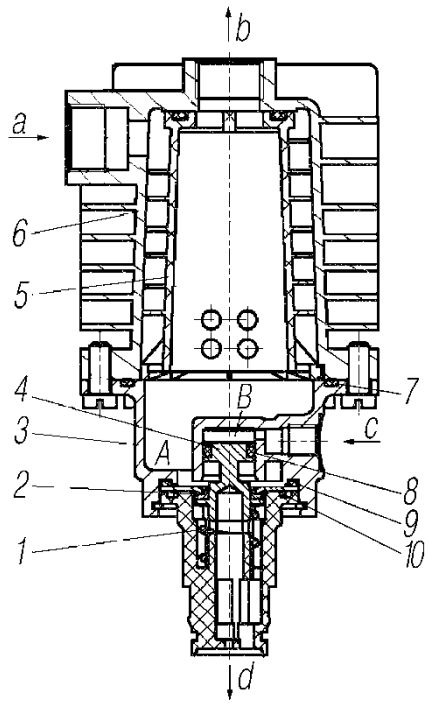
Figure 101 - Scheme of Pneumatic Brake System Drive without Trailer Outlets

Legends to the Figures 100-101:

- 6 mm diameter nylon tubing;
- 8 mm diameter nylon tubing;
- 10 mm diameter nylon tubing;
- 12 mm diameter nylon tubing;
- 14 mm diameter nylon tubing;
- 15 mm diameter nylon tubing;
- rubber hose.

4.5.2.1 Compressor. Compressor operation and maintenance should be done according to the Operation Manual "YAMZ236HE2, YAMZ236HE, YAMZ-236H, YAMZ-236-БЕ2, YAMZ-236БЕ, YAMZ-236Б Power Units".

4.5.2.2 Oil separator is shown in Figure 102 and is dedicated for cleaning the pumped compressed air as well as for condensation and discharge of water, oil and other contaminants being in the air. It is installed before pressure controller with adsorption tank and it helps to prolong dehydrating case life.



1-Spring; 2-valve; 3-lower housing; 4-piston; 5-screw; 6-upper housing; 7,8,9-seal rings; 10-valve seat; a,b,c,d-outlets.

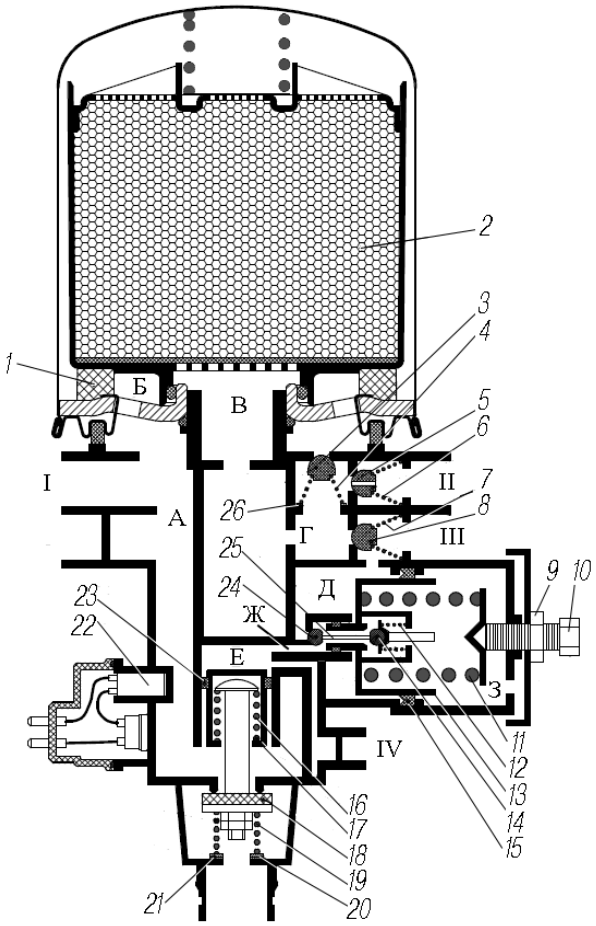
Figure 102 - Oil Separator

Compressed air from the compressor is pumped to "a" outlet and runs down along internal surface of the upper housing 6 with great speed through the screw 5. While running along the screw 5 air is cooled, part of steam contained in it is condensed and is sedimentated on the upper housing wall and the screw together with oil and other contaminants, then it flows to the sink of the lower housing 3. Cleaned air gets to the internal screw cavity and further to "b" outlet through radial hole.

When pressure controller is actuated, pressure compatible to operating pressure in A cavity is fed to B cavity through “c” outlet and it impacts the piston 4 overcoming spring 1 force. Valve 2 opens and oil and condensed air collected are discharged through “d” outlet.

4.5.2.3 Water and oil separator with installed pressure controller is shown in Figure 103, it is designed to separate condensed water from compressed air to discharge it automatically from drive feeding part.

Compressed air from the compressor is fed to the outlet I of the device and comes to A cavity. Going through the channel to Б cavity and further through the filter 1 to the upper part of the adsorption case, air is cleaned from oil, hard particles and condensed moisture. Going through the adsorption chemical (zeolite) 2 compressed air is finally dried and goes to В cavity and Г channel.



1-Filter; 2-zeolite; 3-air-escape valve; 4-air-escape valve spring; 5-throttle valve; 6-throttle valve spring; 7-check valve spring; 8-check valve; 9-nut; 10-adjusting screw; 11-balancing piston spring; 12-spring; 13-balancing piston; 14-discharge valve; 15-gasket; 16-dummy piston spring; 17-dummy piston; 18-unload valve; 19-unload valve spring; 20,21-adjusting washers; 22-valve unload heater; 23-O-ring; 24-discharge valve; 25-tappet; 26-adjusting washer; А, Б, В, Д, Е, З-cavities; Г, Ж-channels; I-compressor outlet; II-pneumatic system outlet; III-regeneration tank outlet; IV-control inlet/outlet.

Figure 103 - Scheme of Water and Oil Separator with Installed Pressure Controller

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Then, overcoming spring 7 force of the check valve 8, compressed air is fed to outlet III and then to the truck brake system. Simultaneously, compressed air having overcome spring 6 force of the throttle valve 5 having 1.5 mm diameter hole, enters the regeneration air tank through outlet II. At the same time compressed air goes through Д cavity under the balancing piston 13 impacted by spring 11. Herein, discharge valve 14 connecting E cavity over the unload piston 17 with the environment through Ж channel and З cavity, is open. Discharge valve 24 is closed under impact of the tappet 25 and spring 12. Also unload valve 18 is closed under the impact of spring 19. Such condition of water and oil separator with installed pressure controller corresponds to compressed air level in the brake system receivers coming from the compressor.

When switch-off pressure in Д cavity is achieved, the balancing piston 13 having overcome spring 11 force, moves right. Herein, discharge valve 14 closes and discharge valve 24 opens. Compressed air from Д cavity enters E cavity through open discharge valve 24, unload piston 17 moves downwards, unload valve 18 opens and compressed air from the compressor is discharged to the atmosphere together with collected condensed water over unload valve seat and discharge valve 18. Herein, pressure in Г channel and B cavity falls, the check valve 8 closes. As a result the compressor works in unloaded mode without back pressure.

At the same time the throttle valve 5 closes. Dry air is discharged to the environment from the regeneration air tank through 1.5 mm diameter throttle hole of the throttle valve 5, channel Г, B cavity and the adsorption case, restoring zeolite 2 properties, grasping water, oil drops and dust particles sedimentated in filter 1.

When pressure on III outlet drops (due to air consumption) to the pressure of switch-on, balancing piston 13 moves left by spring 11 force. Discharge valve 24 closes, discharge valve 14 opens and connects E cavity with the environment through Ж channel and З cavity. Herein, unload valve 18 by spring19 force closes and the compressor pumps compressed air to the system receivers again.

Besides, unload valve 18 works as safety valve. If the installed pressure controller is not actuated when switch-off pressure is achieved, then reaching switch-on pressure of the safety valve actuation, unload valve 18 opens overcoming spring 19 and 14 force, and air is discharged to the environment. Actuation pressure of the safety valve is adjusted by number of washers 20,21 under the unload valve spring 19. Installed heater 22 of the unload unit prevents failures due to possible freezing of condensed water.

Structural feature of this water and oil separator is that unload valve is located in the direct flow of heated compressed air fed from the compressor. In case of heater electrical circuit failures, sometime later warm air coming from the compressor will heat the unload valve, the latter will return to its normal position and the pressure controller will switch on to fill the system. In case of heavy clogging or moisture freezing in the adsorption case due to improper operation (long operation without regeneration, etc.) causing air flowing through the adsorption case, air feeding to the pneumatic system is done through the air-escape valve 3 with pressure difference of 0.15-0.24 MPa, the latter can be adjusted with the washer 26 under the unload valve spring 4. Herein, the device only adjusts pressure. This operation mode of the device is emergency mode, it is allowed only when it is not possible to replace the case in field or restore its flow, but it is necessary to drive farther. Long operation in the emergency mode especially in low temperatures can lead to pneumatic system devices failure due to negative impact of the condensed water.

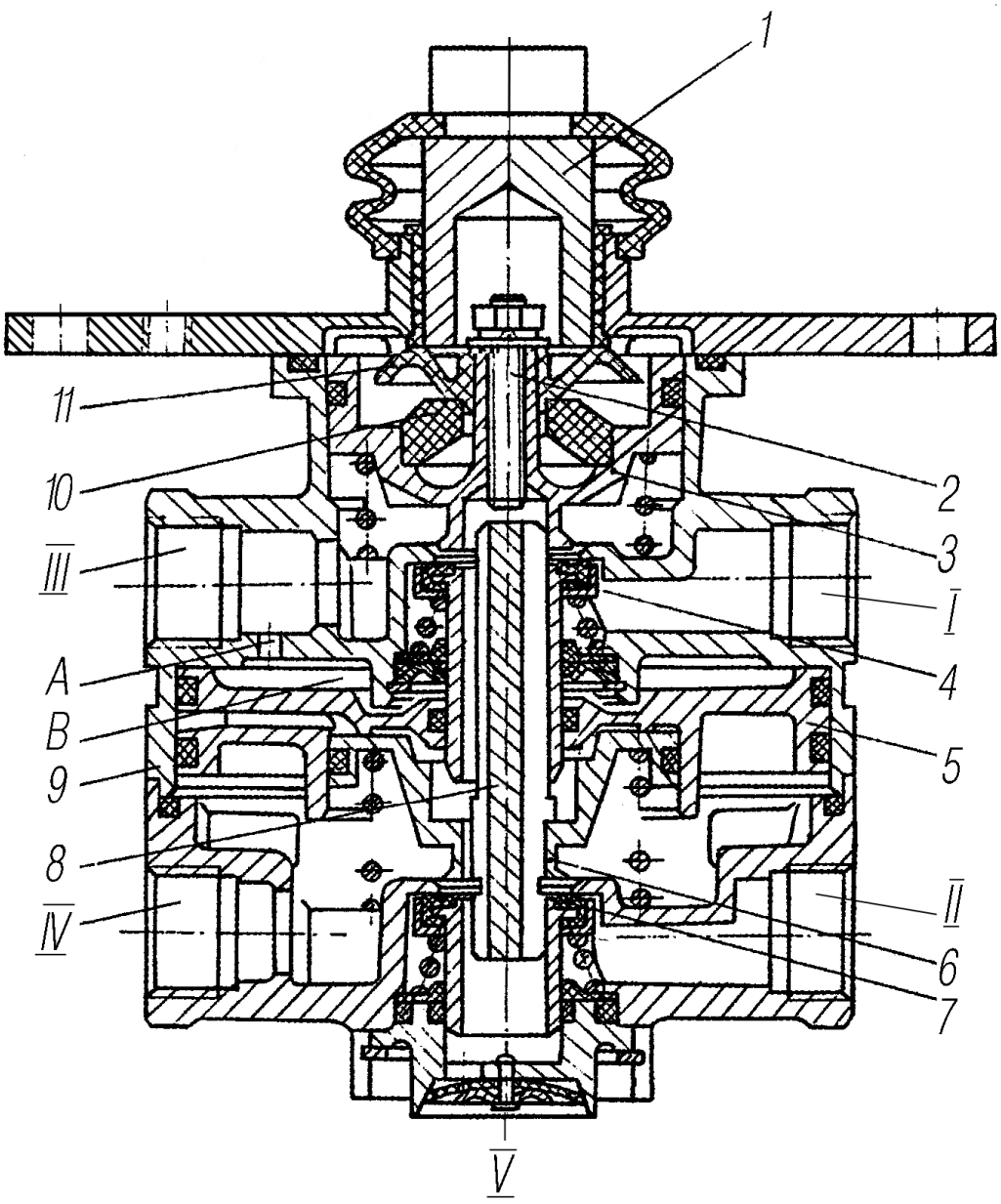
4.5.2.4 Two-section brake valve is shown in Figure 104, is designed to control the actuators of truck primary brakes as well as to control trailer brake drive valve.

Brake valve is controlled mechanically from the suspended brake pedal, ensuring filling of brake chamber cavities of each of the two circuits with compressed air as quick as necessary under control, as well as filling control cavities of other pneumatic devices of the system.

If one of two pneumatic brake system circuit is depressurized, the brake valve allows keeping controlled (with “under control” function) filling of the properly functioning circuit cavities with compressed air.

When the brake is released, compressed air from the receivers of the corresponding brake circuits goes to the outlets I and II of the upper and lower brake valve sections. Herein, valves 4 and 7 are close, and outlets III and IV are connected with atmospheric outlet V through backlashes between pistons 3 and 6 seats. When footing the brake pedal the tappet 1 is impacted. Moving downwards the tappet 1 impacts piston 3 through the cap 11 and elastic member 10, the piston moving downwards seats the valve 4, thus insulating outlet III from the atmospheric outlet V. With further piston 3 movement valve 4 opens, and compressed air from outlet I starts flowing to outlet III which is connected with the corresponding brake circuit. Pressure at outlet III will grow until compressed air pressure from down the piston 3 balances pressure force, applied to the tappet 1 of the brake valve. Herein, valve 4 will close and compressed air overflow from outlet I to outlet III will stop. Thus, controlling function in the upper section of the brake valve is performed. At the same time compressed air enters cavity B over piston 5 through hole A. Herein, piston 5 moves downwards together with piston 6. Piston 6 seats valve 7 thus insulating outlet IV from the atmospheric outlet V. With further piston 6 movement valve 7 opens, and compressed air from outlet II starts flowing to outlet IV which is connected with the corresponding brake circuit.

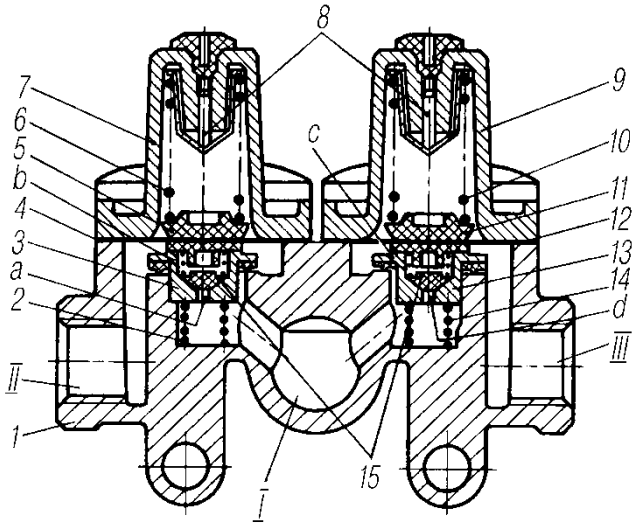
With pressure grow at outlet IV pressure under pistons 5 and 6 also grows, leading to balance of force impacting piston 5 from the up. As a result, outlet IV gets the pressure corresponding to the force applied to the tappet of the brake valve. Thus, controlling function in the lower section of the brake valve is performed. If upper section of the brake valve fails, lower section will be controlled mechanically being fully in operation. When impacting the tappet 1, piston 3 with screw 6 move downwards against stop to the rod 8, rigidly connected with piston 6. Further joint movement of pistons 6 and 3 makes valve 7 open, and compressed air flows from outlet II to outlet IV. Compressed air pressure fed to outlet IV moves piston 5 upwards against stop in housing 9 and simultaneously impacts piston 6, creating a force necessary to balance the force applied to the tappet of the brake valve, which is transferred to piston 6 through screw 2 and rod 8. Thanks to the fact that pistons 6 and 3 diameters are the same control function of the brake valve is maintained, if the upper section fails. Maintaining of minimal adjusted backlash between the screw 2 and the rod 8 allows achieving maximal pressure value at the outlet of the lower section in case of upper section depressurization. Failure of lower section of the brake valve influences upper section operating mode as described above, i.e. in case of one of the two circuits of the pneumatic brake system depressurization, brake valve allows keeping controlled filling of a properly functioning circuit cavities with compressed air.



1-Tappet; 2-screw; 3,5,6-pistons; 4-valve; 7-valve; 8-rod; 9-housing; 10-elastic member; 11-cap; III-outlet to air intensifier of front axle brake circuit; IV-outlet to PTC and air intensifiers of rear axle brake circuit; I,II-outlets to air tanks; V-atmospheric outlet; A-hole; B-cavity

Figure 104 -Brake Valve

4.5.2.5 4-circuit protective valve is shown in Figure 105.



1-Housing; 2,6,10,14-springs; 3,13-valves; 4,12-diaphragms; 5,11-guides; 7,9-covers; 8-adjusting screw; 15-check valve; I-outlet to the compressor; II,III-outlets to the brake system circuits; a,d-throttle holes, b,c-side holes

Figure 105 - 4-Circuit Protective Valve

4-circuit protective valve is designed to distribute one feeding pipeline into two main and two auxiliary circuits: automatic cut of one of the two circuits, if it is depressurized, to preserve compressed air reserve in undamaged circuits, to preserve compressed air in all circuits, if the feeding pipeline is damaged.

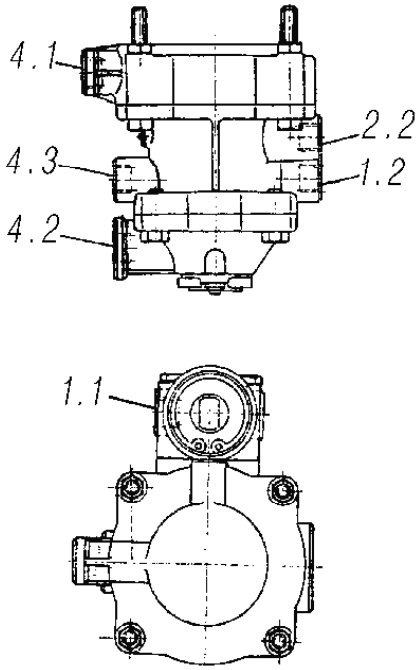
Compressed air fed to outlet I flows through the throttle holes “a” and “d”, opens the check valve 15 and enters outlets of circuits II,III and two auxiliary circuits through side holes “b” and “c” in valves 3,13.

As air flows through throttle and side holes slowly, pressure in circuits also grows slowly at the initial moment. Coming through throttle holes air presses diaphragms 4,12 and overcoming spring 6,10 force, fully opens valves 3 and 13. Pressure equal to pressure at the outlet I is set at outlets II and III.

Throttle holes in valves 3 and 13 provide brake drive circuits filling at very low pressure at outlet I.

If pressure drops in one of the circuits connected to the main outlets II and III, pressure at outlet I and in the circuit, connected the properly functioning outlet also drops until switch-off pressure of failed circuit valve. In the auxiliary circuits pressure drops to valves switch-off value.

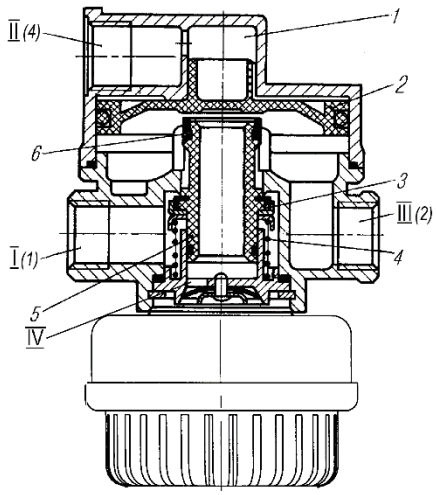
4.5.2.6 Trailer brake control valve with two-wire drive and cut valve is shown in Figure 106, and is designed to control two-wire drive of trailer brakes. In case of trailer control pipeline damage or failure, it ensures pressure drop in the feeding pipeline, and that leads to automatic braking of the trailer.



1.1-Feeding pipeline inlet; 1.2-trailer feeding pipeline outlet (to the red coupling head); 2.2-outlet to the trailer control pipeline (to yellow coupling head); 4.1-inlet from the front circuit of tractor primary brake system; 4.2-inlet from rear circuit of tractor primary brake system; 4.3-inlet from tractor parking brake system

Figure 106 - Trailer Brake Control Valve with Two-Wire Drive and Cut Valve

4.5.2.7 Relay valve is shown in Figure 107, is installed in rear axle wheels brake system to reduce time of brake drive actuation due to short pipeline of compressed air inlet from the air tank in the actuator.



1-Upper chamber; 2-piston; 3-inlet valve; 4-spring; 5-valve case; 6-discharge valve; I,II,III,VI-outlets

Figure 107 - Relay Valve

Compressed air is fed from air tank to outlet I. Outlet II is connected with the brake valve, and outlet III- to air chambers of axle brakes.

If there is no pressure at outlet II, piston 2 is up. Inlet valve 3 is close by spring force 4, and discharge valve 6 is open.

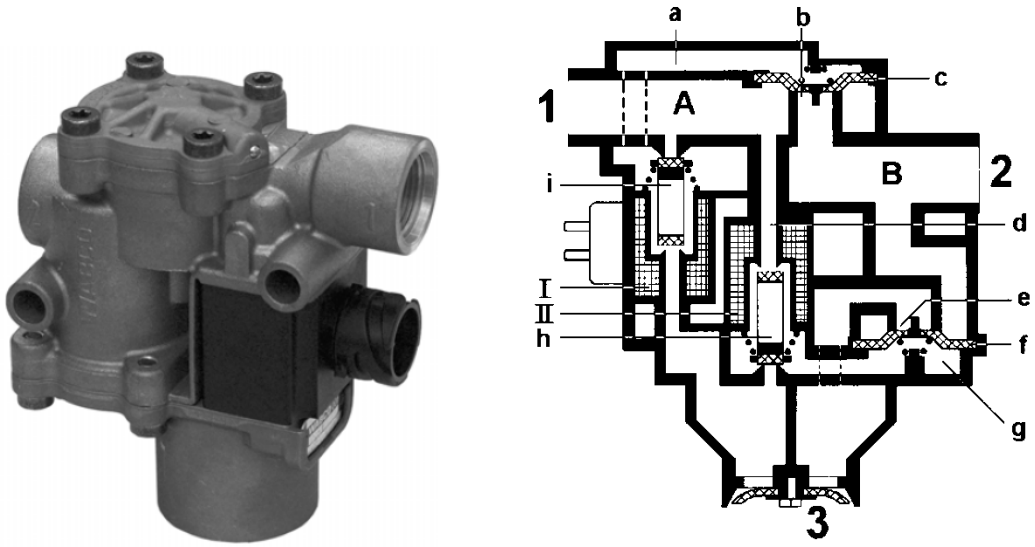
When compressed air is fed to outlet II from brake valve , air enters the over-piston area - chamber 1. Piston 2 by compressed air force moves downwards. Discharge valve closes, and then inlet valve opens. Chambers connected to outlet III are filled with compressed air from the air tank through outlet I and open discharge valve. The truck is braked via axle brakes.

4.5.2.8 ABS modulator is shown in Figure 108. ABS modulator is aimed at quick (milli-seconds) pressure grow, drop or maintaining in brake cylinders during braking process depending on control signals of the electronic unit.

Operating principle:

a) Pressure grow

Both valve magnets I and II are not exited, discharge hole of “i” valve and discharge hole of “h” valve are closed. Preliminary control chamber “a” of diaphragm “c” there is no pressure. Compressed air at the outlet 1 enters from chamber A through open inlet hole “b” to chamber B, and then to brake cylinders through outlet 2. Simultaneously, compressed air also goes through hole “d” in the chamber of preliminary control “g” of diaphragm “f”, and the discharge hole “e” is closed.



1-Outlet; 2-outlet to brake cylinders; 3-atmospheric outlet; A,B-chambers; I,II-magnets; a,g-chambers of preliminary control; b-inlet hole; c,f-diaphragms; d-hole; e-discharge hole; h,i-valves

Figure 108 - ABS Modulator

b) Pressure Drop

If ABS electronic unit gives a signal to drop pressure, valve I magnet is excited, “i” valve closes the connection with outlet 3, and preliminary control “a” chamber gate opens. Compressed air being inside chamber A flows into preliminary control chamber “a”, and diaphragm “c” closes inlet hole “b” of chamber B. Simultaneously, valve magnet II switches, valve “h” closes the gate of “d” hole so that compressed air being inside the preliminary control chamber can be discharged to the environment through outlet 3. Diaphragm “f” opens discharge hole “e”, and brake pressure at outlet 2 is discharged to the environment through outlet 3.

c) Pressure maintaining

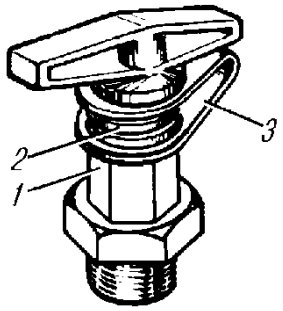
With the help of the corresponding impulse gate to outlet 3 closes during reversing of magnet II of valve “h”. Compressed air from A chamber goes again through hole “d” to the preliminary control chamber “g”, and diaphragm “f” closes discharge hole “e”. Thus, locking of pressure raise or drop in chamber B is performed, and consequently, in brake cylinders.

4.5.2.9 Coupling Heads. The heads have caps that protect the system from dust and dirt. Feeding head cap is painted red, control head cap is painted yellow. For correct coupling of the trailer brake system connect heads according to their colour.

First control head (yellow) is uncoupled, and then feeding head (red) is uncoupled. Uncouple semi-trailer pneumatic drive in the reverse order.

4.5.2.10 Control Outlet Valves. Control outlet valves are shown in Figure 109, designed to determine air pressure parameters at the outlet for each circuit through check pressure gauges.

To connect to the valve use hoses with coupling nut M16x1.5 and pressure gauges with measuring range 0-1000 kPa (0-10 kgf/cm^2).



1-Valve case; 2-cap; 3-hook

Figure 109 - Control Outlet Valve

4.5.2.11 Maintenance of Pneumatic Brake System Drive

General When maintaining the pneumatic brake system drive of the truck, first check the tightness of the system as a whole and its elements. Pay special attention to tightness of pipeline connections and flexible hoses and hose connections. Large air leakages are detected by ear, and small air leakages are detected with soap solution. Leakage is eliminated by tightening connecting nuts with the torque:

- for 10 mm pipelines - 21.6-27.5 Nm (2.2-2.8 kgfm);
- for 14 mm pipelines - 49-60.8 Nm (5.0-6.2 kgfm).

To avoid connecting boss damage on the brakes tightening torque of fittings, angles and other flanges should not exceed 30-50 Nm (3-5 kgfm).

Check tightness at nominal pressure in the pneumatic drive - 588 kPa (6.0 kgf/cm^2), switched on consumers and non-operated compressor.

Pressure drop in the tanks comparing to the nominal one should not exceed 49 kPa (0.5 kgf/cm^2) during 30 minutes when control members are free and during 15 minutes after complete actuation of control members.

When pressure controller is actuated for compressor unload, water and oil separator adsorption element is blown with dry air from the regeneration tank.

Change the filtering element as soon as necessary, when you detect condensed water in pneumatic system tanks.

4.5.2.12 Maintenance at Start of Operation (TO 1 500-3 000). Maintenance of spring-type brake actuators involves periodical inspection, cleaning from dirt, check of tightness and brake chamber operation, nut tightening. Nut torque moment is 300±20 Nm (30±2 kgfm).

4.5.2.13 Maintenance after 15 000 km run (TO-15 000). Pneumatic drive check parameters:

- Pressure controller: - maximal pressure at switch-off is 870 kPa (8.7 kgf/cm^2),
  - minimal pressure at switch-on is 720 kPa (7.2 kgf/cm^2);
- Four-circuit protective valve: pressure of static circuit closing is 450 kPa (4.5 kgf/cm2);
- control valve of trailer brakes: corresponding pressure at inlet or outlet is 210 kPa (2.1 kgf/cm^2) at check pressure of 150 kPa (1.5 kgf/cm^2).

4.5.3 Emergency Brake System

Function of emergency brake system is performed by one of primary brake circuits. If one of the circuits is failed, emergency brake system ensures quite efficient truck braking.

4.5.4 Parking Brake System

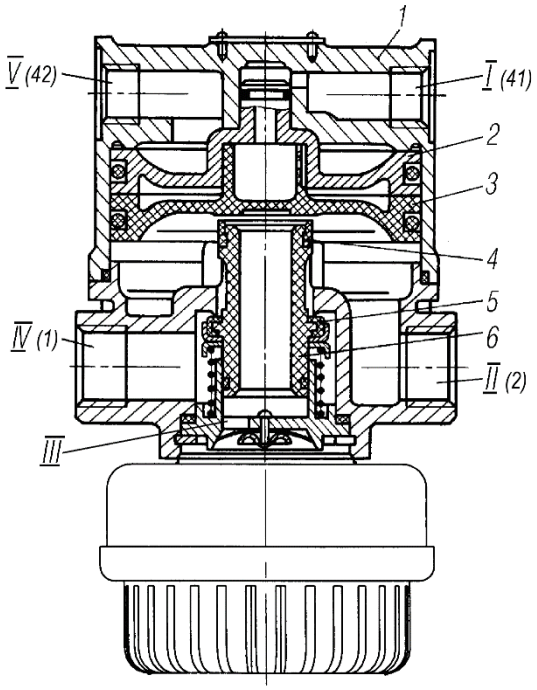
Parking brake system is designed to ensure truck immobility at slopes. Parking brake drive is pneumatic. Control is performed by brake valve with manual control located on the right hand of the driver's seat.

4.5.4.1 Pneumatic Drive Operation of Parking and Emergency Brakes. Compressed air from the tank 23 goes to valve 21 of the parking brake through check valve (see Figure 100), then it goes to the control pipeline of the relay valve 20, as a result the latter lets air from the tank 23 pass to brake actuators chambers 15.

When braking with the parking brake (valve handle 21 is set in a fixed position "BRAKED"), air from the relay valve 20 control pipeline is discharged to the environment. When being released brake actuator springs actuate wheel brake gears.

Control valve of the parking brake has controlling function which allows truck braking adjustment depending on valve handle position.

At emergency pressure drop in the parking brake circuit, spring-type brake actuators 15 are automatically actuated and the truck is braked.



1-Upper housing; 2-upper piston; 3-lower piston; 4-discharge valve; 5-inlet valve; 6-valve case; I-outlet from manual brake valve; II-outlet from spring-type brake actuators; III-atmospheric outlet; IV-outlet from air tank; V-outlet from brake valve

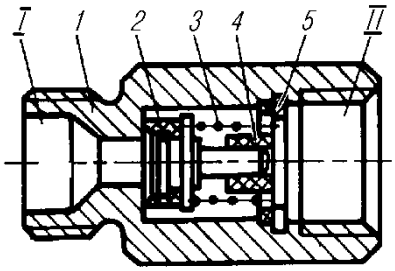
Figure 110 - Parking Brake Relay Valve

4.5.4.2 Parking brake relay valve is shown in Figure 110. Compressed air from the air tank is fed to outlet IV. Outlet I is connected with emergency and parking brake valve; outlet II - with spring-type brake actuators. Control pressure from the primary brake system. Herein, air from parking brake system tank is fed to brake actuators.

When actuating primary brakes, parking brake system is locked.

If there is no pressure at outlet I, piston 3 is up. Inlet valve 5 is close by spring force, and discharge valve 4 is open. Spring-type brake actuators are connected with the environment through outlet III and open discharge valve and outlet II. The truck is braked by spring-type brake actuators. If the truck is herein braked by primary brake system, pressure from brake valve is fed to outlet V, which moves its together with piston 3 downwards impacting the piston 2. Herein, discharge valve 4 closes and discharge valve 5 opens. The primary brake is protected from force coming from primary brake diaphragm and brake actuator spring.

4.5.4.3 Check valve is shown in Figure 111. When compressed air is fed to outlet I the valve 2 overcoming spring 3 force, opens and that ensures compressed air flow to outlet II. When pressure at outlet I drops, valve 2 seats into housing 1 by the spring 3 force and pressure difference at outlets II and I. Reverse compressed air flow from outlet II to outlet I becomes impossible.

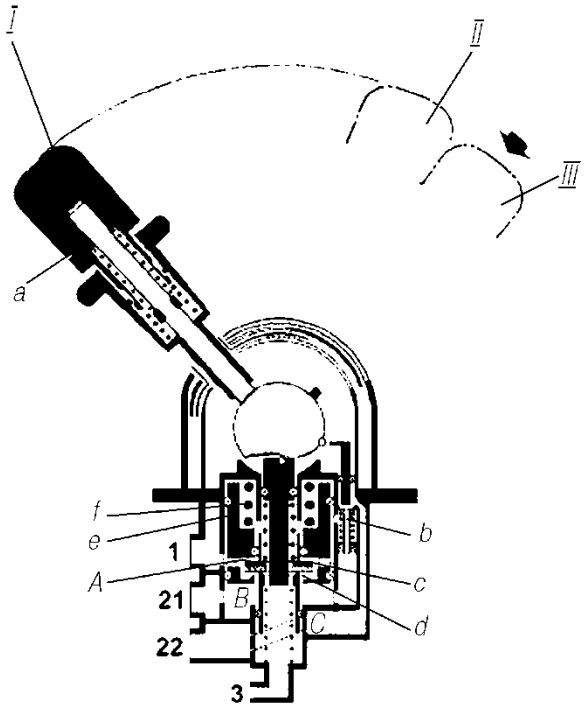


1-Housing; 2-valve; 3-spring; 4-guiding bushing; 5-thrust ring; I-compressed air inlet; II-compressed air outlet

Figure 111 - Check Valve

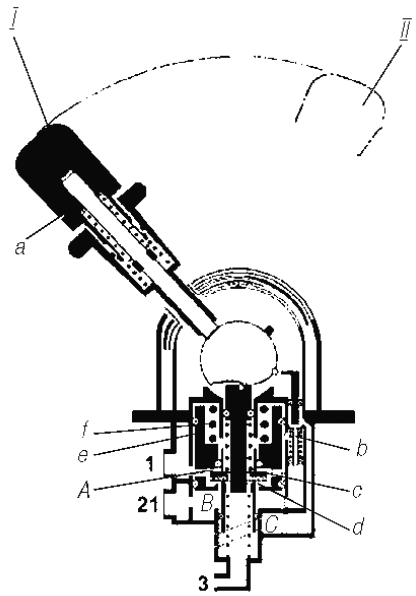
4.5.4.4 Brake valve with manual control is shown in Figures 112, 113, and is dedicated to control spring-type brake actuators, it allows verification test of tractor parking brake efficiency to keep the whole truck on a slope.

Manual brake valve for auxiliary and parking brake systems is used together with brake chambers with spring-type brake actuators. Additional coupling to trailer brake control valve ensures braking action transfer to the trailer. There is control position to check truck parking brake efficiency.



a-handle; b,c-valves; d-discharge hole; e-piston; f-spring; A,B,C-chambers; I-driving; II-parking; III-check

Figure 112 - Brake Valve with Manual Control for Trucks Having Trailer Equipment



a-handle; b,c-valves; d-discharge hole; e-piston; f-spring; A,B,C-chambers; I-driving; II-parking

Figure 113 - Brake Valve with Manual Control for Trucks Having No Trailer Equipment

4.5.5 Truck Brake System with the Antilock Brake System (ABS)

Antilock Brake System (ABS) is designed to maintain high-efficiency truck stability when braking at various tire-to-surface friction coefficients. Thanks to ABS the truck acquires a number of advantages:

- active truck safety, stability and steerability improvement especially at wet and slippery roads;
- possibility to improve average safe speed;
- **tire life improvement.**

ABS consists of angular velocity sensors, brake pressure modulators, electronic control unit, block of fuses; connection cables, warning lamp; test button and off-road mode switch.

4.5.5.1 Magnetic valve (ABS modulator) is shown in Figure 108.

4.5.5.2 Electronic control unit (ECU) is the main part of ABS. The control unit is located in the driver's cab on the control panel spacer. The unit serves to treat signals coming from the angular velocity sensors, deliver control signals to the modulators, trip relay of secondary brake solenoid valve and warning lamp, as well as to check system components.

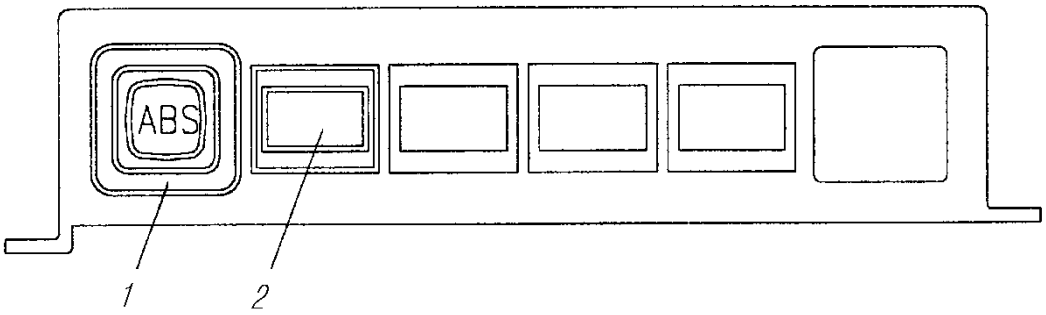
Control units are protected from leakage and short circuit, electrostatic discharge, voltage drop, voltage rise at start-up and other electric transient phenomena.

A control unit has control mode that gives advantage of reducing braking path and keeping steerability and stability on soft road pavements. A driver can switch on "off-road" function on the control panel. Warning lamp flashing will show to the driver that ABS "off-road" function is actuated.

Special ABS mode should not be used on roads as truck stability and steerability can be lost.

4.5.5.3 ABS Operation, Maintenance and Test

When switching on (when the starter is turned to the position “DEVICES”) “Tractor ABS” indicator 2 switches on (see Figure 114) for conventional cab trucks and “Tractor ABS” indicator 34 (see Figure 29) for cabover trucks is on, automatic test of the electronic unit and electrical chains of the devices, modulators and switching units is performed, after test completion the lamp will fade, if there are no failures.



1-ABS test switch; 2-”Tractor ABS” indicator

Figure 114 - ABS Control Unit

If the memory contains failures, the lamp will fade out, if they are eliminated and the truck reaches 5-7 km/h speed. When there is a failure in the system or in electrical chains of one component (sensors, modulators) or control circuits, “Tractor ABS” indicator 2 switches on (see Figure 114) for conventional cab trucks and “Tractor ABS” indicator 34 (see Figure 29) for cabover trucks is on. Herein, it is possible to switch off the corresponding ABS circuit, and the brake system will work in ordinary mode (without ABS mode).

The system does not require special maintenance, except cross check of functioning and check of ABS sensors installation when adjusting or replacing bearings in wheel assemblies or replacing brake linings.

4.5.5.4 ABS Test

System condition can be determined through diagnostic equipment or with blink codes (light). Blink codes check is simple and does not require dedicated equipment.

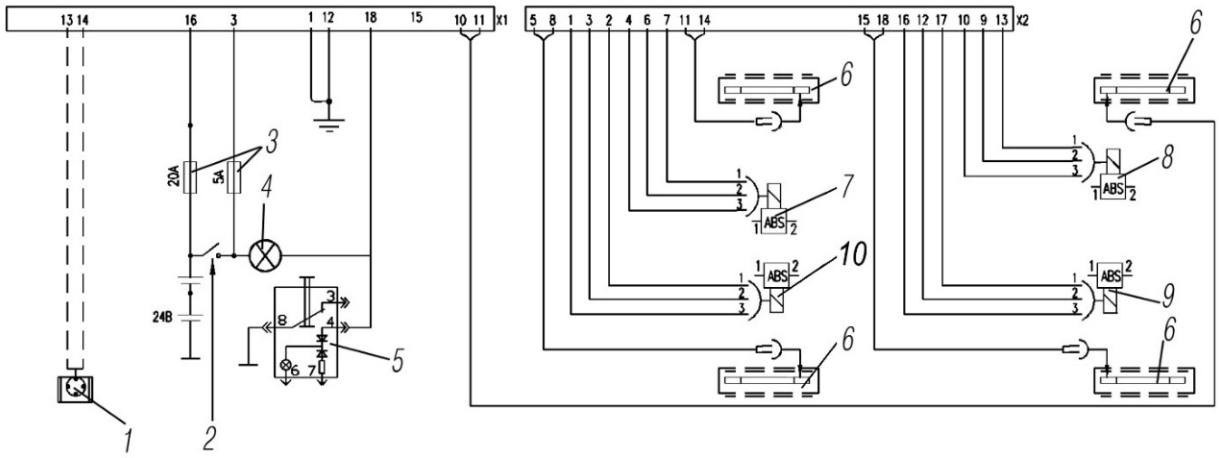
Blink code test is used to detect failures that ECU discovered.

Before blink code test is is necessary to start up the ignition (connect ABS to voltage).

During the test ABS is not functioning! After start up the ignition wait 1 sec at least before pushing test button.

4.5.5.5 Knorr Bremze ABS Blink Code Test

Electrical schemes of components connection to Knorr Bremze control unit are shown in Figure 115.



1-Vehicle communication interface (VCI); 2-ignition switch; 3-fuses; 4-warning lamp; 5-test switch; 6-key phasers; 7-front right modulator; 8-rear right modulator; 9-rear left modulator; 10-front left modulator

Figure 115 - Plug Connection Scheme of Knorr Bremze Control Unit

Error codes are activated by one click on ABS test button 1 (see Figure 114) for conventional cab trucks and ABS test button 10 (see Figure 32) for cabover trucks during 0.5-8 sec, and they are displayed by warning lamp flashing (the so called blink codes are delivered) (see Figure 116).

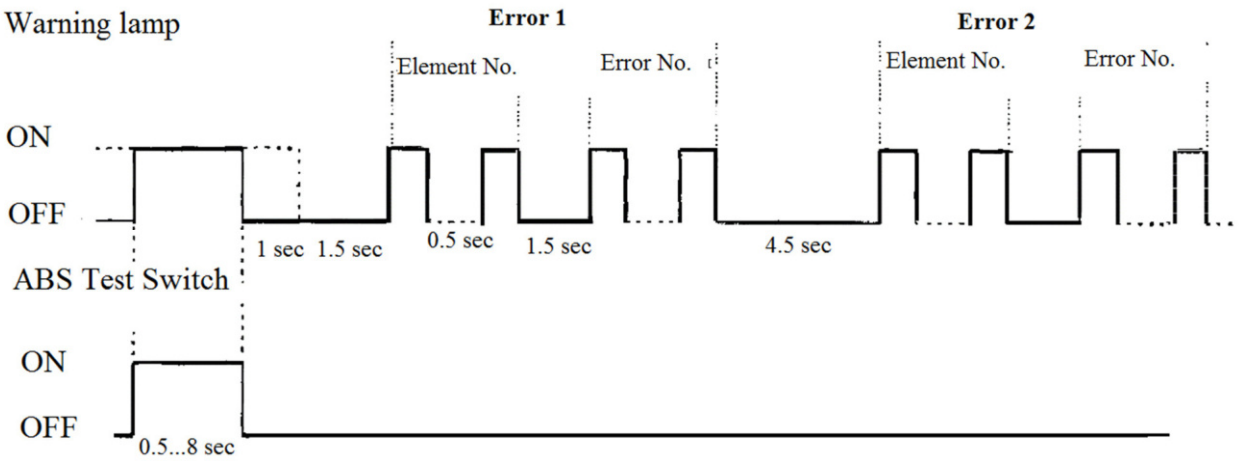


Figure 116 - Error Codes (Blink Codes) Activation

Each error is delivered in a block consisting of two categories: first identifies component number and second one - error number.

Error codes are given in Table 14.

Error codes delivery can be interrupted by clicking again ABS test button 1 (see Figure 114) for conventional cab trucks and ABS test button 10 (see Figure 32) for cabover trucks.

Table 14

Blink Codes		Description
of compo-	of error	
1	1	No failure
Left speed sensor of steering axle		
2	1	Too large air breather
2	2	No signal from sensor during braking
2	3	Bad target ring, ABS should be maintained
2	4	Unstable signal
2	5	Sensor signal is lost
2	6	Ground fault or battery fault, or broken wire
Right speed sensor of steering axle		
3	1	Too large air breather
3	2	No signal from sensor during braking
3	3	Bad target ring, ABS should be maintained
3	4	Unstable signal
3	5	Sensor signal is lost
3	6	Ground fault or battery fault, or broken wire
Left speed sensor of driving axle		
4	1	Too large air breather
4	2	No signal from sensor during braking
4	3	Bad target ring, ABS should be maintained
4	4	Unstable signal
4	5	Sensor signal is lost
4	6	Ground fault or battery fault, or broken wire
Right speed sensor of driving axle		
5	1	Too large air breather
5	2	No signal from sensor during braking
5	3	Bad target ring, ABS should be maintained
5	4	Unstable signal
5	5	Sensor signal is lost
5	6	Ground fault or battery fault, or broken wire
Left modulator of steering axle		
8	1	Battery fault for the clear coil
8	2	Ground fault for the clear coil
8	3	Clear coil wire is broken
8	4	Wire of general pin is broken
8	5	Battery fault for the lifting coil
8	6	Ground fault for the lifting coil
8	7	Lifting coil wire is broken
8	8	Valve configuration error
Right modulator of steering axle		
9	1	Battery fault for the clear coil
9	2	Ground fault for the clear coil
9	3	Clear coil wire is broken
9	4	Wire of general pin is broken
9	5	Battery fault for the lifting coil

Break-over of Table 14

Blink Codes		Description
of component	of error	
9	6	Ground fault for the lifting coil
9	7	Lifting coil wire is broken
9	8	Valve configuration error
Left modulator of driving axle		
10	1	Battery fault for the clear coil
10	2	Ground fault for the clear coil
10	3	Clear coil wire is broken
10	4	Wire of general pin is broken
10	5	Battery fault for the lifting coil
10	6	Ground fault for the lifting coil
10	7	Lifting coil wire is broken
10	8	Valve configuration error
Right modulator of driving axle		
11	1	Battery fault for the clear coil
11	2	Ground fault for the clear coil
11	3	Clear coil wire is broken
11	4	Wire of general pin is broken
11	5	Battery fault for the lifting coil
11	6	Ground fault for the lifting coil
11	7	Lifting coil wire is broken
11	8	Valve configuration error
Connection pins of diagonal ground		
10	10	Battery fault for diagonal 1
10	11	Ground fault for diagonal 1
10	12	Ground fault for all modulators
Internal ECU failures		
15	1	Defective ECU
15	2	Defective ECU
15	3	Defective ECU
15	4	Defective ECU
15	5	Defective ECU
15	6	Defective ECU
15	7	Defective ECU
15	9	Defective ECU
15	10	Defective ECU
15	11	Defective ECU
Power supply		
16	1	Diagonal 1, high voltage
16	2	Diagonal 1, low voltage
16	3	Diagonal 1, wire is broken
16	4	Wire is broken or large voltage difference
16	9	High voltage
16	10	Low voltage

End of Table 14

Blink Codes		Description
of compo-	of error	
Decelerator interface		
17	1	Battery fault for brake relay or wire is broken
17	2	Ground fault for brake relay
17	4	ERC1 is broken
Special errors		
17	5	Big difference between dimensions of front and rear tires
17	9	ABS function “bad road” is activated
17	10	Warning lamp is defective
17	12	Memory fault of sensor parameters
17	13	Sensors of axle 1 or 2 are mixed

4.5.5.5.1 Error Deletion from the Memory

After the faults are eliminated, it is necessary to delete the error from control unit memory as shown in Figure 117.

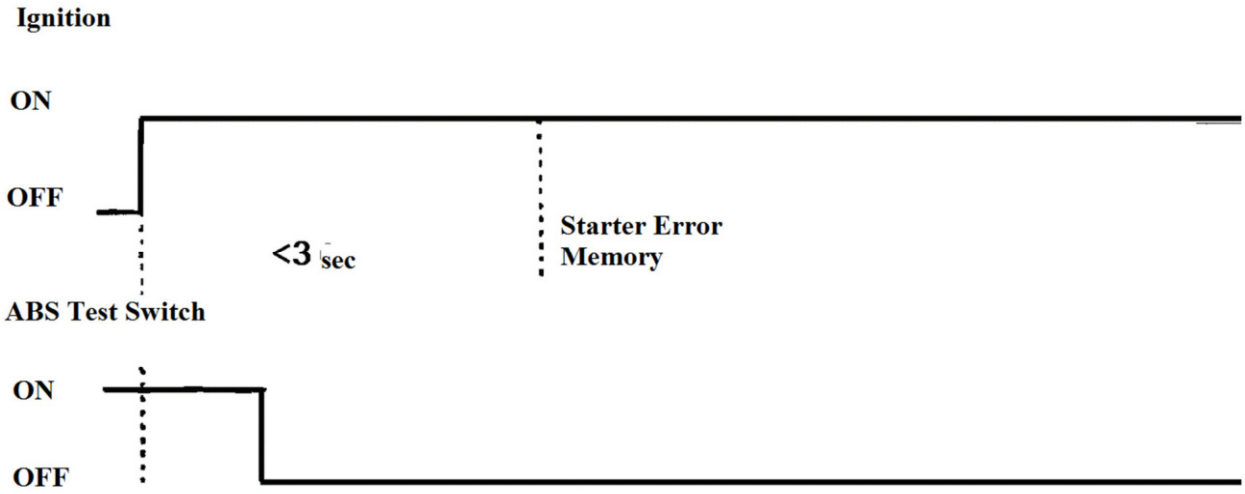
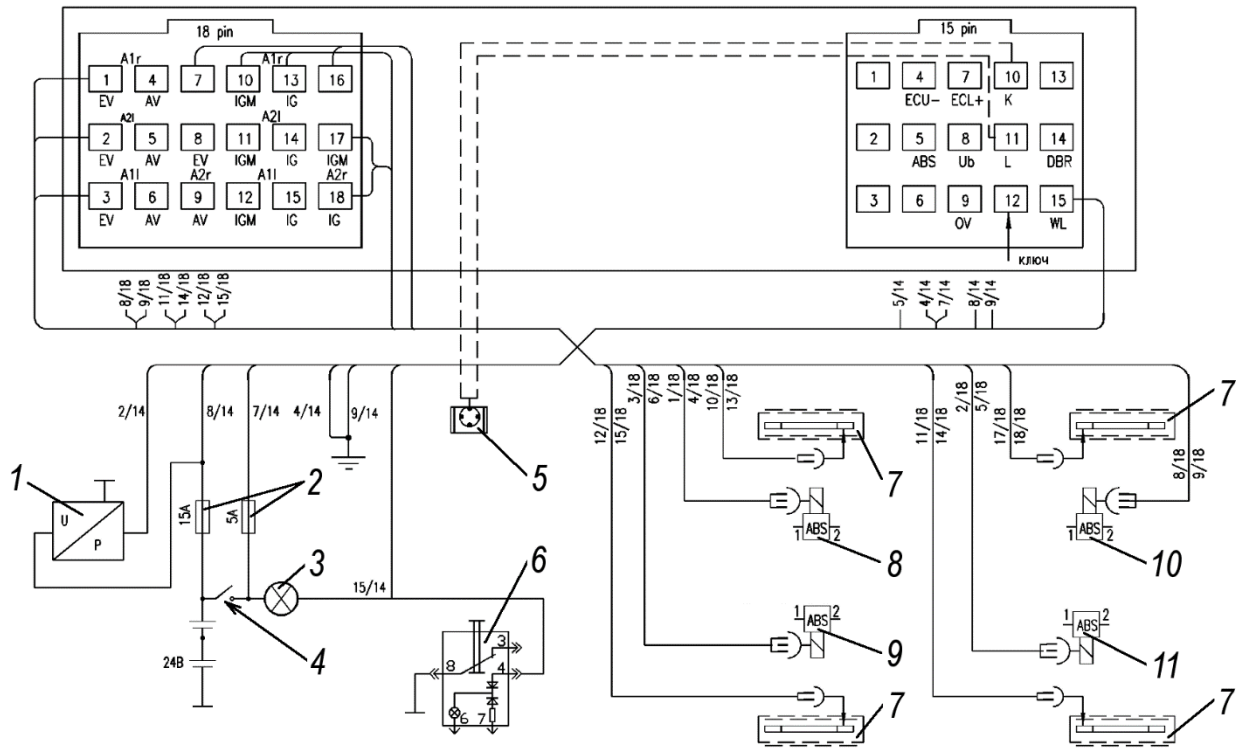


Figure 117 - Error (Blink Codes) Deletion

To do this press ABS test button when the ignition is off and release it only when the ignition is switched on. In less than 3 sec memory is cleared.

4.5.5.6 Wabco ABS Blink Code Test

Electrical schemes of components connection to Wabco control unit are shown in Figure 118.



1-Pressure gauge; 2-fuses; 3-warning lamp; 4-ignition switch; 5-vehicle communication interface (VCI); 6-test switch; 7-key phasers; 8-front right modulator; 9-front left modulator; 10-rear right modulator; 11-rear left modulator

Figure 118 - Plug Connection Scheme of Wabco Control Unit

To activate test ABS lamp should be connected with storage battery minus during 0.5-3 sec through ABS switch button (see Figure 119).

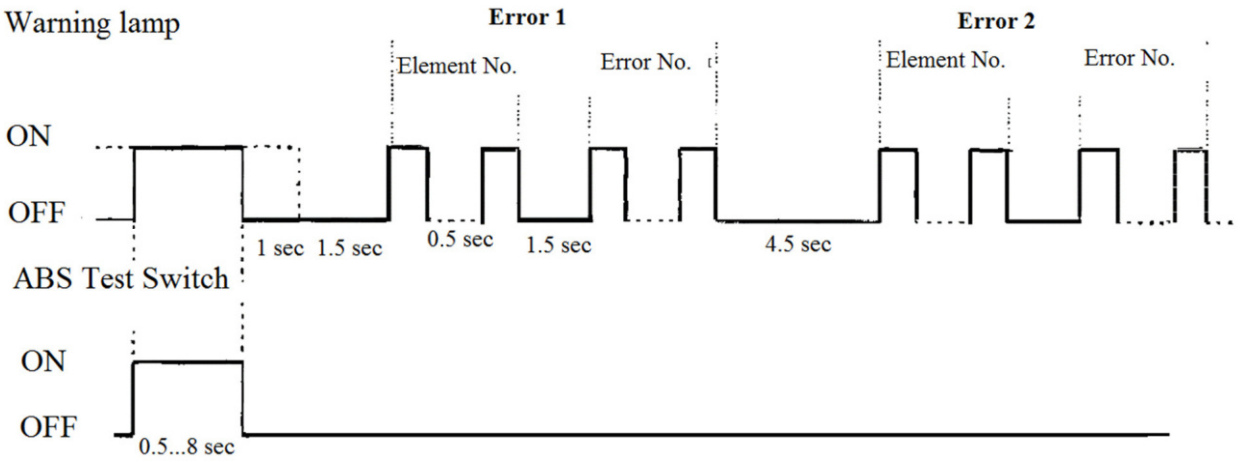


Figure 119 - Error Codes (Blink Codes) Activation

Herein, the length of lamp connection with storage battery minus determines information display mode (if the lap is connected with battery minus 3-6.3 sec, systematic mode is activated). After pushing ABS test button during the time specified,
"Tractor ABS" indicator is on for about 0.5 sec to confirm that the ground was registered and received by the electronic control unit.

Herein, if the electronic unit registers new error appeared during reading, or if the warning lamp is connected to battery minus for over 6.3 sec, the system will exit test mode. If "Tractor ABS" indicator was connected to the battery minus for over 15 sec, it is registered that "Tractor ABS" indicator is broken.

If when ignition is switched on, any active error is registered, at test mode activation the control unit will display only this error, if several active errors are registered, active mistake registered last will be displayed at test mode.

To exit test mode switch on/off the ignition, or the truck should be moving (signal from speed sensor from several axles).

If no active error is registered when the ignition is switched on, passive mistake (not present in the system at the moment) will be displayed in an order reverse to their appearance (the last goes first, the first goes last). Herein, error number does not show error appearance sequence. Passive errors stop to be displayed, when the last passive error registered in the control unit memory is displayed.

List of error codes for Wabco and troubleshooting are given in Tables 15 and 16.

If the warning lamp does not fade out after the failure is eliminated, apply to the service centre.

When repairing and eliminating failures, stop the engine and switch off the system. The system is switched off when the key is turned in the ignition, the devices are in "SWITCHED OFF" position and "ground" is off.

When welding is performed at the truck, disconnect plugs from the electronic control unit.

Table 15 - Errors Described by Blink Codes for Wabco

First code series of error message		Second code series of error message	
1	No errors	1	No errors
2	Modulator	1	Front right
3	Sensor (large backlash between the sensor and the toothed rotor)	2	Front left
4	Sensor (closing or breakage)	3	Rear right
5	Sensor (intermittent signal)	4	Rear left
6	Toothed rotor	5	Third axle right
		6	Third axle left
8	Electronic control unit	1	Low source voltage
		2	High source voltage
		3	Internal error
		4	Configuration error
		5	Connection to the storage battery minus

Table 16 - Troubleshooting for Wabco

Error code	Troubleshooting practice
2-...	Check modulator cable. Wires can be broken, or their insulation is damaged
3-...	Low value of sensor signal magnitude. Check bearing runout, toothed rotor runout, move the sensor towards rotor. Check sensor cable integrity and contact in plug connections.
4-...	Check sensor cable integrity
5-...	Check sensor cable. Check the toothed rotor, if there no defects Wheel diameters can differ from teeth number of toothed rotors.
6-...	Check the toothed rotor, if there no defects, if all the teeth are present, if there is no runout. Replace the rotor.
8-1	Check feed cables and the fuse. Low voltage in the truck electric network.
8-2	Check voltage at the generator and storage battery terminals.
8-3	Replace the control unit, if the error will repeat.
8-4	The electronic control unit does not comply with the number of installed sensors and modulators. Replace the electronic control unit.
8-5	Check “ground” of the electronic control unit and modulators.

4.6 Electrical Equipment

Electrical equipment system is single-wire, negative terminal of power sources and consumers is connected to truck earth. Negative terminal of the storage battery is connected with truck earth via remote switch.

Power sources are two storage batteries connected in series, and the alternator. Electrical equipment tools and devices are connected by wires with polyvinylchloride insulation of various sections. Wires in bundles are marked according to the electrical equipment scheme to simplify their finding and mounting. Wires are marked on the nipples places on both ends of a wire.

Wire interconnection and their connection to devices is done through plugs.

For safe operation of the devices and systems follow the condition of fuses, installed in the blocks. Do not use fabricated fuses such as crimped wires, bolts, washers, because in case of network short circuit it will immediately destroy items based on electronics. Blown fuse should be replaced by another one having the same operational current, if the fuse is blown for the second time find and delete the failure.

4.6.1 Conventional Cab Truck Wiring Diagram is shown in Figure 162 (see the attachment). Legend to Figure 162 is given in Table 17.

Table 17

Pos. in Figure 162	Name	Device type or number
1	Front light	ПФ130АБ-3712010-01 or 112.02.022
2.7	Headlamp electric drive	-
3.6	Headlamp	62.3711-19
4	Low tone audio signal	С306Д or 24.3721010
5	High tone audio signal	С307Д or 241.3721010
8	Side direction indicator	511.3726010 or УПБ 1.101
9	Front side light	264.3712
10	Side position lamp	431.3731-01 or 50.3731010-05
11	Master lighting	ПТ-37-3М
12	Road-train indication light	2512.3726010-02
13	Wind shield wiper electric drive	-
14	Wind shield washer fuse	ПР119-01 (6А)
15	Understeering switch of wind shield wiper with wind shield washer	9902.3709-01
16	Understeering switch of direction and light indicators	1102.3769-02
17	Central dimmer	П305
18	Fuel heater fuse in the fuel fine filter	14.3722 (25А)
19	Air drier fuse of water and oil separator	ПР119-01 (6А)

Break-over of Table 17

Pos. in Figure 162	Name	Device type or number
20	Storage batteries switch	11.3704-01
21	Stator and devices switch	2109.3704-30
22	Direction indicator flasher	5412.3787010
23	Hand lamp socket	47К
24	Left block of warning lamps	ПД512Е
25	Engine readiness for start-up indicator	2212.3803-17
26	Engine control system warning indicator	2212.3803-91or 7712.00.00.000-65
27	Air filter restriction warning light	2212.3803-20
28	Interface engine block test indicator	2212.3803-34
29	The cross-axle differential lock indicator	2212.3803-13 *
30	High beam light indicator	2212.3803-28 or 7712.00.00.000-10
31	Storage battery discharge indicator	2212.3803-16
32	Right block of warning lamps	ПД511Е
33	Emergency warning light switch	245.3710-01 or 249.3710-02
34	Tachograph connection socket	1-967621-1
35	Engine idling control socket	1-967626
36	Interface Engine Block	БДИ 1
37	Tire pressure gauge	2411.3830
38	Low fuel notification a) Fuel reserve indicator	УБ170М or 34.3806 -
39	Voltage indicator	11.3812010
40	Electronic speedometer	ПА8046-4П
41	Electronic tachometer	6201.3813
42	Oil pressure indicator in the engine lubrication system	УК170М or 33.3810
43	Coolant temperature sender	УК171М or 36.3807
44	Two-pointer pressure gauge	1921.3830010
45	Indication relay (buzzer)	733.3747-10
46	VCI	MOL51116-1601
47	The interaxle differential lock indicator switch	2212.3803-14
48	Transfer box low speed actuation indicator	2212.3803-34
49	Additional Power Takeoff switch	3842-3710-02.30*
50	Power Takeoff switch	3842-3710-02.30*
51	Master lighting switch	ВК343-3709-01.08 or П147-3709-04.08
52	The cross-axle differential lock switch	3842.3710-02.28*
53	Interface engine block test switch	3842.3710-11.88
54	Rear fog beam switch	3842.3710-11.04
55	Road-train indication light switch	3842.3710-02.38
56	EDC switch	3842.3710-11.161
57	The interaxle differential lock switch	3842.3710-02.29

Break-over of Table 17

Pos. in Figure 162	Name	Device type or number
58	Transfer box gears switch	3742.3710-11.00
59	Engine idling adjustment switch	3842.3710-11.00
60	Search light switch	3842.3710-02.05*
61	Cab heater mode selector switch	82.3709-25.09
62	Engine idling control switch	771.3709-02.00
63	Transfer box gear selector	82.3709-28.00
64	Heater electric motor	-
65	Heater electric motor resistance	СЭ300
66	“Stop” signals relay	751.3777-02
67	Brake pedal position relay	751.3777-02
68	Horn relay	751.3777-02
69	High beam light relay	751.3777-02
70	Dimmer relay	751.3777-02
71	Ignition switch terminal 15 unload relay	2-1904025-6 or 755.3777-01
72	Ignition switch terminal 15 unload relay	2-1904025-6 or 755.3777-01
73	Storage battery switch lockout relay	751.3777-02
74	Position light relay	751.3777-02
75	Additional rear fog beam relay	751.3777-02
76	Rear fog beam relay	211.3777М
77	Fuse blocks	41.3722-09
78	Headlight adjuster	ЭМКФ35
79	Throttle pedal	61000NO-51SD-42
80	Engine starting heater control panel	-
81	Engine starting heater	14ТС.451.20.00.00.000-22
82	Backing light switch	ВК403В or ВК24-1
83	Power Takeoff switch sensor	ВК403В or ВК24-1*
84	Transfer box differential lock switch sensor	ВК403В or ВК24-1
85	Transfer box low speed switch sensor	ВК403В or ВК24-1
86	Air pressure emergency sensor	6072.3829.000
87	Brake signal switch sensor	2802.3829010 or АДЮИ.407529.003
88	Speedometer sensor	ПД8093-1
89	Additional Power Takeoff switch sensor	ВК403В or ВК24-1*
90, 108	Low fuel notification sensor Searchlight	5202.3827010 2012.3711 or 112.05.44*
91	Parking brake switch sensor	6072.3829.000
92	The cross-axle differential lock switch sensor	ВК403В or ВК24-1*
93	Air drier heating element of the water and oil separator	-
94	Heating element of fuel coarse filter	-
95	Water in duel level sensor	-
96	Hand lamp socket in the truck body	47К
97	Horn switch in the truck body	ВК322.3710-0
98	Jake break switch	ВКП-2
99	Stator relay circuit fuse	14.3722 (25А)

End of Table 17

Pos. in Figure 162	Name	Device type or number
100	Stator relay	738.3747-20
101	Thermal bimetallic fuse	291.3722
102	Alternator	5340.3701010 or AAN8172
103	Stator	5340.3701010
104	Air filter clogging sensor	132.3839600 or ДСФ-70
105	Wind shield washer electric motor	-
106	Storage battery	TITAN STANDART 6CT190.OL (ST) or 6CT-190N3
107	Battery switch	1400.3737
109	Trailer socket	ПС325-37 or СНЦ124-7/45Р034-0123
110	Trailer socket	ПС326-3723 or СНЦ125-7/45Р034-01
111	Transfer box neutral gear switch solenoid valve	КЭБ-420 or КЭМ 10Д
112	Transfer box low gear switch solenoid valve	КЭБ-420 or КЭМ 10Д
113	Transfer box differential lock switch solenoid valve	КЭБ-420 or КЭМ 10Д
114	Transfer box high gear switch solenoid valve	КЭБ-420 or КЭМ 10Д
115	The cross-axle differential lock switch solenoid valve	КЭБ-420 or КЭМ 10Д
116	Additional Power Takeoff switch solenoid valve	КЭБ-420 or КЭМ 10Д
117	Power Takeoff switch solenoid valve	КЭБ-420 or КЭМ 10Д
118, 120	Tail light	7442.3716-10 or 8512.3716-01
119	Registration plate lamp	ФП131АБ-02
121	Wind shield wiper relay	S4031.3747

_____
*Installed on request

4.6.2 Cabover Truck Wiring Diagram is shown in Figure 163 (see the attachment). Legend to Figure 163 is given in Table 18.

Table 18

Pos. in Figure 163	Name	Device type or number
1	Right direction indicator	26.3726010 or 112.01.11
2	Right additional headlamp	-
3	Right day running light	2PT 980.680 or 2PT 980.970
4	Right headlamp adjuster	Is in the headlamp set

Break-over of Table 18

Pos. in Figure 163	Name	Device type or number
5	Right headlamp	671.3711
6, 7	Audio signals	С306Д/307д-3721000 or 24./241.3721000
8	Dashboard	73.3801-01
9	Left headlamp	671.3711
10	Left headlamp adjuster	Is in the headlamp set
11	Left day running light	2PT 980.680 or 2PT 980.970
12	Left additional headlamp	-
13	Left direction indicator	26.3726010 or 112.01.11
14	Tachograph	1391.210010010100*
15	Fuel sensor selector	82.3709000-26.10
16	Stator and devices switch	2109-3704-30
17	Undesteering direction and dimmer switch	1102.3769-02
18	Understeering wind shield wiper/washer switch	9902.3709-01
19	Throttle pedal	61000NO-51SD-42
20	Engine rpm control selector	771.3709-02.00
21	Engine rpm control switch	3842.3710-1187M
22	Secondary brake switch	ВКП-2
23	Direction indicator flasher	5412.3787010 or S4012.3747
24	Electric left rear-view mirror	391/820120
25	Left repeator direction indicator	5702.3726000
26.53	Master lighting	СИЕУ.453754.005-01
27	Cab light to light loading area	112.05.44 or 2012.3711*
28.54	Door light switches	ВК409-3710000
29	Cab light switch to light loading area	3842.3710-02.05
30	Rear fog beams switch	3842.3710-11.04
31	External light selector	82.3709-24.33
32	Remote battery switch	21.3737-10
33	Emergency warning indicator switch	245.3710000-01 or 329.3710000
34	Rear fog beams relay R13	211.3777
35	Left position light	264.3712010
36	Left side position light	ГФ1-26
37, 38,39	Road-train indication lights	2512.3726010-02
40	Road-train indication switch	3842.3710-02.38
41	Independent warmer and heater connection socket	4573739002
42	Cab heater control panel light	-
43	Cab heater valve regulator	771.3709-02.00
44	Cab heater electric motor regulator	82.3709000-25.09
45	Right side position light	ГФ1-26
46	Right position light	264.3712010

Break-over of Table 18

Pos. in Figure 163	Name	Device type or number
47	Right electric rear-view mirror	391.8201020
50	Hand lamp socket	47K
51	VCI	OBD-II(MOL51116-1601)
52	Right repeater direction indicator	5702.3726000
55	Mirror heater selector	82.3709-30.18
56	Cab heater valve	-
57	Cab heater electric motor	-
58	Fuse block F1	A part of the harness 4420БМ-3724010
59	Fuse block F2	A part of the harness 4420БМ-3724010
60	Fuse block F3	A part of the harness 4420БМ-3724010
61	Stator relay R1	A part of the harness 4420БМ-3724010
62	Terminal 15 unload relay R2	A part of the harness 4420БМ-3724010
63	Terminal 15 unload relay R3	A part of the harness 4420БМ-3724010
65	Auxiliary relay of rear fog beams R5	A part of the harness 4420БМ-3724010
66	Position light relay R6	A part of the harness 4420БМ-3724010
67	Fuse block F4	A part of the harness 4420БМ-3724010
68	Dimlight relay R7	A part of the harness 4420БМ-3724010
69	High beam light relay R8	A part of the harness 4420БМ-3724010
70	Horn relay R9	A part of the harness 4420БМ-3724010
71	"Stop" signals relay R10	A part of the harness 4420БМ-3724010
72	Fuse block F5	A part of the harness 4420БМ-3724010
73	Fuse block F6.	A part of the harness 4420БМ-3724010
74	Mirror heater relay	A part of the harness 4420БМ-3724010
75	Brake pedal position sensor relay	A part of the harness 4420БМ-3724010
76	“Rear” tire inflation selector	82.3709000-26.00
77	“Front” tire inflation selector	82.3709000-26.00
78	Transfer box interaxle differential lock switch	3842.3710-02.29
79	Power Takeoff switch	3842-3710-02.30
80	Additional Power Takeoff switch	3842.3710-02.30
81	The cross-axle differential lock switch	3842.3710-02.28

Break-over of Table 18

Pos. in Figure 163	Name	Device type or number
82	Transfer box gear selector	82.3709000-28.00
82a	Transfer box gear switch	3842.3710-11.00
83	Headlight adjuster	ЭМКФ35
84	Wind shield washer electric motor	22.5208010-01
85	Wind shield wiper electric drive	31.5215.000-01
86	Buzzer	733.3747-10
87, 88	Braking signal pneumatic switches	2802.3829 or АДЮИ.407529.003
89, 90	Primary brake system failure sensors	ДКД-5К
91, 92	Tire inflation sensors	ДКД-5К
93	Transfer box interaxle differential lock solenoid valve	КЭМ 10Д
94	Transfer box low gear solenoid valve	КЭМ 10Д
95	Transfer box neutral gear solenoid valve	КЭМ 10Д
96	“WABCO” tire inflation solenoid valve	A500326091 or 4729000530
97	The cross-axle differential lock solenoid valve	КЭМ 10Д
98	Power Takeoff solenoid valve	КЭМ 10Д
99	Additional Power Takeoff solenoid valve	КЭМ 10Д
100	High gear solenoid valve	КЭМ 10Д
101	Jake break door valve	-
102	Cam shaft rpm sensor	650.1130544
103	Pressure gauge	-
104	Fuel low pressure and low temperature sensor	650.1130540
105	Oil pressure and temperature sensor	650.1130552
106	Forced induction pressure and temperature sensor	650.1130548
107	Cam shaft rpm sensor	650.1130544
108	Fan control valve	-
109	Fan speed sensor	-
110	Ambient air temperature sensor	650.1130556
111	Fuel meter	-
112,113, 114, 115,116, 117	Fuel injection nozzles	650.1112010
118	Engine electronic control unit	650.3763010(EDC-7UC31)
119	Engine starting heating elements	650.3740005
120	Engine starting heater relay	-
121,122	Fuel fine filter heating elements	-
123	Fuel heater thermo relay	-
124	Water in duel level sensor	-
125	Heating element of fuel coarse filter	-

End of Table 18

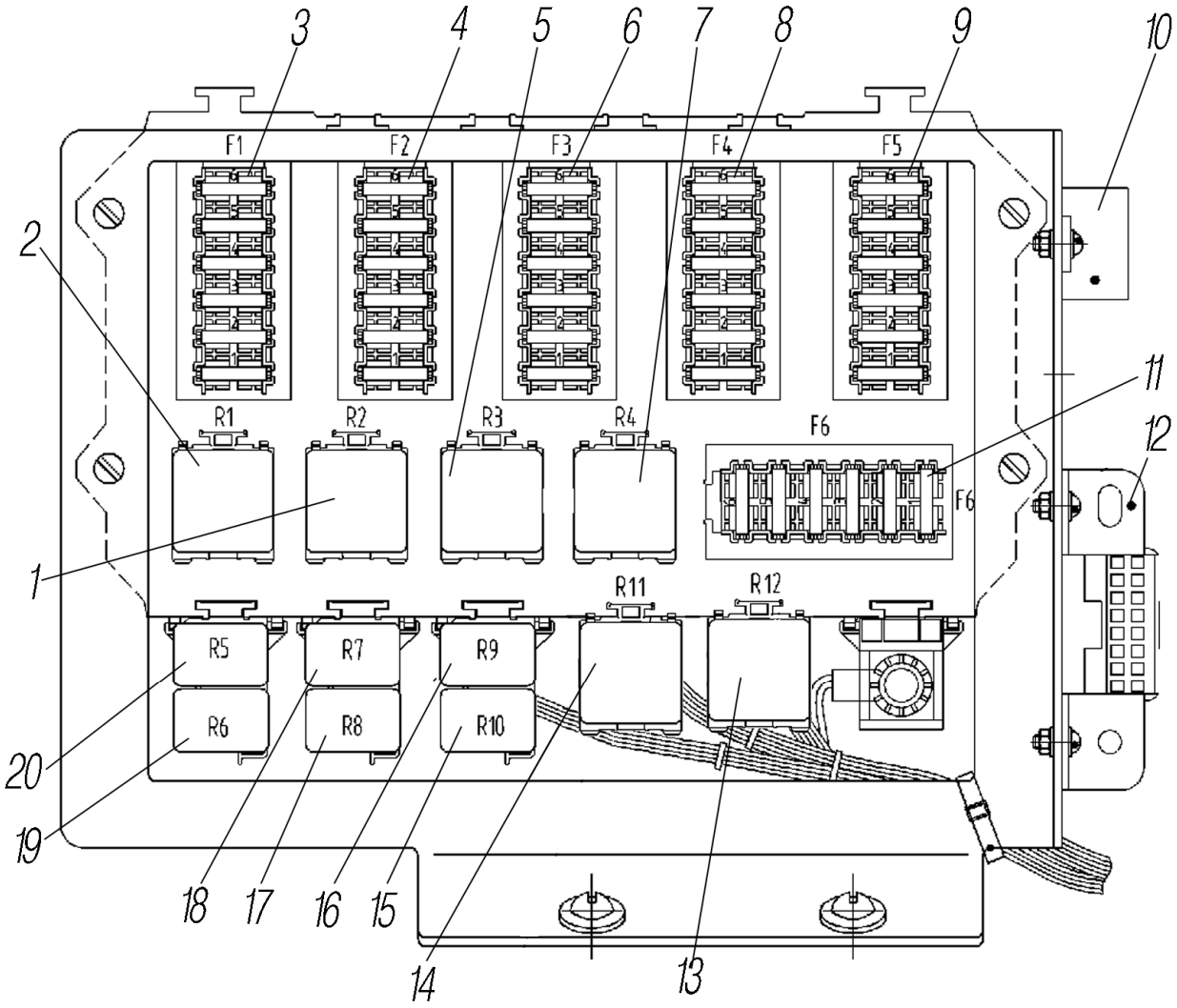
Pos. in Figure 163	Name	Device type or number
126	Stator	AZF4137
127	Alternator	AAN5752
128	Air drier heating element	-
129	Swivelling headlamp	112.05.44 or 20123711*
130,131, 132,133	Side position lights	ГФ1-26*
134	Trailer socket	ПС325-150 or СНЦ124-7/45В034-01
135	Trailer socket	ПС325-150 or СНЦ125-7/45В034-01
136	Right tail light	7442.3716-10 or 8512.3716-01
137,138	Registration plate lamp	ФП131АБ-3717010-02
139	Left tail light	7442.3716-10 or 8512.3716-01
140	Low fuel sensor	5202.3827010
140a	Additional fuel sensor	5202.3827010
141,142	Storage batteries	TITAN Standart 6CT-190.OL(ST) (Tubor) or 6CT-190 АЗ (Kursk)
143	Battery switch	1402.3737
144,145	The cross-axle lock sensors	ВК403В-3716
146	Transfer box interaxle lock sensor	ВК403В-3716
147	Transfer box low speed switch sensor	ВК403В-3716
148	Power Takeoff switching on sensor	ВК403В-3716
148a	Additional Power Takeoff switching on sensor	ВК403В-3716
149	Air filter clogging sensor	132.3839600 or ДСФ-70
157	Parking brake sensor	6072.3829.000
158	Speed sensor	2159.20102301
159	Neutral sensor	-
160	Gearbox splitter sensor	-
161	Back-up alarm sensor	-

*Installed on request

4.6.3. Fuses

Engine starting heater supply circuit is protected by a fuse from short circuit.

All relays and fuses are united in one clock (see Figure 120) installed under the dash-board. Fuse sequence number in the list corresponds to their numeration in the blocks.



1-Terminal 15 unload relay (P2); 2-stator relay (P1); 3,4,6,8,9,11-fuse blocks; 5-terminal 15 unload relay (R3); 7-wind shield wiper relay (R4); 10-rear fog beams relay; 12-VCI; 13-brake signal pneumatic switch relay (R12); 14-outside mirror heater relay (R11); 15-stop signal relay (R10); 16-audio signal relay (R9); 17-high beam relay (R8); 18-dimlight relay (R7); 19-tail lamp relay (R6); 20-rear fog beams additional relay (R5)

Figure 120 - Scheme of Switching Unit and Fuse Blocks

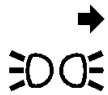
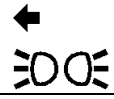
Fuse block F1

No.	Design current, A	Symbol	Dedication
1	20	START	Engine start-up
2	10		Rear fog beams
3	30	**24V**	Stator and devices switch
4	30	EDC	Engine electronic control unit
5	5		Tail light switch, high beam indication
6	10		Storage batteries switch

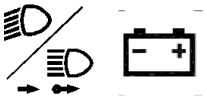
Fuse block F2

No.	Design current, A	Symbol	Dedication
1	25		Independent engine heater
2	25		Autonomous heater
3	5		Electric torch switch
4	15	ABS (ABS)	Truck ABS, trailer ABS
5	5		Autonomous heater
6	7.5		Emergency warning, audio signals

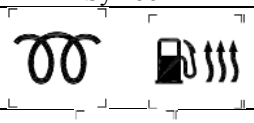
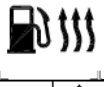
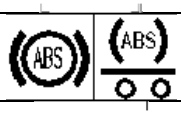
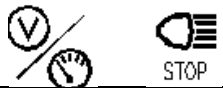
Fuse block F3

No.	Design current, A	Symbol	Dedication
1	7.5		Right high beam headlamp
2	7.5		Left high beam headlamp
3	7.5		Left dimlight headlamp
4	7.5		Right dimlight headlamp
5	5		Sidelights, right drop side
6	5		Sidelights, left drop side

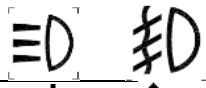
Fuse block F4

No.	Design current, A	Symbol	Dedication
1	10		Fuel heater, air drier heater
2	10		Heated rear-view mirrors
3	5		The interaxle lock, Power Take-off
4	5		Low gear (auxiliary transmis-sion)
5	5		High beam/dimlight selector, storage battery charge
6	5		Backing light

Fuse block F5

No.	Design current, A	Symbol	Dedication
1	30		Electric torch, fuel heater
2	25		Fuel heater
3	5		Truck ABS, trailer ABS
4	5		Direction indicator
5	5		Control of trailer dipper, tire inflation
6	7.5		Devices, stop signal lamp

Fuse block F6

No.	Design current, A	Symbol	Dedication
1	7.5		Searchlight, front fog beams
2	5		Dashboard light, headlights adjuster
3	5		Cab light
4	10		Wind shield wiper, wind shield washer
5	5		Devices
6	5		Engine electronic control unit, secondary brake

4.6.4 Alternator

The alternator is a synchronous machine with installed rectifier assembly, with positive pressure ventilation.

To avoid the alternator failure it is forbidden:

- to operate the engine when storage batteries switch is off;
- to disconnect wires from positive and negative alternator outlets and to disconnect alternator and voltage regulator plugs when the engine is in operation;

- to check alternator proper functioning by short circuiting “+” and “-” plug outlet bonding strips of the alternator and voltage regulator;
- to check alternator proper functioning with indicating lamp or megohm meter;
- to switch off the storage battery with reverse polarity or to connect alternator positive outlet with storage battery negative outlet;

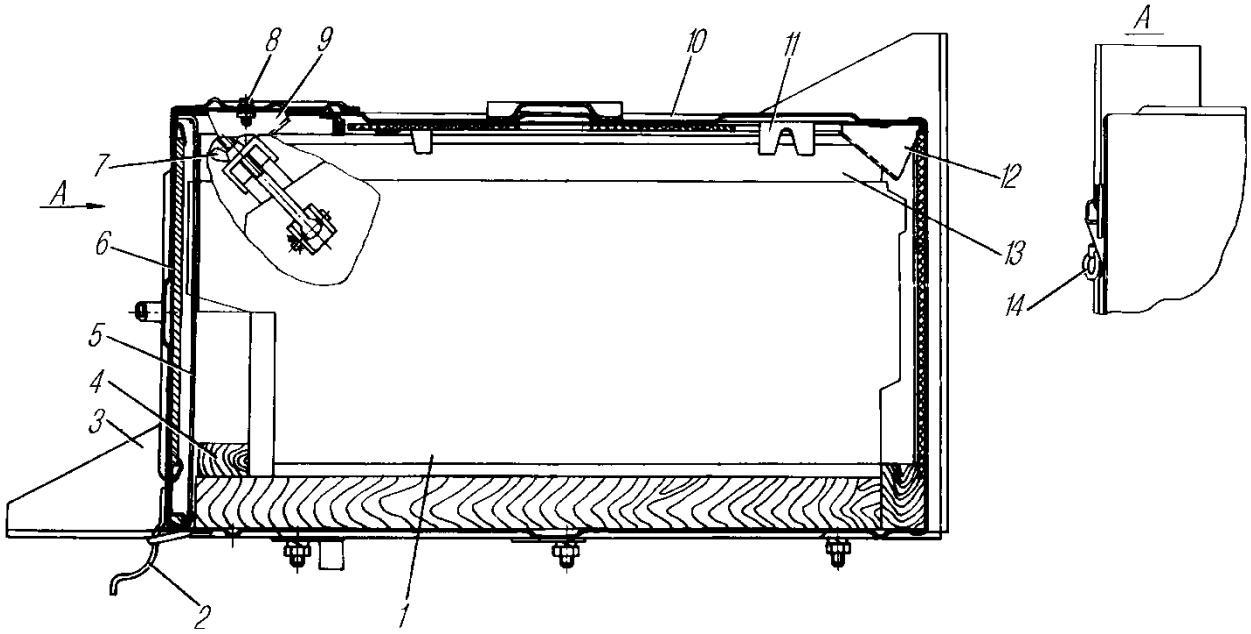
Clean the alternator from dust by compressed air blowing. Repair the alternator in a specializing workshop.

4.6.5 Storage Batteries

Storage batteries are dedicated to start the engine through the stator and to operate together with the alternator at maximal loads.

The truck is equipped with storage batteries filled with battery fluid. On a separate order, dry-charged storage batteries can be installed.

4.6.5.1 Storage Batteries Fastening for Conventional Cab Ural Trucks. Storage batteries 1 (see Figure 121) are installed in the container 10 on two side and intermediate supports. When installed in the container the batteries are fastened by upper clamps 13 and front cam dog 4. The upper clamps 13 are fixed by front 9 and rear 12 folding wedges. Front folding wedges 9 are adjustable and are fixed on the container lid 6 by bolts 8. Rear cam dog 12 is welded to the upper rear part of the container 10. The guiding members 11 are welded to the upper panel of the container 10 for correct clamp 13 installation relative to the cam dogs 9 and 12.



1-storage battery; 2-staple; 3-storage batteries brackets; 4-front cam dog; 5-casing reinforcement; 6-container flap; 7-butterfly nut; 8-bolt; 9,12-front and rear folding wedges; 10-container; 11-guiding members; 13-upper clamp; 14-cam plate

Figure 121 - Storage Batteries Installation and Fastening

To maintain truck storage batteries without removal:

- switch off storage batteries from the truck power line trough battery switch;
- remove snap ring 14 of the lid 6 locks and open the locks;
- lift the lid 6 up and throw it on the bracket 3. Make sure that lid 6 is securely fixed in horizontal position;
- loosen wire fixation and the strap between the storage batteries, preliminary removing battery terminal protective housings, if any;
- remove the front cam dog 4 from the container 10 lifting one end of the cam dog 4 until it goes out the reinforcement 5;
- remove upper clamps 13 from the container 10. If the clamp is locked between the battery 1 and rear folding wedge, use a screw driver or a drift pin to remove the clamp by inserting the screw driver or the drift pin into the hole located on the clamp end;
- move the batteries to the container flap 6.

To remove the storage batteries from the truck, do the described operations in the same sequence except the one: flap 6 should be removed from the container, do not loosen the wires, but disconnect from battery terminals. By moving the batteries to the bracket 3 one by one, remove them from the truck.

When moving the batteries 1 from the container 10 to the bracket 3 and when removing them from the truck, take measures not to drop unfixed battery.

Install the batteries to the truck and fasten them in the reverse order.

Check that the upper clamps were installed into the guiding members 11. Otherwise, the clamp 13 will not couple with the cam dogs 9 and 12, and the battery will not be fastened, that can lead to their damage. Do not deform the guiding members 11 when the battery is being installed and fastened.

When installing and fastening the battery, do not pinch and bend wires to the stator and battery switch, do not bend caps, as well as destroying contacts of wires with container metal parts.

After installing the batteries to the truck, adjust the front folding edges 9 position, to do that loosen the bolts 8 of cam dogs 9 fastening to the flap 6, move the cam dogs 9 along the oval holes of the flap 6 from yourself against stop, and fasten the bolts 8. Adjust the position of front cam dogs 9 on the closed flap 6 of the container 10 after the batteries 1 and upper clamps 13 are installed in the container.

4.6.5.2 Storage Batteries Fastening for Cabover Ural Trucks. Storage batteries 13 (see Figure 122) are installed in the container 1 housing in a dedicated seat. After the batteries are installed into the container, they are fastened with locking plate 7 and storage battery ties 12. The locking plate 7 is tightened to the storage batteries with nuts 6.

To maintain truck storage batteries without removal:

- switch off storage batteries from the truck power line trough battery switch;
- loosen the nut 5 and uncouple the bolt 4;
- remove the flap 8.

To dismantle the storage batteries also:

- unscrew the nut 6 and dismantle the locking plate 7;
- disconnect wires from the battery terminals;
- take out the batteries from the truck one by one.

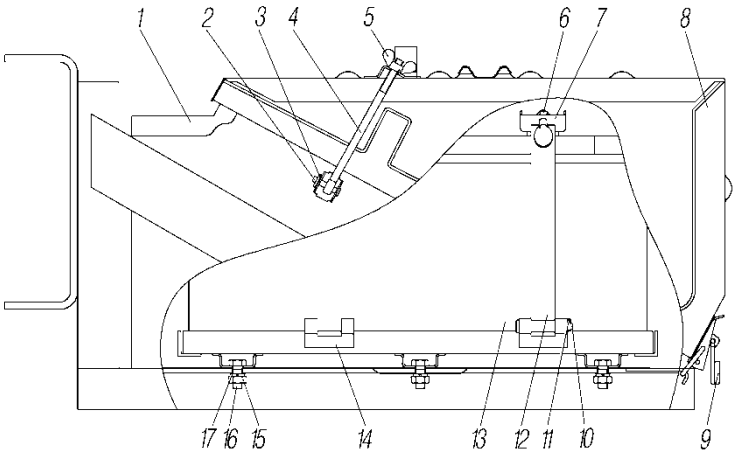
Main failures of the storage batteries and troubleshooting practices are given in the paragraph “Troubleshooting”.

4.6.5.3 Installation of Additional Devices to the Truck

Customers can install additional devices to the truck using help of the corresponding qualified staff.

External consumers are wired from the truck batteries and positive terminal located on the switching unit or in the area of 4 bayonet bases on the cab front board through additional fuses of the corresponding capacity not exceeding 20A in total.

Caution! It is forbidden to connect 12 V devices to the truck network without voltage converter. It is also forbidden to connect external consumers to one storage battery.



1-Container housing with insulation; 2,10-6x30 stud; 3,11-split pin; 4,16-eye bolt; 5,6,15-nut; 7-locking plate; 8-container flap with insulation; 9-latch ring; 12-storage battery tie; 13-storage battery; 14-storage batteries seat; 17-washer

Figure 122 - Storage Batteries Installation and Fastening

Engine electronic control unit wiring scheme is shown in Figure 123.

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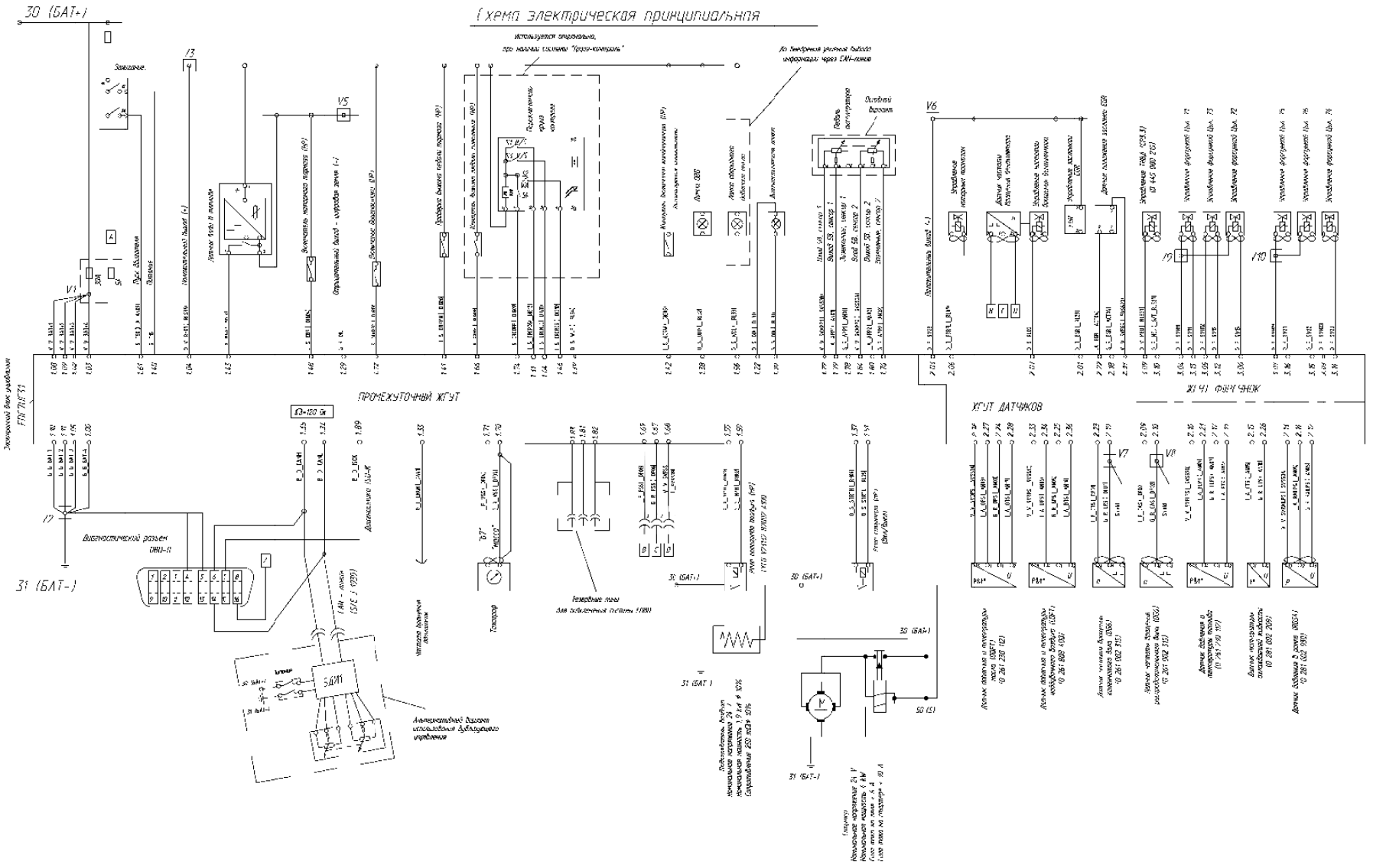


Figure 123 - Engine Electronic Control Unit Wiring Scheme

4.6.6 Lighting and Alarm System

Lighting and alarm devices include two headlamps, front and back lamps, registration plate lamp; searchlight, backing light, master lighting, under bonnet lamp and dashboard lamp, warning lamps located on the control panel.

Audio alarm is given by electric signal of low and high tone. Signals are actuated by the switch located on the understeering switches.

Direction and Braking Indication Direction lights are switched on by the switch located on the steering mast. When turning the switch handle clockwise, right turn lamps are switched on: in the front lamp, side repeater and back lamp. When turning the switch handle counter-clockwise, left turn lamps are switched on.

The switch returns into its initial position automatically.

Flasher provides discontinued light alarm. If a lamp in the lights fails, warning lamp on the control panel is not on. All direction indicators (truck emergency condition) are switched on by a special switch, herein a warning lamp is on. When footing the brake pedal, stop signals of tail lights are on.

Other audio and light indicators are switched on by the corresponding sensors or switches.

Lamps adjustment is done on the kerb-weight truck , i.e. the truck should be completely fuelled and equipped with all auxiliary tools and devices.

Wheels should be inflated to the pressure corresponding to the full load. The truck should be kept at temperature stated above during eight hours.

Lamps adjustment consists in initial angle of low beams.

Initial angle adjustment of low beam should be done with dedicated devices according to the manuals for such devices.

4.6.6.1 Lamps Adjustment Depending on Truck Load (if there is electric and mechanic low beam adjuster). To adjust low beam angle depending on the load, a dedicated electric and mechanic low beam adjuster is installed. Adjuster control unit is located in the cab. Adjuster switch handle is located on the control board, it should be positioned on “0” when the truck is in kerb-weight load.

For Ural trucks with load weight not more than half maximal allowed weight for transportation (see the Technical Specifications), adjuster switch handle should be in “0” position, when driving with 50-75% load weight of maximal allowed weight for transportation, the handle should be in “1” position, if the load weight exceeds 75% - the handle should be in “2” position.

For products on Ural chassis low beam angle adjustment with the adjuster should be done according to Rules No. 48-01 of the United Nations Economic Commission for Europe, herein switch handle positions can differ from the ones, described above.

Mount and dismount terminal strips of actuators and control units only when truck storage batteries are switched off.

Change lamp bulbs with dark envelopes not waiting their blowing out. When changing the blown bulb, restore optic component tightness. Auto bulbs used on the truck and their specifications are given in Appendix F.

4.6.6.2 Installation of Additional Devices to Cabover Trucks*.

External Consumers Wiring External consumers are wired from the truck batteries and positive terminal located in the area of 4 plug connections on the cab front board through additional fuses of the corresponding capacity not exceeding 20A in total.

Caution! It is forbidden to connect 12 V devices to the truck network (or a voltage converter should be used). It is also forbidden to connect external consumers directly to one storage battery.

Radio Recorder Mounting 24 V radio recorder is mounted in the cab upper console (radio panel) (see Figure 28) according to the Manual for Radio Recorder. "+" is connected to the truck network via additional 15A fuse. Feeding wire having minimum 1.5 mm^2 cross-section should be laid under the dashboard fixed with clamps to the main wire bunch, then to the radio recorder via rubber bushing inside cab side column.

The recommended radio recorder model is URAL RM-251SA or similar.

When wiring 12 V radio recorder, use 4/12 voltage converter, which is installed and fastened in the area of the switching unit. Wiring is done according to the scheme attached to the Technical Manual for voltage converter. Such converter can be connected to the 12 V lighter socket (mounted on the switchboard).

24 V lighter socket is mounted on the switchboard. "+" is wired to the lighter with 25A fuse. Feeding wire with 2.5 mm2 cross-section is laid from feeding terminal together with cab main wire bunch to the place of lighter installation.

* Can be done by dedicated workshop specialists.

4.7 Cab, Trim Package and Platform

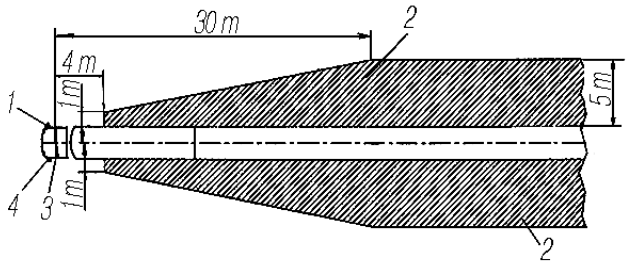
4.7.1 Cab

The cab of the cabover truck - two-seat, spring-mounted, equipped with the heat and sound insulation, the spring-mounted driver seat and the passenger seat, the ventilation system, the heating system and the heating system of windshields, the vehicle sun roof, sunscreens, the wind shield wiper, the windshield washer, rear view mirrors, side view mirrors and wide-angle mirrors, and also the forward view mirror and could be completed with the independent heating unit.

The independent air heating unit Planar-4D-24 (or Airtronic D2 or D4) is located inside the cab and on the right side as viewed in the direction of the truck motion. Fuel supply is provided out of the fuel tank.

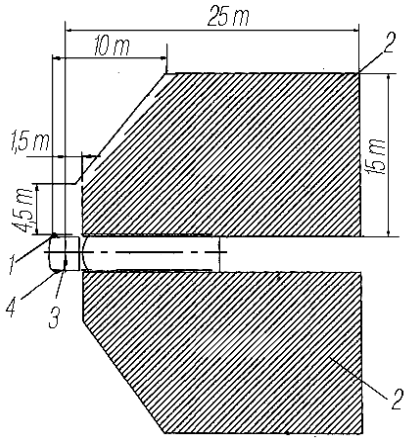
Upon operation of the independent heating unit, it is necessary to follow requirements, specified in the paragraph “Safety Requirements”.

Regulate spherical mirrors, providing the viewing area though them according to figures 124, 125, 126, 127, by loose tension bolts of holders and mirrors, and them fasten them properly.



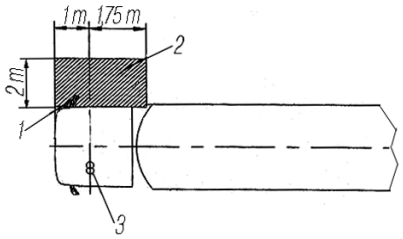
1,4-rear view mirrors (right, left); 2-viewing area of road surface; 3-point of driver’s eyes

Figure 124 - Viewing area through outside rear view mirrors (II class)



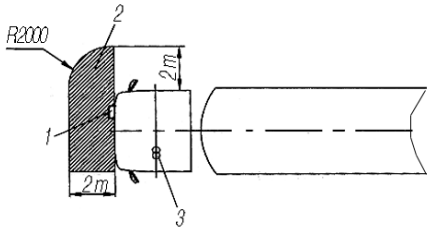
1,4-wide-angle mirrors (on one holder of the II class); 2-viewing area of road surface; 3-point of driver’s eyes

Figure 125 - Viewing area through wide-angle mirrors (IV class)



1-mirror; 2-viewing area of road surface; 3-point of driver’s eyes

Figure 126 - Viewing area through the side view mirror (V class)

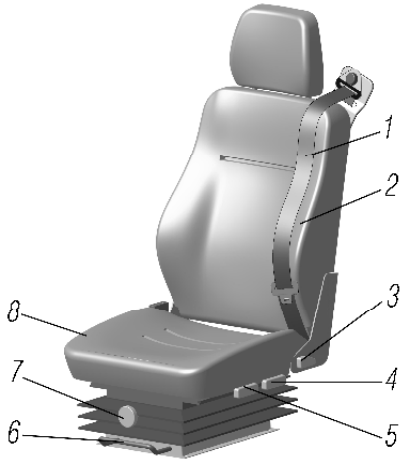


1-forward view mirror; 2-viewing area of road surface; 3-point of driver’s eyes

Figure 127 - Viewing area through the forward view mirror (IV class) for cabover trucks

4.7.1.1 Driver's Seat. In the seat construction the mechanical system of cushioning is provided, which could be regulated in accordance with the driver's weight. Faux leather or fabric upholstery provides durable operation and cleaning with any household detergents.

Seat is provided with the three-point seat belt with the emergency locking retractor 1, as shown in figure 128.



1-Safety belt; 2-seat back; 3-seat tilting lever; 4,5-height and cushion angle adjustment lever; 6-fore-and-aft lever; 7-flywheel of the seat suspension stiffness; 8-seat cushion

Figure 128 - Driver’s seat

The seat could be adjusted in height, inclination of the cushion and the back and regulation of the fore-and-aft motion. Control (adjusting) devices of height and cushion and back angle are located on the left side of the seat, devices of fore-and-aft motion and seat suspension stiffness are in the front part of the seat.

Regulation of seat suspension stiffness is implemented by the flywheel 7 with the graduated scale (adjustment range according to the driver's weight from 40 to 130kg).

For seat adjustment in the fore-and-aft location lift the lever 6 up, move the seat in the chosen position and put the lever down,

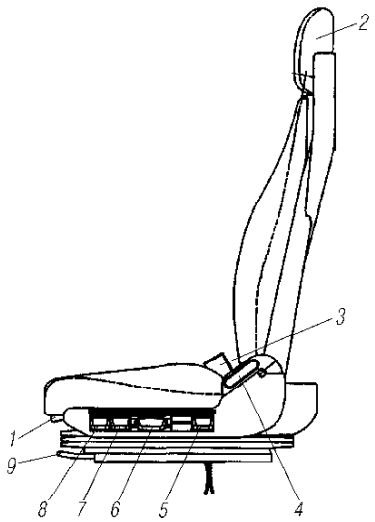
The vertical regulating and the seat cushion angle are provided by pressing levers 4 and 5.

The back angle is regulated by pressing the lever 3. Adjustment range of the seat angle is 45°.

The truck could be also completed with the driver's seat with the cushioning pneumatic system. In the seat construction pneumatic system of cushioning is provided, which is regulated depending on the driver's weight. Faux leather or fabric upholstery provides durable operation and cleaning with any household detergents.

Seat is provided with the three-point seat belt with the emergency locking retractor.

When pushing the lever 1 up, as shown in figure 129, the cushion moves fore-and-aft relative to basement. Upon the lowered lever it is gradually fixed in the chosen position.



1-adjusting lever of the seat cushion length; 2-head cushion; 3-seat belt buckle; 4-adjusting lever of the seat angle; 5-button ”fast seat descent”; 6-adjusting button of seat height; 7-adjusting button of seat suspension stiffness; 8-adjusting button of the seat cushion angle; 9-adjusting lever of the fore-and-aft seat position

Figure 129 - Driver’s seat

When lifting the lever 9 up, seat slides will unblock. Upon the lowered lever it is gradually fixed in the chosen position.

When lifting the button 8 up the front cushion sealing lip rises, when pushing down - decreases. When the button is pushed, it is fixed in the chosen position.

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The shock absorber adjustment in four positions depending on the road surface. When lifting the button 7 up, suspension stiffness increases, when pushing down – decreases.

When lifting the lever up, the seat rises, when pushing down - decreases. When the button 6 is pushed, it is fixed in the chosen position.

Upon fixation of the lifted button 5, the seat quickly decreases in the lower position. When pushing the button down – the seat automatically rises and fixes in the position, chosen by the button 7.

DRIVING WITH THE LIFTED BUTTON 5 IS FORBIDDEN!

ALWAYS DECREASE THE SEAT WITH THIS BUTTON UPON EVERY TRUCK LEAVING!

When lifting the lever 4 up, the back is unlocked, declines forward due to the spring, when decreasing - gradually fixed in the chosen position.

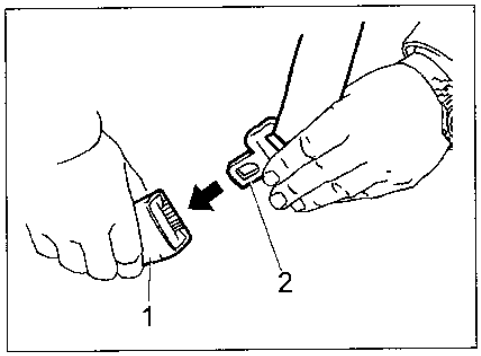
The seat belt buckle 3 fixes the belt buckle.

To choose the height, the head cushion 2 has four fixing positions at intervals of 20 mm.

Control organs of the passenger's seat are located on the right side.

When driving in the truck, the driver and passengers shall fasten their safety belts.

Safety belts are the effective protective mean of the driver and passengers from severe consequences of the road vehicle accident. To fasten the seatbelt, it is necessary smoothly to stretch it out, taking the belt tongue, and pull the tongue 2 in accordance with figure 130 in the lock until its clicking position, not allowing ribbons to twist. Make sure, that the lower belt ribbon tightly adjoins hips - the lower belt ribbon shall not go around the waist. To unfasten the belt, push the red button of the lock, the belt will automatically return in the initial position.



1-Lock; 2-tongue

Figure 130 - Fastening of the safety belt

If straps are stained, clean them with mild soap. Ironing of straps is not allowed, Belt shall be replaced with the new one, if it underwent critical load during the road vehicle accident or has buffies, disruptions and other damages.

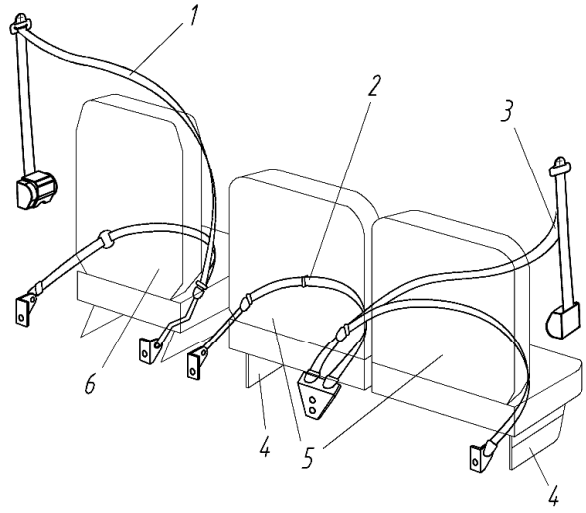
4.7.1.2 Cab of the conventional cabin truck is the three-seater, located behind the engine, equipped with conventional cabin truck heat and sound insulation, seats for drivers and passengers, the ventilation system, the central and local heating of windshields, sunscreens, the wind shield wiper, the windshield washer, rear view mirrors from right and left sides, the wide-angle mirror and the side view mirror.

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Regulate spherical mirrors, providing the viewing area though them according to figures 124, 125, 126 by loose tension bolts of holders and mirrors, and them fasten them properly.

The cab is fastened to the truck frame in 4 points of rubber pads. Upon frame deformation elastic fastenings preserves cab parts from overload.

The cab is equipped with safety belts for the driver and passengers. Lower points of safety belts fastening are located on the rear back of the shore 4, as shown in figure 131, upper points of safety belts fastening are located on cabin side walls.



1-left safety belt with emergency locking retractor; 2-safety belt waist static; 3-right three-point seat belt with emergency locking retractor; 4-shore; 5-passengers' seats; 6-driver's seat

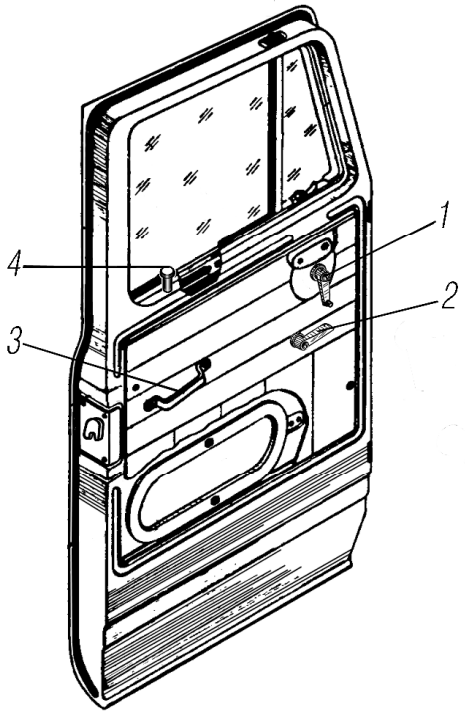
Figure 131- Fixation of safety belts

When driving in the truck, the driver and passengers shall fasten their safety belts according to figure 131.

4.7.1.1. Conventional cabin doors are shown in figure 132. Doors are equipped with locks for locking doors and power windows. Outside the door is locked with the key, inside – with the blocking button.

During truck driving doors shall be closed tightly.

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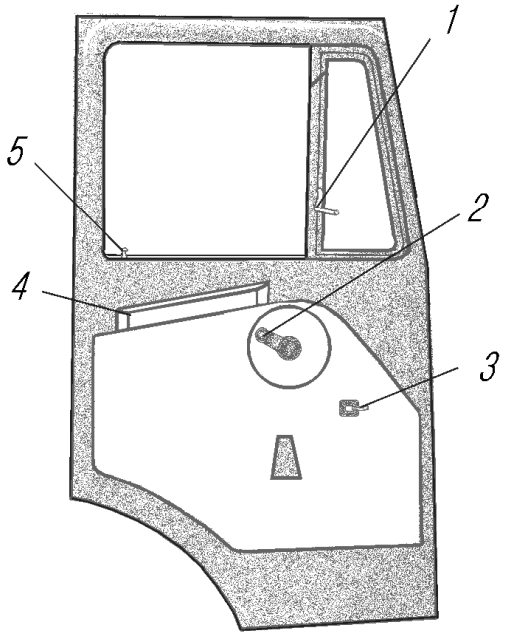
1-power window handle; 2-opening door handle; 3-closing door handle; 4-button for door blocking from inside

Figure 132 - Conventional cabin doors

4.7.1.2 Doors of the cabover truck are shown in figure 133. Doors are equipped with locks for locking doors. Outside the door is locked with the key, inside – with the blocking button.

When opening the door, the automatic switch-on of the cabin indoor light above the driver and the passenger upon the correspondent position of the master lighting switch.

Windows are equipped with drop and swinging windows. Drop windows lift and decrease by lifting devices. Windows shall move in the directions freely without jawings.



1-vent window catch lever; 2-power window handle; 3-opening door handle; 4-closing door handle; 5-button for door blocking from inside

Figure 133 – Door of the cabover truck

4.7.1.3 Wind shield wiper and washer. The cab is equipped with the wind shield wiper and the washer. The double-speed wind shield wiper consists of the electrical drive, two pull-rods, wiper levers and two wipers. The wind shield wiper is turned on by the switch located on the steering mast. When turning the wind shield wiper off, wipers are automatically packed at the bottom edge of the window.

In the conventional cab on the left side of the hood the windshield washer reservoir with the pump and the electric motor. The tank capacity is 2 l. The windscreen washing liquid is delivered with hoses through two jets.

In the cabover truck cabin the windshield washer reservoir is located below the radiator surfacing on the right side.

Supply of the windscreen washing liquid is realised with the switch located on the steering mast.

When free-air temperature is above plus 5°C, then the filtered water is acquired for tank filling. When temperature is from plus 5°C to minus 40°C, it is recommended to use the solution of distilled water and the sulfanol solution in isopropil alcohol(liquid НИИСС-4) ТУ 38.10230-76 in the ratio mentioned in figure 19.

Figure 19 - Concentration of the water solution НИИСС-4 depending on free-air temperature

Free-air temperature, 0°C	Composition by volume in the ratio	
	НИИСС-4	Water
Below +5	0	10
From +5 to -5	1	9
From -5 to -10	1	5
From -10 to -20	1	2
From -20 to -30	1	1
From -30 to -40	2	1

Do not use НИИСС-4 without watering, as combined effect of the concentrate, air pollution and ultraviolet radiation cause changes of the truck paint-and-lacquer coating.

Clean mirrors with simultaneous turning on of wind shield wipers. Change the stream direction of liquid with the guide turn in the jet.

4.7.1.4 Heating of the conventional cab. The cab is warmed with air, heated in the heating unit, which is included in the engine cooling system. Air supply from outside to the heating unit radiator is regulated with the lid 12, as shown in figure 125, of the external hatch and the cab lid 7 of the inner hatch. When the heater fan is turned on, heated air goes into the warm air distributor 3, from where it is spread through the cab by controlled flaps.

Control of flaps is provided by the lever 4. When the lever is in the high position, air goes through vents 13 for the glass bead blasting, and in the low position – for leg heating of the driver and passengers. When the changing lever position relatively to end positions, air quantity, arriving for the glass bead blasting and the leg heating of the driver and passengers changes correspondingly.

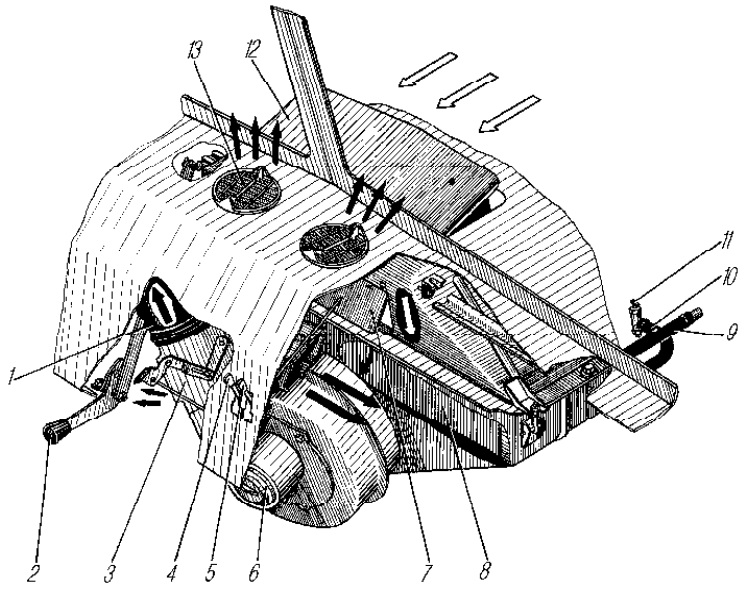
The lid 7 of the inner hatch is operated by the lever 5. In the high position of the lever the hatch is opened, in low - closed.

Optimum positions of heating control devices: simultaneous outside air induction through the hatch, regulated by the lid 12, from the cab though the inner hatch, which is closed with the lid 7, and hot air supply for windshields, driver’s and passengers’ legs by putting the lever 4 in the middle position. The fan switch is located on the control panel.

The pet cock 11, located on the right engine water pipe, shall be opened during operation at sub-zero air temperatures. In summer the heating unit shall be unplugged from the cooling system, by closing the pet cock 11.

When using water as coolant at sub-zero air temperatures, close the heating unit tap before filling the cooling system to prevent cold water penetration in the heating unit radiator and its freezing.

The cab is ventilated through heating unit hatches, apertures in turning and drop door windows. Upon insufficient air ventilation in the cab, open the external hatch and turn on the fan.



1-warm-air feed pipe for windshield demist; 2-joystick of the external hatch drive gear; 3-warm air distributor; 4- gear lever of the flap of the warm air distributor; 5-gear lever of the internal hatch; 6-electric motor assembled with fan; 7-inner hatch lid; 8-heating unit radiator; 9-water discharge pipe from the heating unit radiator; 10-water discharge pipe; 11-pet cock; 12-external hatch lid; 13-vent

Figure 125 – Operating circuit of the cab heater and the glass bead blasting

4.7.1.5 Cab heating and ventilation system of the cabover truck is designed to heat the cab and consists of the radiator, included in the engine cooling system and the engine starting heater system, the heater tap, the fan and the air duct system with adjustable flaps to distribute air on the windshield, side windows and the cab floor. System operation is realised by levers, located on the control panel.

The lever 11, in accordance with figure 28, regulates air distribution on the windshield. When the lever is in the right position, flaps are closed, in the left – opened (air is distributed on the windshield).

The lever 12 regulates air supply in the leg area of the driver and passengers. When the lever is in the right position, flaps are closed, in the left – opened (air is distributed in the leg area of the driver and passengers).

The lever 13 regulates fresh air intake in the cab. When the lever is in the right position, the recirculation air flap is closed (air for heating is taken from the cab), in the left position the recirculation air flap is opened (air is taken from outside).

The cab ventilation is realised through the ventipane, movable door windows and quarter windows, and in summer season – through the heating system, when the heating unit tap is closed.

The independent air heating unit is installed on the cab floor, on the right side. Fuel feeding is realised from the heating unit tank.

Upon operation of the independent heating unit, it is necessary to follow rules, specified in the paragraph “Safety Requirements” and use the technical description and installation guidelines.

4.7.1.6 Hydraulic system of cabover truck roll over is shown in figure 135 and includes the hydraulic pump 9, pipelines and high pressure hoses, the hydraulic cylinder of cab roll over 4, the central lock of cab locking 1.

For the cab roll over it is necessary:

- turn clockwise the switch on the pump 8 by the lever 10, which is included in the tool kit, against stop;

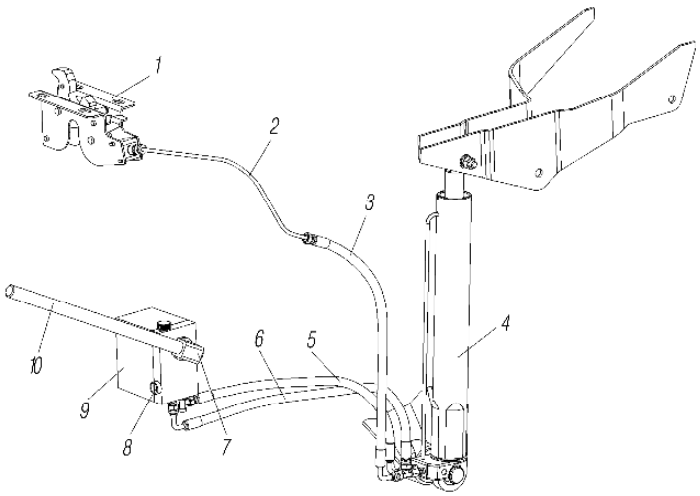
- put the lever in the sleeve bore of the pump 7 and, pumping it, raise the cab.

Opening of the central lock of cab locking happens automatically at the moment when the cab starts raising.

To lower the cab down, it is necessary to turn the switch on the pump counter-clockwise against stop, to put the lever in the sleeve bore of the pump and, pumping it, lower the cab. The central lock latches automatically.

Caution! All possible operations below the cab shall be realized when the cab is raised fully. Do not leave it in the intermediate position.

When the cab is not in the intermediate position, the engine starter blocks.



1-central lock of cab locking; 2-high-pressure pipeline; 3,5,6-high pressure hoses; 4-hydraulic cylinder of cab roll over; 7-pump liner; 8-raise/lower switch; 9-hand-operated hydraulic pump; 10-lever

Figure 135 – Hydraulic system of cabover truck roll over

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4.7.2 Trim Package

For ease of maintenance of the engine and the conventional truck separate trim package nots are demountable. The trim package is attached to the truck frame with the rubber bearing shoe and to the cab with rubber bumpers. The alligator hood with the opening angle 90°.

4.7.3 Platform

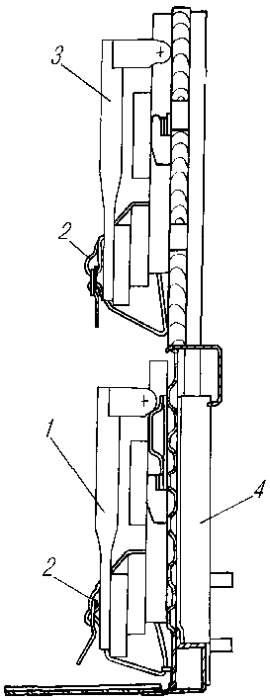
Demountable, metal platform is designed to transport packaged cargos, cargos on standard pallets and people. Borders and side racks are demountable. Rear and side racks are hinged. Rack locks could be regulated and located on struts.

On the body bottom alongside racks hinge yokes are located for lashing and securing the cargo.

A platform is equipped with seats, the additional side rack, canopy bows with braces and canopy. The middle seat is established upon the customer request and could be dismantled and fixed on the front rack, as shown in figure136. Side seats could be folded for space clearing upon cargo transportation.

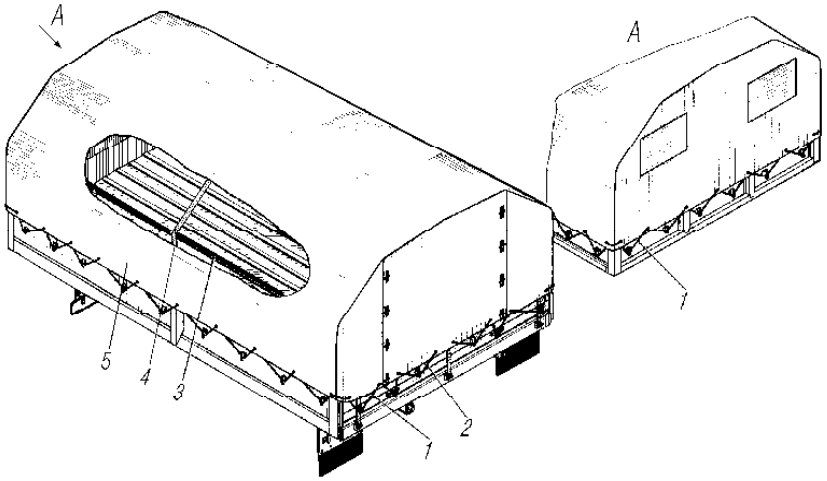
The installed canopy is shown in figure 137. Folding order of the removed canopy is shown in figure 138. Dry the canopy before folding.

After the truck layover with the canopy under precipitation before moving off it is necessary to make sure, that high water and snow volume is absent, as it could cause harm for other road users.



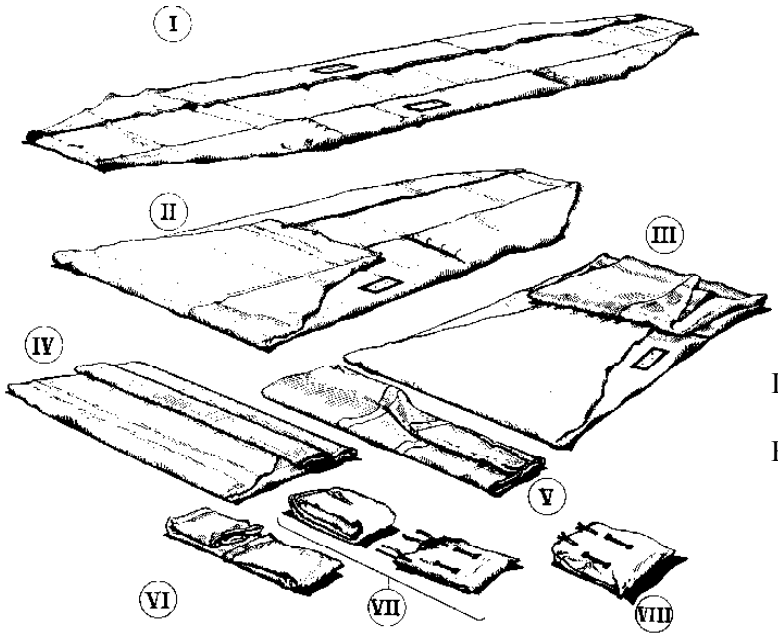
1-rear middle seat; 2-fixing belt; 3-front middle seat; 4-front platform rack

Figure 136 - Middle seat folding



1-canopy fixation rope; 2-ceiling fixation rope; 3-stay tube of bow; 4-canopy bow; 5-canopy

Figure 137 - Platform with the canopy



I-VIII – canopy folding order

Figure 138 - Method of canopy folding

4.7.3.1Adjustment of the device for platform rack locks. Aim of the adjustment is achievement of secure rack locks and fixation of lock handles in the position CLOSED.

Adjustment is implemented according to the following scheme, as shown in figure 139.

Determine direction and distance of movement for the lock 1 in the housing strut 2 according to the following characteristics:

1. If after the full rack closing and the strut locking the rack has free run in the opening direction, it is necessary to move the lock 1 up.

2. If pressure on the handle 7 goes beyond 300 N (30 kgf) or the handle does not reach the vertical position or could not be fixed in it, it is necessary to move the lock 1 down.

3. Distance of movement for every case mentioned above shall be determined by sight.

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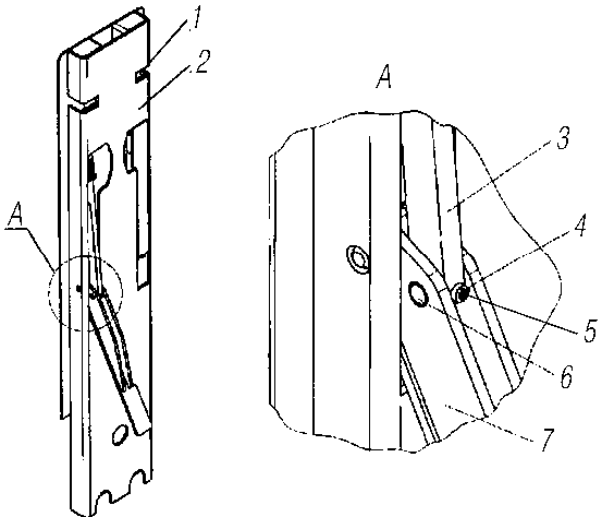
For adjustment implementation:

1. Move the handle 7 in the position OPENED.
2. Remove the screw 5 with the spring washer 4.
3. Push the tappet axle 6 out of the handle hole 7.
4. Remove the tappet 3 from the handle groove 7.
5. Moving the tappet 3 round its axis for whole number of rotations, implement movement of the lock 1 on the required value in the required direction (on rotation of the tappet corresponds to 2mm of the lock movement):

-to move the lock 1 down screw the turn 3 off;

-to move the lock 1 down screw the turn 3 out;

6. Put the tappet 3 in the handle groove 7, combining holes on the handle with the tappet.
7. Put the tappet axle 6 in the handle hole 7, combining the axle screw hole with the tappet hole 3.
8. By rack closing and strut locking, check accuracy of adjustment. If necessary, repeat clauses 1, 2, 4-9.
9. Move the handle 7 in the position OPENED.
10. Turn the screw with the spring washer 4 in the screw hole of the tappet 3.



1-Lock; 2-housing strut; 3-tappet; 4-spring washer; 5-screw; 6-tappet axle; 7-handle

Figure 139 - Platform strut with the device adjustment

4.7.3.2 Side safety devices (SFD) are shown in figure 140, provide efficient protection at full length of the vehicle, unprotected road users from falling under the vehicle on the side. Vehicle SFD includes right and left SFD, each of them consists of two barriers: front (below the cab) and rear (behind the cab).

When lowering the spare wheel holder, it is necessary to dismantle the right rear SFD:

- turn away fastening bolts of SFD brackets to upper connecting shackles, located on inside of the barrier;
- remove SFD from the lower hooks of brackets.

Installation of the rear barrier provide in the reversed order.

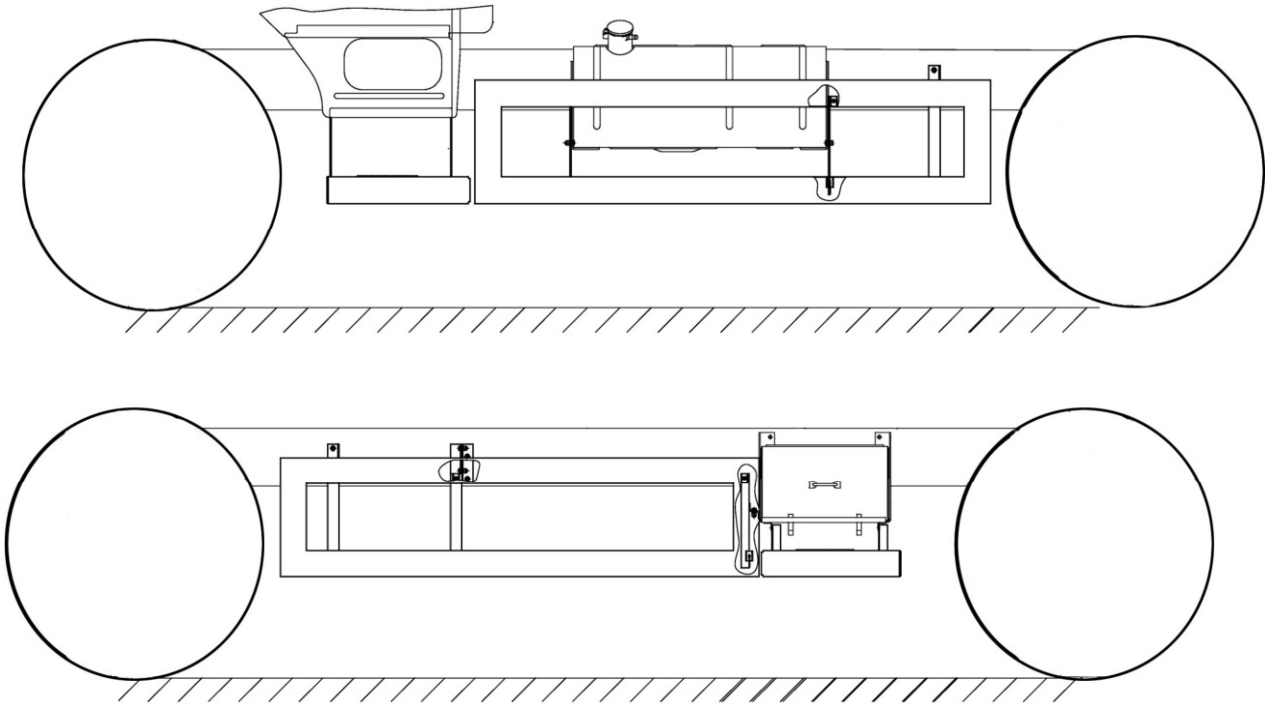


Figure 140 - Installation of left and right side safety devices.

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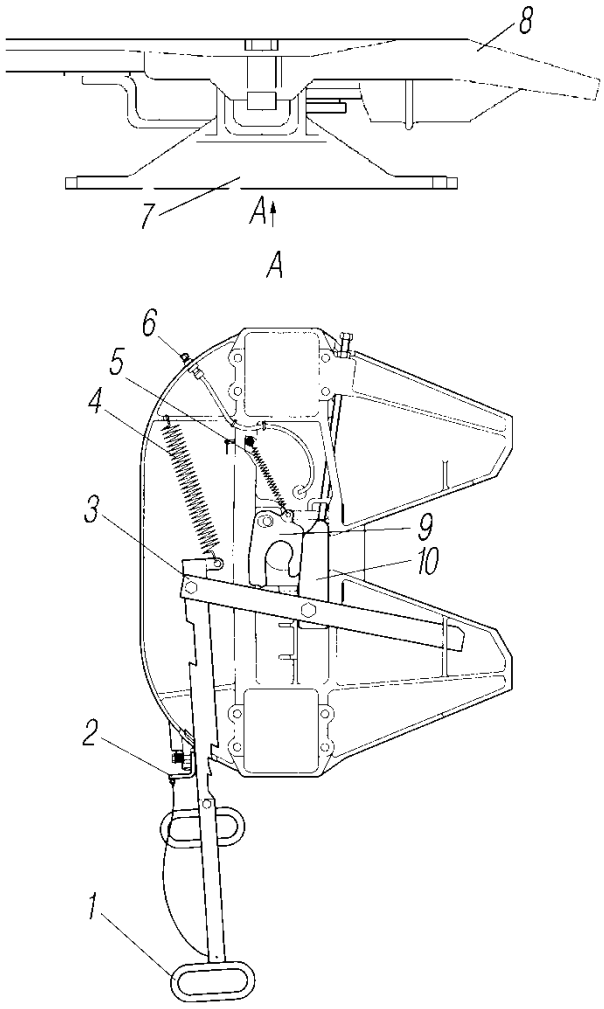
4.8 Fifth-Wheel Coupling

The tractors have a fifth-wheel coupling that is dedicated for: flexible coupling of the tractor with the semi-trailer having king pin of 50 mm diameter; transfer of drawbar power from the tractor to the semi-trailer; manual-automatic hitch and separation of the tractor and the semi-trailer.

Fifth-wheel coupling consists of a fifth-wheel 8 (see figure 141), brackets 7 and detachable coupling mechanism. Rubber absorbers in the connection place of the fifth-wheel and the brackets provide fifth-wheel sweeping in the longitudinal and transversal planes and reduce dynamic stress.

4.8.1 Towing coupling is located under the fifth-wheel and is shown in view A (brackets 7 are not shown for clarity). When drawing control joystick by the unlocking device 1 through the lever 3, locking valve 10 releases gate hook 9 and it turns by spring force 5 to the position for coupling. Lowering the control joystick by spring force 4 the locking valve 10 holds the gate hook 9.

When coupling the semi-trailer king pin turns the gate hook 9. The valve 10 and the joystick 1 move to the closed position by spring force 4. Accidental uncoupling interlock 2 fixes the joystick 1 in this position.



1-Uncoupling control joystick; 2-accidental uncoupling interlock; 3-lever; 4-spring; 5-spring; 6-line; 7-bracket; 8-fifth-wheel; 9-gate hook; 10-locking valve

Figure 141 - Fifth-Wheel Coupling

4.8.2 Fifth-Wheel Coupling Maintenance

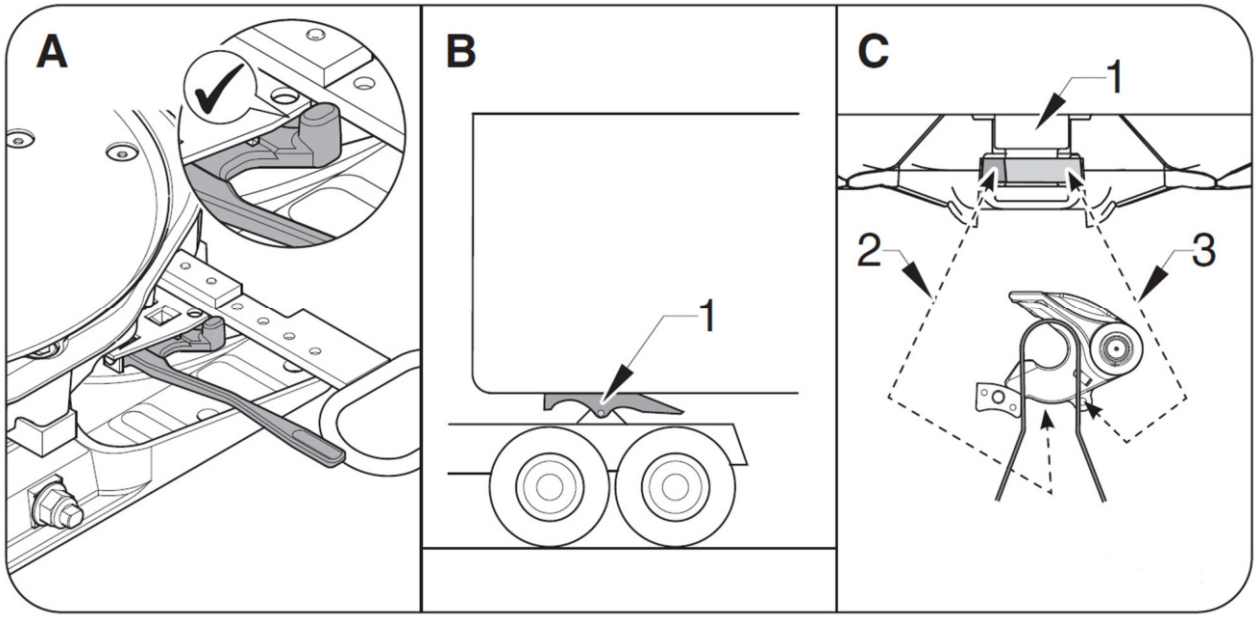
Before each trip:

1. Check if the safety lever is closed.

2. Make general visual inspection of the fifth-wheel coupling and mountain frame to check if they are well coupled, have no wear, corrosion or damage.

3. Check if fixation is full and reliable according to figure 142.

4. Test of move the truck from a standstill: move the tractor from a standstill slowly - the semi-trailer should not uncouple.



1-Central trunnion; 2,3- locking element; A - unlocking handle is fixed in the device plate and lip of the safety lever is completely before the unlocking handle. B - there is no clearance between the trailer and the fifth-wheel coupling. C -locking element 3 is securely closed on the central trunnion 1.

Figure 142 - Check Full Fixation of the Block

4.8.3 Coupling and Uncoupling of the Tractor and the Semi-Trailer

Before coupling make sure that the fifth-wheel coupling and its fasteners are properly functioning, the fifth-wheel is not dirty and it has no foreign objects, if necessary, clean the top surface of the fifth-wheel and oil it. Put the semi-trailer in a way that its base was on the same level with the tractor fifth-wheel or a little bit lower it, but no more than 50 mm.

Coupling and uncoupling should be done on a horizontal platform with hard surface. Herein, longitudinal axes of the tractor and of the semi-trailer should be in line.

Coupling should be done as follows:

- make sure that the locking element of the fifth-wheel coupling was completely up, and unlocking handle was in ready-for-unlocking position as shown in figure 143.

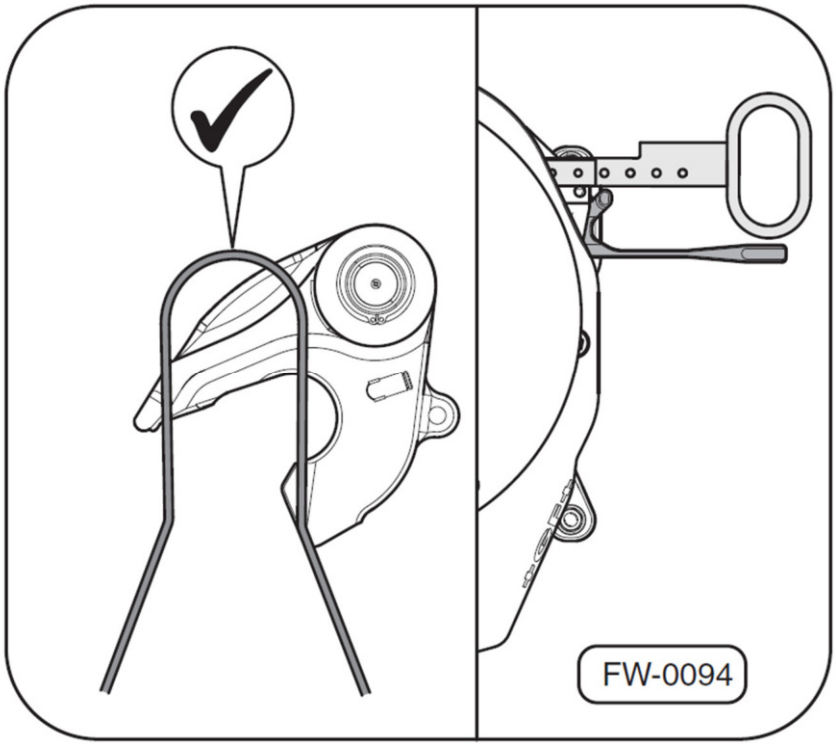


Figure 143 - Locking Element in the “Open” Position.

- clean the area between the tractor and the semi-trailer;
- reverse the tractor at low speed to the semi-trailer in a way that the semi-trailer king pin entered the grips of the fifth-wheel coupling. The tractor and the semi-trailer are coupled automatically;
- brake the tractor with the parking brake. Make sure that accidental uncoupling interlock 2 (see figure 141) is down and prevents the handle move towards itself;
- lift the semi-trailer support in the extreme up position and fix it securely;
- plug in the connecting cable of the semi-trailer wiring;
- connect the connection hoses of the tractor pneumatic brake system drive to the coupling heads;
- release the semi-trailer parking brake;
- move the road-train for some distance, make sure that the coupling is secure, that the brake and the semi-trailer electric gauges are properly functioning.

When coupling the tractor with various models of semi-trailers regulate the distance between hose clips to avoid their breakage due to friction on the tractor extensions.

Before uncoupling choose even area for the semi-trailer park.

Uncouple the tractor as follows:

- brake the semi-trailer with the parking brake;
- lower the semi-trailer support until it touches the ground, unloading tractor springs. When it is necessary to uncouple the train on soft ground put plates under semi-trailer support;
- plug out the connecting cable of the semi-trailer wiring;
- disconnect the connection hoses of the pneumatic brake system drive from the coupling heads (first feeding line, after - control line) and close with protective lids. Fix coupling heads with hoses on the tractor area;
- move the accidental uncoupling interlock 2 (see figure 141) in up/down position (depends on the fifth-wheel coupling model) and pull the control joystick until fixed, herein the locking valve 10 will be pushed aside opening the gate hook 9;
- select first gear and drive the tractor forward at low speed for complete uncoupling of the semi-trailer;
- the gate hook will stay open due to the spring 5.

4.9 Dedicated Equipment

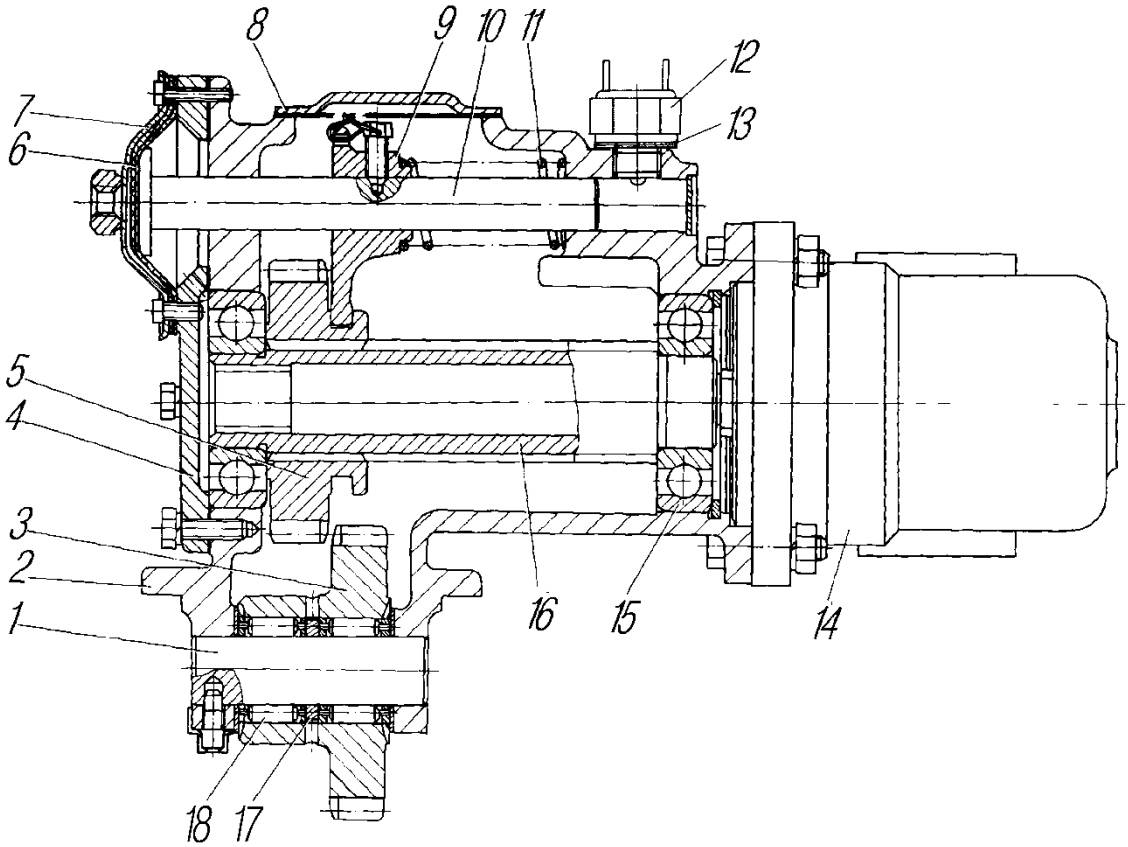
Auxiliary devices wiring schemes, their drives and power takeoff modes should be approved by the manufacturer. Propeller shafts installed by a customer to drive auxiliary devices must have maximum 40 g*cm out-of-balance and 150 N (15 kgf) propel effort in spline joints.

4.9.1 Power Takeoff

Power Takeoff is single reduction, it is fastened to gearbox crankcase on the right and is dedicated to drive auxiliary devices. Power Takeoff is manufactured in two design styles: with a pump (see Figure 144) and a flange (see Figure 145).

Switch on the Power Takeoff when air pressure in the pneumatic system is 500 kPa (5 kgfm) at least and when the clutch is disengaged. Between Power Takeoff crankcase flanges adjusting gaskets are installed, they help to adjust side backlash in the gear engagement (noise-level adjustment). When it is time to replace the gaskets by new ones, their thickness should be the same.

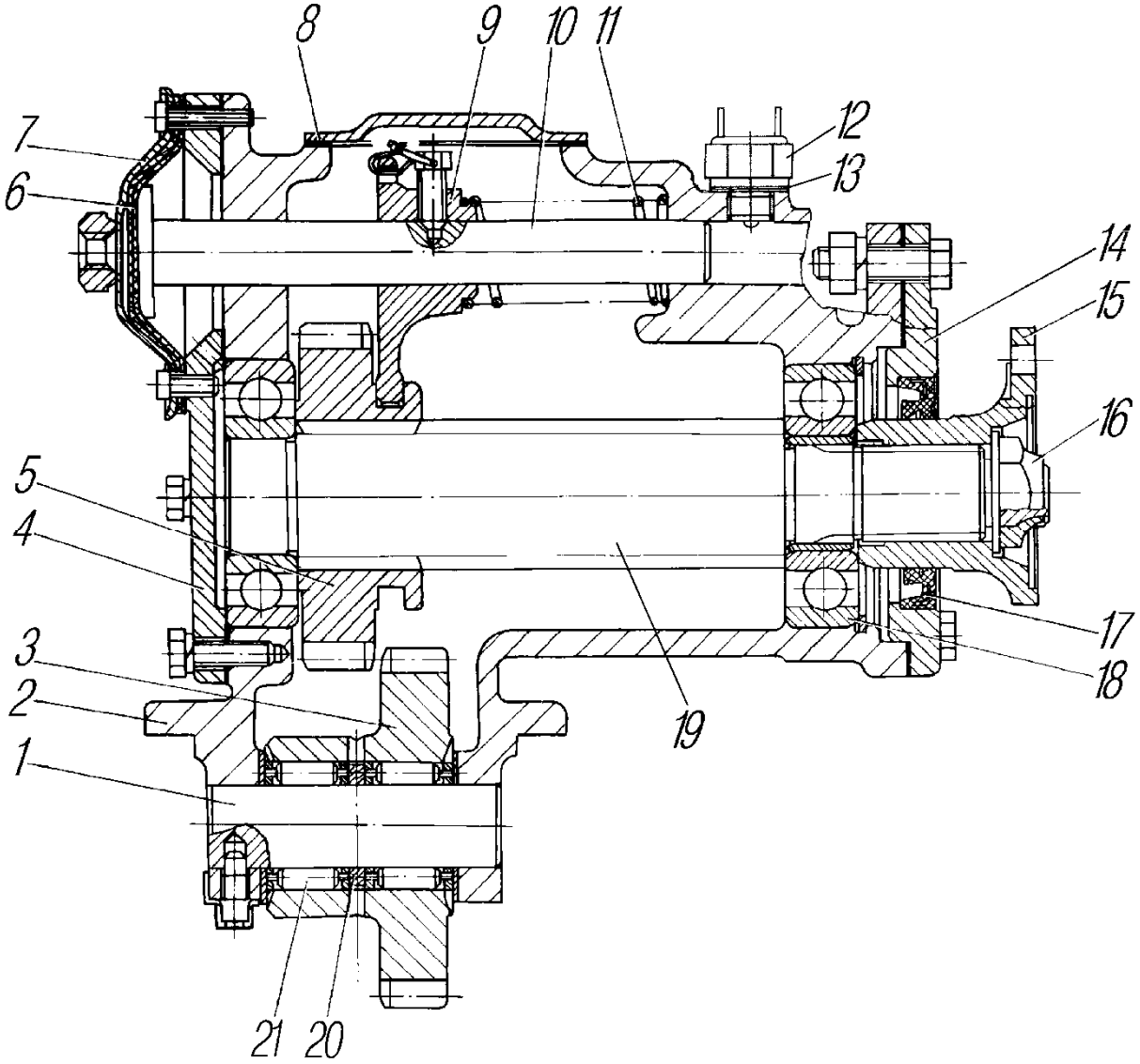
Information of Power Takeoff control is given in paragraph 4.2.4 “Transfer Box”, clause 4.2.4.4 “Transmission Devices Control”.



1-drive gear axle; 2-crankcase; 3-drive gear; 4-crankcase cover; 5-idle shaft gear; 6-selector chamber diaphragm; 7-selector chamber cover; 8-cover; 9-fork; 10-selector fork rod; 11-spring; 12-switch; 13-adjusting gaskets; 14-pump; 15-ball bearings; 16-idle shaft; 17-bearing spacer; 18-roller bearings

Figure 144 - Power Takeoff with a Pump

When switching on the Power Takeoff compressed air goes to the diaphragm chamber of the selector mechanism. Diaphragm 6 (is shown in Figure 145) couples the idle shaft gear 5 with the drive gear 3 through the rod 10 and the fork 9. The rod 10 impacts the switch 12 making switch contacts, and Power Takeoff indicator flashes on the dashboard. When switching the Power Takeoff off, solenoid valve stops compressed air intake and connects the mechanism chamber with the environment, air is discharged from the chamber, and the rod 10 with the fork 9 uncouples the idle shaft gear 5 from the drive gear 3 by spring 11 force.



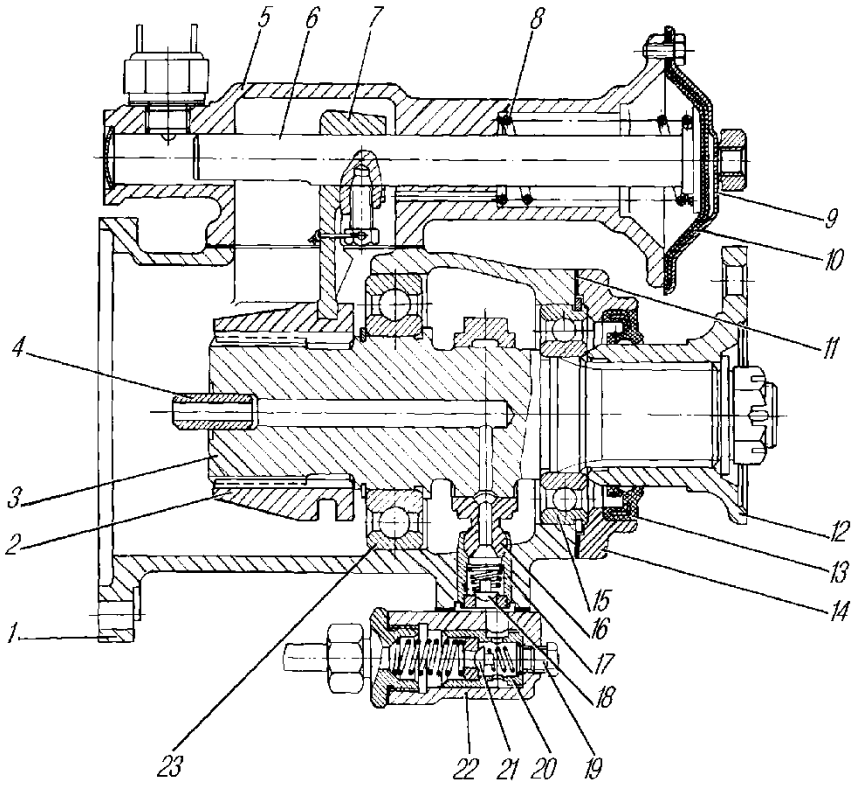
1-drive gear axle; 2-crankcase; 3-drive gear; 4-crankcase cover; 5-idle shaft gear; 6-selector chamber diaphragm; 7-selector chamber cover; 8-cover; 9-fork; 10-selector fork rod; 11-spring; 12-switch; 13-adjusting gaskets; 14-cover; 15-flange; 16-nut; 17-gasket; 18-ball bearings; 19-idle shaft; 20-bearing spacer; 21-roller bearings

Figure 145 - Power Takeoff with a Flange

4.9.2 Additional Power Takeoff

Power is taken from the main shaft of the transfer box through flexible clutch 2 (see Figure 147) and is used for winch drive.

Additional Power Takeoff operation is possible at any gear of the transfer box, neutral including. To lubricate gear bearings and transfer box shafts in the additional Power Takeoff crankcase a plunger-type pump is installed.



1-Crankcase; 2-clutch; 3-shaft; 4-shaft bushing; 5-selector chamber housing; 6-selector rod; 7-fork; 8-spring; 9-cover; 10-diaphragm; 11-seal; 12-flange; 13-gasket; 14-cover; 15,23-ball bearings; 16-pump side rod; 17-piston; 18,21-pump valves; 19-plug; 20-safety valve; 22-pump casing

Figure 146 - Additional Power Takeoff

The pump consists of the piston 17 with pressure valve 18, of safety valve 20 and the casing 22. The piston with the side rod is mounted on the shaft 3 cam, and when it rotates, the piston translates. To avoid excess pressure and rpm increase, differential suction valve is designed with a coil spring. Oil is sucked through the tube connected to the transfer box oil bath, and is fed to the gear bearings from the pump through channels made in the shaft 3 and the transfer box main shaft. Some oil leaks through backlashes and lubricates shaft bearings.

Information of Additional Power Takeoff control is given in paragraph 4.2.4 “Transfer Box”, clause 4.2.4.4 “Transmission Devices Control”.

When the additional Power Takeoff is operated, there should be no excess overheating of transfer box main shaft bearings and PTO. Excess overheating proves the oil pump failure.

Pump proper functioning should be tested by two people. To check pump operation:

-Tighten the parking brake lever as far as it goes;

-Select neutral of the transfer box;

-Switch off the winch, to do that, lower the lever on the frame right girder;

-Unscrew the plug in the pump casing;

-Start the engine, switch on the additional Power Takeoff and one of gearbox gears;

-Define pump proper functioning by closing the plug hole with your finger.

If the pump is functioning properly, you will feel oil surge in the plug hole.

It is forbidden to operate with the pump broken.

4.9.3 Winch

The winch is shown in Figure 147, it is designed for self-winch and winch of vehicles and trailers from off-roads. It consists of a worm gearbox, a drum with rope fixed to it and of a rope guideplate.

Gearbox mechanism consists of globoidal couple with 31:1 gear ratio. Worm gear 20 is fastened to the boss that can connect with the drum shaft 10 through flexible coupling 22.

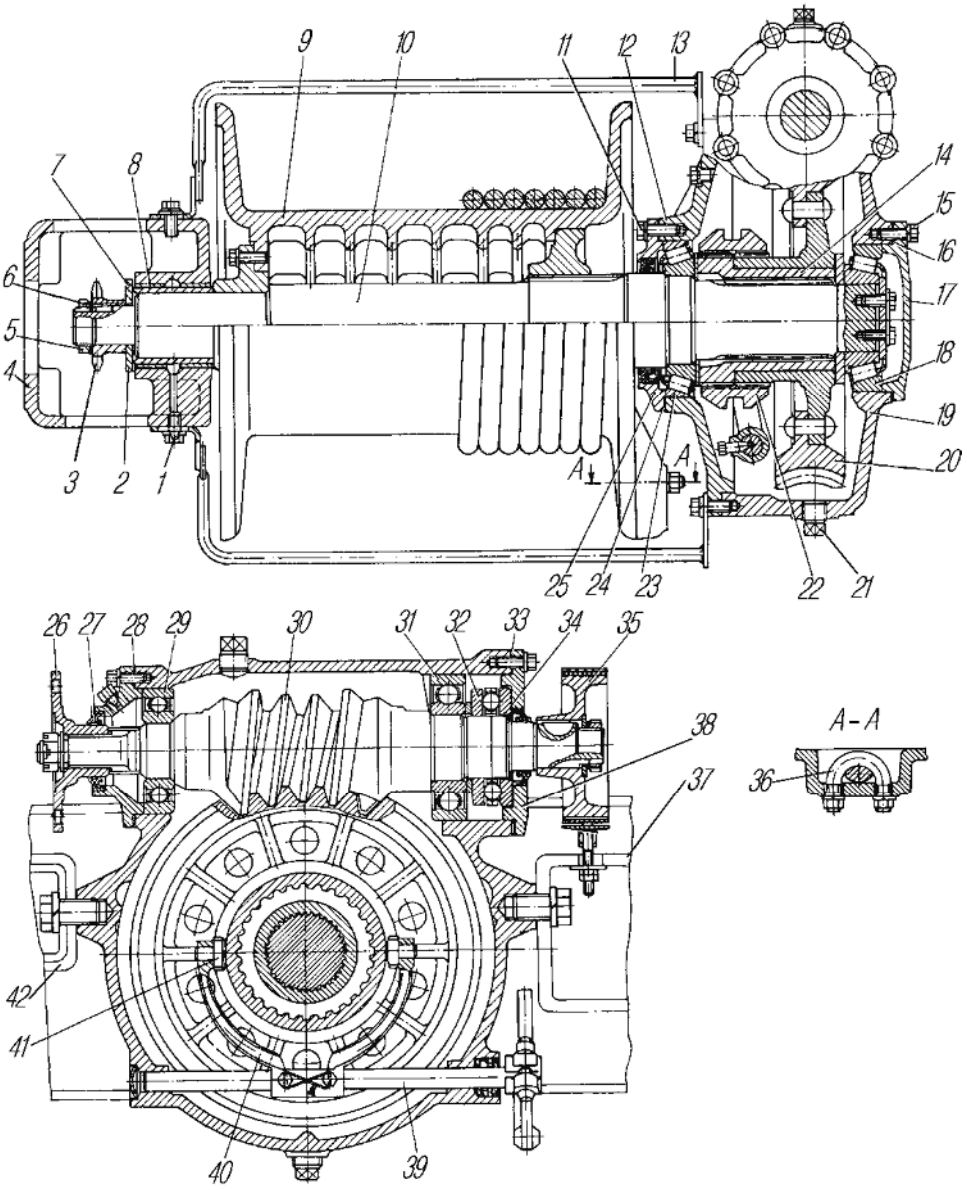
An automatic band brake 1 is installed on the gearbox worm (see Figure 148) preventing from uncontrolled rotation of the winch drum and rope reel-out, when the truck clutch is disengaged, and if the safety pin is cut.

Adjust the brake when the drive is in backing mode and the drum flexible clutch is disengaged. If the brake heats over the temperature that a hand can stand (about 60 °C) during 1-3 min, unscrew the band nut 3 and the lock nut 4 two-three rotations back.

Winch Gearbox Adjustment. Gearbox bearings should be adjusted when axial backlashes appear, as well as when a new worm-and-worm gear is mounted.

Adjust bearings only when bolt tightening of the bearing caps has not eliminated the axial backlash. The bearings should be adjusted with interference.

Torque necessary for gearbox worm propping in the bearings 29,31 and 32 (see Figure 147) should be 1.0-2.5 Nm
(0.1-0.25 kgfm). If the shaft is rotating too loosely or if it has axial backlash, remove some gaskets 28 and 33 of equal thickness from the front and rear bearing caps. If for shaft rotation a torque over 2.5 Nm (0.25 kgfm) is required, add gaskets of equal thickness under the caps. When checking rotating torque of the worm , cap retaining bolts should be tightened against stop.



1-oil cup; 2-thrust washer; 3-star; 4-drum shaft bracket; 5-nut; 6-lock washer; 7-sliding bearing; 8-distance sleeve; 9-drum; 10-drum shaft; 11,15-bolts; 12-gearbox cover; 13-rope guardrail; 14-fixed clutch; 16,24,28,33-adjusting gaskets; 17,25,27,38-bearing caps; 18,23,29,31,32-bearings; 19-gearbox crankcase; 20-worm gear; 21-plug; 22-flexible clutch; 26-flange; 30-gearbox worm; 34-gasket; 35-band brake; 36-rope retaining bracket; 37-right bracket of actuating screw; 39-clutch rod; 40-fork; 41-slide block; 42-winch suspension cross member

Figure 147 - Winch Gearbox

The number of gaskets under the front and the rear covers after adjustment should be approximately the same, it will make further adjustment of worm-and-worm gear easier.

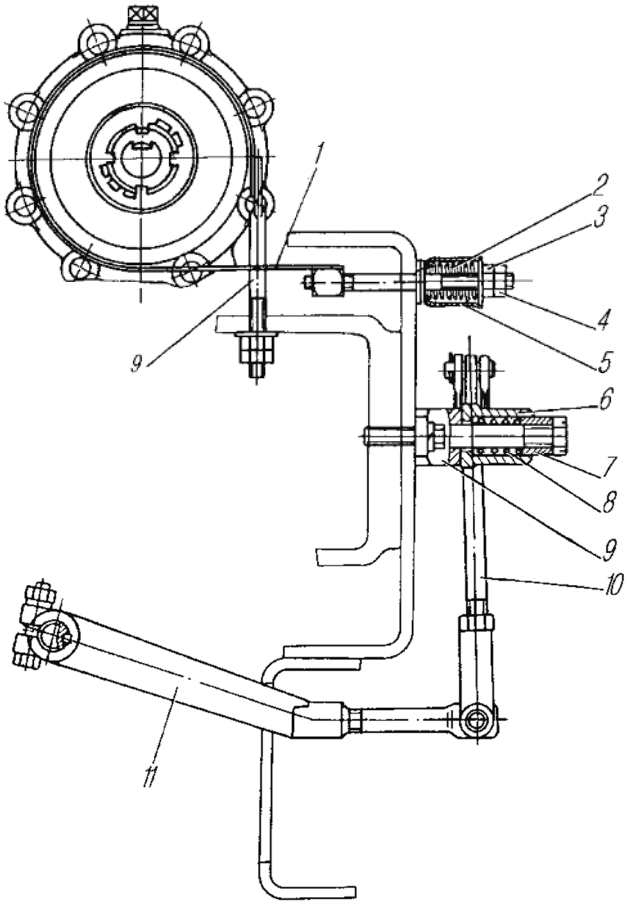
Adjust taper bearings of worm gear shaft by changing the number of gaskets 16 and 24 under the bearing caps.

Check bearing preload of the worm gear shaft when coupled with the worm. Torque necessary for rotating the worm gear shaft in the bearings must be 3-6 Nm (0.3-0.6 kgfm). After bearing adjustment check the correctness of worm-and-worm gear coupling by blueing by teeth contact pattern. In properly adjusted worm-and-worm gear contact pattern of tooth work surface without load should be in the centre, and should be at least 5 mm wide and 2/3 high.

Contact pattern is changed by moving the worm 30 in axial direction via gaskets. To move contact pattern to the tooth fillet, remove gaskets 28 out of the cap 27 from the flange side; to move contact pattern to the tooth face, add gaskets. Herein, change the number of gaskets 33 under cap 38 from the brake side accordingly, so that the total gasket thickness on both sides is maintained. Contact pattern is moved along the tooth width with axial movement of the worm gear in the same direction as the pattern is moved.

Globoidal worm-and-worm gear can function properly only if the coupling is correctly adjusted.

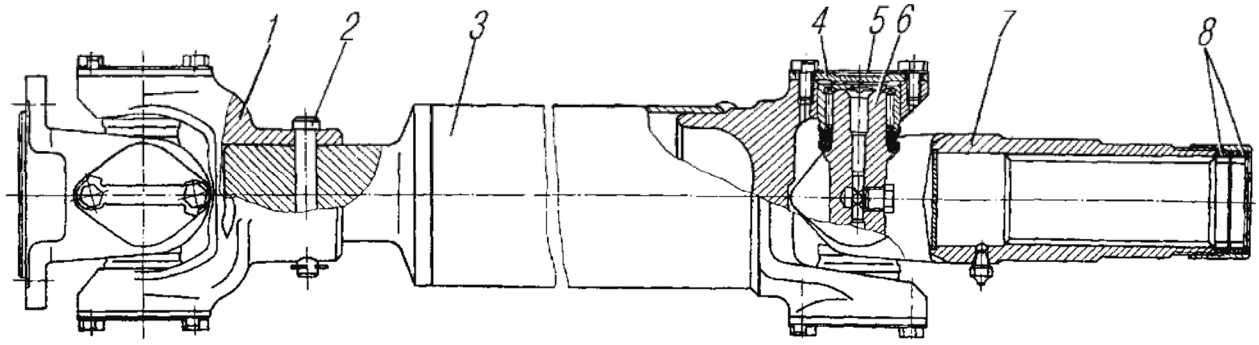
Incorrect adjustment can cause worm-and-worm gear overheating and excess wear of worm gear teeth.



1-Band brake; 2,8-springs; 3-nut; 4-lock nut; 5-crimp clutch; 6-winch control lever; 7-bushing; 9-bracket; 10-pull rod; 11-winch actuation lever

Figure 148 - Winch Control

4.9.3.1 Winch Drive. Power from the transfer box through additional Power Takeoff to the winch gearbox is transferred by three propeller shafts. To protect winch parts from overload a safety pin 2 (see Figure 150) is installed on the first propeller shaft, it will be cut if the load is over maximum allowable.



1-Universal joint fork; 2-safety pin; 3-propeller shaft; 4-needle bearing cap; 5-locking plate; 6-centre piece; 7-slide yoke; 8-O-rings

Figure 149 - Front Propeller Shaft of the Winch Drive

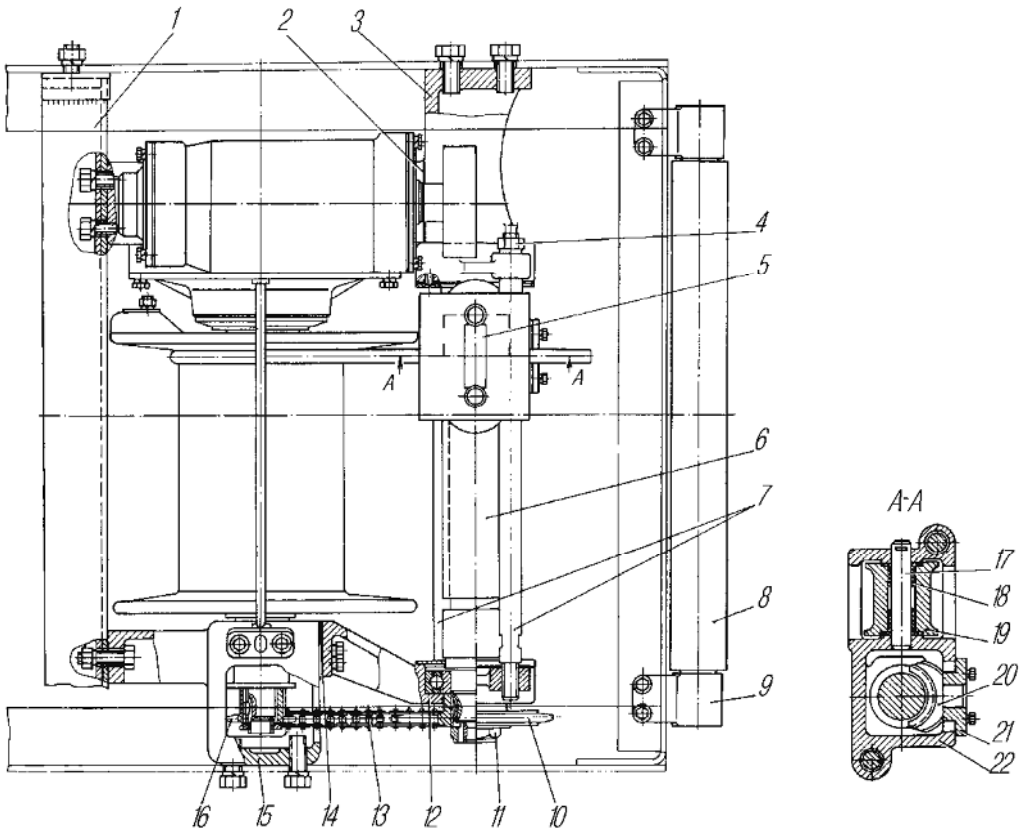
All universal joints are similar in their construction and unified with GAZ-53A truck joints.

Coupling shaft is installed on two supports. To compensate installation inaccuracy slide yokes 7 of front and rear shafts are installed on splint ends of the coupling shaft. Lubricant in the spline joint is retained by O-rings 8.

5.9.3.2 Rope Guideplate. The winch has a rope guideplate (see Figure 150) which ensures correct rope laying on the drum, when is inclines from the truck axis for 15°.maximum. The rope is fixed to the drum by a bracket, it is released only backwards. The holder housing 22 of guiding rollers lays the rope by back-and-forth motion along the actuating screw 6 and along two guiding rollers 7. Left-hand and right-hand screw installed on two bearings is rotated by the chain transfer from the drum shaft through the drive sprocket 16 and idler sprocket 10. Chain tension is adjusted by gaskets 2 and 14; chain slack can be 3-10 mm.

Axial force from the actuating screw 6 is transferred to the holder housing of the guiding rollers through the slide block 20 of the actuating screw. The slide block is installed in the holder housing of the guiding rollers and fixed by the cover 21. The guiding rollers 19 are installed on nylon bushings 18 and rotate on the studs 17 fixed with locking plate 5.

5.9.3.3 Rules of Using the Winch. Before winch operation check that the winch drum drive switch is properly functioning and that the rope is correctly reeled and fixed. When the drive is properly adjusted, pull rod 10 length (see Figure 148) in hole axles of the adjusting for should be 228-232 mm.



1-Winch cross member; 2,14-adjusting gaskets for chain tension (right and left); 3,12-actuating screw brackets (right and left); 4,11-nuts; 5-locking plate; 6-actuating screw; 7-guiding rollers; 8-horizontal roller; 9-horizontal roller bracket; 10,16-drive and idler sprockets; 13-chain; 15-drum shaft bracket; 17-guiding roller stud; 18-bushing; 19-guiding roller; 20-actuating screw slide block; 21-slide block support cover; 22-guiding roller holder housing

Figure 150 - Winch Rope Guideplate

When the winch drum is hindered during cold period, it is necessary to warm the winch gearbox when idling during 3-5 min.

It is forbidden to use the winch rope to tow a truck or a trailer, as well as when the rope is inclined more than 15° from the truck axis.

To switch on the winch:

- put transfer box and gearbox levers to the neutral position;
- using wrench 30, put the flexible clutch lever to the upper (ON) position when the rope is forced out. When unreeling the rope manually, flexible clutch lever should be in lower (OFF) position;
- release the stop and move the lever of the additional Power Takeoff forward against stop;
- select first or second gear, release the rope as far as necessary; select rope tension manually. Before starting tensioning the drum should have at least three four rope winds;
- select reverse gear to pull the cargo;
- when self-winching, select low gear of the transfer box and reverse gear of the gearbox.

Increase engine crankshaft rpm smoothly. Sharp increase of the engine rpm will not lead to drawbar power increase of the rope, but it can cut the safety pin. When the pin is cut, immediately disengage the clutch and move the gear lever to neutral, otherwise the shaft can be stuck in the flange. Replace the cut pin with a new one.

It is forbidden to use bolts or other parts instead of the safety pin.

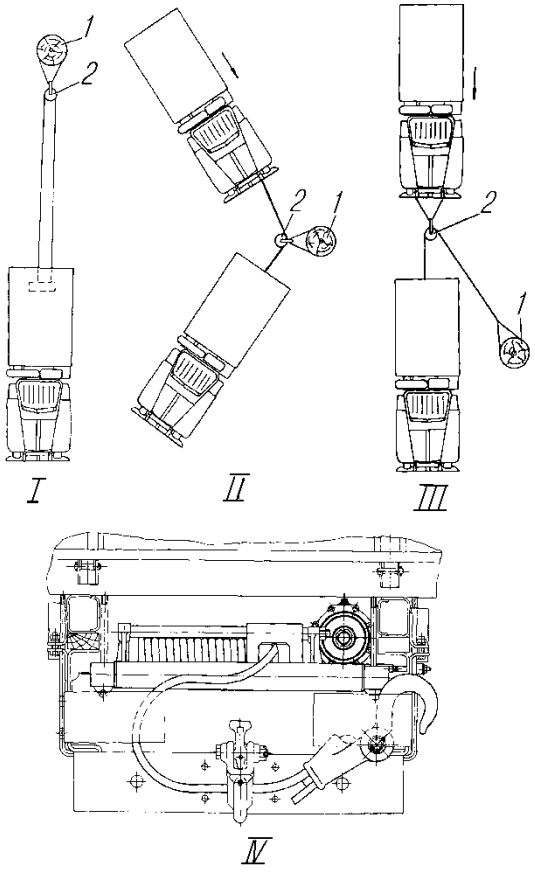
During the operation it is difficult to determine rope force, that is why before using the winch, define the reasonableness of using the block approximately considering the certain conditions.

Usage of the winch with the block is shown in Figure 151. To pull the winch rope, unsplint and loosen the nut from the block lower axis with the distance piece, pull the axis out, put the rope in the block groove and mount it back and fix. When using the block without the hook, apply the towing cable supplied with the truck.

If the block is used to increase drawbar force when self-winching (position I), it will be fixed to an object selected as a support by the towing cable, and the winch rope hook is fixed to the towing device hook. If the hook is used to change drawbar direction when winching another vehicle (position II), it is then fixed to an object used as a support via the towing cable, and the winch rope hook is fixed to the towing hook of the towed vehicle. if the block is used to increase drawbar force when towing another vehicle (position III), it is fixed to the towing hook or the towing cable put on the towing hooks of the towed vehicle, and the winch rope hook - to a fixed object via second towing cable. The winch rope can be fixed directly to a fixed object, herein the hook is attached to the cable preliminary tensioned.

To avoid winch gearbox overheating do not pull a cargo with wholly unwound rope more than three times in sequence with maximal or close to maximal load.

Lay the winch hook in at carry (see Figure 151), (position IV).



1-A fixed object; 2-block; I-drawbar force increase when self-winching; II-drawbar direction change when winching another vehicle; III-drawbar force increase when towing another vehicle; IV-rope lay at carry

Figure 151 - Winch Block Usage

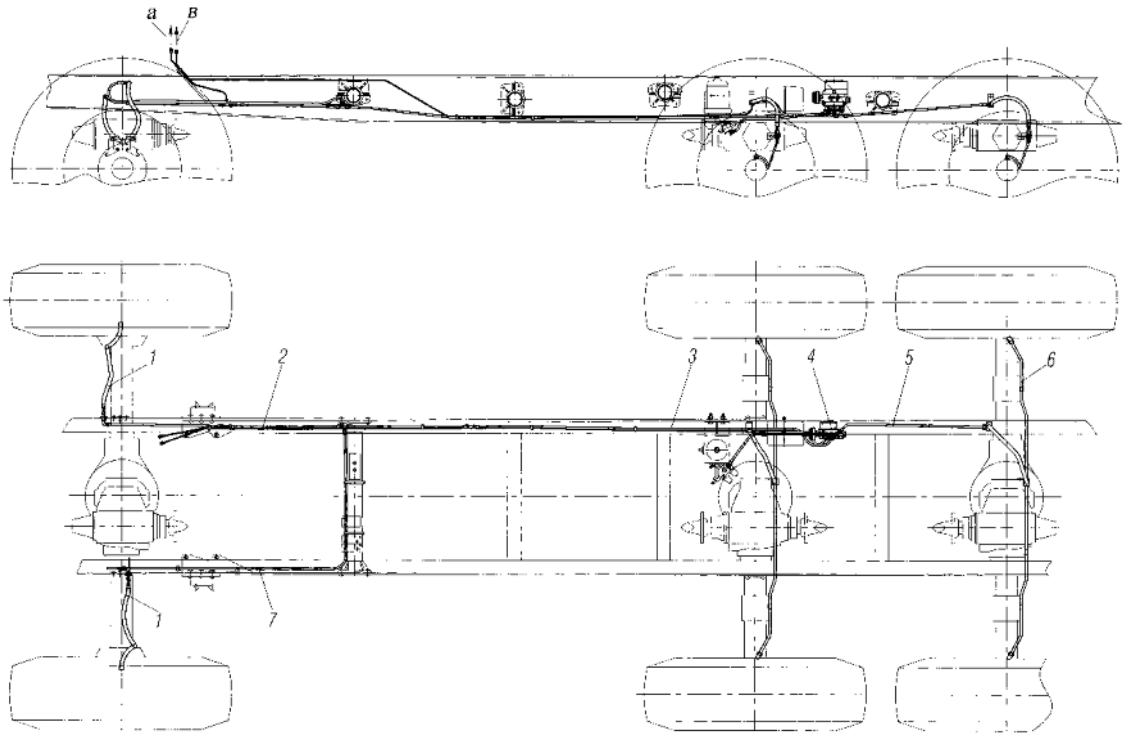
4.9.4 Tire Pressure Control System

Tire pressure control system (for a conventional cab truck) is shown in Figure 152, and it allows pressure control and pressure maintaining within the normal limits, as well as off-road performance due to tire pressure decrease. It allows the truck to continue moving without wheel replacement, if a tire is damaged (**wheel valves of damaged wheels should be closed**).

Air supply to the tires has a two-wire scheme.

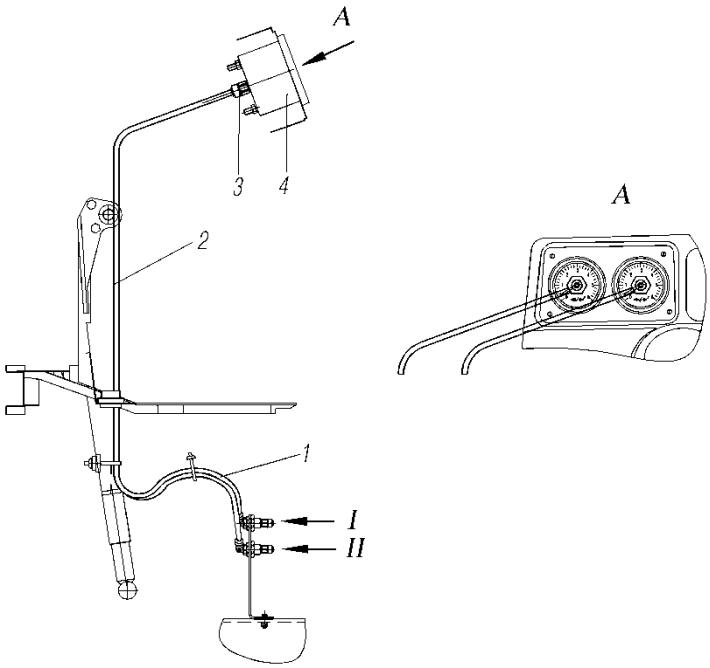
Before driving, open the wheel valves and check tire pressure when the switches are in neutral position. If necessary, inflate the tires as norms require. Pressure norm for 425/85R21 tires and 156 lifting capacity index are given in Table 20. Pressure norm for 500/70-20(1200x500-508) tires and 156 lifting capacity index are given in Table 21.

For operative control of tire pressure, wheel valves should be open.



1-Hoses; 2,3,5,6,7-pipelines; 4-solenoid valve; a - to the front wheels pressure gauge; в - to the rear wheels pressure gauge

Figure 152 - Installation of Air Pressure Control System
in Tires with a Solenoid Valve on a Conventional Cab Truck



1,2-Tube to tire pressure gauges; 3-reducing bush; 4-tire pressure gauges; I-to rear wheel inflation pressure gauge; II-to front wheel inflation pressure gauge

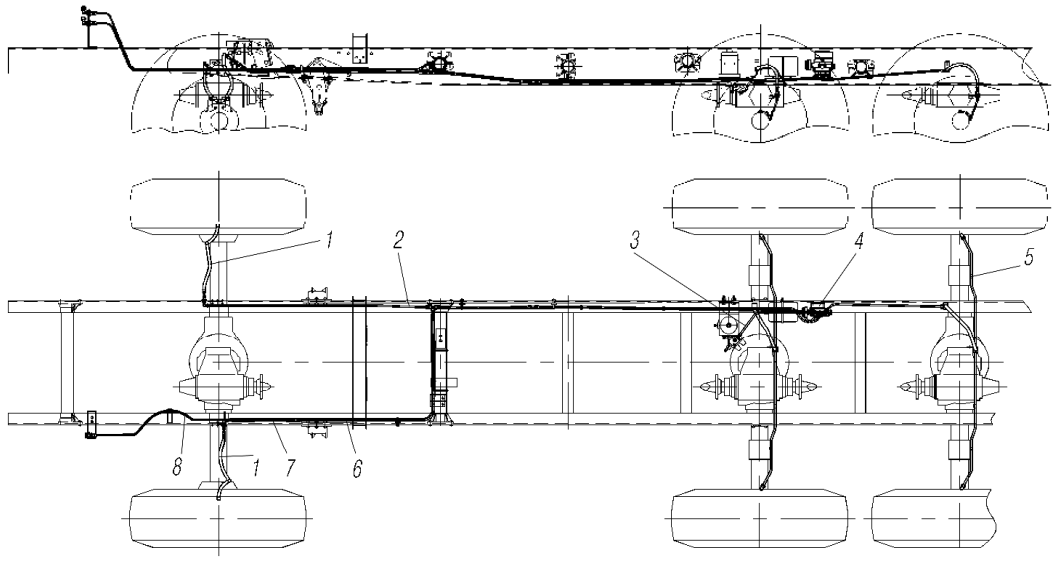
Figure 153 - Tire Pressure Control System

Table 20 - Pressure Norm for 425/85R21 Tires and 156 Lifting Capacity Index

Road type	Allowable pressure, kgf/cm^2 (MPa)	Maximal speed, km/h	Maximal run during the guarantee period, km
Difficult paths of moorland, virgin snow and quicksand	not less than: 0.8 (0.08) 1.1 (0.11) 2.0 (0.20)	 15 25 30	 600 800 1400
All road types only for the period of tire inflation after difficult paths	from 2.0 to nominal	40	1400

Table 21 - Pressure Norm for 500/70 -20(1200x500-508) Tires and 156 Lifting Capacity Index

Road type	Allowable pressure, kgf/cm^2 (MPa)	Maximal speed, km/h	Maximal run during the guarantee period, km
Difficult paths of moorland, virgin snow and quicksand	1.0 (0.10)	20	400
	1.5 (0.15)	20	1000
All road types only for the period of tire inflation after difficult paths	In the range of maximum allowable lower pressure corresponding to maximal allowable tire load	30	1000
Note - When tire pressure is increased at entering paved roads, it is recommended to stop the truck			

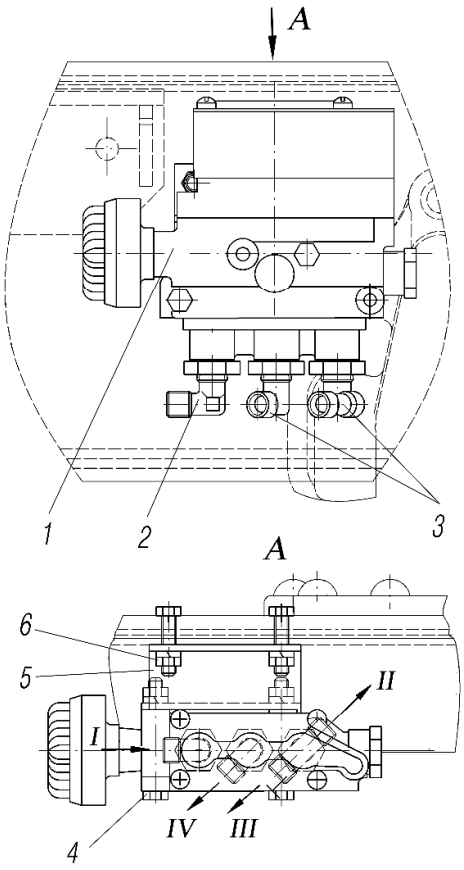


1-Hoses; 2,3,5,6,7,8-pipelines, 4-solenoid valve

Figure 154 - Installation of Air Pressure Control System in Tires with a Solenoid Valve on Cabover Trucks

Solenoid valves have three operating positions: DEFLATE, NEUTRAL AND INFLATE and ensure pressure decrease in 4-6 min depending on tire standard size according to OST 37.001.144-73.

The trucks have a solenoid valve shown in Figure 155.



1-Solenoid valve; 2-angle; 3-fittings; 4-bolt; 5-bracket; 6-nut; I-from safety valve; II-to rear wheels; III-to intermediate wheels; IV-to front wheels

Figure 155 - Solenoid Valve

5 Troubleshooting

Failure	Possible cause	Troubleshooting practice
	Transfer Box	
Loud noise	Insufficient oil quantity in the transfer box	Fill oil until the oil level check plug
	Main and lay shaft axial movement is big	Adjust the bearings or replace them by new
Gears self-disengagement	Gear shift clutch and yoke are wear Gear shift clutch shaft and spline wear	Replace worn parts
Gears and differential locks are switched with an effort	Gear, front case, shift sleeve splines have burrs	Fine the splines surface
	Clamper is stuck	Clean the ball hole
	Driving Axles	
Axle loud noise	Conical gears contact pattern is displaced to the toe-end tooth	Adjust the coupling according to the contact pattern
	Backlash in gearbox bearing	Restore bearing preload
	Gear teeth working surface wear, damage	Replace the gears
	Wheels and Tires	
Thread pattern are strongly and unevenly worn	Steering wheels misalignment	Align the wheels Adjust the bearings
	Wheel boss bearings and swivel member king pin bearings are misaligned	
	Tie rod ends joint parts wear	Replace the worn parts by new
	High radial or lateral wheel wobble	Replace wheels with high radial or lateral wheel wobble
	Hard braking or hard move from a standstill, driving at low or high tire pressure, tire overload with load weight	It is necessary to follow the rules and rational methods of truck driving. Strictly comply with the internal tire pressure norms, do not overload tires

Failure	Possible cause	Troubleshooting practice
Steering wheel		
Unstable truck movement, "Hard" steering wheel	Steer unfastening	Fasten the crankcase and steer bracket retaining nuts
	Air or water in the system (foam in the tank, cloudy oil)	Discharge air If the air is not discharged, check tightening of all hydraulic joints, replace the filter If the above measures did not help, change the oil.
	The pump does not operate with necessary capacity and pressure	Check pump pressure
	Steering shaft crankcase spline joint is not flexible	Disassemble, clean and lubricate
Oil throwing from the oil tank through the breather	Filter clogging	Replace the filter
Brake System		
Minimal air pressure emergency indicator is permanently flashing (when the engine is stopped)	No air due to compressor failure, pressure controller failure, or pneumatic system leakage	Repair the compressor, replace the pressure controller. Find air leakage place and repair
Braking is not efficient	Piston seals or air-oil intensifier insert seal are worn, herein air is discharging from the air-oil intensifier exhaust pipe, when the brake pedal is pressed	Replace the seals
The brakes are stuck (are not released) Pressure controller is often actuated	There is no brake pedal free travel	Adjust brake pedal free travel
	Compressed air leakage in the system from the controller to the safety valves unit	Fasten the joints, replace defective joint parts, pipelines
Storage Batteries		
The storage battery does not provide sufficient torque of the engine crankshaft	Low battery (below permissible level)	Charge the battery and check alternator and voltage regulator operability
	High voltage drop in stator feeding circuit	Clean battery clips and clamps. Lubricate them with jelly. Tighten stator clamps fixation, if necessary.

Failure	Possible cause	Troubleshooting practice
Fast battery self-discharge	Failure of all or several storage batteries	Give the battery for repair
	Battery leads are dirty with mud or battery fluid covering the battery surface	Clean the battery with dry cloth, then with a cloth moisten in 10% ammonia spirit solution or soda ash solution
	Battery fluid has contaminants	Discharge the battery with current, equal to 1⁄10 of storage capacity, until 1.1-1.2 V for one battery. Drain battery fluid, fill new battery fluid and charge the battery
Battery fluid is decreased too fast	Battery fluid is "boiling out"	Check the voltage regulator
	Battery monoblock is damaged	Give the battery for repair
Battery fluid is leaking from one or two batteries through the vent hole during battery charge	Too high battery fluid level	Remove excess battery fluid with rubber bulb
	Too high charge rate	Check the voltage regulator
	Short circuit of the plates in one of the batteries	Give the battery for repair
When charging completely discharged battery, battery fluid voltage and temperature are raising very fast and boiling starts, and density is slightly increasing	Sulfatation of the plates that can be caused by long storage battery shutdown, or it is operated when battery fluid level is too low, or if the battery is systematically undercharged	Sulfatated plates are corrected by the charge-discharge cycle with current not exceeding 1⁄20 of battery capacity, when the initial battery fluid density is 1.12 g/cm^3 maximum. Very sulfatated plates are not repaired
Power Takeoff		
Power Takeoff is not switching on	Pneumatic chamber diaphragm of the Power Takeoff is damaged	Replace the diaphragm
	Power Takeoof pinion teeth are worn or damaged	Disassemble the Power Takeoff, align gear teeth and replace worn parts
	High air leakage due to poor fastening of the air pipe connecting fittings, or their failure	Detect leakage places by putting soap solution on the hose and the plumbing fittings. Tighten the plumbing fittings in the leakage places. Replace defective parts

Failure	Possible cause	Troubleshooting practice
The power takeoff doesn't switch on	The power takeoff switch recoil spring is broken	Replace the spring
	Control valve rod is stuck	Disassemble the valve, eliminate the sticking and grease the housing surface of the rod with thin layer of ЦИАТИМ-201 lubricant
	No backlash between the valve and the rod when they are off due to control valve deformation	Replace control valve
Additional Power Takeoff		
Additional Power Takeoff is switched with difficulty	Additional Power Takeoff shaft and shift sleeve splines have spurr	Fine the splines surface
High vibration, noise and oil leakage	Flange nut is loose	Replace flange nut
	Additional Power Takeoff rear bearing wear	Replace rear bearing
Additional Power Takeoff pump is not working	Oil feeding pipe is damaged	Replace the pipe
	Pipe retaining nuts are not tightened	Tighten the nuts
	Oil channels are clogged	Bleed the oil channels with compressed air
	Pump valves are leaking, air inflow	Disassemble the additional power takeoff, if necessary, and clean all the parts properly
Winch		
The rope guideplate does not ensure rope winding to the drum	Chain is broken	Replace the chain
	Slide block is broken	Replace the block
	Actuating screw grooves are ruined	Replace the screw
	Insufficient rope pulling force when wound on the drum	Unwind the rope, make rope pulling force 3000 N (300 kgf) at least, when winding it on the drum
		Properly install guide pulley holder housing
	Guide pulley holder housing during rope fixation on the drum should not be in the extreme right position	Unwind the rope, disconnect from the drum, fix it in the extreme right position of the guide pulley holder housing

Failure	Possible cause	Troubleshooting practice
The drum is jammed	The rope letoff due to violation of operation rules: when the rope is forced out its sag The rope is wound to the drum without necessary pulling force	Unwind the rope, remove the winch from the truck, if necessary, and replace the defective parts Wind the rope again

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6 Operation Features

6.1 New Truck Preparation for Operation

Study the present operation manual before operation of the new truck and provide daily maintenance and additionally:

4. Check the coolant level and, if necessary, refill.

5. After filling of the fuel tank fill with fuel the engine feed system by means of hand fuel feed pump.

6. Check level and electrolyte density in the storage batteries and, if necessary refill distilled water and charge the storage batteries.

7. Open wheel valves, ramp inflation pressure of tires up to the norm.

8. Check the door locks performance.

9. Check the power window performance of the cab.

10. Carry out the test drive.

6.2 Engine Start and Stop

6.2.1 Cold Engine Start by Means of Engine Starting Heater

1. Make sure that deteriorations and foreign objects are absent in the air charge system and the gas exhaust system of the heater.

2. To accelerate the engine warm-up close the cab heater tap.

3. Start heater by putting the regulator on the heater control unit in the regulation "**I**"

4. When coolant temperature reaches 40°C upon readings of the coolant temperature indicator on the control panel, open the heater tap.

5. Start engine in accordance with the operation manual for the engine. The heater could continue working and automatically regulate the performance of the cab heater. For this establish the fan thermostatic controller of the cab on the heater control unit in the necessary position, the cab heater switch shall be in the position "OFF".

6. Turn off the heater by putting the switch in the position "**O**".

6.3. Truck Breaking In

Truck service life, reliability and cost effectiveness of its performance depend on the parts running-in during the initial period of the operation. Breaking in could be implemented before putting into operation of the new truck, and also during its operation. During its period delicate service of the new truck and strict adherence to operation rules specified below are needed.

During the operation it is necessary to monitor the thermal conditions of the truck units. Within the range of the first 1500-3000 of the mileage:

- warm the engine up at the cranking speed 1300-1600 min^{-1};
- do not exceed the driving speed in first gear more than 5 km/h, in second - 10 km/h, in third - 20 km/h, in fourth - 40 km/h, in fifth - 50 km/h;
- do not operate the truck in severe road conditions and with the trailer;
- tighten wheel retaining nuts up twice through 100-150 km and 200-300 km and upon every removal and installation of wheels on the truck boss;

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- do not decrease the inflation pressure of tires. Tractor units operation during the first 1500-3000 km of mileage provide on the roads with hard surface with the semi-trailer gross mass no more than 12 tones,

After 1500-3000 km of mileage (50-100 hours of engine performance) implement the works, specified in the paragraph “Maintenance”. Maintenance during the initial period of operation.

6.4 Truck Breaking In Truck Driving

Accurate truck driving is one of the most important conditions, which prolongs its operating life and faultless performance, and also allows to achieve the high middle driving speed with minimum fuel.

Successful passing of the tough road is possible only with the skilled control of all truck units. On soft ground, raw meadows, virgin snow and sandy surfaces movement shall be smooth, without hitches, skidding and stops. Small snowdrifts and short lifts shall be passed with acceleration.

On especially difficult areas (snow, mud, soft ground, sand and etc.), if necessary, decrease the inflation pressure of tires up to the definite range, which corresponds to the best off-road performance at the given area, and lock the differential of the transfer Box, as **leading wheels slipping upon loosing the truck mobility or driving with wheels slipping with unlocked differential leads to the intensive wear-out of the transfer box differential and tires.**

In case of heavy turning-on or turning-off of differential locks and gear shifting of the transfer box it is necessary to push the truck (back and forward) and repeat the process of shifting.

When passing the tough road with the possible truck slipping, the cross-axle differential of the rear trailer shall be locked. The cross-axle differential lock increases the off-road performance of the truck. With that it shall be preliminary turned on before passing the tough road area, but not at the moment when the truck has already lost its mobility.

Locking shall be implemented after full stoppage of truck wheels. The cross-axle differential lock upon truck movement with speed no higher than 5 km/h considering the absence of the wheels slipping. After turning the locking off it is necessary to make sure of full actuation of the lockout mechanism, with that the indicator 21 shall light up in accordance with figure 25 and the indicator 25 in accordance with figure 32. Partial engagement of the lockout mechanism could lead to gearbox destruction.

After passing the tough road it is necessary to turn off the differential locks switch of the rear trailer and make sure of turning the clutch off (indicator shall blink off).

The cross-axle differential lock is allowed only in exceptional circumstances, when the other measures for increasing of off-road performance are taken (necessary tire pressure is established, differential locks of the transfer box is turned on).

In other cases of movement if the wheel slipping is absent, unlock the differential of the transfer box in order to avoid extra pressure in the transmission. Select the low gear in the transfer box when passing tough roads and also rapid scents.

Select gears of transfer box only after full stop of the truck, and do not turn on neutral gear of the transfer box, when the gear box is turned on and, when box of auxiliary power takeoff is turned off upon the working engine without truck movement.

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If the differential lock of intermediate and rear axles is not turned on or turned off, it is necessary to push the truck (back and forward) until indicator lamps will light up or blink off.

Turn on the box of auxiliary power takeoff and the power takeoff box when the truck stopped, the clutch is turned off and the pneumatic-system air pressure is below 500 kPa (5 kgf/sm^2). After pushing the button “Home/Com” and lighting the indicator of this button “Home/Kom” on control panel the clutch pedal shall be released. If the indicator lamp does not light up, turn the main drive shaft of the transfer box with short unfinished clutch engagement. If after this, the indicator does not light up, eliminate the failure and repeat actuation.

Slowdown the truck smoothly, gradually increasing the pressure on the pedal. On long slopes use the engine braking using the secondary brake. With it the engine cranking speed could be close to rated, but to not go beyond 2300 min^{-1}. If the engine speed is close to 2300 min^{-1}, periodically intensively stop the truck with pedal brakes.

Caution! Do not turn of the engine passing long slopes.

It is not recommended to stop the truck on the slope. Upon the forced stoppage it is necessary to take measures excluding the possibility of rolling the truck down: turn off the fuel feed, turn on the parking brake, first gear of the gear box and put blocks under wheels.

Proceed with caution upon movement on the slippery and ice-covered roads to avoid the side slipping.

On the trucks which have the centralized tire pressure control system, moving on the roads with the improved road pavement with nominal load, the tire pressure shall be rated.

Do not decrease the tire pressure more, than it could be necessary for road conditions. Remember that mileage upon decreased pressure is limited, so decrease pressure only in case of emergency.

When moving with the decreased pressure, keep the eye on tire pressure gauge readings. Allowed time of driving with the decreased tire pressure depends on the truck weight - the more weight is, the less time of driving shall be.

The driving with decreased pressure for increasing of ride comfort is prohibited. Upon ongoing driving the tire pressure could increase due to tire warming up. To decrease rolling resistance and fuel consumption, do not decrease pressure of the warmed tires.

6.4.1 Ford Passing. The truck equipped with the pressurization system could overcome the ford to the depth of 0.7 m after special development. Before ford passing it is necessary to measure the ford depth, check the bed condition, make sure of absence of holes, big stones, squashy ground, choose and check places of entrance and exit for the truck out of water, and also mark with pole deep places.

For ford passing establish the nominal inflation pressure of tires.

Pass ford at the first or second gear of the gear box, low gear in the transfer box and with the locked interaxle differential. Drive into at low speed not making waves, avoid manoeuvring, do not stop. Time for presence of the truck in water is no more than 15 min.

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To avoid the penetration of water and mud in the tool kit, firmly press the cover of the tool kit with the central screw. After ford passing open the tool kit, remove water and dry tools.

After ford passing check oil level in the engine and truck units. Increased oil level, presence of water drops on the oil level indicator or oil colour change are signs of water penetration. Change oil, if water penetrated in the oil crankcase.

Check the presence of water in the engine fuel feed system, turning away drainage plugs of the fuel tank and the fuel coarse filter until fuel discharge. If water penetrated, pour the settling out of the tank and change filter elements of the fine fuel purification.

Remove water out of the unit pipe airline and the starting heater boiler by turning of the pumping unit for 2-3 min.

Check for absence of water crankcase openings of the engine flywheel and the clutch housing by removing the lid of the flywheel crank and unscrewing the conical plug out of the lower hatch of the clutch housing. After the check install removed details. Implement the check as soon as possible after ford passing, do not admit long parking without mentioned check.

Extrude sliding bearings and pivot connections as soon as possible.

When moving after ford passing, pay special attention to the brake fade due to soaking of plates. Dry brake gears by braking the truck three-five times during movement.

If when passing the ford the engine stopped, make two-three tries of engine run-ups with the stator, making pauses between starts for 1 minute. If the engine does not start, the truck shall be removed out of water.

After removing the stuck truck out of water, where it was more than 20 minutes, tow it to the closest place, where maintenance could be provided. When moving under own power, check all main assembly units, and also wheel hub cavities and swivel members of the front axle (if there is water). When the oil level in units is high, decrease it up to the required and change oil as soon as possible.

After ford passing prepare for performance in normal road condition all assembly units of the truck and eliminate reasons for penetrating of water in units. To maintain truck readiness for ford passing, it is necessary to take care of condition of hoses, tubes, their joints, unit seals and duly eliminate defects.

When moving across the cross-country terrain, pass grooves, ditches and moats at low speed, in especially rough conditions block differential of the transfer box. Pass grooves at right angle, otherwise upon truck incline redistribution of load will cause slipping of free wheels.

6.4.1.1 Driving with the Trailer. To provide safe truck operation with the trailer, before coupling make sure of size correspondence of the trailer towing eye and tractor drawbar couplings. Make sure of wear-out absence of conjugated surfaces: for towing coupler of zero-clearance coupling according to GOST R 41.55-2005 (see Installation and Operation Manual). For towing device of the type “hook-eye” GOST 2349-75 use the trailer towing eye with the internal diameter 90 mm and section size 42 mm, the hook of the towing device with the jaw diameter and the width in the jaw section 69 mm. Acceptable limiting dimensions of: the loop section 38 mm, the hook jaw 58 mm, the hook width 66 mm.

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Towing hooks and towing eyes, sizes of which differ from the mentioned above, have to be replaced with new ones.

When driving reverse, avoid trailer assembling against stop of trailer hitch in the frame girder face or other truck elements.

Failure to comply with these instructions may result in seizure of the eye trailer in the towing hook jaw and breakdown of the towing hook.

When passing especially tough road, snap out the trailer and after passing of this road hitch it to the truck with the hoist. With this remember, that on the cylinder shall stay three-four turns. Hitch the trailer at the middle rotational rate of the engine crankshaft. Do not tow the trailer with the hoist rope.

For the driver's attention!

Trucks URAL-4320M are equipped with the engine YAMZ-536 with wide-duty rotational range. Its maximum capacity develops at ranges 2200-2300 min^{-1}, the maximum moment at 1300-1700 min^{-1}. For full implementation of potential truck towing performance upon intensive accelerations, upgrading, use full rotational range and when shifting the gear, increasing rates up to 2200-2300 min^{-1}.

6.4.2 Truck Towing

Towing could be implemented on the bendable (using towing cable) or tight coupling (using towing devices, such as "beam" or "triangular"), made according to GOST 25907-89.

For towing and deditching of the truck with towing devices and tag lines (chains) present towing devises are used. Truck towing or its use as tractor shall implement in accordance with requirements of the Traffic code and safety instructions applicable to organisations, which operate the truck.

When towing on the towed truck with the non-working engine, the driver shall choose the neutral gear in the transfer box. The order of neutral gear actuation is specified in the paragraph "4.2.4 Transfer Box".

6.4.2.1 Installation of Towing and Auxiliary Devices. Implement coupling of the tractor and the towed truck in the following sequence:

- remove the towing cable from attaching point or tow "triangular" considering the malfunction mode and road conditions of towing;
- implement, if necessary, assembling of the towing device;
- implement coupling of the towed truck with the tractor with the help of crew;
- if necessary, bring air from the tractor to the towed truck, using the hose of the trailer tire inflation and the coupling head from spare parts kit of the truck. Attach hose with the threaded nut M16x1,5 to towing valve, established behind the first cross-arm on the tee of the tee air pressure piping in the regulator, in accordance with figure 43, of the disabled truck, and on the second hose end erect the coupling head, which shall be installed on the tractor coupling head;
- Upon malfunction of the emergency brake light, fasten the emergency stop sign on the rear side of the towed truck.

6.4.2.2 Truck Towing with the Engine out of Work and Power Steering is possible on all types of road. Truck towing without the driver with the engine out of work and power steering is possible only on rigid tow of the type "triangular". With it driving speed in sharp turns shall not go beyond 10 km/h.

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If to release the brakes of pressure accumulators with air is impossible, then unscrew bolts on pressure accumulators in accordance with figure 97.

Check-up examination on the way. In half the hour after towing beginning and then every 1.5-2 hours it is necessary to inspect hooking devices, fastening of the emergency stop sign (if it is installed), check to the touch thermal conditions of transmission unit crankcases and wheel bosses, if they are damaged.

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7 Maintenance

Maintenance is intended for maintaining of the truck in working order and appropriate outer appearance, for decreasing of the wear-out rate of details, preventing failures and malfunctions, and also their identifying for timely elimination. Maintenance is a preventive measure, compulsory for implementing on a regular basis after specified lifetime mileages or working period of the truck.

An observation of a periodicity and qualitative performance of maintenance, when required, provides a constant mechanical availability of the truck and decreases maintenance requirements. For qualitative performance of the work maintenance has to be performed in special stations equipped with necessary tools and devices.

Works, connected with adjustment and maintenance of devices of the engine feed system, electrical equipment, have to be implemented by skilled technicians.

Types of Maintenance

According to the periodicity and the work labour input, maintenance is divided into the following types:

- daily maintenance;
- maintenance upon its return from a trip;
- maintenance at initial operating period (Maintenance 1500-3000);
- maintenance at operating period (Maintenance - 15000);

Periodicity of Maintenance

Lifetime mileages and working hours of the power unit between maintenance for the first operation category are provided in accordance with GOST 21624.

Periodicity of maintenance is adjusted in accordance with the category of truck service conditions and climatic and natural districts of the truck operation in accordance with the Appendix J.

Daily maintenance is implemented before the truck departure and after its return.

Maintenance at initial operating period is implemented every 1500-3000 km of lifetime mileages (50-100 hours of engine running). Maintenance at operating period is every 15 000 km of lifetime mileages (500 hours of engine running).

Maintenance of the special vehicles, intended for process operation (maintenance facilities, lorry cranes, special-purpose machines for oil and gas complex and etc.), should be performed according to the hour-meter.

For trucks, implementing the transportation (fuel trucks, dump trucks, bus trucks, traction units), maintenance should be performed according to the lifetime mileage.

30 km of the lifetime mileage corresponds to 1 service meter hour.

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7.1 List of Truck Maintenance Operations

Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Daily Maintenance (EO) ***Maintenance before departure***				
Inspect the truck and check, if there is the leakage of the fuel, oil or special liquids, air leaking. If any, eliminate a shortage.			+	+
Maintain the engine in accordance with the operation manual for the engine.			+	+
Inspect the engine, if necessary, clean it off dust and mud.			+	+
Check the oil level in the power steering pump reservoir, if necessary, ramp it up to norm.	Oil level should be between high and low set-point hairlines.	Oil level indicator, waste cloth	+	+
Fill in the windscreen washer reservoir.	At temperatures below zero, pour the water out of reservoir.	Container	+	+
Check operability and performance of lights, the audio-visual alarm, control and measuring instruments and windscreen wipers.	Malfunctions are not allowed		+	+
Check the alternator performance at the current indicator registration	Current indicator should show charging current	Current indicator	+	+
Check operability of: - clutch;	The clutch has to provide full and smooth engagement (no slipping), full shutting down (should not “slip”)		+	+
- steering wheel;	Nuts of control arm pins and booster should be split-pinned, free plays should be absent, loosening of propeller-shaft yokes’ is not allowed.	Visual examination	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
- primary brake system;	Check the operability of alarm indicators. In this regard push the button of the operability check of alarm devices, by doing so alarm indicators will light up.	Truck manometer, malfunction indicator of brakes on the dash board.	+	+
Check the brake fuel level in the reserve tank of declutching hydraulic gear	Liquid level should be 15-20 mm below of the upper edge of the inlet.	Container, waste cloth	+	+
Inspect the fastening of the fifth-wheel coupling and overframe of the long haul trucks	Loosening of the fifth-wheel coupling and overframe is not allowed.		+	+
Check the condition of cabin glasses and rearview mirrors, and also operability of the door lock. For cabover trucks check operability of the cabin latch gear.	Malfunctions are not allowed.		+	+
Check the tire condition and wheels mounting, if necessary, eliminate malfunctions.	The tire tread should be without damages and foreign objects. Wheel retaining nut loosening is not allowed.	External examination. If necessary, fasten the wheel retaining nuts.	+	+
Check the condition of the towing device (when the truck is working with trailer)	The hook-nut of the towing device should be locked, the hook clutch should be forelocked.	Visual examination	+	+
When working with the trailer check and, if necessary, eliminate axial displacement of the towing hook (see subparagraph “Frame”)	Axial displacement of the towing hook is allowed for no more than 0.5 mm.	Socket wrench 55, tire iron with hydraulic jack handle	+	+
Check and, if necessary, tighten up the towing device fastening to the transverse cross bar.	Loosening of the fastening is not allowed.	Wrenches 17x19, 22x24	+	+
Maintenance upon Return from a Trip				
Maintain the engine in accordance with the operation manual for the engine.			+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
If necessary, wash the truck and clean up the cabin and the platform without wetting the floor upholstery and the engine compartment.		Manual wash from a hose, brushes, waste cloth	+	+
In winter fuel the full tank to avoid water condensation in it.		Filling station	+	+
Pour condensation out of the air-storage tank. In winter pour condensation out after ever departure from a warm garage.	Pour condensation out, if pressure in the air-storage tank is present.		+	+
Maintenance at initial operating period is performed every 1 500-3 000 km of lifetime mileages (50-100 hours of engine running)				
Engine and Engine Systems				
Maintain the engine in accordance with the operation manual for the engine.				
Check and, if necessary, tighten up a fastening of: - power unit in all points; - all connections of air injection and exhaust systems.	Loosening of the fasteners is not allowed.	Wrenches 24x27, 10x12, 14x17, screwdriver	+	+
Check and, if necessary, tighten up straps of the cooling system and the reservoir pressure maintenance system.	Coolant leakage is not allowed.	Wrench 7x9, screwdriver	+	+
Pour residue out of fuel tank.	Fuel leakage through the drain plug is not allowed.	Wrenches 14x17, 17x19, container, waste cloth	+	+
Transmission				
Check and, if necessary, adjust free and full travel of the diaphragm single-disk clutch pedal (see subparagraph “Clutch pedal”).	For 4x4 and 6x6 trucks (with conventional cabin): clutch pedal free travel should be in the range from 5 mm to 10 mm. Full travel – from 185 to 190 mm.	Wrenches 17x19, 14x17, pliers, scaled rule	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Check tightening and, if necessary, tighten up retaining nuts of:	For 4x4, 6x6 trucks (cabover): clutch pedal free travel should be in the range from 2,5 to 5,5 mm. Full travel – from 135 to 150 mm.	The same		
- universal shafts; - lever, upper and lower covers of axle swivels and ball unit flanges	Loosening of the fasteners is not allowed.	Wrench 17x19, box wrench 22x24 Box wrench 24x27	+	+
Check tightening and, if necessary, tighten up bolt and fastening nuts of leading axles drive gears	The same	Wrench 22x24, box wrench 22x24, pliers, screwdriver	+	+
	Undercarriage			
Check fastening and, if necessary, tighten the retaining nut of:				
- Torque arm stud;	Loosening of the fastening is not allowed. If holes for cotter pin do not match during nut torque, tighten the nuts.	Head wrench for 50, tire iron with hydraulic jack handle, pliers, screwdriver, drive pin, hammer.		+
- Wedges of fixation of front spring pins;	Loosening of the fasteners is not allowed.	Wrench 17x19	+	+
- Front spring eye;	The same	Socket wrench 30x32tire iron with jack handle	+	+
- Rear spring eye (for 4x4 trucks)	-«-	The same	+	
- U-bolt of the front spring eye	-«-	Box wrench 22x24	+	+
- U-bolt of the rear spring eye (for 4x4 trucks);	-«-	The same	+	
- wheels	-«-	Socket wrench 27x38 for wheel nuts, tire iron	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
- Front spring U-bolt;	Loosening of the fasteners is not allowed. Tighten the truck with full load.	Socket wrench 30x32 for spring U-bolts nuts, tire iron with hydraulic jack handle	+	+
- Rear spring U-bolt;	Loosening of the fastening is not allowed. Implement tightening of the truck with full load (for trucks 4x4), and for trucks 6x6 implement tightening of the non-loaded truck.	Socket wrench 27x38 for wheel nuts, tire iron with hydraulic jack handle	+	+
Check and, if necessary, tighten retaining bolts of:				
- Front mounting bracket of front springs and (for 4x4 trucks) the rear mounting of rear spring to the bottom girder flange;	Loosening of the fasteners is not allowed.	Wrenches 17x19, 22x24	+	+
- Rear mounting bracket of front springs to the reinforcement panel of the girder flange;	The same	Wrench 22x24 (24x27), socket wrench 24, tap wrench	+	+
- Front mounting bracket cover of rear springs;	-«-	Box wrench 22x24	+	
- Balance shaft ready fitted with balance arm mounting brackets of the rear suspension;	-«-	Socket wrench 30x32, tire iron		+
- Balance arm mounting brackets of the rear suspension to the cross-arm;	-«-	Wrench 17x19		+
- Mounting brackets of upper reaction rods to axle beams of the rear suspension;	-«-	Socket wrench 24, crank crowbar, box wrench 22x24		+
- Towing device (when working with trailer)	-«-	Wrenches 17x19, 22x24	+	+
Steering Wheel				
Replace the drain filter of the hydraulic steering system tank.	Oil leakage through the tank cap seal is not allowed. Oil level should be between high and low set point hairlines when the plug is unscrewed.	Wrench for hydraulic brake bleeding, screwdriver, grease tank, tank for unit clean, waste cloth	+	+

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Содержание работ	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Check fastening and, if necessary, tighten the retaining nut of:				
- Control arm pin;	Loosening of the fasteners is not allowed.	Wrench 32x36, pliers	+	+
- Retaining bolts of the steering unit to the mounting bracket and the mounting bracket to the frame;	-«-	Wrenches 22x24, 27x30, box wrench 24x27	+	+
- Cranckshaft yoke of the steering shaft.	-«-	Wrenches 14x17, 17x19	+	+
Primary Brake System				
Check diaphragm spring brake actuators, clean them from mud. Check tightness and operation of brake chambers, tighten retaining nuts.	Loosening of the fasteners is not allowed.	Wrench for round nuts 65-70	+	+
Check tightness of pneumatic drive and focus on rubbing places or contagions of pipelines and eliminate them.	Pneumatic system should not have air leak.		+	+
Check pressure output of both brake valve sections and performance of 4-circuit protective valve (see subparagraph “Pneumatic Brake System Drive”)	Air pressure on test pressure gauges should be equal to pressure in the system (according to cross needle pressure gauge)	Wrench 11x13, test pressure gauge	+	+
Check brake pedal free play, if necessary, adjust (see subparagraph “Pneumatic Pedal Brake Drive”)	Brake pedal free play should be 20-30 mm. Brake pedal free play should be 2.5-5.5 mm for 4x4, 6x6 trucks, (cabover)	Wrenches 17x19, 22x24, screwdriver, pliers	+	+
Electrical Equipment				
Check electrolyte level	See operation manual	Wrenches 11x13, 17x19, tank with	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
in storage batteries, if necessary, add distilled water.	for storage batteries	distilled water, glass tube with the diameter 3-5 mm		
Check fastening and reliability of the contact and clearness of cable terminal to starter terminal and storage batteries.	Fastening of cable terminal should be reliable.	Wrenches 14x17, 17x19	+	+
Check and, if necessary, adjust lights (see subparagraph "Lighting and Alarm System")	Adjust lights when the truck is not loaded, located on the level ground.	Screwdriver, screen with special line pattern	+	+
Check fastening reliability of electrical wire harness.	Loosening of the wire fasteners is not allowed.	Pliers, screwdriver, knife, adhesive tape	+	+
Check fastening of the storage batteries container mounting bracket to the frame.	The same	Wrenches 17x19, 22x24	+	+
Check the condition of the rubber boot on rear lights, side repeaters, the storage battery switch, the stop signal, the fuel level sensor, the secondary brake switch.	Loosening of the wire fasteners is not allowed.	Visual examination	+	+
Dedicated Equipment				
Check fastening of crankcase mounting arrangement of the power takeoff device (PTO) to the gearbox housing and fastening of the oil pump to the crankcase of PTO.	Loosening of the fasteners is not allowed.	Wrench 14x17	+	+
Lubrication				
Maintain the engine in accordance with operating manual for the engine			+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Replace oil in the gearbox YAMZ-0905 or YAMZ-1105 with cleaning of the crankcase, the screen and the magnet.	Oil level in the gearbox housing should be not lower than the lower edge of the check hole. When installing the entry cover, be attentive not to shut down the oil passage with cover or its filler. Clean the gearbox with the industrial oil И-12А or И-20А upon GOST 20799-88; 2,5-3 l. Cleaning of the gearbox with kerosene or diesel oil is strictly forbidden for the avoidance of malfunctions upon the oil pump performance due to insufficient depression during intake and as a consequence breakdown of the gearbox.	Wrench 14x17, tank for pure oil and tank for used oil.	+	+
Replace oil in the gearbox FG9JS135	Oil level in the gearbox housing should be not lower than the lower edge of the check hole.	Wrench 22	+	+
Check oil level in the gearbox ZF 9S1310	Oil level in the gearbox housing should be not lower than the lower edge of the check hole.	Wrench 22	+	+
Replace oil: - in the transfer box housing (see subparagraph “Transmission” and Lubricants and Hydraulic Fluids Charts);	Pour oil to the level of the level-fill opening of the rear crankcase side. Oil leakage through plugs is not allowed.	Wrench 27x30, tank for scavenge oil., oil dispenser of 133M model, waste cloth	+	+
- in the bevel gear housing of drive axles.	Pour oil to the level-fill opening on the axle housing. If the bevel gear is dismounted, fill preliminary 1 liter of oil through the hole for breather on the bevel gear housing, the rest – through the level-fill opening up to its edge.	Wrench 27x30, tank for scavenge oil., oil dispenser of 133M model, waste cloth	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Check and, if necessary, ramp oil level up to the norm in steer knuckle housings of the front driving axle.	Oil level should be below the edge of the level-fill opening. Oil leakage through a plug is not allowed.	Wrench 27x30, oil dispenser of 133M model, waste cloth	+	+
Maintain the dry-type filter element upon reading of the clogging indicator, but not less than upon every maintenance. Under conditions of hyperdustiness maintain oftener in the view of operation experience in these conditions.	After every maintenance or upon installation of a new element, check its condition visually, highlighting it from the inside out. For the avoidance of the paperboard breach the compressed air-pressure should not be above 200-300 kPa (2-3 kgf/sm^2). Direct the airstream under the angle to the surface. Regulate the stream force changing the distance between the hose and the element.	Wrench 14x17, screwdriver	+	+
Check oil level in the rollover hydraulic pump (for trucks with cabover cabin), if necessary refill (see Lubricants and Hydraulic Fluids Charts).	Oil level should be within 20-25 mm upon the lowered cabin.		+	+
Check oil level in the hydraulic steering system tank, if necessary refill (see Lubricants and Hydraulic Fluids Charts).	Oil level should be between high and low set point hairlines.	Oil level indicator, waste cloth	+	+
Lubricate according to the Lubricants and Hydraulic Fluids Charts:				
- front spring pins (for trucks 4x4, 6x6) and rear spring pins (for trucks 4x4).	Finish lubrication before the appearance of the fresh lubricant out of the juncture of the pin and the spring eye.	Lever type grease gun or lubricating gun, waste cloth	+	+
- wheel-hubs of the rear equalizing beam suspension	Finish lubrication before the appearance of the fresh lubricant out of the filler ring.	Lever type grease gun, waste cloth		+
- bushing of towing device (when working with trailer)	Finish lubrication before the appearance of the fresh lubricant.	The same	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Lubricate the intermediate bracket shaft of the clutch linkage and the brake valve.	Lubricate through oil filet before the appearance of the fresh lubricant.	-«-	+	+
Unified Maintenance through every 15 000 km of lifetime mileages (500 hours of engine running)				
Engine				
Maintain the engine in accordance with the operation manual-1 OM for an engine.			+	+
Hereafter perform maintenance in accordance with the operation manual-2 OM for an engine.			+	+
Check and, if necessary, tighten up a fastener of power unit in all points.	Loosening of the fasteners is not allowed.	Wrenches 24x27	+	+
Check the tightening of the starting preheater and the fuel tank.	The same	Wrenches 11x13, 14x17	+	+
Check and, if necessary, tighten up the fastener of all connections of air injection and exhaust systems.	-«-	Wrenches 14x17, 17x19	+	+
Check the tightening of the fuel strainer.	-«-	Wrench 14x17	+	+
Check the tightening of the radiator module.	-«-	Wrench 17x19, pliers	+	+
Check the tightening of the air filter.	-«-	Screwdriver, wrench 10x12	+	+
Check and, if necessary, tighten up straps of the cooling system and the reservoir pressure maintenance system.	Coolant leakage is not allowed.	Wrench 7x9, screwdriver	+	+
Check and, if necessary, tighten up the fuel line nut.	Fuel dribbling is not allowed.	Wrench 24x27	+	+
Pour residue out of fuel tank.	Fuel leakage through the drain plug is not allowed.	Wrench 17x19, container, waste cloth	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
	Трансмиссия			
Check and, if necessary, adjust free and full travel of the diaphragm single-disk clutch pedal (see subparagraph “Clutch Pedal”).	For trucks 4x4, 6x6 (with conventional cabin): clutch pedal free travel should be in the range from 5 mm to 10 mm. Full travel – from 185 to 190 mm.	Wrenches 14x17, 17x19, pliers, scaled rule	+	+
	For trucks 4x4, 6x6 (cabover): clutch pedal free travel should be in the range from 2,5 to 5,5 mm. Full travel – from 135 to 150 mm.		+	+
Check and, if necessary, adjust primary and intermediate shaft conical roller bearings (see the clause “Transfer Box”)	For trucks 4x4, 6x6 provide the axial displacement of the primary and intermediate shaft conical roller bearings every 30 thousand km -0.03-0.08 mm.	Wrenches 8x10, 10x12, 11x13, 14x17, 17x19, 22x24, socket wrenches 27x38 and 41x46, flat-nose pliers, screwdriver, mount spoon, overhead crane, needle indicator, device for indicator fastening, drive pin, flange puller group 375-3918050, waste cloth	+	+
Adjust steer axle kingpin bearings (see the clause “Engine Idle Adjustment”) upon every sixth Maintenance-15000	Thickness of the removed linings out of levers and covers should be 0.15 mm (0.05+0.1) mm each.	Box wrench 24x27, blocks for bottom covers of axle swivels, jack handle, tire iron	+	+
Adjust the leading axle gears (upon every sixth Maintenance-15000)	Technical specifications and adjustment procedure see in the clause “Engine Idle Adjustment”.	Wrenches 110x12, 11x13, 17x19, 22x24, 24x27, device for removal and installation of gear units, dynamometer, indicator unit, pliers, screwdriver, hammer, tire iron, axle shaft puller, waste cloth	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Check tightening and, if necessary, tighten up retaining nuts (upon every sixth Maintenance-15000) of:				
- universal shafts;	Loosening of the fasteners is not allowed.	Box wrench 24x27	+	+
- lever, upper and lower covers of axle swivels and ball unit flanges.	The same	The same	+	+
Check tightening and, if necessary, tighten up bolt and fastening nuts of leading axles drive gears.	The same	Wrench 22x24, box wrench 22x24, pliers, screwdriver	+	+
Undercarriage				
Check and, if necessary, tighten nuts of:				
- Wedges of fixation of front spring pins;	Loosening of the fasteners is not allowed.	Wrench 17x19	+	+
- Front spring eye;	The same	Socket wrench 30x32, tire iron with jack handle	+	+
- Rear spring eye (for trucks 4x4);	-«-	The same	+	
- U-bolt of front spring eye;	-«-	Box wrench 22x24	+	+
- U-bolt of rear spring eye (for trucks 4x4);	-«-	The same	+	
- Front spring U-bolt;	Loosening of the fasteners is not allowed. Tighten the truck with full load.	Socket wrench 30x32 for spring U-bolt nuts, tire iron with hydraulic jack handle	+	+
- Rear spring U-bolt;	Loosening of the fasteners is not allowed. Tighten the truck with full load (for trucks 4x4), and for trucks 6x6 tighten the non-loaded truck.	Socket wrench 27x38 for wheel nuts, tire iron with hydraulic jack handle	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
- Torque arm stud.	Loosening of the fasteners is not allowed. If holes for cotter pin do not match during nut torque, tighten the nuts.	Head wrench for 50, tire iron, pliers, screw-driver, drive pin, hammer		+
Check and, if necessary, tighten the hold-down bolts of:				
- Front mounting bracket of front springs and (for trucks 4x4) rear mounting of rear spring to the bottom spar flange;	Loosening of the fasteners is not allowed.	Wrenches 17x19, 22x24	+	+
- Rear mounting bracket of front springs to reinforcement panel of the girder flange;	The same	Wrench 22x24 (24x27), socket wrench 24, tap wrench	+	+
- Front mounting bracket cover of rear springs;	-«-	Box wrench 22x24	+	
- Balance shaft ready fitted with balance arms mounting brackets of the rear suspension;	-«-	Socket wrench 30x32, tire iron		+
- Balance arms mounting brackets of the rear suspension to the cross-arm;	-«-	Wrench 17x19		+
- Mounting brackets of upper reaction rods to axle beams of the rear suspension;	-«-	Socket wrench 24, crank crowbar, box wrench 22x24		+
Check the condition of tires, wheels and their fastening. See subparagraph “Wheels and Tires”	Loosening of the fasteners is not allowed.	Wrenches 11x13, 17x19, socket wrench 27x38 for wheel nuts, hydraulic jack handle, tire iron with hydraulic jack handle, truck GARO for wheel removal.	+	+
Steering Wheel				
Check tightening and, if necessary, tighten up retaining nuts of:				

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
- Hold-down bolts of the steering unit to the mounting bracket and the mounting bracket to the frame;	Loosening of the fasteners is not allowed.	Wrenches 22x24, 27x30, box wrench 24x27	+	+
- Cranckshaft yoke of the steering shaft.	The same	Wrenches 14x17, 17x19	+	+
- Control arm pin;	-«-	Box wrench 32x36, pliers	+	+
Check and, if necessary, adjust: - Free travel of the steering wheel;	See the clause "Steering Wheel" (Free travel check of the steering wheel)	Endfloatmeter	+ +	+ +
- Front wheel toe-in	See the clause "Steering Wheel" (Adjustment of front wheel toe-in)	Wrench 17x19, alligator wrench, scaled rule L=2000 mm	+	+
Replace the drain filter of the hydraulic steering system tank. (Upon every Maintenance-15 000).	Oil level should be between high and low set point hairlines when the plug is unscrewed.	Wrench for hydraulic brake bleeding, screwdriver, tank for unit cleaning, waste cloth	+	+
Brake Systems				
Check pressure output of both brake valve sections and performance of 4-circuit protective valve (see subparagraph "Pneumatic Brake System Drive")	Air pressure on test pressure gauges should be equal to pressure in the system (according to cross needle pressure gauge)	Wrench 11x13, test pressure gauge	+	+
Check the performance of the pressure-regulator valve and the trailer brake relay valve.	Air pressure on test pressure gauges should be equal to pressure in the system (according to cross needle pressure gauge)	Wrench 11x13, test pressure gauge	+	+
Check brake pedal free play, if necessary, adjust (see subparagraph "Pneumatic Pedal Brake Drive")	Brake pedal free play should be 20-30 mm (for trucks 4x4, 6x6). Brake pedal free play should be 2.5-5.5 mm (for 4x4, 6x6 cabover trucks)	Wrenches 17x19, 22x24, screwdriver, pliers	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Electrical Equipment				
Check fastening of the storage batteries container mounting bracket to the frame.	Loosening of the fasteners is not allowed.	Wrenches 17x19, 22x24	+	+
Check fastening of the starter to the engine.	Loosening of the fasteners is not allowed.	Wrench 22x24	+	+
Check the battery charging rate, density and battery electrolyte level. Check according to the operation manual for the storage battery (Implement these operations not less than 1 time in a quater).	Upon storage battery discharge in summer up to 50% and in winter up to 25%, charge them fully at charging home base.	Wrenches 11x13, 14x17, 17x19, densimeter, tank with distilled water, glass tube with the diameter of 3-5 mm, waste cloth	+	+
Check the regulated voltage of the truck.	See the clause “Electrical Equipment”, subparagraph “Voltage Regulator”.	Voltage meter with the accuracy class not lower than 1.0 with the scale 0-30 V, screwdriver	+	+
Check and, if necessary, adjust lights (see paragraph “Electrical Equipment”, subparagraph “Lighting and Alarm System”).	Adjust lights when the truck is not loaded, located on the level ground.	Screwdriver, screen with special line pattern	+	+
Check the fastening of the starter to the engine.	Loosening of the fasteners is not allowed.	Wrench 22x24	+	+
Check the condition of the electrical wire insulation and their fastening.	The same	Pliers, screwdriver, knife, adhesive tape	+	+
Cab				
Check and, if necessary, tighten the fastening of the cab, platform and trim package.	Loosening of the fasteners is not allowed.	Wrenches 10x12, 11x13, 17x19, 22x24	+	+
Check the condition of the rubber buffer.	Fractures and tearings are not allowed.		+	+
Dedicated Equipment				
Check fastening of crankcase mounting arrangement of the power takeoff device (PTO) to the gearbox housing and fastening of the oil pump to crankcase of PTO.	Loosening of the fasteners is not allowed.	Wrenches 14x17	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Let the additional power takeoff operate for 10 minutes and check the pumping action DOM (see paragraph "Dedicated Equipment", subparagraph "Additional Power Takeoff")	The presence of the pressure oil pulsation in the plug hole DOM.	Wrench 12x13	+	+
Detach and purge containment system pipelines of brake chambers with compressed air.	Pipeline and hose blockage is not allowed.	Wrenches 11x13, 14x17, 22x24, box wrench 22x24, combination wrench 14x14, socket wrench 10, compressor air hose.	+	+
When working with trailer, check the condition of the thread on the hook and the nut of the towing device. If the thread is deformed, substitute the hook and the nut with the new ones.	Thread deformation is not allowed.	Wrenches 22x24, box wrench 24x27, socket wrench 55, wrench for hydraulic brake bleeding, tire iron	+	+
Lubrication				
Maintain the engine in accordance with the operation manual for the engine.				
Change the coolant in the cooling system (see the operation manual for the engine YAMZ).	Change in accordance with the operation manual for the engine.		+	+
Check and, if necessary, ramp the oil level up to the norm:				
- in the drive gear of the leading axle;	Oil level should be below the edge of the level-fill opening. Oil leakage through the plug is not allowed.	Wrench 27x30, oil dispenser of 133M model, waste cloth	+	+
- in the transfer box.	The same	Wrenches 17x19, 22x24, oil dispenser of 133M model, waste cloth	+	+
Change the brake fluid in the hydraulic clutch linkage (one time in five years, see Lubricants and Hydraulic Fluids Charts)	Liquid level in the tank should be 15-20 mm below of the upper edge of the inlet.	Container, waste cloth, wrenches 8x10	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Check and, if necessary, ramp oil level up to the norm in steer knuckle housings of the front driving axle.	Oil level should be below the edge of the level-fill opening. Oil leakage through a plug is not allowed.	Wrench 27x30, oil dispenser of 133M model, waste cloth	+	+
Change lubricant in steer knuckle housings of the front driving axle (steer knuckle housings of the front driving axle) (upon every fifth Maintenance-15000, but not less than one time in three years).	Pour lubricant up to the edge of the level-fill opening.	Wrenches 10x12, 17x19, 24x27, socket wrench for 140, tire iron with hydraulic jack handle, screwdriver, hammer, GARO trolley for wheel removal, assembled with wheel hub and drum, container for used oil, waste cloth	+	+
Change oil (upon every fifth Maintencnace-15000, but not less than one time in three years):				
- in the drive gear of the leading axle (see Lubricants and Hydraulic Fluids Charts)	Fill oil up to the edge of the level-fill opening on the back wall of the crankcase. Oil leakage through a plug is not allowed.	Wrench 27x30, tank for used oil., oil dispenser of 133M model	+	+
- in the transfer box	The same	The same	+	+
Lubricate top bearings with steering knuckle pivots of the front driving axle according to the Lubricants and Hydraulic Fluids Charts (upon every second Maintencnace-15000).	Fill with lubricate through oil fillers in quantity specified in Lubricants and Hydraulic Fluids Charts.	Lever type grease gun, waste cloth	+	+
Lubricate according to the Lubricants and Hydraulic Fluids:				
- front spring pins (for trucks 4x4, 6x6) and rear spring pins (for trucks 4x4);	Finish lubrication before the appearance of the fresh lubricant out of the juncture of the pin and the spring eye.	Lever type grease gun or lubricating gun, waste cloth	+	+
- bushing of towing device (when working with trailer)	Finish lubrication before the appearance of the fresh lubricant.	The same	+	+
- propeller shaft slip joint of the steering wheel;	Dismantle and lubricate the slip joint	Waste cloth	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
- needle bearings of the universal shafts:			+	+
- drive gears of the intermediate (for the truck 6x6), rear and front axles (for the truck 4x4), intermediate shaft	Finish lubrication before the appearance of the fresh lubricant.	Lever type grease gun, waste cloth	+	+
- wheel-hubs of the rear equalizing beam suspension	Finish lubrication before the appearance of the fresh lubricant out of the filler ring.	The same		+
Check oil level in gearboxes YAMZ-1105 and YAMZ-0905, see the operation manual for gearboxes YAMZ-1105 and YAMZ-0905 (every Maintenance-15 000, except the third)	For gearboxes YAMZ-1105 and YAMZ-0905 oil level in the gearbox housing should be not lower than the lower edge of the check hole. When installing entry cover, be attentive not to shut down the oil passage with cover or its filler.		+	+
Replace oil in the gearbox with cleaning of crankcase, screen and magnet, see the operation manual for gearboxes YAMZ-1105 and YAMZ-0905 (upon every third Maintenance-15 000)	Purge the gearbox with 2.5-3 l of industrial oil И-12А or И-20А according to GOST 20799-88. Cleaning of the gearbox with kerosene or diesel oil is strictly forbidden for the avoidance of malfunctions upon the oil pump performance due to insufficient depression during intake and as a consequence breakdown of the gearbox. For the gearbox ZF 9S 1310 change oil when reaching 60000 km of lifetime mileage. For the gearbox FG9JS135ZF	Wrench 14x17	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
	change oil when reaching 45000 km of lifetime mileage. Oil level in the gearbox housing should be not lower than the lower edge of the check hole.			
Maintain the dry-type filter element upon reading of the clogging indicator, but not less than upon every maintenance. Under conditions of hyperdustiness maintain oftener in the view of operation experience in these conditions.	After every maintenance or upon installation of the new element, check its condition visually, highlighting it from the inside out. For the avoidance of paperboard breach the compressed air-pressure should be not above 200-300 kPa (2-3 kgf/sm^2). Direct the airstream under the angle to the surface. Regulate the stream force changing the distance between the hose and the element.	Wrench 14x17, screwdriver	+	+
Dismantle wheel hubs, remove old lubrication and put the new one. Wash, lubricate and when installing adjust hub bearings (see subparagraph “Driving Axles” and Lubricants and Hydraulic Fluids Charts) upon every second Maintenance-15000	Apply lubrication smoothly on the external surface of bearing rollers and cage. After the short mileage and correct adjustment of bearings, the wheel-hub should be cold or slightly warm.	Socket wrench на 140, wrenches 10x12, 17x19, tire iron with hydraulic jack handle, screwdriver, jack handle, GARO trolley for wheel removal, container for lubricant, waste cloth, axleshaft puller	+	+
Check oil level in the rollover hydraulic pump (for trucks with cabover cabin), if necessary refill (see Lubricants and Hydraulic Fluids Charts).	Oil level should be within 20-25 mm upon the lowered cabin.		+	+
Change oil in the hydraulic steering system tank (upon every third Maintenance-15000)			+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Lubricate the intermediate bracket shaft of the clutch linkage and the brake valve (upon every Maintenance-15000).	Lubricate through oil filet before the appearance of the fresh lubricant.	The same	+	+
Check oil level in the gear casing of the winch and, if necessary refill (see Lubricants and Hydraulic Fluids Charts) (upon every third Maintenance-15000).	Oil level should be below the edge of the level-fill opening. Oil leakage through the plug is not allowed.		+	+
Lubricate the chain wheel gear of the roller winch (upon every third Maintenance-15000).	Lubricate all full length of the chain.	Waste cloth	+	+
Lubricate according to the Lubricants and Hydraulic Fluids (upon every third Maintenance-15000):				
- plain bearer of the winch drum;	Lubricate before the appearance of the fresh lubricant.	Lever type grease gun, waste cloth	+	+
- guide rollers axle;	Lubricate axles	The same	+	+
- bushing rollers and holder-body cavity of guide rollers of the roller winch;	Apply the lubricant		+	+
- working area of the driving screw of the roller winch and the guide shaft;	The same		+	+
- block thorn	-«-		+	+
Lubricate propeller shaft slip joints of the winch driving gear (see Lubricants and Hydraulic Fluids Charts) (upon every third Maintenance-15000).	Lubricate through oil filet before the appearance of the fresh lubricant.	Wrench 17x19, box wrench 22x24, waste cloth	+	+
Lubricate the seat working area and the locking hook.	Lubricate through the ball valve oiler.		+	+
Lubricate the clutch bearing and yoke shafts bushing of the clutch, if the greaser on the clutch housing is present.	Lubricate through the ball valve oiler, making no more than three travels of the syringe lever.	Lever type grease gun, waste cloth	+	+

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Scope of work	Technical specifications	Recommended equipment, devices and tools	Axle configuration	
			4x4	6x6
Lubrication after every 10 000 km				
Check and, if necessary, ramp the oil level up to the norm in the gearbox FG9JS135	Oil level in the gearbox housing should not be lower than the lower edge of the check hole.	Wrench 22	+	+
Sporadic Procedures of Engine Maintenance (200 000 km)				
Change alternator and fan drive belts.	Maintain in accordance with paragraph "Maintenance of the accessories drive" operation manual for the engine.		+	+

Note – It is recommended to combine maintenance of different types, if they coincide with application conditions.

*[1] In case of brake pads dismantling.

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7.2 Truck Lubrication

General

In the Lubricants and Hydraulic Fluids Charts instruction for the usage of combustive and lubricating materials of domestic manufacture and their foreign analogues upon truck operation in the conditions of moderate climate are given. Detailed recommendations and procedure of lubrication of separate parts are specified in respective sections of the operation manual, enclosed to every truck.

Lubrication is implemented upon the maintenance with the prescribed periodicity and the component overhaul.

When changing the engine oil with all-season oil, vice versa, change oil filter elements, and wash out the centrifugal oil-cleaning filter.

The range of the leading and variety of combustive and lubricating materials of the powerplant, and also seasonality and periodicity of their change should correspond to the operation manual for engines YAMZ, enclosed to every truck.

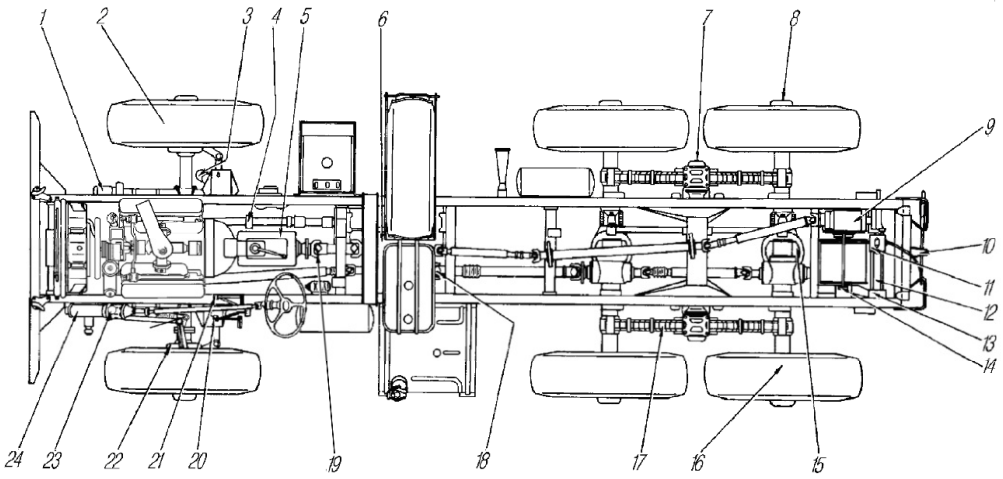


Figure 156 - 6x6 Truck Lubrication Scheme

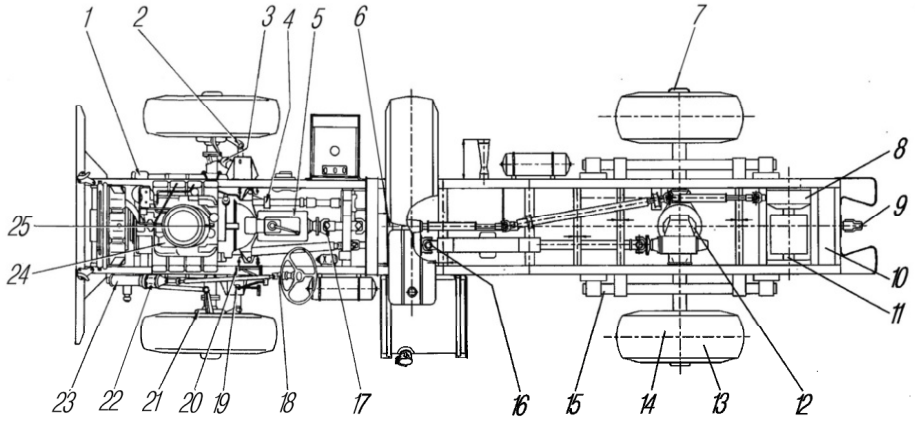


Figure 157 – 4x4 Truck Lubrication Scheme

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7.3 Lubricants and

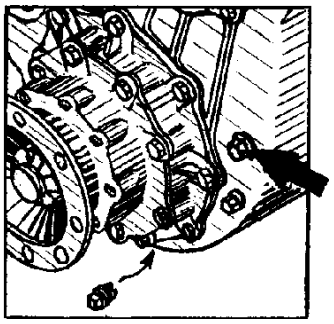
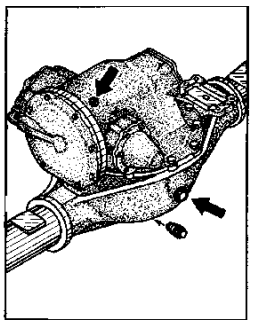
Posi-tion on the fig. 156, 157	Name of the lubrication point or the fuelling system	Quantity of points	Leading brands, seasonality of operation	Duplicating brands, seasonality of operation
1	2	3	4	5
-	Engine feed system	1	See the operation maintenance for operation of YAMZ engines	
-	Engine crankcase: YAMZ-536	1		
-	Engine units		See the operation maintenance for operation of YAMZ engines	
5	Gearbox		See the operation maintenance for operation of YAMZ gearbox	
	ZF 9S1310TO	1		
	YAMZ – 0905, YAMZ-1105	1		
	FAST GEAR 9JS135TA *1	1	All-season: Lukoil Oil TM-5 SAE 80W-90 API GL-5	All-season oil: Lukoil TM-4 SAE 80W-90, G-TRAC GL-4/GL-5, SAE 80W-90, G-BOX GL-4/GL-5 SAE 75W-90, TRANS KP-2 SAE 80W-85 TRANS KP-4 SAE 80W-90

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Hydraulic Fluids Charts

Foreign analogues	quantity of combustive and lubricating materials		Periodicity of lubricating or replacement (replenishment of combustive and lubricating materials)		Lubrication recommendations (refilling, oil replacement or lubrication)
	Norm level of the filling (L, kg)*[1]	Total for the truck (L, kg)*[1]	Leading brand	Duplicating brand	
6	7	8	9	10	11
			See the operation maintenance for operation of YAMZ engines		
	23	23			
See the operation maintenance for operation of YAMZ engines					
	8.8 5.5 13.0	8.8 5.5 13.0	See the operation maintenance for operation of YAMZ gearbox		
ZF-ECOFLUID M SAE 75W-80 Fuchs Petrolub AG TITAN supergear mc SAE 80W-90, TOTAL TRANSMISSION RS FE 80W-90, CASTROL SYNTRANS MAX 75W-80			Maintenance 1500-3000 Every 10 000 km Through 45 000 km		The first oil replacement Check oil level and, if necessary, refill Replace oil

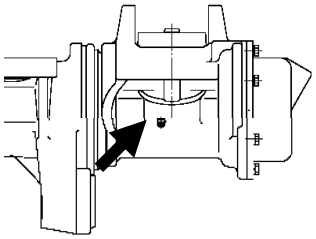
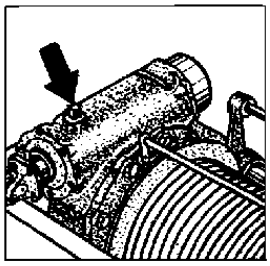
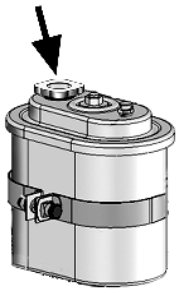
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1	2	3	4	5
6	Transfer Box *2 	1	All-season: Lukoil Oil TM-5 SAE 80W-90 API GL-5	All-season oil: Lukoil TM-4 SAE 80W-90, G-TRAC GL-4/GL-5, SAE 80W-90, G-BOX GL-4/GL-5 SAE 75W-90, TRANS KP-2 SAE 80W-85 TRANS KP-4 SAE 80W-90 Oil ТСп-15К (at temperature not below minus 30 °С) Oil ТСп-10К (at temperature not below minus 45 °С) At temperature below minus 30 °С oil ТСп-15К, diluted with 10-15% of arctic diesel or winter diesel fuel is allowed, or “Omskoil К ТМ3-18” ТУ 38.301-19-93-97
-	Additional power take-off	1		
	Leading axle gears *2 - front		Oil ТСп-15К (at temperature not below minus 30 °С) Oil ТСп-10К (at temperature not below minus 45 oC)	At temperature below minus 30 °С oil ТСп-15К, diluted with 10-15% of arctic diesel or winter diesel fuel is allowed, or “Omskoil К ТМ3-18” ТУ 38.301-19-93-97
-	- intermediate, rare 	2 (6x6) 1 (4x4)		

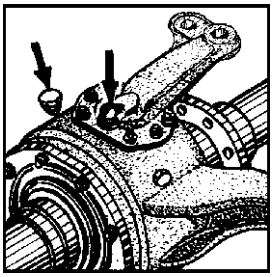
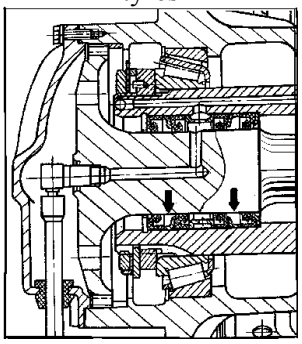
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6	7	8	9	10	11
Shell Dentax G 80W-90, Mobilube GX 90, Energear EP 80W-90 Transmission oils with serviceability level according to API GL-4/GL-5, SAE J306 viscosity grade: 70W75W-90, 80W-90, 85W-90	3.50	3.50	Maintenance 1500-3000		Replace oil. Refill oil below the edge of the level-fill opening
			Maintenance-15000		Check oil level and , if necessary, refill below the edge of the level-fill opening
			Upon every third Maintenance-15000 but not less one time in three years		Replace oil
	0.01	0.01	-		Upon maintenance
	6,0-6,5 6,0-6,5	6,0-6,5 12,0-13,0 (6x6) 6.5 (4x4)	Maintenance 1500-3000		Replace oil. Pour oil to the level-fill opening on the axle housing. If the drive gear was demolished, pour preliminary 1 litre of oil through the hole below the breather of the bevel gear housing, the rest through the level-fill opening below its the edge.
			Maintenance-15000		Check oil level and, if necessary, refill
			Upon every third Maintenance-15000, but not less one time in three years		Replace oil

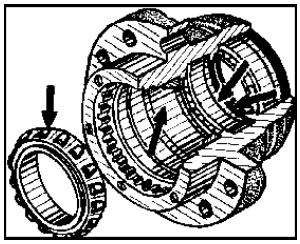
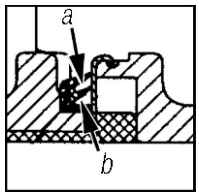
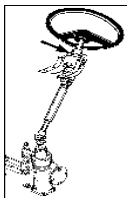
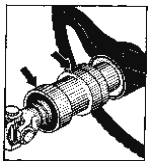
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1	2	3	4	5
7	Wheel-hubs of the rear equalizing beam suspension 	2	Litol-24	Lubricant Litol-24PK
9, 8*	Gear casing of the winch 	1	Oil used for the engine	Oil TCгип (Transmission oil used for the hypoid gear)
26, 24*	Hydraulic system of steering gear - RBL C 700-V Oil tank of the steering gear 	1	Oil ВМГЗ (multi-grade low-temperature hydraulic oil)	ГИПОЛ-РС (GIPOL RS)

6	7	8	9	10	11
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.15	0.3	Maintenance 1500-3000 Maintenance-15000		Lubricate through oil filler before the appearance of the fresh lubricant out of the filler ring.
Mobilube GX 140, Shell pirax GX 140	7.5	7.5	Upon every third Maintenance-15000		Check oil level and, if necessary, refill
STATOIL TRANSWAY PS DX III	3.9	3.9	Maintenance 1500-3000 Upon every third Maintenance-15000, Upon hydraulic booster maintenance		Check oil level and, if necessary, refill Replace oil (along with filter replacement)

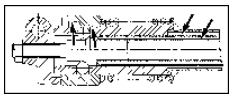
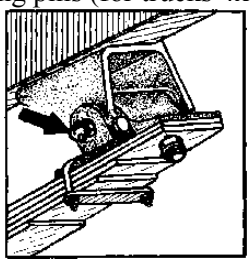
1	2	3	4	5
24, 23*	Steer knuckle housing of the front driving axle 	2	Combination of 35 % of lubricant Litol-24 and 65% of oil for drive axle gear boxes	Combination of 35 % of lubricant Lita and 65% of oil for drive axle gear boxes
21, 18*	Universal shaft joint crosses (needle bearers) - drive gears of the front, rear and intermediate axles and the intermediate shaft	8 (6x6) 6 (4x4)	Lubricant Litol-24	Lubricant 158
	- steering wheel	2		
	- winch driving gear	4		
2	Gaskets for the air inlet of tyres 	6	Lubricant Lita	Lubricant CIATIM 201

6	7	8	9	10	11
-	2.7	5.4	Maintenance 1500-3000		Check lubricant level in the node and, if necessary, refill. Fill lubricate below the edge of the level-fill opening
			Upon every fifth Maintenance-15000, but not less one time in three years		Replace lubrication
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.004 0.004	0.32 0.024	Maintenance-15000		Lubricate through oil filler before the appearance of the fresh lubricant.
	0.006	0.012	-		Change lubricant when dismantaling
	0.024	0.096			
AeroShell Grease 6	0.05	0, 30	-		Upon maintenance lubricate the working area of gaskets, apply the lubricant between first and second, and also third and fourth gaskets. Apply thin coat of the lubricant of the working area of the semi-axle

1	2	3	4	5
8, 7*	Wheel hubs 	6 (6x6) 4 (4x4)	Lubricant Litol-24	Lubricant Lita Lubricant MC - 1000
7	Cavity below the protective ring of the equalizing beam hub 	2		Lubricant Lita
	Needle bearer of the steering head 	1	Lubricant Litol-24	Lubricant Lita
	Steering-shaft bearing 	1		

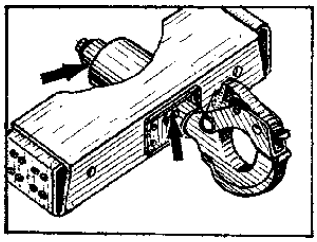
6	7	8	9	10	11
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	1.0 (6x6) 1.0 (4x4)	6.0 (6x6) 4.0 (4x4)	Upon every second Maintenance-15000		Change lubricant. Apply lubricant on the working area of gaskets and preliminary put it in the space between the bearing and the gasket. Wash the overboard bearing. Apply lubricant on the bearing until the cavity between rollers is full, put lubricant in the hub between bearings
	0.025	0.05	-		Lubricate when dismantling. Remove old lubricant and fill the whole cavity below protective gaskets with fresh one.
	0.002	0.002	-		Upon maintenance
	0.03	0.03			

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1	2	3	4	5
	Gear shift control: - parts of the ball lock of the lever handle selector	1	Lubricant Litol-24	Grease Ж and grease C
	- cavity of the hinged bearing level housing	1		
	- yoke end hubs	2		
	Lockout mechanism: - exterior surface of the internal movable pull-rods 	3		
-	Power contacts of battery switch	4	Lubricant Litol-24	Grease Ж and grease C
1, 15*	Front spring pins (for trucks 4x4, 6x6) and rear spring pins (for trucks 4x4) 	2	Lubricant Litol-24	Grease Ж and grease C
-	Working area of the fifth-wheel coupling	1		
	Locking hook of the fifth-wheel coupling	1		

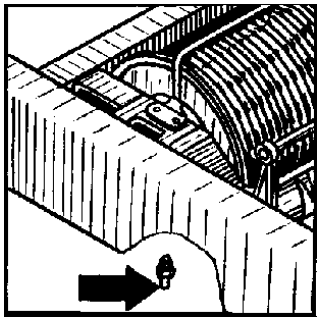
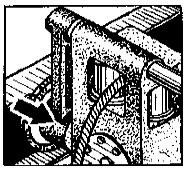
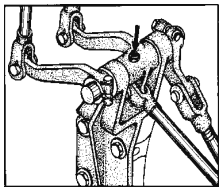
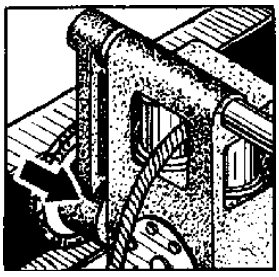
6	7	8	9	10	11
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.005	0.005			Upon maintenance lubricate
	0.04	0.04			
	0.0025	0.005			
	0.0165	0.005			
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.0005	0.002	-		Upon maintenance. Apply a thin coat of lubricant
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.025 (for trucks 6x6, 4x4 front springs) 0.04 (for trucks 4x4 rear springs)	0.05 (for trucks 6x6, 4x4 front springs) 0.08 (for trucks 4x4 rear springs)	Maintenance 1500-3000 Maintenance-15000		Lubricate before the appearance of the fresh lubricant out of the juncture of the pin and the spring eye.
	0.28	0.28	Maintenance-15000		Lubricate through the ball valve oiler the seat working area and the locking hook
	0.015	0.015			

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1	2	3	4	5
	Axles and rollers of the spare wheel holder	4	Lubricant Litol-24	Grease Ж and grease C
-	Gearing pivot joint of the fuel intake control	6		
10, 9*	Bushings of towing device 	2		
-	Top bearings with steering knuckle pivots of the front driving axle	2		
18, 16*	Slip joints of - universal joints	3		
	- steering wheel	1		
	- winch driving gear	2		
	Clutch shifter bearing	1		
	Space roller bearings of the clutch release yoke lever	2		

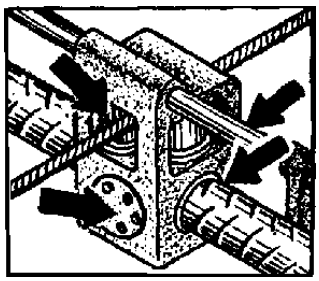
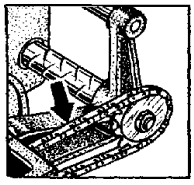
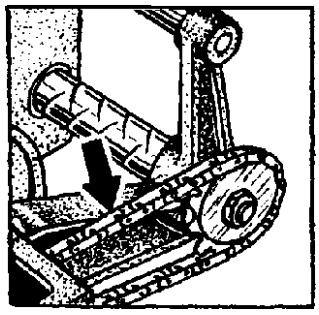
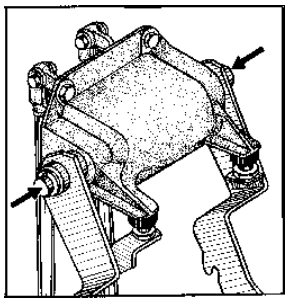
6	7	8	9	10	11
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.008	0.032			Upon maintenance lubricate
	0.0033	0.020	Maintenance - 15000		Lubricate the working areas when dismantling
	0.025	0.05	Maintenance 1500-3000 Maintenance-15000		Lubricate through oil fillers before the appearance of the fresh lubricant (when working with trailer)
	0.100	0.20	Upon every second Maintenance - 15000		Fill with lubricant through the oil filler
	0.02	0.06	-		Lubricate when dismantling
	0.01	0.01	Maintenance-15000		Lubricate
	0.015	0.03	Upon every third Maintenance-15000		Lubricate through oil fillers before the appearance of the fresh lubricant
	0.04	0.04	Maintenance-15000		Lubricate (if the oil filler on the clutch housing is present)
	0.005	0.01			

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1	2	3	4	5
-	Lift reduction unit of the spare wheel	1	Lubricant Litol-24	Grease Ж and grease C
14, 11*	Plain bearer of the winch drum 	1		
	Guide rollers axle 	2		
	Intermediate bracket shaft of the clutch linkage and the brake valve 	1	Graphite lubricant УСсА	Grease Ж, grease C or oil Litol-24
13	Roller winch bearings 	2	Lubricant Litol-24	Grease Ж and grease C

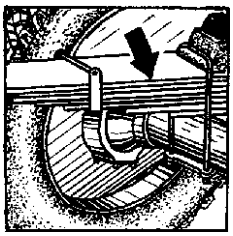
6	7	8	9	10	11
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.05	0.05	-		Lubricate when dismantling
	0.025	0.025	Upon every third Maintenance-15000		Lubricate through the oil filler before the appearance of the fresh lubricant
	0.035	0.07			Lubricate axles
Alvania HDX2, Rhodina EP2, Mobilgrease Graphited №3	0.03	0.03	Maintenance 1500-3000 Upon every third Maintenance-15000		Lubricate through the oil filler before the appearance of the fresh lubricant
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.035	0.07	-	-	Lubricate when dismantling

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1	2	3	4	5
12, 10*	Working areas of the driving screw of the roller winch and the guide shaft 	1	Graphite lubricant УСсА	Grease Ж, grease C or oil Litol-24
11	Bushing rollers and holder-body cavity of guide rollers of the roller winch	3		
	Block thorn 	1		
13	Chain gearing of the roller winch 	1	Graphite lubricant УСсА	Grease Ж, grease C or oil Litol-24
23, 22*	Brake pedal and clutch pedal shaft 	1		

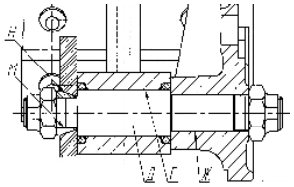
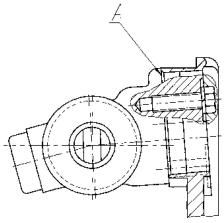
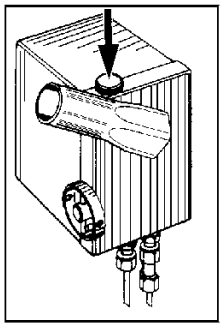
6	7	8	9	10	11
Alvania HDX2, Rhodina EP2, Mobilgrease Graphited №3	0.15	0.15	-		Lubricate after every third use of the winch
			Upon every third Maintenance-15000		Apply lubricant (if the winch was not used)
	0.033	0.1	Upon every third Maintenance-15000		Apply lubricant
	0.004	0.004	Upon every third Maintenance-15000		Apply lubricant
Alvania HDX2, Rhodina EP2, Mobilgrease Graphited №3	0.05	0.05	Upon every third Maintenance-15000		Lubricate all full length of the chain.
	0.015	0.015	-	-	Lubricate when dis-mantling the bushing and shafts

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1	2	3	4	5
17, 15*	Sheets of front and rear springs 	4	Graphite lubricant УСсА	Grease Ж, grease C or oil Litol-24
-	Screw thread of front and rear spring U-bolt	16		Oil ТСгип
	Power contact on the battery	3	Oil Litol-24	Grease Ж, grease C
	Junctions in the points of the battery wire connections	10	Oil Litol-24	Grease Ж, grease C

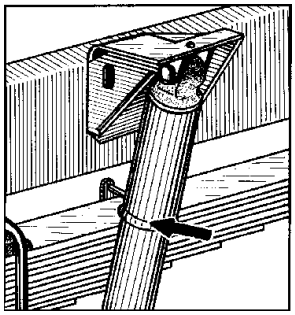
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6	7	8	9	10	11
Alvania HDX2, Rhodina EP2, Mobilgrease Graphited №3	0.325	1.300	-		Lubricate the concave surface of sheets after dismantling of the spring, preliminary clean them off corrosion
	0.0025	0.02	-		Lubricate the threaded part when dismantling, preliminary clean it off corrosion and mud
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.0005	0.0015	-		Upon maintenance apply a thin coat of lubricant before joining ends, preliminary clean them
Shell Gadus S2 V220 2, RENOLIT EP2, Shell Gadus S2 V100 3, Mobilgrease XHP 222, Energrease L2	0.0005	0.005	-		Upon maintenance apply a thin coat of lubricant before joining ends, preliminary clean them

1	2	3	4	5
	  Pedal brake caliper and wedge mechanism	12	Lubricant AMC-3	Sealing component on rubber or silicone base
	Expanding sleeve, brake shoe axle and brake caliper	36	Lubricant AMC-3	Sealing component on rubber or silicone base
	Axles and areas of brake shoes	12	Graphite lubricant УСсА	Grease Ж, grease С or oil Litol-24
-	Hydraulic cab tilt systems 	1	Oil МГЕ-10А	Oil ВМГЗ

6	7	8	9	10	11
	0.0075	0.09	-		When dismantling Before assembling the axle Д and the surface of the brake shoes Г, lubricate them with graphite grease. Apply lubricant АМС-3 on the surfaces Н, М, Ж, А
	0.0022	0.08	-		
Alvania HDX2, Rhodina EP2, Mobilgrease Graphited №3	0.005	0.06	-		
Shell Tellus T15	1.70	1.70	Maintenance 1500-3000 Maintenance-15000		Check oil level and, if necessary, refill. Upon system repair replace oil.

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1	2	3	4	5
3	Telescopic shock absorbers of front and rear springs for trucks 4x4, of front springs for trucks 6x6 	4 2	Shock-absorber fluid Lukoil - АЖ	Shock-absorber fluid ГРЖ-12
	Hydraulic fluid power of declutching	1	Brake fluid РОСДОТ	Brake fluid “Tom”, “Neva”
			When temperature is below minus 30°C, dilute it with ethyl alcohol in quantity of 18-20% (by weight)*[5]	
-	Cooling system with heating unit YAMZ -53622-10	1	See operation maintenance for operation of YAMZ engines	

* For trucks 4x4

*[1] In columns 7, 8 oils and power fluids are given in litres, plastic lubricant are in kilograms.

*[2] Norm of oils and power fluids filling, which is specified in the column 7, is nominal. That is why after the oil (fluid) filling it is necessary to check and, if necessary, ramp it up to the norm in accordance with the requirements of paragraph "Maintenance".

*[3] For trucks Ural with cabover cabin

*[4] For trucks Ural with conventional cabin

*[5] Diluted brake fluid replace with the fresh one (undiluted) with the onset of warm season.

<table>
<tr><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th></tr>
<tr><td>Shell Tellus T15</td><td>0.850</td><td>3.4
(for trucks 4x4)
1.700
(for trucks 6x6)</td><td>-</td><td>-</td><td>Change fluid after dismantling and maintenance, washing out details of the shock absorber in the kerosene and drying them.</td></tr>
<tr><td rowspan="2">Shell Donax B, Brake Fluid DOT3/DOT4</td><td rowspan="2">0.5</td><td rowspan="2">0.5</td><td colspan="2">EO</td><td rowspan="2">Check fluid level and, if necessary, refill.
Change fluid</td></tr>
<tr><td>one time in five years</td><td>one time in three years</td></tr>
<tr><td></td><td>29,0*[3]

27,0*[4]</td><td>29,0*[3]

27,0*[4]</td><td colspan="3">See the operation maintenance for exploitation of YAMZ engines</td></tr>
</table>

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8 Storage

8.1 Guideline

The new truck, if it is not put into service, could be kept without conservation within three months starting with the date of the shipment from the factory. In this case after installation of the truck in the storage place it is necessary to protect the undyed surfaces of the front axle ball-unit with the fine coat of the lubricant Litol-24 or grease, to provide the maintenance service of the battery energy storage and tires in accordance with the operational guidelines.

If it is necessary to keep the truck in excess of the permitted period, then it should be conserved and protected in accordance with the requirements of the present chapter.

The truck shall be stored in the clean, dry and ventilated room or under cover. Upon storage on the open space tires, the steering wheel, rubber and plastic parts shall be kept from sunlight, and engine with systems shall be covered with water-resistant package paper or stained tape, tarpaulin and etc. The pressure of the tires shall be maintained in the inflated condition.

To prevent the tire damage, the long-term contact of the tires and oils is prohibited (e.g. the parking of the truck in oil puddles and oil stains).

8.2 Preparation for Storage

Provide daily maintenance service and scheduled Maintenance 1500-3000, Maintenance-15000 depending on the odometer.

Fill up the housings of the transfer, the axle gearbox and steering control with preservation or power oils up to workload; fill up the winch case with power oil.

Switch on the gear of the additional power take-off for 3-5 minutes while the engine is running. But before make sure that the winch engagement lever is in off-position.

Implement the conservation of the engine and the gearbox in accordance with the operation manual for the engine and the gearbox.

The air intake snorkel, the exhaust pipe and the junction pipe of the crankcase ventilation shall be hermetically sealed.

Close the wheel valve.

Pour the water out of the windscreen washer reservoir.

Turn off the switch of the storage batteries.

Clean, wash, dry and talc rubber carpets of the cab floor, roll up and lay them down on seats.

Upon storage at the open site, remove, pack the platform canopy, windscreen wipers, rear view, wide-angle and side view mirrors and store them in the closed space.

Dry the canopy before the storage.

Cover the rubber technical goods with the protective coating according to the table 7 or wrap them with the packing material.

Close tight the hatch of the ventilation cab, close drop windows, door vents and pull up the radiator blind.

Lubricate with the thin coat of the lubricant according to the table 22:

- The plug connector of the rear lights, the number plate light, backing lights, connections of the air-pressure sensors in balloons;
- Terminal connections of the failure sensor in the brake system and the light switch STOP;
- Leading out pole terminals of the storage batteries with wire terminals.

Lubricate the external undyed surfaces of the front axle ball-units, open surfaces of the transfer box stem and additional power takeoff with the thin coat of the lubricant Litol-24.

Lubricate open surfaces of the threaded joint, outside cabin door handle, frames of the door vents, nozzles head of the window washer, headlight moldings, the chain gearing, the driving screw, guide shafts, rolling elements of the roller winch of the wrench and the cable, the carving couple hook-screw of the towing device with the preservation lubricant, and the surfaces of stems with Litol-24 or grease.

Table 22 – Preservative and Protective Coatings

Purpose of the coating	Name and composition
For conservation of the transmission units	Preservation oil ТМ5-12рк ТУ 38 101 844-88 or the combination of the transmission oil ТСп-15К ГОСТ 23652-79 and 10% (by volume) detergent АКОР-1
For conservation of the external undyed and dyed surfaces and threaded areas	Cannon grease ГОСТ 19537-83
For conservation of the plug connectors and terminal connections of the electric equipment	Petroleum jelly ВТ13-1 ТУ 38 101 180-76, lubricant Litol-24 or grease
For coloring of the damaged metal surfaces	Enamels МЛ 12 of orange, sand-colored, khaki colors GOST 9754-76; enamels МЛ-152 of orange, sand-colored, golden yellow colors GOST 18099-78; enamel МЧ-145 of orange color GOST 23760-79; enamel МЧ-123 of black color TS 6-10-979-84; enamel MC-17 of black color TS 6-10-1012-78
For protection of tires, hoses, transmission belts and other rubber goods against light exposure	Combination of the aluminum dust and the light oil varnish or the aluminum paste with the white spirit in the ratio 1:4 or 1:5 (by weight). Chalk-casein composition: combination of chalk 75 % (by weight), casein adhesive 20%, drowned lime 4.5%, sodium carbonate 0.25%, phenylic acid 0.25%
Packing material for hermetization and partial packaging	Paraffine paper GOST 9569-79, condenser paper 1908-82, impregnated with paraffine oil, double layer packaging bituminized paper GOST 8828-75, bituminized and tarred packing paper GOST 10354-82, rubber fabric and etc.

Lubricate the tire irons supplied with the truck, internal sides of the socket wrench, hole for the reamer holder, the probe, forcing screws with the preservation lubricant and pack the mentioned goods in the paraffin or other type of paper.

Lubricate hinged connections of the secondary brake, the tool box, storage batteries containers, flat-car side walls, cabin doors, the hood, door and hood locks with preservative (engine or transmission) oil.

Glue up holes, connecting the internal cavities with atmosphere on the brake valve, the pressure regulator valve, the trailer brake-application valve, the condensed water drain valve, hermetization pipes behind the cabin with adhesive tape.

Unload wheels, raising them off the ground up to 80-100 mm and the truck suspension in the sequence mentioned bellow:

- Establish offloading supporting blocks 620 mm height under ball-unit flanges 18 axle swivels for unloading of wheels of the front axle (for trucks 4x4 and 6x6), as in figure 63;
- Establish offloading supporting blocks 570 mm height under the mounting bracket of the spring 6 for unloading of wheels of the rear axle (for trucks 6x6), as in figure 69;
- Establish offloading supporting blocks 670 mm height under the axle beam next to the mounting bracket of the spring for unloading of wheels of the rear axle (for trucks 4x4);
- Establish offloading supporting blocks 1070 mm height under frame side rail in the rear axle zone for unloading of the rear axle (for trucks 6x6);
- Establish offloading supporting blocks 1000 mm height under frame side rail in the rear axle zone for unloading of the rear axle (for trucks 4x4);
- Establish offloading supporting blocks 220 mm height between the spring and frame side rail for unloading of the front axle.

8.3 Maintenance of the Truck Upon Storage

Check monthly the air pressure in tires, the condition of the protective coatings and devices, if the fuel, oil or special liquids are not leaking. Eliminate the mentioned shortages.

Remove occasionally the discovered corrosion out of undyed and dyed surfaces, restore the damaged paint-and-lacquer coatings, cover the undyed surfaces after the corrosion removal with the conservation lubricant. Trim off the damaged paint-and-lacquer coatings with the fine emery or water resistant paper, after clean the surface with the cloth moisten in the unleaded fuel or dissolvent, dry and in summer dye two coats with the enamel of the same color with 5-10 minutes interval, in winter lubricate with the conservation lubricant.

Implement the maintenance of the engine and the gearbox in accordance with the operation manual for the engine and the gearbox.

Upon finishing of work seal hermetically the feed and gas exhaust systems, deflate the balloons through the condensed water drain valve. Renew the lubrication on the ball-unit surface.

On the trucks, stored in the unheated space or under cover, carry out the above mentioned inspection of the efficiency of nodes, units and systems quarterly.

On the trucks, stored in the open space or under cover, and the units of which are filled up with preservative oils, check the efficiency of the brake system drive and the clutch, the gearbox control linkage, the housings of transfer box, the parking brake.

After inspection set everything to neutral position.

8.4. Withdrawal of the Truck from Storage

Before starting the exploitation of the truck after storage:

- Check the air pressure in tires and ramp it up to norm;
- Remove the truck from supporting blocks and release springs;
- Unseal the feed, gas exhaust and ventilation systems of the engine and the oil tank;
- Remove the protective lubricant from outward surfaces with the cloth moisten in the unleaded fuel or dissolvent;
- Depreserve the engine and the gearbox in accordance with the operation manual for the engine and the gearbox;
- Check the brake fluid level in the reserve tank of the clutch linkage;
- Check the oil level in the transmission units, the power steering pump reservoir, the oil tank and, if necessary, ramp it up to norm;
- Implement the examination and maintenance of the truck to an extent of daily maintenance;
- If some of the filled up preservative or power oils and liquids in the units and systems do not correspond to the exploitation season or the expiry date has run out, refill them;
- Before engine ignition pump the feed system over with the fuel boost pump.

9 Transportation

The trucks could be transported by railway, water, air transport or under its own power. The type of transport is stipulated by the delivery contract. And the following preparatory works shall be implemented:

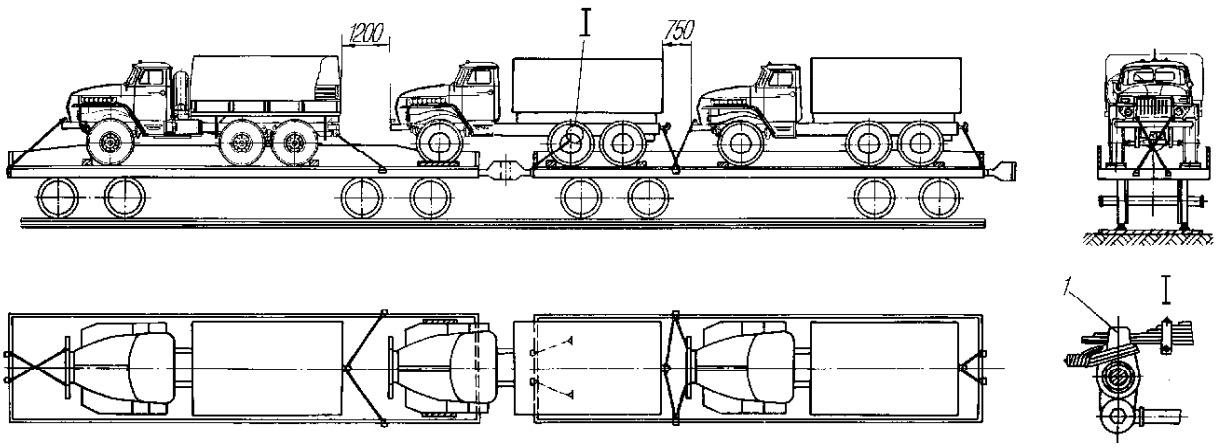
1. Before loading check and, if necessary, ramp the air pressure in tires up to norm and close wheel valves. On the trucks without the pressure pumping system the pressure in tires shall be normal.
2. After the loading of the truck on the transport:

- Stop the truck with the parking-brake;
- Put in the first speed of the gearbox and the low gear of the transfer box;
- Turn off the storage batteries.

3. Implement loading and unloading under its own power.

9.1.1 Upon truck transportation by train, the truck, erected on the platform, is fastened with two strut braces to the rear towing device and two strut braces to front towing hooks, under the front wheels in front and stop bars 100x160x760 mm of size shall be fixed behind the rear wheels.

The truck, installed above platform clutch, as in figure 158, is fastened with two strut braces to the rear towing device and with two strut braces to the mounting spring bracket of the intermediate axle. It is necessary to fix stop bars under the wheels of the intermediate axle in front and under the wheels behind the rear axle. Fix the front wheels with lateral stop bars outside the wheels.



1- mounting spring bracket

Figure 158 – Plan of Loading and Fastening of Three Trucks on 2 Four-Axle Platforms (for 6x6 Trucks)

Fasten the truck, loaded on the platform, with two strut braces to the rear towing device and two strut braces to the front towing hooks, stop bars 100x160x500 mm of size shall be fixed in front of the front wheels and behind the rear wheels.

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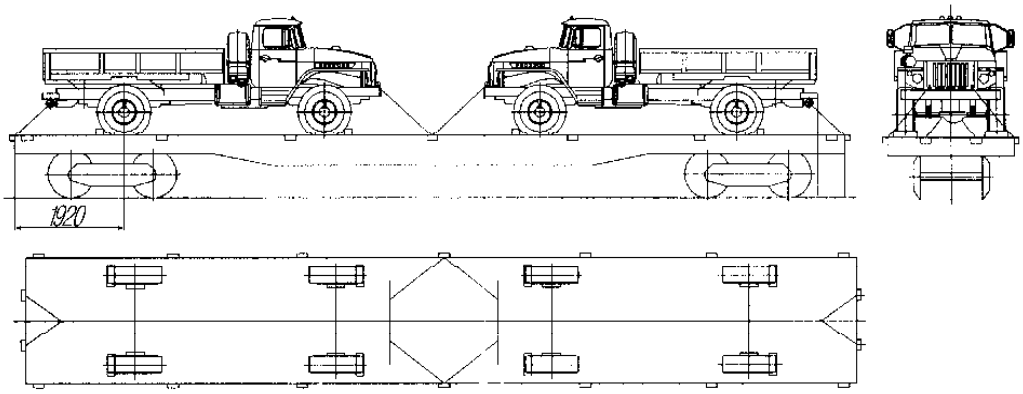


Figure 159 – Plan of Loading and Fastening of Trucks on Four-Axle Platforms (for 4x4 Trucks)

In every separate case, negotiate the transportation terms and conditions with the communication dispatch station.

9.1.2 Upon truck transportation by air the preparatory works shall be implemented and the cushioning by the special tools, which are manufactured and delivered by the consignor, shall be additionally turned off. The cushioning switch framework shall exclude their falling out during vibrations and the chosen material – crumpling, what could lead to loosening of the truck.

Fuel tanks of the truck fill to half of their container. Load and fasten the truck according to special schemes.

9.1.3 Upon truck transportation by water transport load the truck without cargo in the cargo space.

Loading, placement and fastening of the truck with devices installed on the undercarriage are provided in the operation manual of the device.

Trucks are transported by sea vessels in all cargo spaces (holds, tween-decks). The trucks transportation is implemented on the upper deck with the consent of the consignor.

Arrange trucks in the hold and on the deck so that the distance between them is no less than 250 mm on the side of the heat radiator and no less than 130 mm on other sides.

After the truck placement on the vessel, implement the preparatory works, fasten the truck in order to prevent fore-and-aft and lateral displacement with the special mooring device, present on the vessel, or with strut braces. Strain the strut braces, wrenching of threads with crowbars, until the secure mounting of the truck is provided. Loosening of strut braces or separate threads is not allowed.

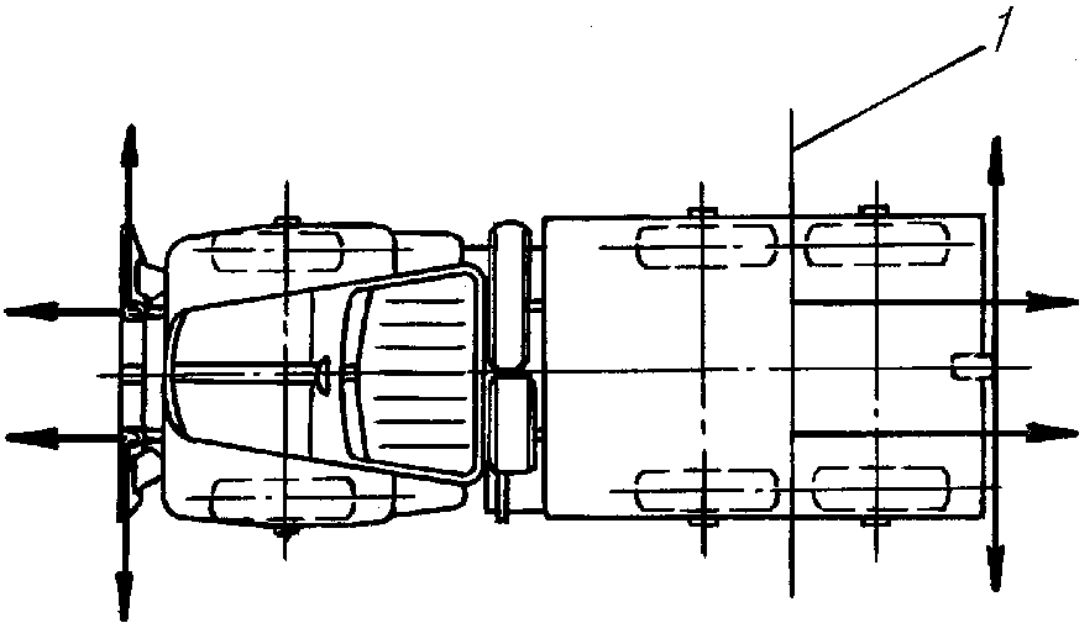
Fasten strut braces to front towing hooks or pivot axles, the equalizing beam suspension axle and the towing device. Variants of fastening are shown in figures 160 and 161.

Fasten strut braces on the long-haul trucks and bus trucks to the equalizing beam suspension axle. Mooring devices or strut braces are not allowed to touch the truck tires. Establish brake shoes under truck wheels upon lateral placement on the vessel.

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Place and fasten trucks according to the ship scheme.

Responsibility for placement and fastening of the truck upon transportation is on the carrier.



1- equalizing beam suspension axle (for trucks 6x6), rear axle (for trucks 4x4)

Figure 160 – Fastening of the Truck on the Upper Deck

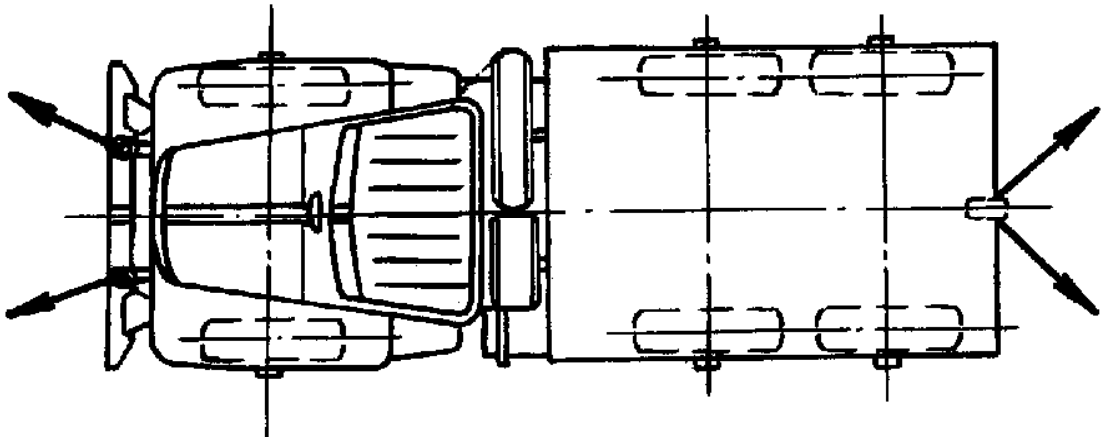


Figure 161 - Fastening of the Truck in the Hold

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10 Disposal

At the end of the service life, the truck has to be disposed. In this regard, implement the following:

- Wash and dry the truck;
- Remove the storage batteries; check them for the serviceability for the further exploitation; in case of inapplicability pour out the electrolyte fluid in the special glassware and hand storage batteries over to the feedstock reception;
- Pour out the liquid out of the engine cooling system in the special container;
- Pour out the oils out of the truck units and clean fuel tanks of the units with the steam-and-air device against remaining oil;
- Dismantle the wiring system from the truck and hand it over to the feedstock reception;
- Dismantle the wheels, plastic and rubber technical details from the truck and hand them over to the feedstock reception;
- Dismantle the truck units, dismount, illuminate defects and unsuitable for use as spare part details, hand them over to the feedstock reception.

Braking devices, subject to disposal, have to be dismantled. Details are sorted by material types. Depending on the wear rate, separate details could be used for repair of similar devices, other metallic parts are traded for scrap metal.

When disposing, observe safety measures, specified in the paragraph “Safety Requirements”.

When working with poisonous and hazardous materials, implement the general technical requirements related to them.

APPENDICES

APPENDIX A
(recommended)

Table A.1 - Torques of Basic Screw Joints Nm (kgfm)

A.1 Engine	
Retaining nuts:	
of the muffler	24 -36 (2.4-3.6)
of the headpipe to discharge manifold collar	28 -36 (2.8-3.6)
of power unit support to the girder	78 -98 (8-10)
of rear brackets to the support	270 -340 (27-34)
of front supports	110 -140 (11-14)
Fixing bolts of	
front brackets to the power unit	49 -61 (5-6.2)
rear brackets to the power unit	270 -340 (27-34)
125 mm air feed system worm drive clamps	5 -6 (0.5-0.6)
90 mm air feed system worm drive clamps	3 -3.5 (0.3-0.35)
V-shape clamps f fastening the gas exhaust system metal pipe	12 (1.2)
Muffler fastening clamp nuts	27.5 -35.3 (2.8-3.6)
A.2 Transmission	
Clutch Master Cylinder Bolts M12	44 -56 (4.4-5.6)
A.2.1 Transfer Box	
Retaining nuts of main shaft, lay shaft and rear differential cage bearings, minimum	200 (20)
Transfer box flanges retaining nuts, minimum	200 (20)
Fixing bolts of:	
differential nut	24 -36 (2.4-3.6)
rear differential cage	55 -65 (5.5-6.5)
main and lay shaft bearing caps	40 -56 (4.0-5.6)
rear differential bearing crankcase	44 -62 (4.4-6.2)
rear axle drive shaft bearing cap	40 -56 (4.0-5.6)
front axle drive shaft bearings cap	30 -35 (3.0-3.5)
oil-level plugs	
MK24x1.5	100 -140 (10-14)
K 3/8”	80-120 (8-12)[*1]
drain plug	100 -140 (10-14)
A.2.2 Driveline	
Fixing bolt nuts:	
of the intermediate axle drive prop shaft and the lay prop shaft flanges	160 -200 (16-20)
of the front and rear axle prop shaft flanges	120 -160 (12-16)
of the intermediate support and insert	180 -220 (18-22)
A.2.3 Driving Axles	
Fixing bolts of:	
the main gear to the axle case	
M16	160-200 (16-20)[*2]
M18	190 -230 (19-23)

Break-over of Table A1

of thru shaft and conical and cylindrical pinion bushing sleeves	60 -80 (6.0-8.0)
of conical pinion bushing sleeve cover and swivel member seal	12 -18 (1.2-1.8)
of the main gear side cover	44 -56 (4.4-5.6)
of the differential bearing caps	250-320 (25-32)
Retaining nuts:	
of the main gear to the axle case	120 -150 (12-15)
of the ball units to the axle shaft housing	280 -320 (28-32)
of swivel member levers and king pin bearing caps:	
M18	160 -200 (16-20)
of front axle trunnions	190 -230 (19-23)
of main gear flanges	250 (25)
of differential carriers	250 -300 (25-30)
of rear axle brake back plate	160 -200 (16-20)
Nut and lock nut of conical pinion bearings	450 -500 (45-50)
Wheel boss bearing retaining nuts	300 -350 (30-35)
	Loosen 1/8-1/6 torque maximum
Wheel boss bearing lock nuts	400 -500 (40-50)
Oil-level plugs and swivel member level plugs, axle case level plugs	100 -140 (10-14)
Drain plug in the axle case	100 -140 (10-14)

A.3 Undercarriage

A.3.1 Suspension

Torque arm stud retaining nuts, minimum (for 6x6 trucks) (if the slot of the nut does not coincide with the split pin hole, tighten the nut)	600 (60)
Fixing bolt nuts of front eyes (for 4x4 and 6x6 trucks) and rear (for 4x4 trucks) springs, minimum	400 -500 (40-50)
Retaining nuts of front eye U-bolts (for 4x4 and 6x6 trucks) and rear (for 4x4 trucks) springs, minimum	80 -220 (18-22)
Front spring stud wedge nuts	28-36 (2.8-3.6)
Tie bolt nuts of rear brackets of front (for 4x4 and 6x6 trucks) and rear (for 4x4 trucks) springs	180-220 (18-22)
Retaining nuts:	
- of front spring U-bolts (for 4x4 and 6x6 trucks) (Full-load truck)	400-500 (40-50)
- rear spring U-bolts	
- on 4x4 trucks (full-load)	580-660 (58-66)
- on 6x6 trucks (kerb weight)	580-660 (58-66)
- shock absorbers	40-50 (4-5)
-shock absorber bodies	120-150 (12-15)
Front (for 4x4 and 6x6 trucks), rear and auxiliary (for 4x4 trucks) spring centre bolt	70 -100 (7-10)
Rear spring (for 4x4 trucks) stud cover fixing bolts	180 -220 (18-22)
Fixing bolts of:	
- arm support to the beam member bracket (for 6x6 trucks)	110-160 (11-16)
-Upper torque arm to the axle beam bracket (for 6x6 trucks)	250-320 (25-32)

Break-over of Table A1

- front spring (for 4x4 and 6x6 trucks) front brackets and rear spring (for 4x4 trucks) rear brackets to lower frame	120-160 (12-16)
- front spring rear brackets to girder reinforcement (for 4x4 and 6x6 trucks)	180-220 (18-22)
- balance shaft assembly with balance shaft brackets (for 6x6 trucks)	700-800 (70-80)
Balance shaft nut tie bolts (for 6x6 trucks)	44-56 (4.4-5.6)
A.3.2 Towing Device	
Bolts and retaining nuts:	
of the towing device to the beam member	110 -140 (11-14)
of the rear towing beam member to the frame:	
M16	160-220 (16-22)
M14	110-160 (11-16)
of locking plate	28 -36 (2.8-3.6)
A.3.3 Wheels	
Wheel retaining nuts	400 -500 (40-50)
Tire valve nut	18 -30 (1.8-3.0)
A.4 Steering Wheel	
Tie rod end studs retaining nuts	235 (24) tightening until the nearest nut slot coincides with the split pin hole
Steer fixation to the girder web	
M18	216-314 (22-32)
M16	157 -215.7 (16-22)
Steer to the frame retaining nuts	110 -140 (11-14)
Steering wheel crankcase yoke fixing bolts M10	44 -56 (4.4-5.6)
Steering wheel retaining nuts	80 -100 (8-10)
A.5 Brake System	
Brake chamber retaining nuts	300 -320 (30-32)
Pad fulcrum pin retaining nut	431 -490 (44-50)
Pad fulcrum pin lining retaining nut	224 -313 (28-32)
Wedger body fixing bolts	79 -85 (7.5-8.5)
A.6 Electrical Equipment	
Alternator pulley retaining nut	60-80 (6-8)
ВК12Б braking signal switch, maximum	24.5 (2.45)
2802.3829 secondary brake switch, maximum	30.0 (3.0)
2702.3829 cylinder air pressure drop detector , maximum	30.0 (3.0)
Coolant temperature gauge sender	
TM100A, maximum	24.5 (2.45)
TM111-01 coolant overheating emergency gauge, maximum	24.5 (2.45)
2602.3729 oil pressure drop emergency gauge, maximum	45 (4.5)
MM370 oil pressure gauge, maximum	150 (15)

End of Table A 1

A.7 Cabover Truck	
Cab suspension, bolts and retaining nuts:	
M12	68.6 -98 (7-10)
M14	107.8 -156.9 (11-16)
M16	156.9 -215.74 (16-22)
A.7.1 Conventional Cab Trucks	
Cab fixing bolt nuts:	60 -80 (6-8)
Cab fixing bolt lock nut:	120 -160 (12-16)
A.8 Fifth-Wheel Coupling	
Fifth-wheel coupling fixing bolts:	
M14	80-90 (8-9)
M16	120-140 (12-14)
A.9 Dedicated Equipment	
A.9.1 Power Takeoff	
Power takeoff crankcase to gearbox crankcase bolts and retaining nuts	22 -32 (2.2-3.2)
A.9.2 Additional Power Takeoff	
Additional power takeoff flange retaining nut, minimum	140 (14)
A.9.3 Winch	
Winch drive prop shaft flanges fixing bolts	60 -65 (6.0-6.5)

*1 for trucks having no additional power takeoff
*2 If there are M14 bolts, maintain 120-150 Nm (12-15 kgfm) torque

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APPENDIX B
(recommended)

Table B.1 - **Control and Adjustment Information**

Coolant temperature in the cooling system, ºC	75-100
Transfer box main and lay shaft axial movement, mm	0.03-0.08
Clutch pedal travel (cabover trucks), mm	
Free play	2-5
Full travel	105-115
Steering wheel backlash (the pump is in operation)	≤25º
Wheel toe (fellow), mm	1-3
Brake pedal travel (cabover trucks), mm	
Free play	2-5
Clutch pedal travel (conventional cab trucks), mm	
Free play	5-10
Full travel	185-190
Brake pedal travel (conventional cab trucks), mm	
Free play	20-30
Pneumatic system air pressure, kPa (kgf/cm^2)	
Pressure controller	
Maximal pressure when switched off	870 kPa (8.7 kgf/cm^2)
Minimal pressure when switched on	720 kPa (7.2 kgf/cm^2)
Four-circuit protective valve	
Circuit static closing pressure	450 kPa (4.5 kgf/cm^2)
Trailer brake control valve	
Corresponding pressure at inlet or outlet	210 kPa (2.1 kgf/cm^2)
At controlled pressure	150 kPa (1.5 kgf/cm^2)

APPENDIX C
(reference)

Table C 1 - Weight of Basic Assembly Units (without fuel, lubricants and fluids), kg

Transfer Box	200
Front driving axle with bosses, brakes and tie rod end	718
Rear (intermediate) axle with bosses and brakes	612
Truck frame:	
Short base	626
Long base	875
Towing device	60
Front spring (for 4x4 and 6x6 trucks)	
With GVW distribution on the axle from 5800 kg to 6300 kg	83.7
With GVW distribution on the axle from 4800 kg to 5300 kg	80.3
Rear spring (for 6x6 trucks)	
With GVW distribution on bogie up to 12000 kg	116.8
With GVW distribution on bogie over 12000 kg	108.9
Rear spring (for 4x4 trucks)	101.7
Auxiliary spring (for 4x4 trucks)	33.3
Balance shaft assembly	149
515-254 (254Г-508) wheel	53.2
514-400 (400Г-508) wheel	68.7
8.5-20 wheel	45.5
14.00-20 tire, ОИ-25 model	120
390/95R20 KAMA-URAL tire, maximum	120
390R20 tire, О-65 model, maximum	120
500/70-20 or 500/70-508 1200x500-508 tire, ИД-П284 model	120
12.00R20, У-4, ИД-304 tire	90
Steer (without drop arm)	45.2
Parking brake	22
6СТ-190 storage battery	57.2
Power Takeoff with the pump	24.2
Power Takeoff with the flange	15.9
Additional Power Takeoff	15.3
Winch with the gearbox	287
Winch rope with the hook	100
Platform	1020 (1170)
short	980
long	1210
Platform canopy	33.5
Cab	428
4320 Cab (conventional cab trucks)	380
“P” cab, short	680
“P” cab, long	850
Trim Package	120.38
Spare Wheel Holder (hinged linkage)	72
Muffler	24

APPENDIX D
(reference)

Roller Bearings

Table D.1 - Truck roller bearings with 4x4, 6x6 wheel arrangement

Identification	Bearing type	Dimensions*, mm	Place of installation	Q-ty
307A	The same	35x80x21	Power takeoff idle shaft	2
64805	Single-row radial roller without races	25x38x24.7	Power takeoff pinion	2
211A	Single-row radial ball	55x100x21	Additional power take-off shaft (front support)	1
50208A	The same	40x80x18	The same (rear support)	1
804807K3C10 or 804707AC10	Roller needle	33.65x50x31 33.65x50x37	Crosses of coupling shaft, intermediate axle drive prop shaft	16
804707A1C10*[2]	The same	33.65x50x37	Crosses of coupling shaft, intermediate axle drive prop shaft with face splines	16
50311A	Single-row radial ball	55x120x29	Transfer box front axle drive shaft, reinforced additional power takeoff shaft (rear support)	2
7312A	Single-row roller conical	60x130x33.5	Transfer box main drive shaft, winch drum shaft	3
7610A	The same	50x110x42.25	Transfer box idler shaft	2
7310A or 6-7310A1	-«-	50x110x29.25	Main gear cylindrical pinion	6
220A	Single-row radial ball	100x180x34	Transfer box differential	1
6-218	The same	90x160x30	The same	1
Б11,112-100	ball		Transfer box control	2
12311K1M	Radial roller with short cylindrical rollers	55x120x29	Main drive pinion shaft (rear support)	3
6-7515A	Single-row roller conical	75x130x33.25	Differential, main drive pinion shaft (front support)	7

Break-over of Table D1

Identification	Bearing type	Dimensions*, mm	Place of installation	Q-ty
2007124A or 6-200712AA	The same	120x180x38	Wheel bosses	12
2007118K1	Single-row roller conical	90x140x32	Intermediate and rear axle main gear differentials	2
12318KM	Radial roller with short cylindrical rollers	90x190x43	Axle drive bevel gear	3
7516A or 6-7516A	Single-row roller conical	80x140x35.25	Main drive pinion shaft (front support)	3
804805K1	Roller needle	25x39x30.5	Crosses of the front and rear axle prop shafts	16
311A	Single-row radial ball	55x120x29	Rear axle transfer box drive shaft, winch rope guideplate actuating screw	3
6-312A	Single-row radial ball	60x130x31	Transmission propeller shaft intermediate support	1
704902K6ÓC10	Roller needle	15.2x28x20	Steering propeller shaft crosses	16
220A	Single-row radial ball	100x180x34	Transfer box differential	1
218 or 218A	The same	90x160x30	The same	1
180206AC17	-«-	30x62x16	Steering propeller shaft support	2
636906C17	Angular ball, forged, without bearing cage	28x42x21	Steering mast	2
108710KC17	Ball single thrust	50x80.5x23	Front axle swivel member	2
12309KM	Radial roller with short cylindrical rollers	45x100x25	The same	4
6-180603K2C9	Single-row radial ball	17x47x19	Alternator (rear support)	1
6-1180304K2C9	The same	20x52x18	Alternator (front support)	1
804704K3C10	Roller needle	22x35x26.5	Winch drive prop shaft crosses	16

End of Table D1

Identification	Bearing type	Dimensions*, mm	Place of installation	Q-ty
180508K2C17	Single-row radial ball	40x80x23	Winch drive coupling shaft (thrust bearings)	2
46310AK	Single-row angular ball	50x110x27	Winch gearbox worm (front support)	1
312A	Single-row radial ball	60x130x31	Winch gearbox worm (rear support)	1
8311	Ball single thrust	55x105x35	The same	1
7216A	Single-row roller conical	80x140x28.5	Winch drum shaft	1
8103 or 8903	Ball single thrust	17x30x9	Spare wheel lifting device gearbox	1
I-941/12K	Roller needle bearing GOST 4060-78	12x17	In the foot mechanism	2
I-943/25K	Roller needle bearing GOST 4060-78	25x32	In the foot mechanism	4

* Inner diameter x outer diameter x mounting width.

APPENDIX E
(reference)

Table E1 - **Oils, Lubricants and Special Fluids**

Main grade		Backup grade		Quantity of one-time fuelling for one truck	
Identification	Standard	Identifications	Standard	Truck 4x4	Truck 6x6
1	2	3	4	5	6
Diesel fuel	GOST R 52368-2005, II or III class	See Operation Manual for the Engine		See Technical Specifications	
ТСп-15К gear-box oil	GOST 23652-79	ТСп-10, ТАп-15В, МТ-16п oils	GOST 3652-79	10.7 l	11.0 l
Lukoil TM-5 SAE 80W-90 API GL-5 gear-box oil	СТО 00044434-009-2006	ТСп-15, ТСп-10 oils Lukoil TM-4 SAE 80W-90, G-TRAC GL-4/GL-5, SAE 80W-90, G-BOX GL-4/GL-5 SAE 75W-90, TRANS KP-2 SAE 80W-85 TRANS KP-4 SAE 80W-90 oil	GOST 3652-79	16.5 l	23 l
SAE 5W; 10W; 15W-40; APICI-4 engine oil	See Operation Manual for the Engine			23.0 l	
“R” type oil	TS 38 101 1282-89	АУ watch oil	TS 38 101 1232-89	5.8 l	
Multigrade low-temperature hydraulic oil	TS 38.101479-00	“R” hudraulic oil	TS 38.1011282-89	3.9 l	
Litol-24 grease	GOST 21150-87	Ж cup grease, С cup grease, АМ crankcase grease, Zimol grease, 158 grease	GOST 1033-79 GOST 4366-76 TS 38 590 1302-91 TS 38 Ukrainian Soviet Socialist Republic 201285-82 TS 38 101 320-77	8.0 kg	10.38 kg
УСсА graphite grease	GOST 3333-80	Ж cup grease, С cup grease, Litol-24 grease	GOST 1033-79 GOST 4366-76 GOST 21150-75	1.93 kg	

End of Table E 1

1	2	3	4	5	6
ВНИИ НП 510 grease	TS 38 101 910-82			0.008 kg	
Lukoil-АЖ damping fluid	TS 0253-025-00148599-2001	ГРЖ-12	TS 0253-048-05767924-96	3.4 l	1.7 l
“Томь” brake fluid	TS 6-01-1276-82	“Нева”, “Роса” brake fluid ГТЖ-22М	TS 6-01-34-93 TS 2451-004-104-88057-94 TS 6-01-787-86	2.3 l 0.5* l	
Ethyl alcohol	GOST 18300-72 GOST 17299-76			0.262 kg	
Cool Stream Standart 40 coolant	TS 2422-022-13331543-2004	See Operation Manual for the Engine		27.0*[1] l 29.0*[2] l	
ДТ-1 grease		“Нева” brake fluid		0.12 kg	
Лита grease	TS 38-101-1308-90	ЦИАТИМ-201 grease	GOST 6267-74 TS 38 Ukrainian Soviet Socialist Republic 201285-82	0.29 kg	0.39 kg

* for pneumatic brake trucks
*[1] for conventional cab trucks
*[2] for cabover trucks

APPENDIX F
(recommended)

Table F.1 - **Auto Bulbs and Their Specifications**

Place of installation	Bulb type	Quantity for one truck
Headlamp	АКГ24-75+70-1	2
Front light	А24-21-3	2
	А24-5	2
Tail light	А24-5	2
7442.3716	А24-21-3	6
Side marking lamp	А24-21-3	2
Master lighting	А24-21-3	1
Warning, indicating and instrument lamps	А24-2	19
Front side light	А24-5-1	2
Registration plate lamp	А24-5	2
Road-train indication light	А24-5	3
Searchlight	АКГ24-1	1
Emergency warning light switch	АМН24-3	1

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APPENDIX G
(reference)

Used oil discharge standard, l

Engine	21.0
Gearbox	7.3
Transfer Box	2.7
Driving Axles Gearboxes	19.0;13.0*
Steering Wheel Hydraulic System	3.0
Winch gearbox	6.3

* for 4x4 wheel arrangement trucks

APPENDIX H
(reference)

3.1. Spare Parts, Tools and Accessories

For each truck the plant supplies single spare parts kit-0, tools and accessories.

On the customer's request the following can be added:

- warranty spare parts kit for the power unit consisting of the tools, accessories and spare parts;
- a set of accessories (mobile lamp, manual-operated pump for fuel transfer, lever type grease gun);
- tools kit (fitting and assembly tools, manufactured according to GOST requirements).

Guarantee period of spare parts kit conservation is three years, if stored in a closed room.

The plant is constantly improving the truck, that is why the articles in the spare parts kit can vary. The exact list is specified in the shipping documentation supplied with each truck.

When shipping a truck, spare parts kit-0 is put into a spare parts kit transportation box. Recommendations of operational tools and accessories breakdown for the truck are given in this paragraph.

The manufacturing plant is making such a breakdown for the items mantled on the truck chassis.

Truck chassis has no fire extinguisher, first aid kit, emergency stop sign (can be supplied if additionally ordered).

When driving the truck, the driver can breakdown the tools as it is convenient for him.

Table H.1 - Tools and Accessories Breakdown for Ural Trucks

Position No. in the figure	Item	Quantity
Tools kit in the kitbag 12 (see figure I.1)		
1	1000 g locksmith's hammer	1*
2	Chipper	1*
3	Locksmith's driftbolt	1*
4	A kit of unseating tools for tubes dismantle	1
5	50 socket head	1*[1]
6	Wrench for 65-70 round nuts	1
7	24X27 box wrench	1*
8	Fitting tube	1
9	27X38 socket wrench for wheels	1
10	19X22 special socket wrench	1
11	30X32 socket wrench	1
12	Kitbag	1
13	Socket wrench 6	1

Break-over of Table H.1

In a kitbag (see figure H.1)		
14	Pliers	1
15	22x24 box spanner	1*
16	17x19 box spanner	1*
17	27x30 key	1*
18	22x24 key	1*
19	19x22 key	2*
20	14X17 key	1*
21	11X13 key	1*
22	10X12 key	1*
23	8X10 key	1*
24	5.5X7 key	1*

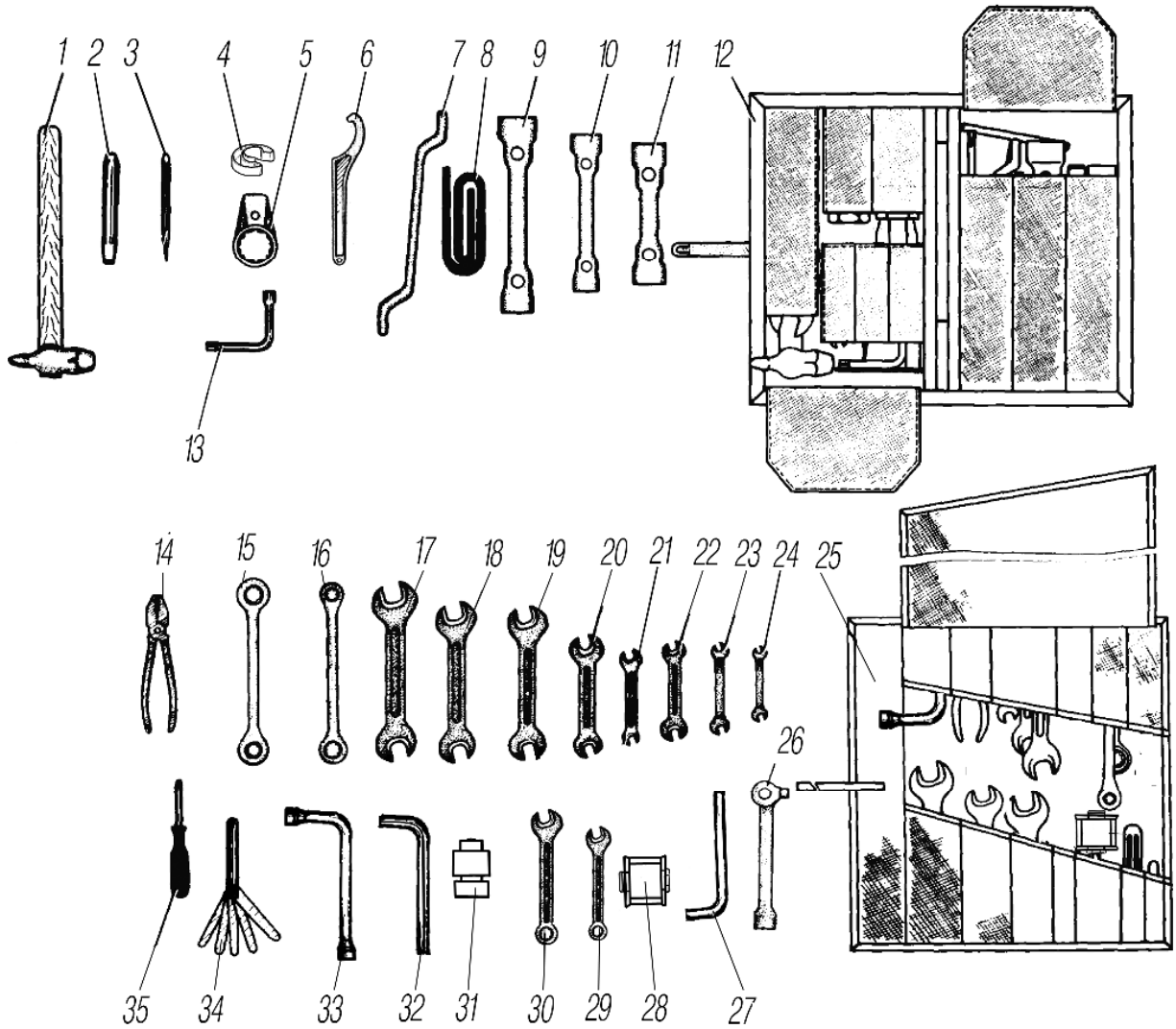
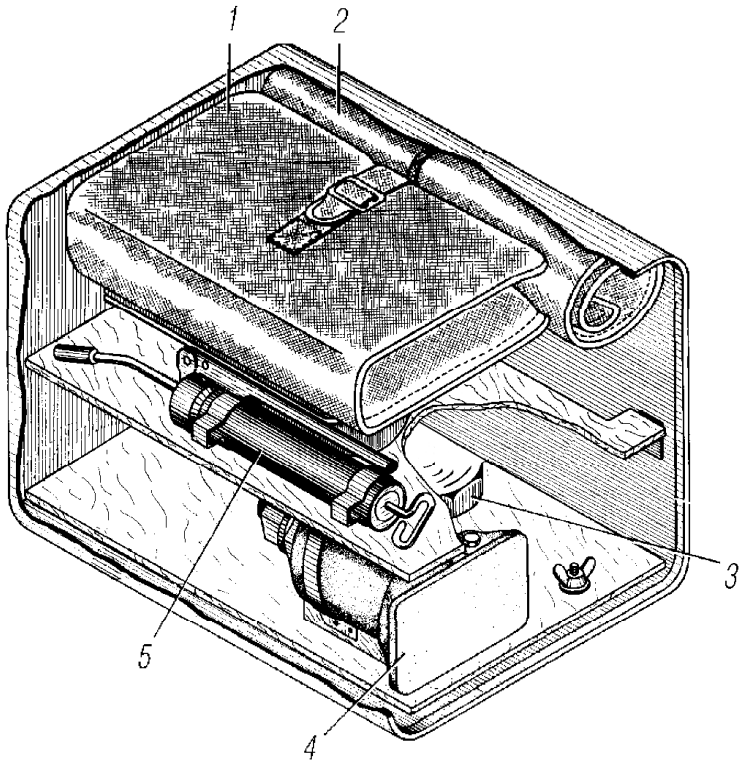


Figure H.1 - Truck Tools

Break-over of Table H.1

Position No. in the figure	Item	Quantity
25	Kitbag	1
26	Socket wrench 24	1
27	A key for replaceable heads	1*[2]
28	“FORCE” filter unseating tool	1*[2]
29	6x6 combination wrench	1*[2]
30	14x14 combination wrench	1*[2]
31	Crankshaft revolution gear	1*[2]
32	Hex key wrench	1*[2]
33	10x10 bent socket wrench	1*[2]
34	Special probe	1*[2]
35	Combination screw driver	1
The tool box (see figure H.2)		
1.2	Kitbags	
3	Socket wrench 140	1



1,2-Kitbags; 3-socket wrench 140; 4-jack; 5-lever type grease gun

Figure H.2 - Tool Box

Position No. in the figure	Item	Quantity
4	Oil jack, 8 t	1
5	Lever type grease gun	1*
-	B-type coupling head with a fitting	1

End of Table H.1

-	Air hose	1
-	Spare wheel bracket winch handle	1
Fixed under the platform		
-	Tire lever	1
In the glove box		
-	Operation Manual	1
On the platform		
-	Distance pipes	1
In the cab		
-	Jacketed canopy	1
In special housing in the front platform part		
-	Canopy bow	1
-	Warm-keeping jacket	1
Under the radiator case		
-	Cab lifting pump lever	1*[3]
-	Fill funnel with a hose	1*[3]

* Delivered on the order
*[1] For 6x6 wheel arrangement trucks
*[2] A part of spare parts kit for YAMZ-536 power unit, delivered on the order
*[3] For cabover trucks

3.2. Hydraulic telescopic jack

3.2.1. Technical Information

Table 32

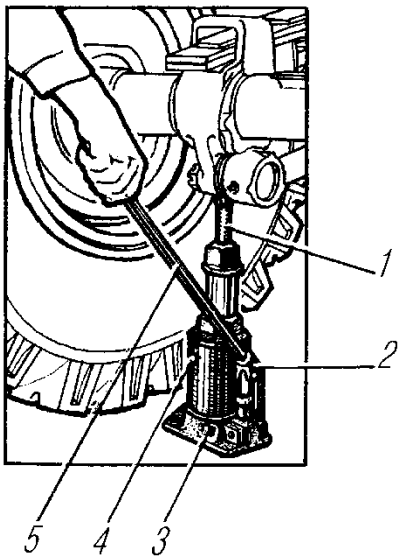
Type	Hydraulic, telescopic, with two operated rams
Lifting capacity, kN (tf)	80 (8)
Jack height when the rams are down and the screw is in, mm	270
Cargo lifting height, mm	285
Oil volume, l	0.6

To lift a cargo by the jack:

- install the jack as needed, screw in the screw 1, as shown in figure K3, as much as necessary, if the ground is soft, put a hard plank or another flat object under the supports to increase the area bearing;
- push the lever 2 twice quickly when the needle valve 3 is unscrewed;
- screw in the needle valve by the tire iron clockwise against stop;
- raise operated rams as necessary by levering with the tire iron inserted into the lever 2.

If the jack is not working due to valves lock, slightly hit the pressure ram lever with the tire iron.

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1 — Inner operated ram screw; 2 — pump lever; 3 — needle valve; 4 — plug; 5 — tire iron

Figure H.3 - Jack Application

To bring a cargo down:

- unscrew the needle valve slowly counter-clockwise;
- unscrew the plug 4 to discharge air and, when the cargo is down, screw it back.

When operating the jack, put blocks under the truck wheels. The truck should be braked with the parking brake, low speed of the gearbox should be actuated.

To jack up the front axle with the jack put the jack head into the spring clip bed, to jack up the rear bogie put the jack head under the spring mountain bracket.

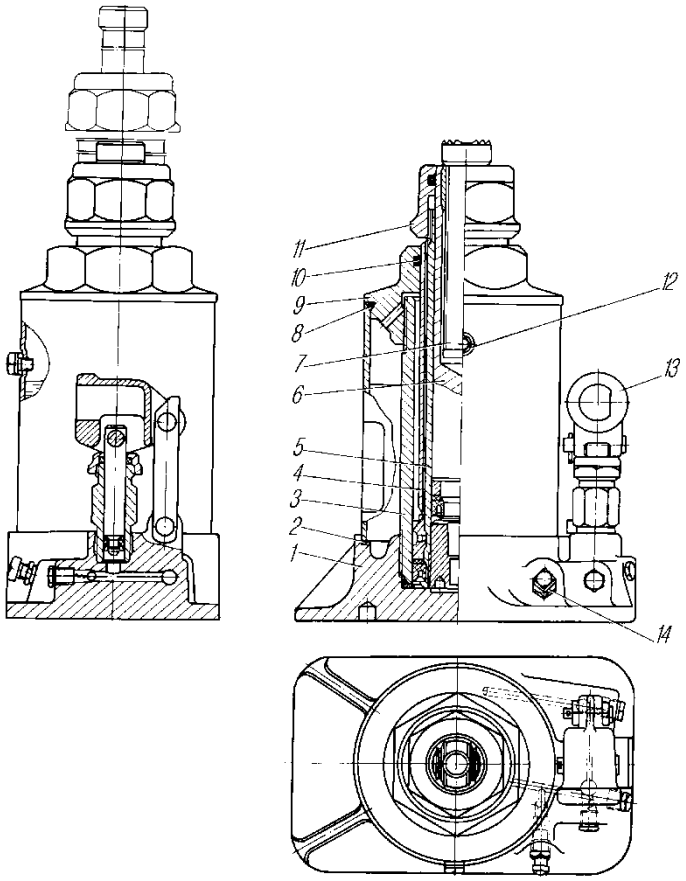
When storing the jack, head screw should be in, operated and pressure rams should be down and the needle valve should be unscrewed.

Eliminate oil leakage in the rams and the needle valve by tightening seal nuts, and oil leakage in housing joints - by tightening the housing head.

To protect jack working space from air, do not lift operated rams by hand when the needle valve is screwed in.

If the jack does not ensure complete working ram travel, check oil level. Add oil until the oil feed opening closed with the plug 4, when the jack rams are completely down and the jack is in vertical position. Figure K.4 shows jack arrangement.

If the jack is not working due to dirt in its working space, drain the contaminated oil through the drain hole, pour kerosene, and bleed the jack with the needle valve unscrewed. Then, when the kerosene is out, fill ВМГЗ filtered oil. It is allowed to fill the jack with МГЕ-10А oil.



1-Base; 2-gasket; 3-outer operated ram cylinder; 4-cylinder tube; 5 and 6-operated rams (outer and inner); 7-screw; 8-compactor; 9-housing head; 10-O-ring; 11-ram head; 12-plug; 13-pump lever; 14-needle valve

Figure H.4 - Jack

Appendix I
(recommended)

List of Gaskets Installed to the Truck

Table I1

No.	Identification	Name	Place of installation	Quan-tity	Fig.	Pos.
			Transfer Box			
1	2.1-80x105-4 or 80x105x10	KTT gasket	Front lid of the main shaft bearing	2 2	51	3
	2.2-70x92-1 or PT 864176-02 or BDUM5SLX26	KTT gasket	Front axle drive shaft bearing cap	2 1 1	51	61
	2.1-80x105-4 or 80x105x10	KTT gasket	Rear axle drive shaft bearing cap	2 2	51	39
2	5323-1803226	Gasket	Neutral gear piston Gear shift piston Piston of the differential lock mechanism	2 1 1	51	9 10 54
			Driving Axles			
3	2.2-70x92-1 PT 864176-02 or BDUM5SLX26	Gasket 2.2-70x92-1 GOST 8752-79/ OST 38 05146-78	Front bearing cap Rear bearing cap	 2 1	 59 59	 20 18
4	2.1-70x92- 4 PT 864176-02 or BDUM5SLX26	Gasket 2.1-70x92-4 GOST 8752-79/OST 38 05146-78	Rear bearing cap	1	59	18
6	375-4224017-03	Gasket	Axle shaft casing	4	60	12
7	4320-3104033 -03	Gasket	Wheel boss	1	63	13
			Truck Suspension			
8	64221-2905338 or 50.2905070 or 50П.2905070	Rod seal Rod seal Rod seal	БААЗ shock absorber ГЗАА shock absorber ПААЗ shock absorber	2* - -	68 - -	4 - -
9	1115-2918180	Safety ring	Balance arm boss	2	69	11

End of Table 11

Power Takeoff with the flange						
10	2.2-45x70-1	Gasket 2.2-45x70-1 GOST 8752-79/OST 38 05146-78	Rear bearing cap	1	145	7
Additional Power Takeoff						
11	2.2-51x76-1	Gasket 2.2-51x76-1 GOST 8752-79/OST 38 05146-78	Bearing cap	1	146	14
Winch (gearbox)						
12	2.2-85x110-1	Gasket 2.2-85x110-1	Winch shaft left bearing cap	1	147	37
13	2.1-45x70-/\3	Gasket 2.1-45x70-/\3	Winch worm end-thrust bearing cap Front end-thrust bearing cap of the winch worm shaft	1 1	137	27
14	4320-4501127-01 (19x32x7)	Gasket 4320-4501127-01 (19x32x7)	Winch gearbox crankcase hole for coupling yoke rod	1	147	

* For 43206 trucks 4 seals are installed

Appendix J
(recommended)

Maintenance Interval Coefficient Correction Chart Depending on Truck Operation Conditions

Table J.1

Operation Conditions Category	Truck operation conditions	Maintenance Interval Coefficient Correction, minimum
I	1) Roads of I, II, III technical categories outside suburban area on a level, gentle terrain and terrain, with concrete or asphalt pavement	1.0
II	1) Roads of I, II, III technical categories outside urban area in mountain countryside, as well as in small towns and suburban area (in all relief types, except mountain) with concrete or asphalt pavement 2) Roads of I, II, III technical categories outside suburban area (in all relief types, except mountain), as well as in small towns and suburban area on level ground with bitumen pavement. 3) Roads of III, IV technical categories outside suburban area with macadam or gravel surface in all relief types, except highland and mountain terrain	0.9
III	1) Roads of I, II, III technical categories outside urban area in small towns and suburban area (mountain terrain), as well as in big cities with concrete or asphalt pavement 2) Roads of I, II, III technical categories outside urban area in small towns and suburban area (mountain terrain), roads in small towns and suburban area (in all relief types, except mountain), as well as in big cities with bitumen pavement. 3) Roads of III, IV technical categories outside suburban area in highland and mountain terrain, roads of suburban areas and small towns, roads of big cities (all relief types, except highland and mountain terrain) with macadam or gravel surface. 4) Roads of III, IV, V technical categories outside suburban area, roads of suburban area and streets of small towns, streets of big cities (level ground), with cobblestone and rock stone, as well as pavements of primers with binding materials. 5) Industrial site roads with improved pavement.	0.8

End of Table J1

Operation Conditions Category	Tractor unit operation conditions	Maintenance Interval Coefficient Correction, minimum
	6) snow roads.	
IV	1) Roads of big cities with bitumen pavement (mountain terrain), macadam or gravel surface (highland and mountain terrain), cobblestone and rock stone pavements and pavements of primers with binding materials (all relief types except level). 2) Roads of V technical category outside suburban area, roads of suburban area and streets of small towns (level terrain) with earth soft or reinforced pavement. 3) Forestry or timber transporting earth roads in proper condition	0.7
V	1) Natural earth roads, on-farm rural roads, quarry and pile roads, temporary access roads to various construction sites and sand, clay, stone, etc. excavation quarries during the periods when driving is possible there	0.6

When calculating the general coefficient correction found by Tables J1 and J2, multiply both. To determine the maintenance interval of a truck regarding its operation conditions, multiply the value of maintenance interval at first category of operation by the general coefficient correction.

Table J2

Natural and climatic region	Maintenance Interval Coefficient Correction
Moderate cold	1.0
Moderate warm, moderate warm and humid, warm and humid	1.0
Hot dry, very hot dry	0.9
Cold (with average January temperature from minus 15 to minus 35 °C)	0.9
Very cold (with average January temperature from minus 35 °C and lower)	0.8

Amendments Registration List

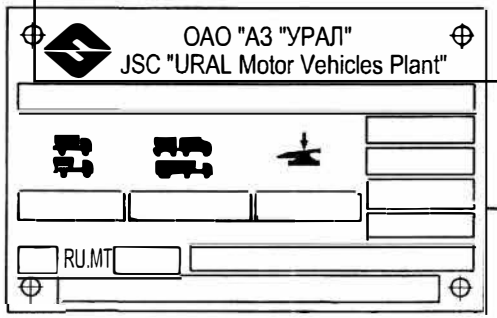
Amendments Registration List									
Amend.	Sheet (page) number				Total sheets (pages) in the document	Document No.	Accompanying document file number and date	Signa-ture	Date
	amended	replaced	new	cancelled					
1	p.37				277	4320M-3902035	4320M-06-16		17.05.16
	p.42				-«-	-«-			
2	p.244, 245				-«-	-«-	4320M-07-16		17.05.16
	p.263				-«-	-«-	-«-		17.05.16
3	P. 13,16, 23, 26				-«-	-«-	4320M-08-16		08.07.16
4	P.36, 37, 40, 42, 43-45		43-45		279	-«-	4320M-01-17		10.03.17

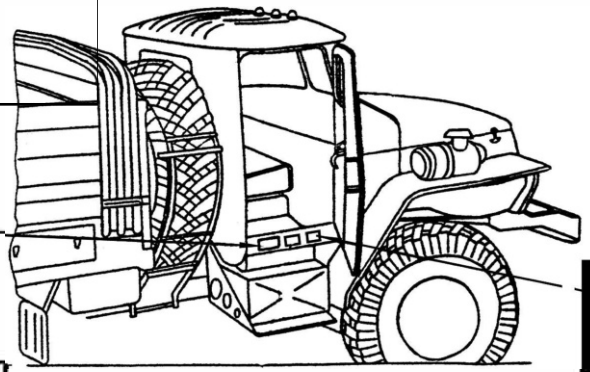
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Guide tablet

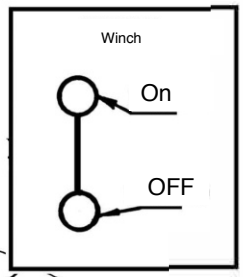
https://truckmanualshub.com/

Tires	Tire pressure kp/cm2		SPEED km/h
All types of roads	Front Tire	Rear Tire	MAX
Cultivated field sandy (soft) ground, virgin snow moorland			
All types of roads for the tire inflation period			standstill



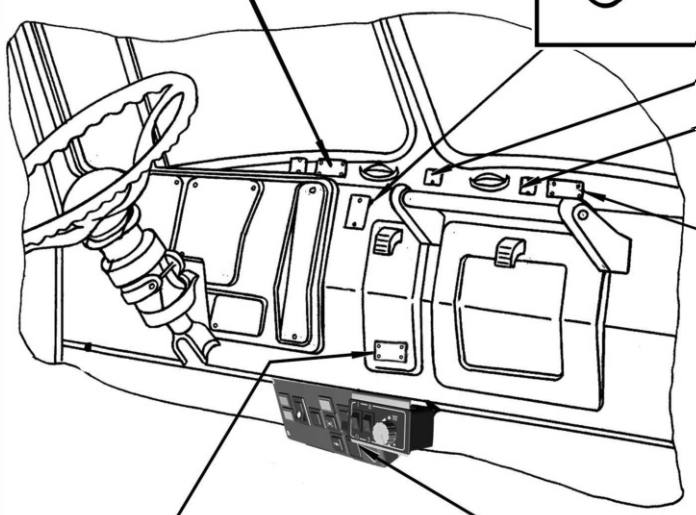


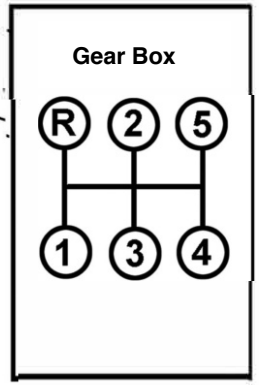


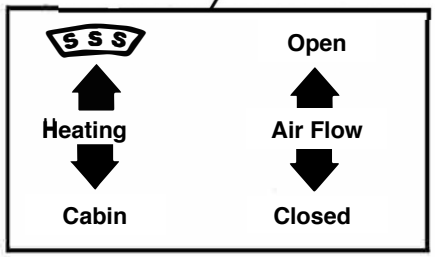


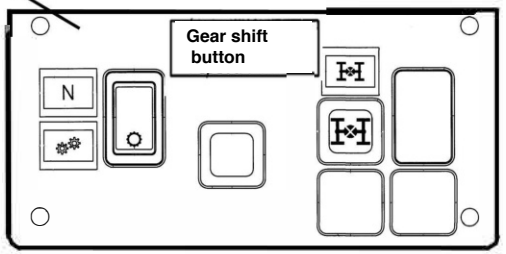
To make a gear shifting of transfer gearbox(GB) set the switchgear on the following position:
top gear
neutral
first gear
Then push the Switch gear of GB (Включение передачи РК) and hold for 5-7 seconds.

1. ON/OFF differential locks should be made when the truck is at full stop. If the locks are not switched on, slowly move the vehicle from a standstill and keep moving at 5 km/h max till differential locka are on.
2. Do not move the truck with differential locks actuated at hard dry roads
3. If cross-axle differential lockbis on, move the truck only straight with the speed of 20km/h max.





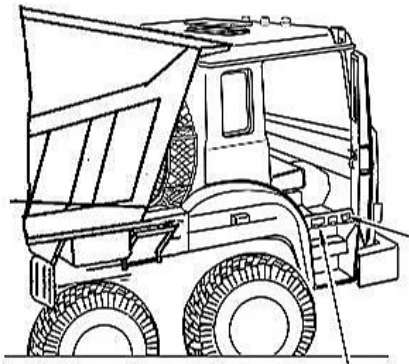




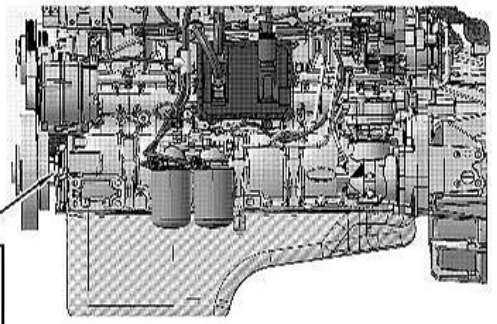


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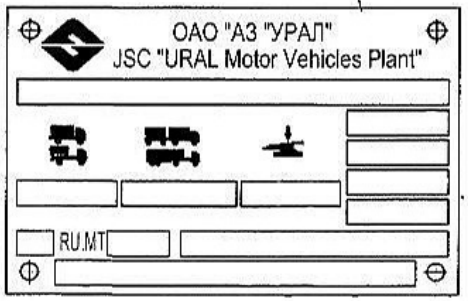
Guide tablet







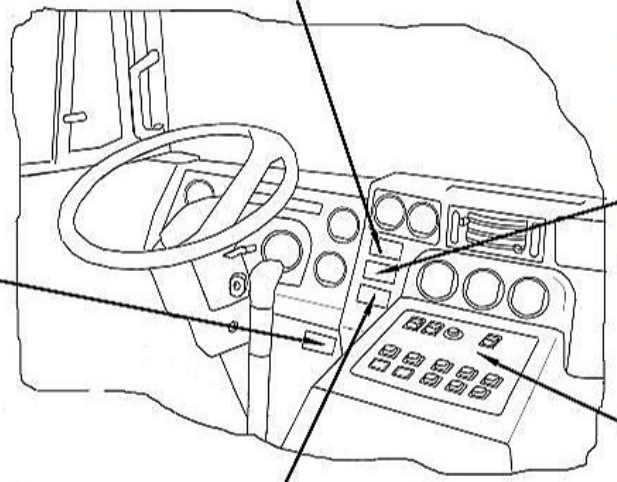


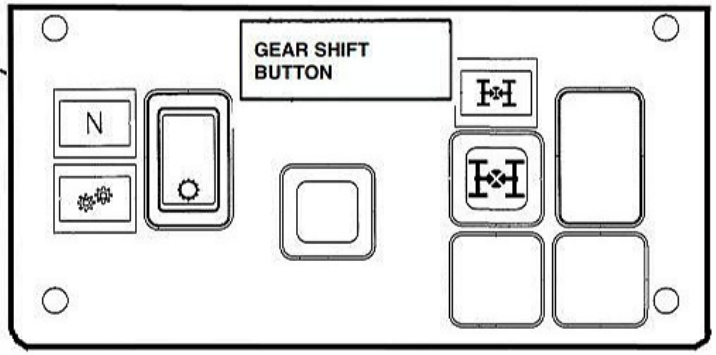


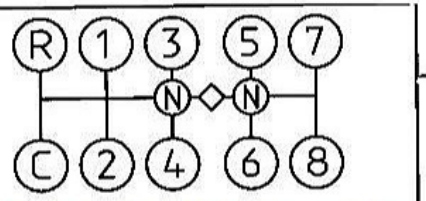
TIRES	Tire pressure kp/cm2		SPEED Km/h
All types of roads	Front tires	Rear tires	
Cultivated field sandy (soft) ground, virgin snow ground moorland			
All types of roads for the tire inflation period			Stand still

1. ON/OFF differential locks should be made when a truck at a full stop. If the locks are not switched on, slowly move the vehicle from a standstill and keep moving at 5 km/h max till differential locks are on.
2. Do not move the truck with differential locks actuated hard dry roads
3. If cross-axle differential locks are on, move the truck only straight with the speed of 20km/h max..

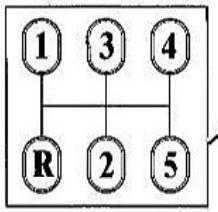
To make a gear shifting of transfer gearbox(GB) set the switchgear on the following position:
top gear
neutral
first gear
Then push the Switch gear of GB (Включение передачи РК) and hold for 5-7 seconds.







C - speed reduction gear, it should be used only for handling with vehicle on the slow speed.
ATTENTION! DO NOT USE FOR MOVING THE VEHILE FROM A STANDSTILL ON A STEEP RISE!



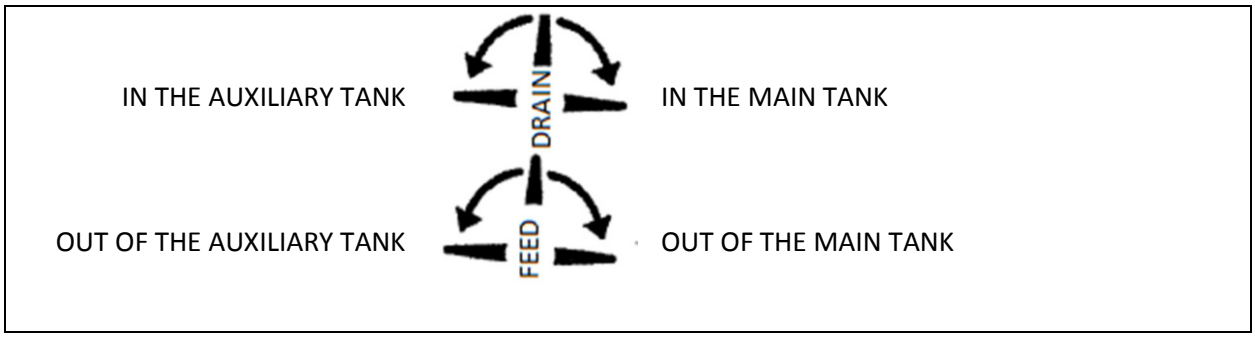
1.

URAL	JST “AP “URAL” Avtozavodtsev str., 1, Miass, Chelyabinsk region, Russia, 456300
Customer Service JST “AP “URAL” 8-800-100-11-74 (Toll-free call) Hot-line@uralaz.ru	

2.

ATTENTION!
Before fuelling turn off the air heating unit of the cabin

3.



4.

IDLING RPM

5.

LEFT SET	13	15A	Dashboard light, searchlights
	12	5A	Parking lights (right side)
	11	5A	Parking lights (left side)
	10	10A	Low beam (right headlight)
	9	10A	Low beam (left headlight)
	8	10A	High beam (right headlight)
	7	10A	High beam (left headlight)
	6	30A	Fuel heating in the filter GOT
	5	5A	ABS of the trailer
	4	5A	ABS of the tractor unit
	3	25A	ABS of the trailer
	2	15A	ABS of the tractor unit
	1		
RIGHT SET	13	5A	Fuel heating in the filter GOT
	12	5A	Breaker UP, transfer box control
	11	10A	Heater
	10	5A	Reverse, interface block diagnostics
	9	10A	Windscreen wiper
	8	7,5A	Speedometer, tachometer, interface block diagnostics
	7	10A	Hazard lights, dome lamp
	6	10A	Main light switch
	5	10A	Horn, fog lights
	4	5A	Ignition switch, valves of power takeoff switch, interaxle differential lock
	3	25A	Reserve
	2	15A	Battery disconnect switch
	1		

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SPTA-S Set List Appendix to OM

(4320Б5-3900033-10) for trucks Ural 3255-3013-79M, 3255-3022-79M, 4320-3171-81M, 4320-3970-80M, 4320-3970-82M, 4320-3971-80M, 4320-4112-81M, 4320-4116-81M, 4320-4121-81M, 4320-4971-80M, 4320-4971-82M, 4320-4972-80M, 4320-4972-82M, 4320-4976-82M, 5557-4112-80M, 5557-4112-82M, 5557-4116-80M, 5557-4121-80M, 55571-4121-80M

(4320Б5-3900033-11)) for trucks Ural 4320-4151-81M, 4320-4151-82M, 4320-4951-80M, 4320-4951-82M, 4320-4952-80M, 4320-4952-82M, 43204-4151-80M, 43204-4153-80M, 5557-4151-80M, 55571-4252-80M

№	Product identification	Product name	Unit	Quantity for a truck	Laying area
		1. Tool			
1	4320Я5-3901007-01	Tool set in the kit bag:			
1.1	375-3901010	Big kit bag	pc	1	In the box
1.2	375-3901035	Hydraulic brake bleed nipple spanner 12 mm	«	1	«
1.3	55571-3901047	Socket head for 50, for 8M.2011.12 substitution is allowed	«	1	«
1.4	4320-3901074	Socket wrench (Hexagon key 6, for 8M.158.358 substitution is allowed	«	1	«
1.5	8M.158.237-01	Socket wrench for screws of the U-bolt 30x32	«	1	«
1.6	8M.158.353	Socket wrench for wheels27x38	«	1	«
1.7	ИП-3901115-01	Socket wrench 19x22, for 8M.158.242 substitution is allowed	«	1	«
1.8	375-3901077	Socket wrench 41x46, for 8M.158.354 substitution is allowed	«	1	«
1.9	28-04125	Stub dual pipe	«	1	«
1.10	И91-3901000	Universal joint screwdriver	«	1	«
1.11	1-200-И	Slip-joint pliers GOST 53925-2010, substitution for 1-180-И is acceptable	«	1	«
1.12	332001	Puller-bolt	«	2	«
1.13	DRK URALAZ	Remover tool kit for pipe dismantling	pc	1	«
2	375-3901124-Б	Socket wrench 140	pc	1	«
3	4185-000-01	Reamer holder blade L-600	«	1	«
		2. Equipment			
1	ДТА-8	Hydraulic leveling jack	pc	1	In the cabin
2	2101-3901350	Tool retention belt (for leveling jack)	«	1	In the box
3	375-3917100-04	Air hose	«	1	«
4	4320-3105862	Winch handle (except trucks 4320-4151-81M, 4320-4151-82M, 4320-4951-80M, 4320-4951-82M, 4320-4952-80M, 4320-4952-82M, 43204-4151-80M, 43204-4153-80M, 5557-4151-80M, 55571-4252-80M)	pc	1	«
5	375-3521012	Coupling head with a stub dual	«	1	«
6	4420БМ-3914030	Warm-keeping jacket for a radiator	«	1	«
7	532303-1301077	Fill funnel with a hose consists of:			
7.1	532303-1301068	Fill funnel	«	1	«
7.2	6361Х-1301107	Pipe	«	1	«
7.3	6361Х-8101424	Hose	«	1	«
8	6361ЯХ-3901057	Lever	«	1	«
		3. Operating documentation			
1	4320М-3902035 РЭ	Operation Manual “Ural-4320M trucks and its Modifications”	pc	1	In the box
2		Supplement No. ДЭ 127-1 (only for trucks 3255-3013-79M, 3255-3022-79M)	«	1	«
3		Service centers	«	1	«

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№	Product identification	Product name	Unit	Quantity for a truck	Laying area
4		SPTA-S Set List	«	1	«
5	536.3902150 РЭ	Operation Manual “YAMZ-536, YAMZ-5362, YAMZ-5362, YAMZ-5363, YAMZ-5364 Engines”	«	1	In the glove box of the truck
6		Operation Manual for ZF 9S 1310 Gearbox (for power units with ZF gearbox) or Operation Manual for YAMZ-0905 Gearbox (for power units with YAMZ-0905 gearbox) or Operation Manual for YAMZ-1105 Gearbox (for power units with YAMZ-1105 gearbox) or Operation Manual for 9JS135TA Gearbox (for power units with FAST GEAR gearbox)	«	1	«
7		Operation Manual (Instruction) for “Lead-acid, starter Storage Batteries”	«	1	«
8		Operation Manual for the Liquid Phase Heater	«	1	«
9		Operation Manual (Instruction) for “Lead-acid, starter Storage Batteries”	«	1	«
10		Installation and Operation Manual for Drawbar Coupling	«	1	«

REMARKS:

1. Due to constant modernisation of the Ural truck construction, improving its reliability and operation conditions, according to the documentation issued by the plant, the SPTA configurations may be partially amended, and such amendments are legalized by the QCD stamp.

If the quantitative difference is observed, it is necessary to provide the act with SPTA-S Set List. Without SPTA-S Set List no claim for replacement will be admitted to examination.

2. The warranty period is no less than 3 years under condition of indoor storage.

Packing date _____

Packer _____

Supervisor _____