

Minsk Automobile Plant

**VEHICLE
MAZ-543403**

Instruction manual

The Republic of Belarus

Minsk, 2011

DEAR DRIVER!

The MAZ vehicle you are going to operate is a highly reliable automobile equipped with modern assemblies and instrumentation, which provides for an easier trailer train driving, easing down on some of the driver's fatigue and enhancing road safety, and makes it possible to considerably increase working efficiency and reduce transportation self-costs.

Before operation of the vehicle, carefully study the manual.

INTRODUCTION

MAZ-543403 – is a 4×4 two-axle vehicle (chassis) with pent busbar of the rear axle wheels (see Figure 1) designed for installation on it various technological equipment and for operation on all types of automobile roads, which are adapted to axial loads specified in the product data sheet . The vehicle is equipped with the Yaroslavl Motor Plant engine and it corresponds requirements of environmental standards Euro-2.

The information on operation and maintenance of the engine, clutch, gearbox is given in separate instructions included with the vehicle additionally.

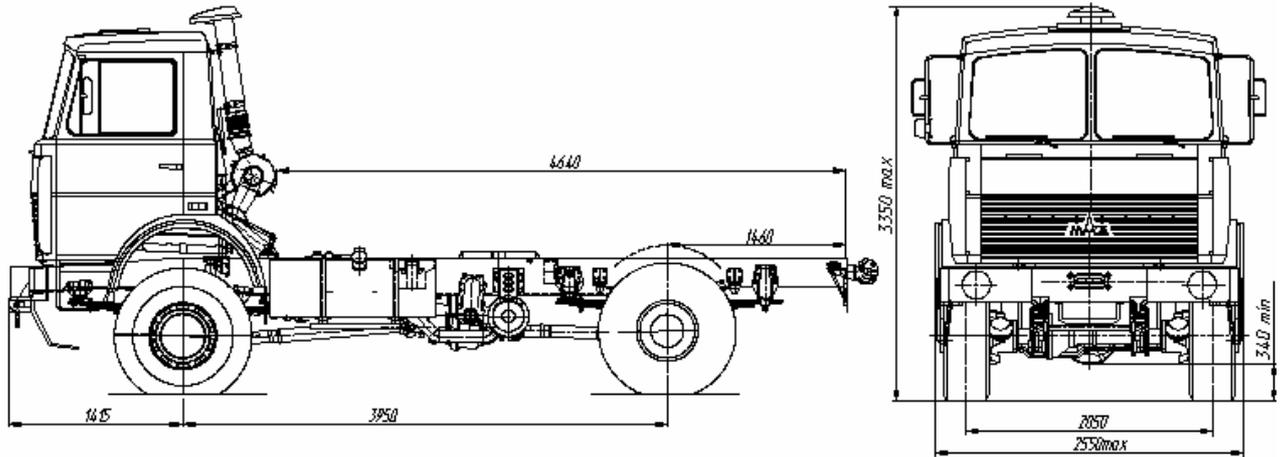


Figure 1 – Automobile chassis MAZ-543403

SAFETY REQUIREMENTS AND WARNINGS

To ensure reliable and effective performance of a vehicle one needs to know how its assemblies and units function, provide for strict compliance with operation, maintenance and servicing instructions and eliminate any deviations from whatever requirements are set out in this operations manual.

Before starting operation of a vehicle, it is necessary to thoroughly examine its construction, study operation, maintenance and servicing instructions provided within this manual, paying special attention to “Particular issues associated with vehicle operation” section.

1 Tightening torques for basic threaded joints are as defined in Annex 2.

2 During a break-in period (for the first 2000 km) it is essential to provide for strict compliance with terms as set out in “Vehicle break-in period” section because further performance of vehicle components largely depends on how well separate parts bed in at the early operation stage.

3 Vehicle assemblies and units shall be lubricated in accordance with instructions set out in “Chimatology list” included into this manual. Application of any oils and lubricants containing contaminants or different from those recommended in this manual **is forbidden**.

4 It is prohibited to drive a vehicle if brake pneumatic drive circuit pressure is lower than 550 kPa, i.e. until indicating lamps for respective circuits go out.

5. The slow range of the additional gearbox shouldn't be turned on at the speed of movement above 25 km/h

6 If a vehicle is started on a slippery road section, it is required to enable interaxial and interwheel differential locks. After the road section is behind, the differentials are to be unlocked. A vehicle with locked differentials is not allowed to enter into a turn.

7 While a vehicle is moving, the driver should monitor its instrumentation and indicating lamps.

8 With engine out of operation and gear box cut-off, a vehicle is not allowed to run at a neutral speed so as to avoid power steering trip-out and air entering brake pneumatic drive receivers.

9 For downward slopes, it is necessary to make sure that vehicle rpm speed is within acceptable range, i.e. rev counter should never go as far as the red section on the instrument dial.

10 It is prohibited to operate vehicles which have defective or failing power steering. While a vehicle is moving, it is recommended not to remove the key from the lock starter and instrumentation switch to avoid steering post interlock and engine shutdown.

11 To prevent steering power pump failures steering wheel should not be held in extreme positions (extreme right and left steered wheel turns) for more than 5 seconds.

12 When parked, a vehicle battery should be disabled by pressing a cut-off push. If a vehicle idle period is rather long (lasts for more than 3 days), it is necessary to take the connector off the battery. It is forbidden to connect 12V electrical appliances (such as radio-recorders, receivers, and etc.) to the battery.

13 Maintenance scopes and frequency requirements as set out in this manual are to be strictly complied with.

14 Power pack servicing scopes are detailed in a separate manual.

15 Power pack servicing is to be carried out on a horizontal flat surface with cabin uplifted **to the maximum extent**.

It is strictly prohibited to perform any works under the cabin unless it is uplifted to the maximum extent.

16 The cabin should be lifted with vehicle stationed on a horizontal even surface. The vehicle must be put on the parking brake. Before uplifting the cabin, the gear-change lever is to be switched into neutral, the doors must be closed and the front cab liner group opened. **While uplifting the cabin, keep a safe distance from the roll over area.**

17 It is prohibited both to uplift or lower the cabin while the vehicle engine is still running and start the engine while the cabin is in the uplifted position, which is necessary to prevent gear box self-start and, accordingly, the resulting unwanted vehicle movement.

When an engine needs to be started with the cabin in the uplifted position to provide for adjustment or repair works, it is necessary to ensure that the gear box is in the neutral position. The starting shall be as required by "Safety instructions."

18 After the cabin is lowered, it is required to ensure that the lock mechanism is in the lock position and the back safety wire rope is fixed into place as appropriate.

19 When washing a vehicle, it is essential to ensure that the stream is not pointed directly at electrical accessories and electric wiring joints.

20 System and electrical accessories circuits state should not be tested with a megohm meter or a lamp supplied from a source with voltage higher than 24V.

21 While the engine is running, it is not recommended to disconnect wiring from generator and battery outputs.

22 It is forbidden to use reverse polarity while connecting the battery to the vehicle-mounted electrical accessories system.

23 When welding a vehicle, the battery must be cut off and the wiring and the brake pneumatic drive piping must be protected from exposure to high temperatures (above 90°C) and welding splashes.

24. While starting the vehicle engine from an external source or using the on-board vehicle network as an external source to start the engine of another vehicle it is necessary to retrieve ABS power fuse to prevent error recording on power supply in the memory of the electronic unit and the ABS disable.

25. It is strictly forbidden to switch "Neutral" in the transfer case, to turn on the power take-off attachment (PTO) and differential lock while driving

26 If a vehicle (a trailer train) is on a public road or is moving through city or settlement streets, transportation operators are to be careful to observe regulatory documentation effective within the respective country in terms of weight and dimensional requirements and transit regulations when those are exceeded.

SPECIFICATIONS

The main weight parameters and specifications of the automobile chassis MAZ-543403 are given in the table 1

Table 1

Parameter	Value
Chassis curb weight with cabine, kg	7700
Curb weight distribution, kg – on the first axle – on the second axle	4950 2750
Technically permissible total weight, kg	16000
Distribution of the vehicle technically permissible total weight, kg – on the first axle – on the second axle	7000 9000
Technically permissible payload, kg	8150
Engine	YaMZ–236BE2T
Nominal engine power, kW	184,0
Gearbox (model)	YaMZ–2381
Road train max speed, km/h	76,0
Reference fuel consumption, l/100 km, for a vehicle (a trailer train) of gross weight moving at the speed of 60 km/h:	40,0
Wheels	Disc, 20-10.00W
Tire size	14.00R20, central tire pumping
Rated wheel tire pressure, kPa**: – on the first axle – on the second axle	650 650

Notes:

1. Gross weight tolerance for an equipped vehicle is plus 3 %. There are no restrictions for the lower weight threshold

2. Equipped vehicle gross weight (standard completeness) is the weight of a vehicle together with cooling fluid, clutch drive fluid, lubricants, windshield washer fluid, fuel (with tank filled up to not less than 90% of its rated capacity), a fire extinguisher, wheel chocks, a standard spare parts and tools package, a spare tire and any other accessories.
3. Reference fuel consumption is used to determine the technical condition of the vehicle and is not an operational norm

Key adjusting data and the chassis filling containers volume are shown in tables 2 and 3

Table 2

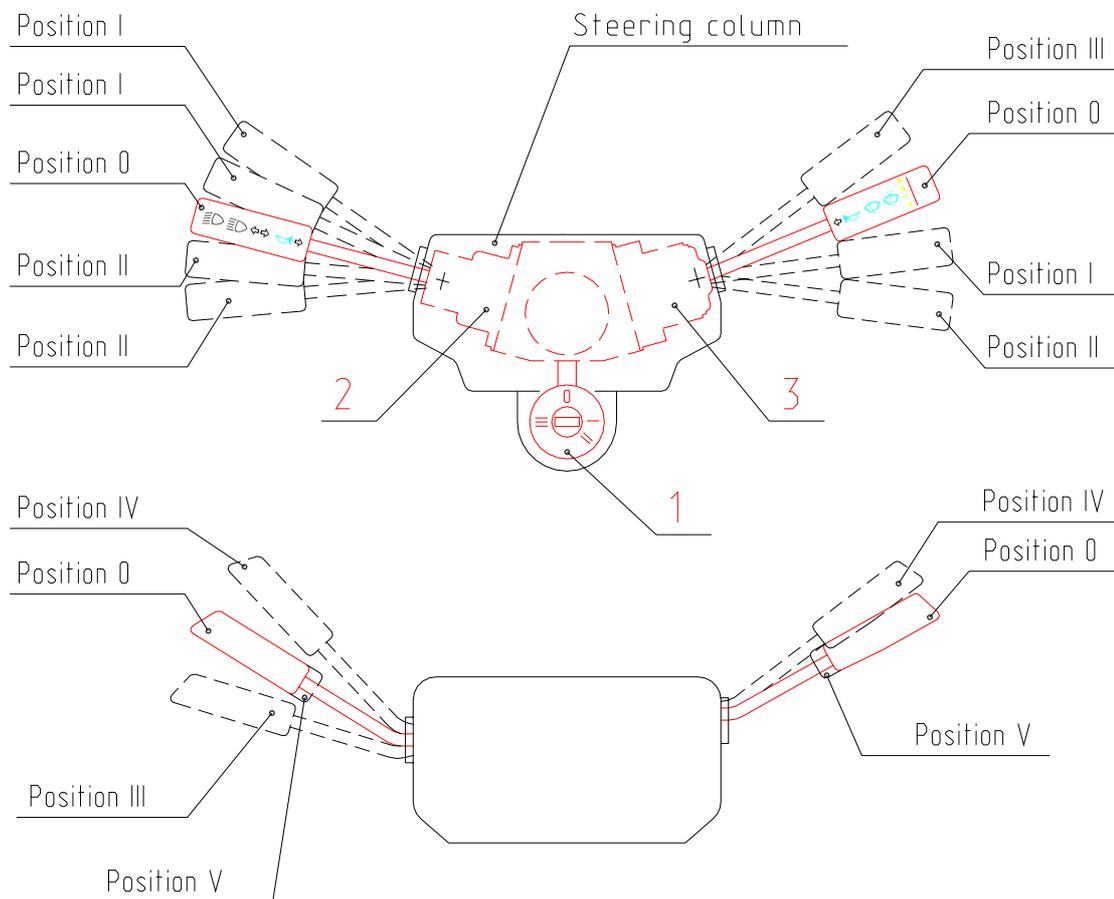
Parameter	Value
Misalignment of wheels	1–2 mm
Turning circle of the internal (respecting the center of rotation) wheel to the left and to the right	(29–1)°
Clutch pedal free travel	(5–7) mm
Brake pedal free travel	(17–27) mm
Brake chamber rod stroke	(38–44) mm

Table 3

Refill capacities	Volume, l
Fuel tank; total capacity	343,0
active capacity	327,0
Cooling engine system	40,0
Lubricant engine system	24,0
Central main gear crankcase: – front and rear axles	up to 4,5
– with a round banjo axle housing	13,0
– with a round banjo axle housing	15,0
wheel gearing crankcase: – front axle	2,3
– rear axle	2,0
Power steering system	6,5
Windscreen washer tank	10,0

CONTROL ELEMENTS AND MEASURING INSTRUMENTATION

Control elements and measuring instrumentation arrangement is as shown at Figures 2, 3, 4 and 5.



- 1 – starter and instrumentation lock switch with an antitheft device;
- 2 – turn indicator switch, dipped and distance headlights switch;
- 3 – windscreen wiper and windscreen washer switch

Figure 2 – Switches below the steering wheel and the starter and instrumentation switch

Starter and instrumentation lock switch 1 (Figure 2) with an antitheft device. Position III is for key insertion and removal from the lock switch.

To unlock the steering post shaft it is necessary to insert the key into the lock switch and, to avoid damage to the key, to slightly turn the steering wheel to the left and then to the right. After that, the key is to be turned clockwise into “O” position.

As soon as the key is removed from the lock switch (i.e. from position III), fuel supply stops and the lock mechanism for the switch is enabled. To lock the steering post shaft it is necessary to turn the steering wheel to the left and then to the right.

Other in-switch key positions:

- 0** – neutral (fixed) position. Starter and instrumentation circuits are cut off;
- I** – supply and instrumentation circuits are on (fixed position);
- II** – supply, starter and instrumentation circuits are off (the position is not fixed).

Switching handle 2 for the turn indicator of dipped and distance lights

Its positions are as follows:

Horizontal:

0 – neutral;

I – (fixed) – right turn indicators on; the indicators switch off automatically;

II – (not fixed) – right turn indicators are short term on;

III – (not fixed) – left turn indicators are short term on;

IV – (fixed) – left turn indicators on; the indicators switch off automatically.

Vertical:

V – (not fixed) – distance headlights are short term on (irrespective of the main light switch position);

0_I – (fixed) – dipped lights are on with headlights enabled at the main light switch 12 (Figure 4).

VI – fixed, distance lights are on with headlights enabled at the main light switch.

When the handle is pressed from the end face plane, an electrical audible beep sounds.

Switching handle 3 for windscreen wiper and washer

Its positions are as follows:

Horizontal:

0 – neutral;

I – (fixed) – the windscreen wiper is on – low speed;

II – (fixed) – the windscreen wiper is on – high speed;

III – (fixed) – the windscreen wiper is on and is operated in an intermittent mode. The interval is regulated up to 60 seconds

To set the time interval of the "pause" for the windscreen wiper in intermittent mode one should:

- Transfer wiper switch from the "intermittent mode» (III) to "neutral" (O);

- Return the wiper switch to the "intermittent mode» (III) after a period of time required for effective work.

Time spent in the "neutral" switch mode (O) further will be equal to the time of the wiper switch in the "pause" mode.

Return to the original time of "pause" (2-3 seconds) take place:

- when wiper switch is in the low or high speed mode,

- when the ignition lock is off

- when the wiper switch is in the neutral position (O) more than 60 seconds, windscreen wiper is enabled in the "intermittent mode".

Vertical:

IV – (not fixed) – the windscreen washer is on and is run simultaneously with the windscreen wiper in a low speed mode.

When the handle is pressed from the end face plane, an electrical audible beep sounds (if it's available).

Parking and emergency brake control valve handle. The handle can be fixed in either of the two extreme positions. As soon as the handle is switched into the rear fixed position, the parking brake is enabled. And when it's in the fixed front position, the parking brake is off. If the handle is held down in any of the intermittent positions (not fixed), the emergency brake is enabled.

Secondary brake control valve handle. When the handle is pushed, the throttle gate blocks the discharge gas line flow passage, which causes backpressure within the gas discharge system with simultaneous fuel supply cut-off.

Battery switch remote control button 1 (Figure 4). In case of remote control system failure, the switch can be enabled or disabled by pressing the on-case button. The switch is located on the battery mounting bracket. When the switch is enabled, the voltage meter pointer starts to shift.

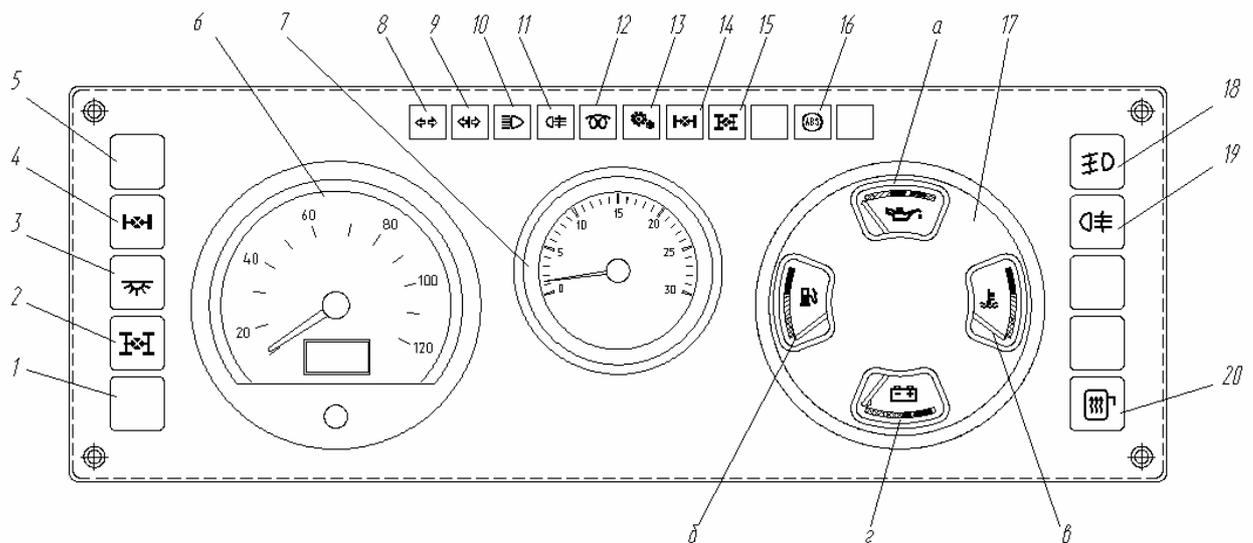
Cabin heater fan switch 2 (Figure 4). The fans can be operated in two modes: maximum rotational velocity (the first fixed switch position) and minimum rotational velocity (the second fixed switch position).

Rev counter 7 (Figure 3). This is a device indicating engine shaft rpm speed (connected to the generator phase and 8A fused).

The rev counter dial is divided into three sections of different colour:

- the green section is to indicate that the engine shaft rpm speed is within the engine economy mode range;
- the yellow section is to indicate that the engine shaft rpm speed range where intermittent engine work mode is possible;
- the red section is to indicate the engine shaft rpm speed range where engine operation is not possible.

Those dial sections which do not have colour designation are to indicate engine shaft rpm speed ranges which are not recommended because of high fuel consumption rates.



1 - centralized switch of pressure release in tires 2 – interaxle differential lock switch; 3 – the switch of plafond lighting engine; 4 – interwheel differential lock switch; 5 – the switch of tire central pumping; 6* – speedometer 7 – rev counter; 8 – vehicle turn indicating lamp; 9 – distance headlight indicating lamp; 10 - trailer turn indicator lamp 11 – rear fog light indicating lamp; 12 – engine electric torch heater indicating lamp; 13 – downshifting indicating lamp; 14 – interwheel differential lock activation indicating lamp; 15 – interaxle differential lock indicating lamp; 16 – vehicle ABS indicating lamp 17 – instrument board: a) – engine oil-pressure indicator in engine; b) – fuel indicator; c) – coolant temperature indicator; d) – voltage meter; 18 – fog lamp switch; 19 – rear fog light switch; 20 – rear-view mirror heating switch (if rear-view mirrors are installed)

Figure 3 – Control panel**

* Rev counter installation is possible

** If a vehicle is equipped with the antilock system, supplementary antilock brake system indicating lamps are installed on the control panel.

Air pressure indicator 16 (Figure 4) in brake circuits:
upper dial – in the front circuit, lower – in the rear circuit.

Alarm system switch 13 (Figure 4). When on, vehicle and trailer left and right turn signals are lit simultaneously.

Main lights switch 15 (Figure 4). Its fixed positions are as follows: neutral, tail and gauge dial backlights on, headlights on (distance and dipped lights depending on the position of the handle 2 (Figure 2) of the turn signal switch, distance and dipped lights switch).

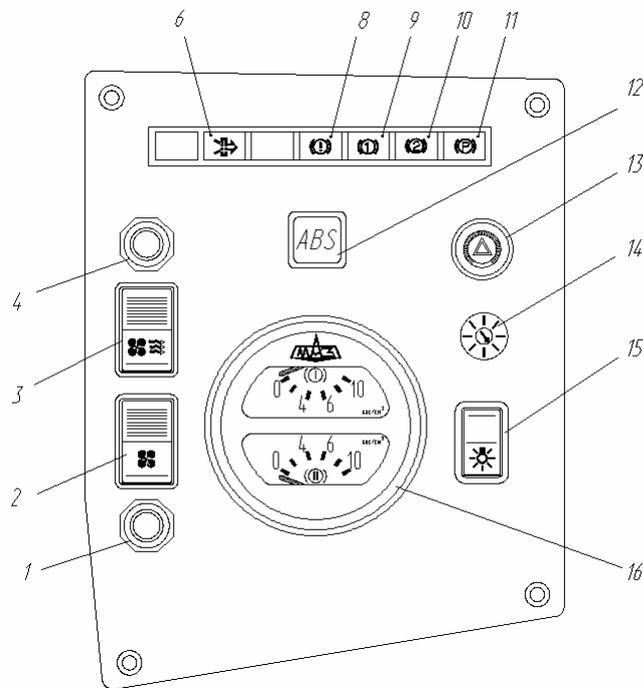
Rev counter (if installed) – device indicating driving speed, current time and mileage, and making a record on the inserted CD (coded as driving speed, current time, mileage, fuel consumption and driving mode).

The following indicating lamps and warning devices are located on the panel (Figure 5):

Warning device 1 for oil level decrease in the power steering tank;

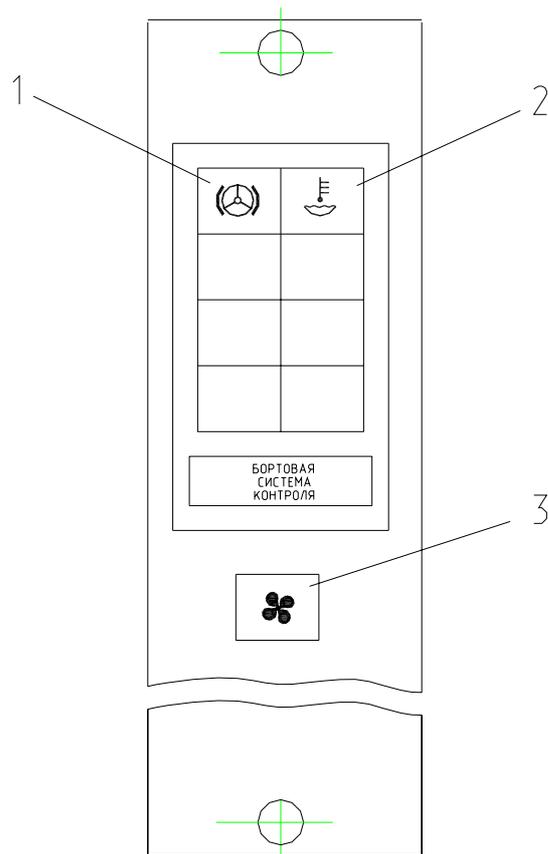
Warning device 2 for coolant fluid level decrease;

Indicating lamp 3 of the fan clutch.



1 – battery switch; 2 – cabin heater fan switch; 3 – cabin heater fan mode switch; 4 – electric torch switch; 5 – air filter blocking indicating lamp; 6 – air filter blocking indicating lamp; 8 – brake malfunction indicator lamp; 9 – indicating lamp for insufficient air pressure in the brake system of the front circuit; 10 – indicating lamp for insufficient air pressure in the brake system of the rear circuit; 11 – parking brake indicating lamp; 12 – searchlight switch; 13 – alarm system switch; 14 – instrument scale lighting resistor; 15 – main light switch 16 - two-pointer indicator for air pressure in the front and rear brake system circuits.

Figure 4 – Auxiliary panel



1 – warning device for oil level decrease in the power steering tank; 2 – warning device for coolant fluid level decrease; 3 – indicating lamp of the fan clutch

Figure 5 – Panel

CABIN ACCESSORIES

Rear-vision mirrors are installed outside of the either side of the cabin. Mirrors position is adjustable.

Windscreen wiper with electric actuator, two-speed, third-brush intended for windscreen wiping, actuated with handle 3 (see Figure 2), located on the right side of the steering post.

Windscreen washer with electric actuator. The washer pump is enabled with the same switch as the wiper. Water jet from the tank is directed to the windscreen via two spray diffusers. The switch released, the pump stops. The water jet direction is adjusted by turning the head spray diffusers.

Driver's and passenger's seats with air bellows 4 (Figure 6) furnished with vertical and horizontal adjustment mechanism and seat back angle adjustment mechanism. The head restraint and armrests set is made on customer's request.

The vertical seat control mechanism - of a bar type with stepped adjustment. Seat height, as well as the slope is regulated by the handles 5 and press / release of the front / rear part of the cushion 7.

The seat slope mechanism - of a bar type with stepped adjustment, allows to adjust the slope angle using handle 3 with the simultaneous pressure on the seat back.

Seat horizontal adjustment mechanism (forward/back) – skid type with stepped adjustment of the seat position is performed by handle 6.

The armrests 9 recline (up) and their angle is smoothly adjusted by handle 10.

Height and angle of the headrest are adjustable.

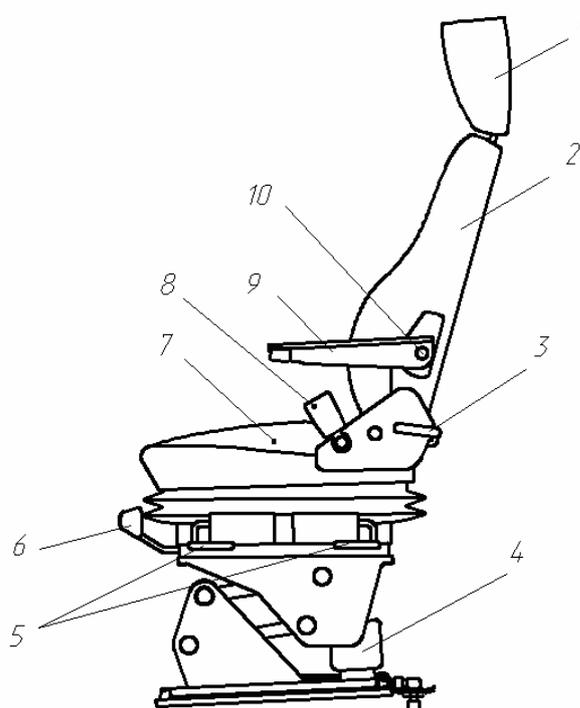
To the driver's attention!

Seat adjustment during driving is forbidden.

The passenger seat may be both unadjustable and adjustable as ordered by the purchaser.

Fixing points for safety belts are provided.

While using seats, bad contacts with the interior elements and other furnishings are forbidden.



1 – headrest; 2- seat back; 3 –seat back angle adjustment mechanism; 4 – air bellows; 5 –vertical seat adjustment mechanism handle; 6 – horizontal seat adjustment mechanism handle; 7 – seat cushion; 9 – armrest; 10 – handle for armrest angle adjustment

Figure 6 – Driver's seat

The passenger seat may be both unadjustable and adjustable as ordered by the purchaser. Fixing points for safety belts are provided.

Cabin is equipped with transformable bed. Transformable bed has two positions: horizontal – for rest, vertical – transport position.

To convert the bed from the transportation position to position for the rest it is necessary:

- to lower the seat with handles 5 to a maximum extent (Figure 6);
- to tilt the seat back 2 forward to the horizontal position using the handle 3 (if necessary, raise up the wheel column and move the seat forward until it stops using handle 6);
- to move the seat forward until it stops with the handle 6.

The similar action should be performed with the passenger's seat.

- to unfasten the straps which fix the bed to the cab;
- to pull the handle of the bed and move it to the horizontal position, avoiding harmful contacts with the cabin interior.
- to set the latches into the locks on the rear wall of the cabin until they click.

To put the bed in the transport position, pull up the cable, located between the bed and the cabin rear wall to unlock the latches, and then do all the actions in reverse order of setting the bed in the position for rest

It is forbidden to stay in front of the cabin while it is being raised or lowered. Before capsizing the cabin it is necessary to verify if the cabin doors are carefully closed and there no any unattached objects in there, the fall of which may cause damage to the cabin.

Cabin doors

The cabin doors are double paneled, pressed form plate steel, welded and canted along the perimeter. In the middle of the inside door panel there are slots for windows mounting and dismounting, a window regulator, a door lock and a lock actuator component.

The doors are equipped with rotary type locks. In order to block the door lock in the closed position from inside of the cabin, press down the lock actuator element handle against the stop and then, without releasing the handle, slowly return it into the original position.

Glare shields. Two glare shields are installed inside the cabin in front of the driver's and passenger's seats. Shields are lifted and lowered manually

Radio receiver or radio recorder is installed on the knapsack shelf of the cabin, if additionally requested by the purchaser.

The cabin is lit by two main dome lamps with internal switches.

The main dome lamps may be switched on when the battery is on as the dome lamps are connected with the use of a two-wire arrangement (plus and minus to the lamps are supplied from the battery terminals).

To reduce vibration load on the driver's workplace, the large cabin is spring-mounted: front springing is achieved by two hinged supports resting on coil springs, two shock absorbers and an antisway bar, back springing is achieved by installation of cabin support beam on two coil springs and two telescopic shock absorbers located inside the springs.

Knapsack shelf intended for team's small belongings is located above the windscreen.

Against additional payment, a refrigerator intended for food storage may be installed in the cabin under the lower bunk behind the driver's seat.

LIST OF PRE-SALE PREPARATION OPERATIONS

- 1 Depreservation (antirust compound removal).
- 2 Visual inspection for transportation damages. Check accessories, tools, manuals according to the packing list.
- 3 Position the items, devices temporarily dismantled for transportation.
- 4 Check oils availability, their level in assemblies and units; top up, if needed.
- 5 Top up cooling fluid (if needed).
- 6 Check batteries condition, their fixings (top up electrolytic solution, recharge, fix, if needed).
- 7 Check the pneumatic brakes, the clutch linkage, electrical equipment, alarms, the cabin roll-over system, tire pressure, wheel attachments, and other joints and, if required, eliminate any failures.
- 8 Check assemblies and systems in all modes and, if needed, eliminate any failures.
- 9 Check steering mechanisms operation with engine running (steering wheel rotation) and, if needed, eliminate any failures.
- 10 Check the vehicle from below (ensure no cooling fluid, oil, fuel leakage, joints reliability) and, if needed, eliminate any failures.
- 11 Wash the vehicle, touch-up, if needed.
- 12 Instruct the owner, driver.

VEHICLE BREAK-IN PERIOD

Service life and reliability of assemblies and mechanisms, vehicle operational cost-effectiveness in many instances depends on how well its parts bed in at the early operation stage.

During break-in period, it is required to monitor fixtures state, tightening up loose bolt and other connections, as well as assemblies heating and, if the latter is excessive, determine the cause and eliminate any defects.

For new vehicles and in cases of wheel replacement, wheel nuts are to be tightened after about 50 km of mileage. Afterwards, wheel nuts must be tightened on daily basis, using the same torque, until firm adherence is achieved.

For new vehicles, break-in periods correspond to 2000 km mileage.

The break-in period has restrictions as follows:

- the break-in mode for the vehicle should be sparing;
- weight of load transported by the vehicle (trailer train) must not exceed 60% of the nominal weight;
- driving speed at each gear should not exceed $\frac{3}{4}$ of the maximum allowable speed or allowable engine rpm;

After 2000 km mileage speed can be gradually increased to its maximum or, accordingly, to the maximum allowable engine rpm.

Recommendations regarding servicing of the engine, clutch and gearbox during and after the break-in period must be observed in strict compliance with the manufacturing plant instruction guidelines.

At the early operating stage, after 2000 km mileage, it is necessary to carry out maintenance as follows:

- 1 Change oil in vehicle units and assemblies as specified in the chimmotology lists.
- 2 Perform the entire scope of works as stipulated for maintenance (A) and carry out supplementary fixing operations as stipulated for maintenance (C) (see section “Maintenance”).

After the above requirements are complied with, the vehicle can be operated as usual.

PARTICULAR ISSUES ASSOCIATED WITH VEHICLE OPERATION

Pre-operation procedures for the vehicle

Prior to operation, it is recommended to carry out some preliminary works, which presuppose checks and filling-in with operational fluids.

Depending on vehicle transportation conditions, batteries can be installed with or without electrolytic solution.

Batteries, if they are empty of electrolytic solution, must be put into the working trim, and the ones with electrolytic solution, if necessary, must be adjusted in terms of electrolytic solution density.

Besides, the following checks should be carried out:

- check availability of cooling fluid and its level in the expansion drum and, if necessary, top it up;
- check oil level in the engine pan, gearbox, drive axles, power steering system and, if necessary, top oil up to the required level;
- check drive belt tension of the water pump, the generator, the compressor and the power steering pump;
- check in-tire air pressure and, if necessary, adjust it as appropriate.

RULES FOR CABIN UPLIFT

Free access to the engine and its systems, the steering arrangement and other assemblies located in the front part of a chassis is ensured by cabin roll-over against front hinged supports.

Prior to cabin uplift, switch the gear-change lever into the neutral position, remove the wire rope from the pin, open the cab liner group and, using the respective handle, open the cabin lock mechanism. For this purpose, the handle must be installed into bushing 2 (Figure 7) and lowered down to the maximum.

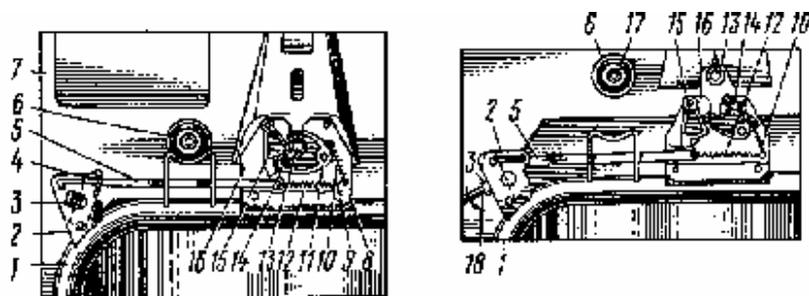
Cabin uplift. For cabin uplift, turn the pump distribution block handle into “Lift up” position and, using the handle inserted into the pump drive shaft hole activate the pump, until the cabin is uplifted to its maximum.

As soon as the instable equilibrium position is reached, further cabin roll-over is inadvertent.

Cabin lowering. For cabin lowering turn the distribution block handle into “Lowering” position and lower the cabin, carrying out operations identical to the above.

When the cabin is in the downmost position, the automatic locking mechanism is enabled, after which safety wire rope must be put onto the cabin axis pin.

The power unit should be serviced with cabin uplifted to its uppermost position.



- 1 – truss; 2 – bushing with a lever; 3 – bracket; 4 – linkage; 5 – support;
6 – washer; 7 – knuckle; 8 – cheek; 9 – pin; 10 – grabber; 11, 12 – springs

Figure 8 – Cabin lock mechanism:
a) lock mechanism open; b) lock mechanism closed

DRIVING AND CONTROLLING THE VEHICLE

When breaking away or moving along slippery road sections, interwheel and interaxle differential lock is recommended to be enabled for a short-term (for a distance not exceeding 1 km). The lock must be enabled immediately before entering a slippery road section. In this case, it is required to throw in the clutch and enable the lock mechanism after the vehicle stopped moving.

It is forbidden to enable the differential lock mechanism at wheel slippage.

Use fog-lights to improve observability while driving in the rain, fog, snowfall.

Remove the leg from the clutch pedal while driving to avoid clutch slippage and failure.

When parked, the vehicle must be put on the parking brake and the gear box must be switched into the neutral position.

To tow a vehicle:

1 Detach the propeller shaft from the intermediate axle flange and fix it securely onto the vehicle frame.

2 Disengage the vehicle from spring brake accumulators; fulfill rigid towing.

3 Unlock the steering post or detach the drag link from the tie-rod arm.

Vehicle brake control

MAZ vehicles have separate pneumatic drive circuits for front and back wheel brake devices, auxiliary, parking and emergency brakes. Driving with lit indicating lamps 8, 9, 10 (Figure 4), signaling insufficient brakes pneumatic drive circuits pressure, is prohibited.

At first signs of stowage or sideslip of a trailer train, release the service brake pedal and change for auxiliary brake, avoiding drift by turning the steering wheel towards where the drift is directed.

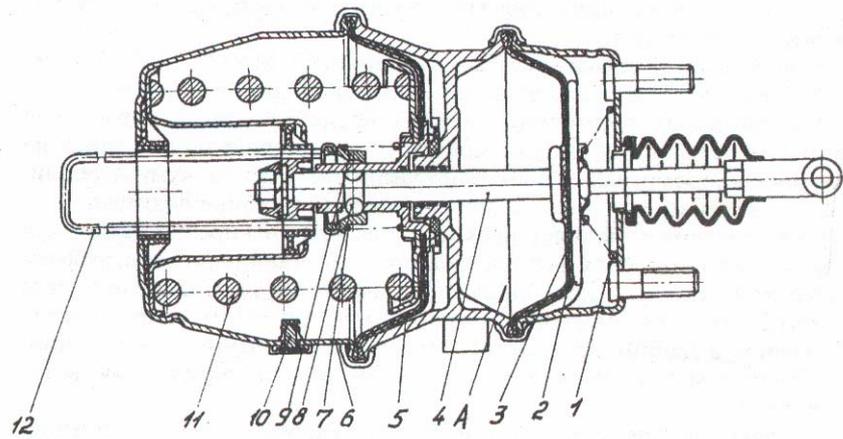
To slow down trailer train motion at down slopes use the auxiliary brake and, if needed, snub using the service brake. At this point, note that auxiliary brake is most efficient when the supplementary box is in the slow range.

While driving along the slippery roads, a trailer train is recommended to be driven “at full length”. For this purpose, in the first place, put the vehicle on the auxiliary brake. Auxiliary rate intensity depends on control valve handle steering angle. The parking brake is enabled when this handle is turned into the back fixed position.

When parking drive circuit pressure is low, spring accumulators are enabled and the vehicle is put on the brake. To brake off the vehicle unscrew pusher fixing bolts from spring accumulator cylinders (see Figure 8) or press pusher 12 while installing the spring accumulator (Figure 9).



Figure 8 – Unscrewing the pusher accumulator fixing bolt



1, 7, 11 – springs; 2, 5 – diaphragm; 3 – disk; 4 – guide bar; 6 – cylinder;
8 – balls; 9 – fixing bushing; 10 – breather hole; 12 – pusher

Figure 9 – Spring accumulator

Vehicle control

While driving, monitor instrumentation indications and indicating lamp signals. Air pressure in the brake pneumatic drive circuits must be 637–784 kPa.

Besides instrumentation, assembly systems state is controlled by lamps indicating:

- when engine lube system pressure drops below 68–98 kPa (lamp for the oil pressure indicator);
- when cooling fluid temperature goes up (lamp for the fluid temperature indicator);
- and when fuel left in the tank is sufficient only for another 20 km (lamp for the fuel level indicator).

When enabling the parking brake, the interwheel and interaxle differential locks, turn lights, when brake mechanism pneumatic drive circuits pressure drops below 441–539 kPa, lamps on the instrumentation panel start to flash, and when chassis is on – those on the speedometer.

Engine power supply system

The coarse filter 4160RHH10MTC (4160RHHPA10MTC–MAZ) or 490RHH30MTC (4160RHHPA30MTC–MAZ) is installed into the suction-pipe in order to protect diesel engine fuel system (booster pump, fuel pump, injectors, valves and pistons), to improve combustion and to provide fuel economy.

Pump fuel system using manual fuel pump, which is mounted on the coarse fuel filter, before starting the engine. Remove air from the coarse fuel filter, installed on the chassis and from the fine fuel filter, which is set on the engine. If there no air bubbles in the nozzle, set on the coarse fuel and fine fuel filters, while pumping the fuel pump, it means the air absence in the fuel supply system.

It is necessary to produce a sludge sink from the coarse fuel filter on a daily basis.

Filter replacement is recommended (the recommendations of the fuel filter manufacturer):

- for 4160RHH10MTC (4160RHHPA10MTC-MAZ) - after 15 000 km;
- for 490RHH30MTC (4160RHHPA30MTC-MAZ) - after 20 000 km

Anti-lock brakes

The 4-channel anti-lock brakes system (ABS) type 4S/4M (4 sensors / 4 modulator) with a microprocessor control unit produced by “Wabco” (Germany) or "Ekran" (Belarus) can be installed on a vehicle.

The main purpose of the system - automatic maintenance of optimum vehicle braking without wheels locking no matter what the road is: slippery or dry.

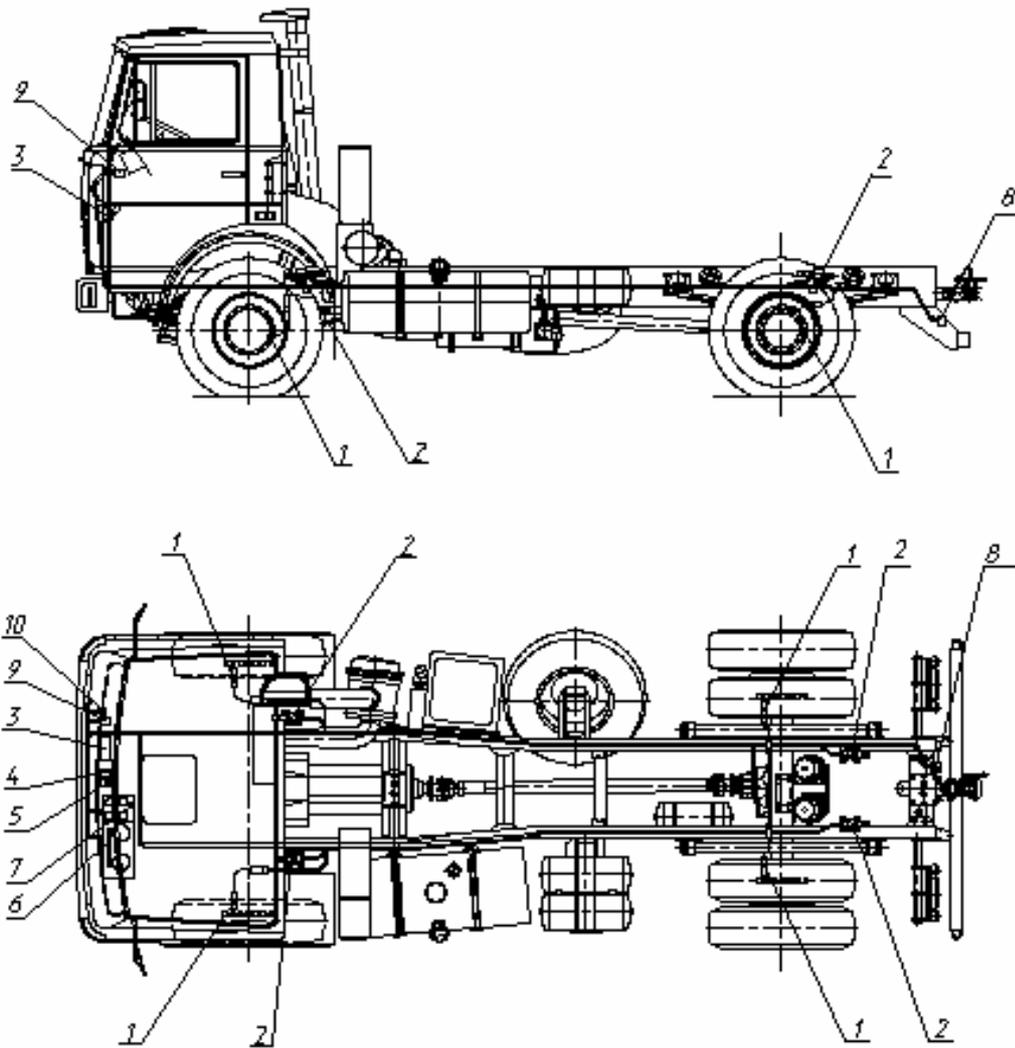
Through this vehicles acquire a number of advantages:

- Improved active safety provided by break stability and control and improved break efficiency, especially on wet and slippery roads
- Eextended life of tires
- The possibility for increasing the average safe speed:
- In addition, the ABS construction, applied by “Wabco” provides a possibility to use the speed limit mode, while ABS system produced by Belarusian Industrial Association “Ekran” provides storage and delivery of information about the last vehicle braking performance (average deceleration) and system pre-emergency mode over the last 40 seconds.
- The system elements layout on the chassis and the instrument panel layout are shown in Figures 10 and 11
- The sensors are installed on wheels of front and rear axles. At the same time on a three-axle vehicles in the anti-lock mode the group breaking wheels control of rear and medium axles of a corresponding board side of a trolley is performed by the same modulator.

Compliance with the rules and additional safety measures when operating a vehicle with electronic systems

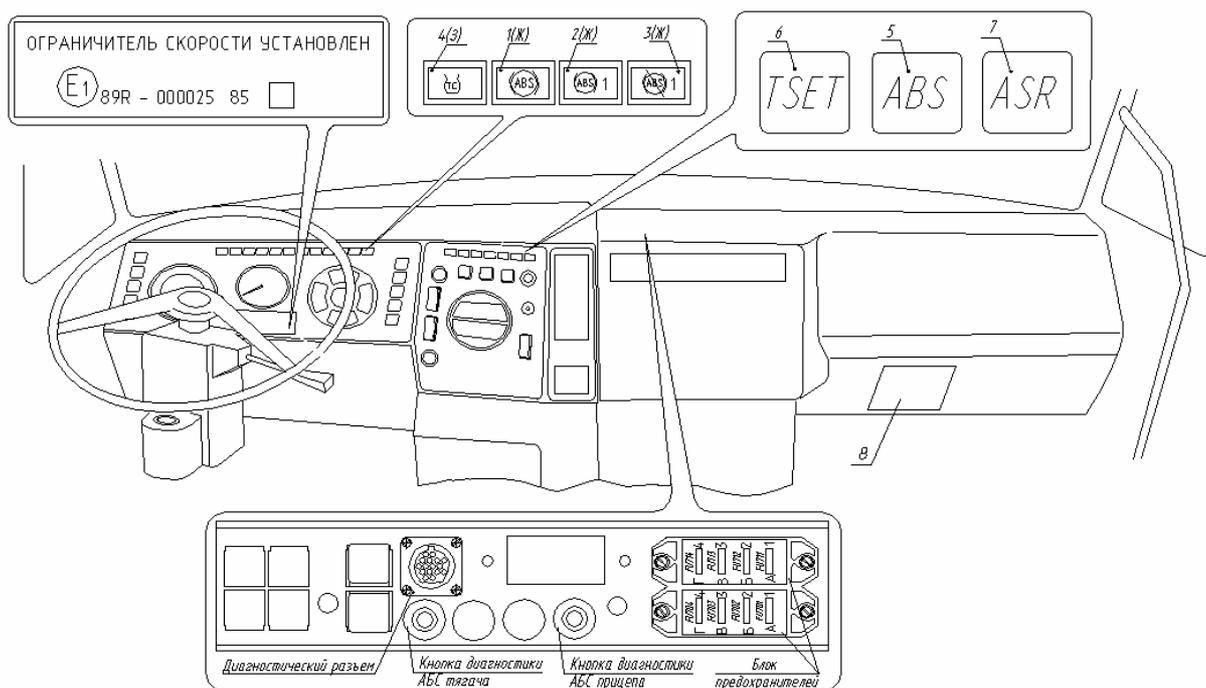
During operation it is necessary to observe the following conditions:

- while repairing a vehicle and replacing its electronic system elements, the battery must be disconnected.
- **NEVER connect electrical connectors to the control unit before the end of the system installation.**
- **NEVER apply voltage directly to the contacts control unit**
- the system voltage measurement should be performed only by appropriate instrumentation! Input impedance of a measuring device must be at least 10 MOhm.
- electronic control unit connectors must be disconnected. Connect them to the control unit only when the ignition and instrument panel switch is off.
- **do not operate the vehicle with the "mass" circuit resistance of more than 3 ohms between the "minus" of the battery and the electronic unit plug. Loosening of the mass wires is not allowed;**
- **during electric welding on a vehicle it is necessary to: disconnect all electronic unit connectors, unplug the battery and connect electrically the plus and minus battery cable tips. In this case the vehicle power switch, which switches the battery “plus” off, must be enable (i. e. the contacts must be closed). The welding machine grounding must be connected as close as possible to the welding point. When carrying out welding works on the cabin – connect ground to the cabin, when welding on the chassis - connect ground to the chassis;**
- **NEVER lay the welding apparatus cable in parallel to the vehicle wiring**
- **During painting works, the electronic components can be subjected to heating in an oven to a temperature of 95 C for a short period of time (up to 10 minutes), at a temperature of 85 C in an oven chamber – up to 2 hours. At the same time the battery must be disconnected.**



1-wheel speed sensor, 2-brake pressure electrical pneumo modulator 3-microprocessor based control unit, 4-fuse block, 5- infomodule 6-indicator lights, 7- ABS mode switch, 8- The cable with the ABS powering socket for a trailer ; 9 diagnostic socket: 10- diagnostic button.

Figure 10 - The ABS elements location on the MAZ chassis



1- tractor ABS indicator lamp, 2-trailer ABS indicator lamp, 3- power supply circuit lamp of a trailer ABS; 4-PBS mode and ABS / PBS diagnostic indicator lamp; 5-ABS mode switch; 6-«TEMPOSET» mode switch (only for vehicles equipped with a velocity limiting device); 7- PBS mode switch; 8-ABS control unit.

Figure 11 - Location of the indicator lamps, diagnostic elements and ABS control on a vehicle dashboard

Tire mounting and demounting

Remember that gaps in hub bearings and steering tie-rod hinges; improper wheel toe-in adjustment; endfloat in “pivot axle–front axle beam” connection increase tire wear rates.

For tires, it is required to observe the following rules:

1 Provide for daily tire pressure checks carried out before departure and, if needed, adjust the pressure as appropriate. If in-tire pressure is 25% lower as compared to the reference norm, it reduces its service life by about 25...40%.

2 Do not overload the tires. Avoid loading a vehicle in excess of its rated load-carrying capacity. Overloading tires by 25% declines their service life by approximately 40%.

3 Brake a vehicle steadily, avoid wheel slips as they lead to increased tire tread wear.

4 Tire chains must be put only if necessary and removed as soon as no longer needed.

5 Keep tires free of fuel, oil and other oil-products, since they lead to rapid tire damage.

6 Avoid using diagonal and diagonal-radial tires and tires of different tread patterns for one and the same axle, twin wheels and axels.

Differences in twin tires tread patterns must not exceed 5 mm (with tread pattern groove measured on the track centre). Any greater differences can cause differential gears to operate continuously resulting in excessive wear and friction loss.

Tires must be changed as frequently as required from the technical point of view (tire damage, changing twin tires for better selected, ensuring more reliable tires for the vehicle front axle, uneven heavy wear of tire tread patterns, etc.).

7 At regular intervals and before rimless wheel removal, check the restraints condition by rotating wheels. In case when any of the restraints is damaged, before removing the ring from the hub, bleed the tires (for safety reasons).

To take the wheels off, unscrew all its restraining nuts at six rotations, then, using a jack, raise the wheel (wheels) off the ground and, using the tire tool, release the blankholders (for back wheels).

When fitting a tire it is strictly prohibited:

- to take a wheel off the hub without bleeding the tire entirely; and to start demounting the tire from the rim without ensuring that the air is bled as appropriate;
- to use stone hammers, iron bars and other heavy objects that can deform wheel parts;
- to mount the tire on a rim that does not match the tire dimensions;
- to use edge and lock wheel rings from other vehicle models;
- to mount supplementary bead rings to decrease the rim width;
- to use rims, edge and lock wheel rings with surface damages: out-of-roundness, local dimples, cracks, outside rim gutter butt end ware as well as dirt, corrosion and paint fade-over;
- to use tires with scratches and damages which hinder mounting;
- to start inflating tires without ensuring that its lock ring is in the proper position in the rim base matching the inflated wheel as appropriate;
- to inflate tires without removing those from a vehicle when in-tire pressure drop is more than 40% of the rated pressure;
- to inflate the tire outside the designated enclosure without removing it from a vehicle or without protective devices (chains and ropes) when in road conditions;
- change edge and lock ring position during tire inflating or bleeding.

To the attention of purchaser’s!

Tire fitting operations must be performed in a facility or on the premises specially designated for these operations using special equipment, devices and tools.

Tire inflating

For vehicle tire inflating use the checkpoint valve located at the receivers or the towing valve located at the frame front cross-member. For this purpose:

- unscrew the checkpoint valve protective cup;
- rotate the tire valve core 2–3 times and twist hose nut onto the checkpoint valve output.

Prior to tire inflating, raise the air brake system pressure up till the kPa pressure-sensitive detector is enabled 800 for compressor unloading. If the vehicle is equipped with a pressure-sensitive detector with an air bleed valve for tire inflating, air bleeding can be carried out after lowering the pneumatic brake system pressure to the pressure-sensitive detector closure pressure of 650 kPa. When inflating the tire, pressure must be controlled with a tire gauge.

Tire air pressure centralized control system

Drive a vehicle with closed valves and normal tire pressure on paved and ground roads. Specified pressure value maintenance ensures the tires safety. To overcome wetlands and quicksand the tire pressure can be reduced for a better passability for a short period of time (according to table 4). In this case wheel valves must be opened and the vehicle velocity must be kept in the limits, specified in table 4.

Table 4

Road quality	Permissible pressure, MPa	maximum Velocity, km/h	maximum mileage in tire warranty period
Wetlands and virgin snow	Not lower than 0,1	20	100 km
Almost impassable areas of wetlands, virgin snow and loose sand	Not lower than 0,13	20	450 km

Roads of all types (only for tire inflation period after overcoming difficult sections of roads)	From 0.15-0.20 to a pressure corresponding to the maximum permissible tire load	30	750 km
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It is necessary to stop after overcoming the difficult road sections (if the situation permits), and inflate the tires to the nominal pressure. Continuous motion at a tire pressure of 0.1 MPa must not exceed 5 km. Tire pressure is determined by the manometer, installed in the instrument panel in the cabine, while the pressure control switches 1 and 5 (Figure 3) are off and the wheel valves are opened. If necessary to determine the pressure in a specific tire the other wheel valves should be cut off. To reduce the tire pressure one should press the switch 1, press the switch 5 to increase (Figure 3). Release the switch, if the required pressure is achieved.

To the driver’s attention!

Do not enable switch 5 (“tire inflation”), if the wheel valves are closed in order to avoid the monometer break down.

Tire pressure regulation system care

Reliable operation of the sealing device is largely dependent on the availability and quality of the lubricant on the cuff friction surfaces and the pin hub adapter bowl, as well as on the damage absence of the adapter bowl O-ring. Therefore, for each withdrawal of the hub the cuffs should be cleaned with clean diesel fuel or kerosene, and all the working edges should be lubricated.

The lubricant should not fall into the channels cavities and the delivering union hole of the tire pressure controlling system.

While mounting the hub it is necessary to control the damage absence of the adapter bowl O-rings.

Cuffs with worn-out edges should be replaced.

Before installing the head, the O-rings, the start connection chamfer and the hub landing surface should be lubricated. The head should be set so that the marks of the head ends and the marks of the hub would be on the same line. Combine the axis of the threaded hole in the head with the axis of the hub hole and tighten the transition union.

It is recommended to blow the pipes and the hoses of the tire pressure controlling system twice a year, if the maintenance is seasonal.

To do this, close the wheel valves, disable the switches 1 and 5, alternatively disconnect the piping, leading to the wheel valves, and blow each branch of the piping by short-term enabling of the switch 5 (Figure 3).

CHECKING AND ADJUSTMENT

Clutch linkage

A clutch linkage is as shown in Figure 12. Free running of the clutch pedal (5-7) mm is regulated by the bolt 5

After pedal free running adjustment, full pedal travel adjustment is required, which provides the hydraulic booster (9) stem stroke ($B=26,5-30,7$ mm) by means of bolts 4 and 5

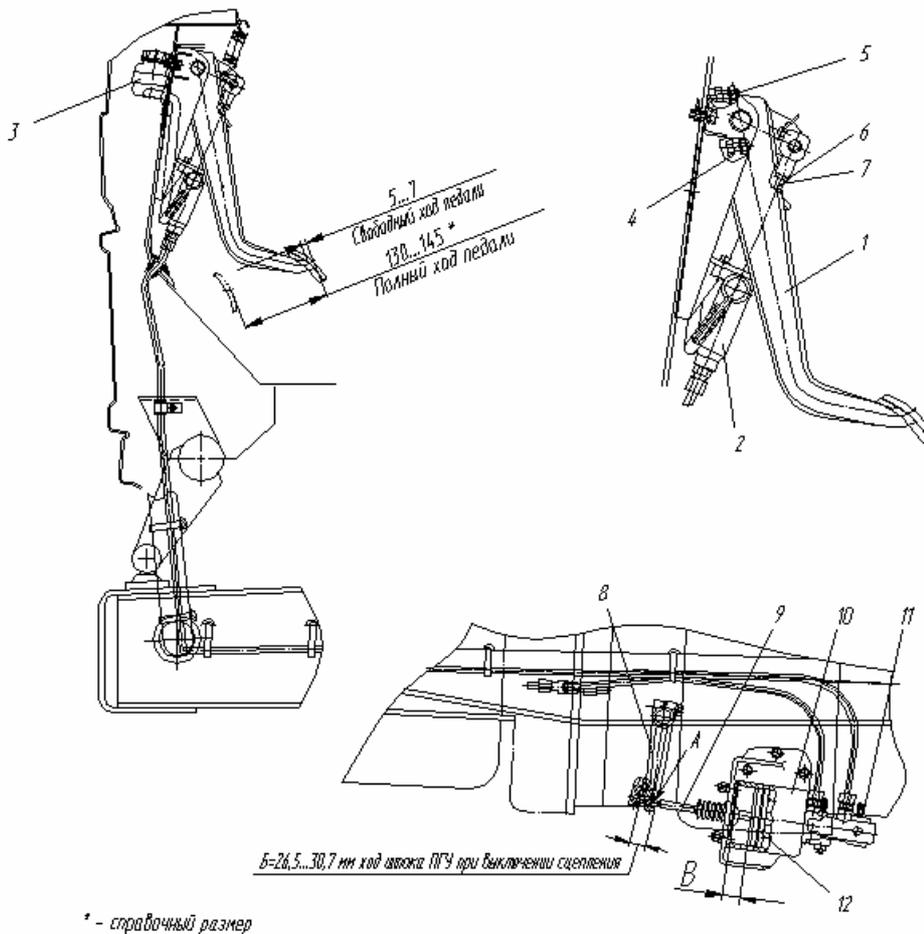
During operation, if necessary, free running adjustment is allowed. Adjustment is performed by varying the stem length (7) by unscrewing the nut 6.

After the lever (8) or hydraulic booster (10) replacement it is necessary that the measure B between the piston 12 and the cylinder end would be no less than 35 mm. Measure B is adjusted in the following way:

- move out the rod 9 from the spherical lever (8) lobe. After the rod was pushed out by the spring, bypassing the lever to the extreme position, rotate the lever 8 clockwise through all the gaps. In this position the plane A on the lever 8 should be between two marks on the hydraulic booster rod (the distance from the plane A to the rod end should be no less than 50mm). If the requirements are not performed, rearrange the lever on the slots of the clutch shaft;

- insert the spherical rod (9) head in the lever socket (8), by pushing the piston (12) of the hydraulic booster.

When filling the clutch hydraulic drive system: the operating fluid should be injected into the hydraulic drive system under the excessive pressure (200-300) kPA through the preliminarily inverted valve (11) (1-2 turns) to the complete disappearance of the air bubbles in the fluid, flowing out into the tank 3. It is allowed to fill the system unless the fluid, which flows out through the valve, wouldn't be clear, without air bubbles. After filling the system, tighten the valve 11 and put on the protective cap. Bring the fluid level in the tank to the level 10-25 mm below the filler neck.



1 - pedal 2 – hydraulic cylinder, 3 - tank, 4, 5 - bolt, 6 - nut, 7, 9 - rod, 8 - lever, 10 – hydraulic booster, 11 - valve, 12 - piston.

Figure 12 - Clutch linkage

Gearbox control drive

The main gearbox is controlled with remote control lever 2 (Figure 13). The auxiliary gearbox is controlled by range switch 1 mounted on the gear-changing lever. The gear changing diagram for the 8-speed gearbox is shown in Figure 14.

The gear changing diagram is stuck to the instrumentation panel.

The main gearbox cannot be used for gear changing until the selected range is enabled at the auxiliary gearbox.

The first speed and the backward motion cannot be used if at the auxiliary gearbox the fast range is enabled.

The slow range cannot be enabled at the auxiliary gearbox unless vehicle speed is lower than 25 km/h.

The fast range is enabled at the auxiliary gearbox with range switch is in the low position, while the slow range is enabled with range switcher is in the upper position.

When operating a vehicle, the following gearbox control drive adjustments are carried out:

- longitudinal grade angle adjustment lever 2;
- transverse grade angle adjustment lever 2;
- drive telescopic components lock mechanism adjustment.

Longitudinal grade angle lever 2 adjustment is to be carried out as below:

- tighten neutral position latch at switching mechanism 10.

To check if the gearbox is in the neutral position move lever shaft 9 axially by pressing it with a hand. At that, the lever travel distance should be (30-35) mm;

- release bolt 3 and ensure angle $\beta=85^\circ$ by moving plate 4 in longitudinal direction;
- if plate 4 travel is insufficient, release bolts 6, shift pull rod 5 relative to shank 7, tighten bolts 6 and check angle “ β ” adjustment by moving plate 4.

Transverse grade angle lever 2 adjustment is carried out by regulating steering tie rod 8 length, which is achieved by disconnecting one of the rod ends, with respective fixing nut unscrewed, followed by length adjustments as appropriate to ensure lever 2 vertical positioning relative to the cabin tunnel mounting surface.

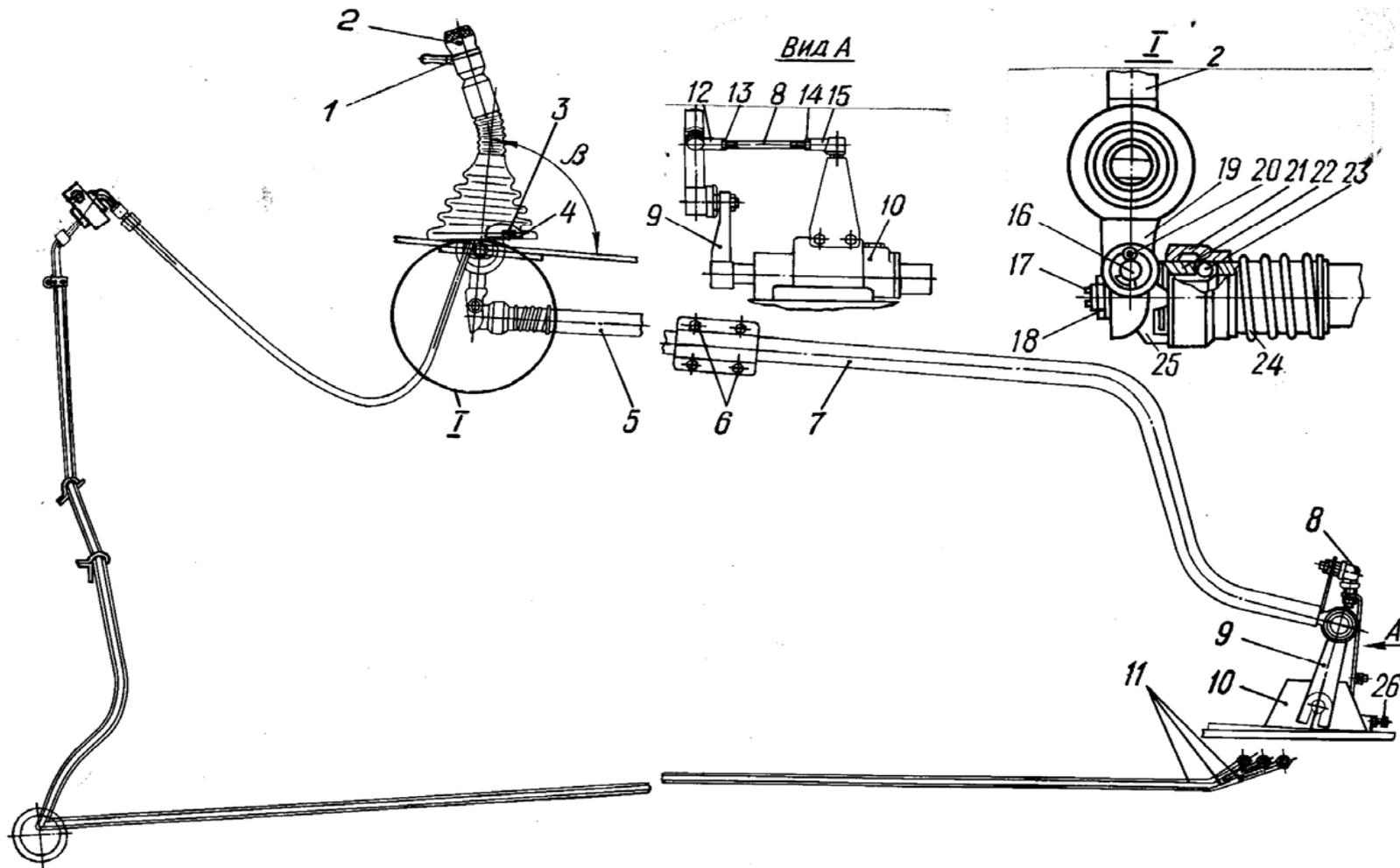
After the adjustment is finished, the neutral position latch must be repositioned as appropriate.

Telescopic device lock mechanism should be adjusted as follows:

- splint out pin 16, back out the nut, dismount the pin and release linkage rod 5 from fork 19 of the gear-change lever;
- release lock nut 18 and screw out shank 17 up to the tread end;
- push drag-link 5 down to where the pendant projects into end grooves 22;
- keeping the device compressed, turn shank 17 until the device is blocked with bushing 21 forced by spring 24;
- tighten lock nut 18, check lock mechanism accuracy.

When the mechanism is locked, axial and angle endfloats must be minimal. When unlocked (bushing 21 shifted rightwards), the inner linkage rod must be pushed off 35-50 mm forward by the return spring. Further extension bar travel must be smooth, without sticking, and the lock mechanism is to ensure fixing the extension bar in the initial position as appropriate.

Bends and bows of the drive drag-link and the telescopic components are not allowed. Adjustment can only be carried out with engine switched off.



1 – switch; 2 – lever; 3, 6 – bolt; 4 – plate; 5, 7, 8 – linkage rod; 9 – lever; 10 – gear change mechanism; 11 – piping; 12, 15, 22 – linkage rod end; 13, 14, 18 – nut; 16 – pin; 17 – shank; 19 – fork; 20 – splint; 21 – bushing; 23 – ball; 24 – spring; 25 – pendant; 26 – screw

Figure 14 – Vehicle gearbox control drive

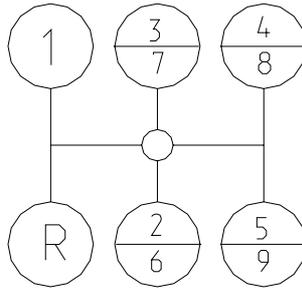
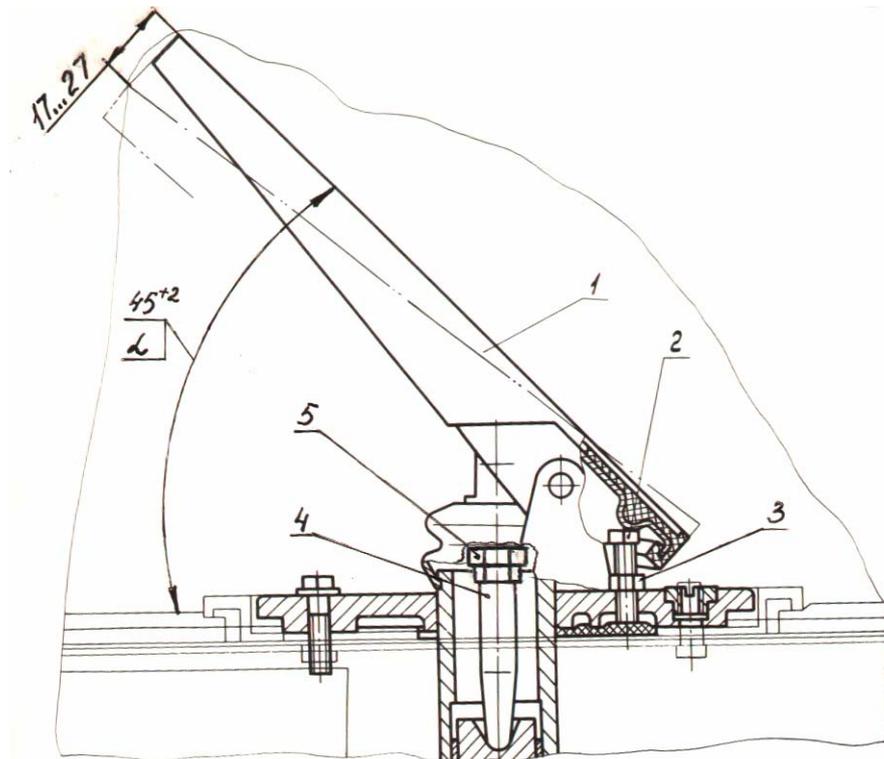


Figure 15 – Gear change diagram KP YMZ–2381

Brake valve actuator

Brake valve angle $\alpha=(45+2)^0$ (Figure 21) can be adjusted, using bolt 2. After the adjustment, nut 3 must be tightened to the torque of 11.8-15.7 Nm. Pedal free travel is to be 17-27 mm. It is determined by pressure build-up in brake chambers. Adjustments are carried out by regulating rod 4 length. After the adjustment, nut is to be tightened to the torque of 23.5–35.3 Nm



1 – pedal; 2 – bolt; 3, 5 – nut; 4 – rod

Figure 15 – Brake valve actuator

Distant and dipped lights adjustment

Lights are adjusted with special equipment.

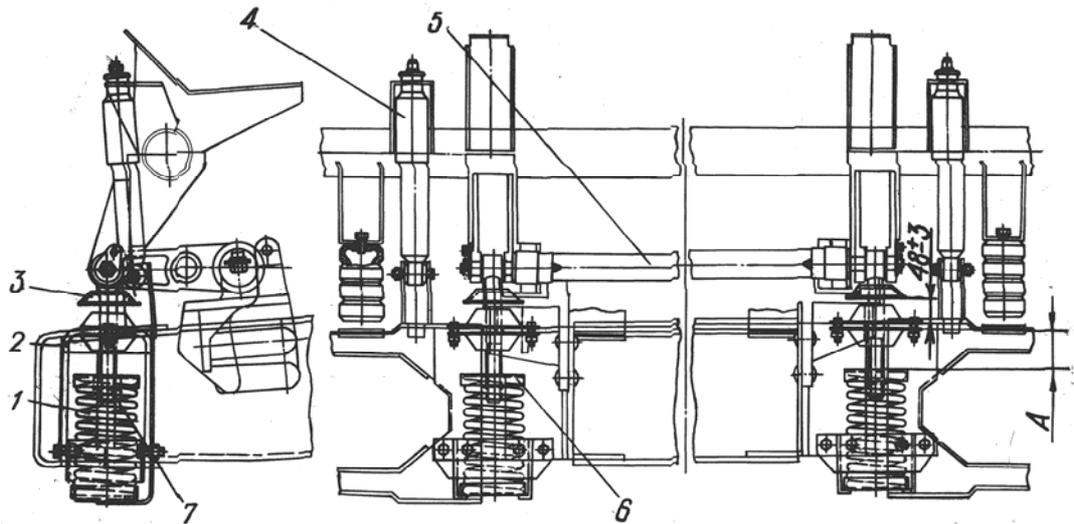
Front cabin springing adjustment

Front cabin springing is adjusted as follows:

- measure the existing gap between support cup 3 and bumper bracket 2 (see Figure 16);
- throw off lock nut 4;
- rotate upper cup 3 with the wrench 6, adjust to 48 ± 3 mm length.

In a similar way, adjust the other support and ensure that the gap between cup 3 and bracket 2 on the first support is still equal to 48 ± 3 mm. At that, A dimension difference should not exceed 8 mm.

Screw in lock nuts for both supports.



- 1 – hinged support; 2 – bumper bracket; 3 – cup (with welded nut);
4 – lock nut; 5 – spring; 6 – wrench; 7 – reamer holder

Figure 16 – Front cabin springing adjustment

VEHICLE MAINTENANCE

Careful vehicle maintenance is the best way to reduce operational costs for the vehicle and to ensure its trouble-free and long-term operation.

During MAZ vehicles operation the following maintenance is recommended:

- daily maintenance;
- maintenance after every 4000 km (A) of mileage for I operation category.
- maintenance after every 8000 km (C) of mileage for I operation category

Maintenance must be carried out in conditions excluding contaminants or dust ingress into vehicle assemblies and equipment.

Engine power system devices, electrical equipment, batteries and hydraulic system assemblies can be adjusted and services only at special maintenance stations or in special workshops where such experienced specialists, having all necessary tools, devices and stands at their disposal, could ensure quality and fast execution of works as above.

After dismounting of pneumatic, electrical and hydraulic systems elements, it is necessary to check for dangerous contacts of such systems with vehicle parts and eliminate them if any.

Power unit maintenance (engine, clutch, and gearbox) is carried out in accordance with manufacturer specification.

Daily maintenance

If needed, washing and cleaning can be carried out. While washing with hose, water streams must be kept away from the electrical equipment.

Before engine start, the following parameters are to be checked:

- fuel level in the tank;
- cabin locking mechanism closure;
- backlights, turn and brake signals;
- clutch;
- oil level in the engine;
- tire state.

After engine start, the following parameters are to be checked:

- oil pressure;
- pneumatic system air pressure;
- clutch operation, including parking brake.

The following parameters must be checked daily:

- in-tire air pressure;
- cooling fluid level;
- windscreen washer fluid level;
- check wheel nuts and tighten them, if needed (including spare wheel nuts, nuts retaining spare wheel bracket to the frame, the disks (rims)).

Biweekly maintenance (after-trip inspection):

- power steering oil level;
- air filter clogging;
- condensate in pneumatic system receivers;
- pneumatic system leakages;
- fluid level in clutch control drive tank;
- in-battery electrolyte level;
- leakages in the engine, the power train, the suspension bumpers, the driving axle, the steering system, the ventilation and heating systems, the cabin uplifting.
- check the battery charge rate in terms of electrolyte density and recharge if needed;

- breather performance on the driving axles and the transfer case, and, if necessary, clean from dirt;
- check steering wheel free travel and for steering rods hinges endfloats.

The first maintenance (A)

During the first maintenance it is required to carry out the entire scope as prescribed for annual maintenance, plus:

- 1 Check all driving belts and adjust if needed.
 - 2 Check clutch pedal free travel and adjust if needed.
 - 3 Check frame bolt connections and tighten if needed.
 - 4 Check brake chamber rods and adjust if needed.
 - 5 Check steering linkage rod nut splints, bolts fixing levers to steering knuckles, brake chambers rod fork pins and brake valve actuator parts and eliminate troubles if any.
 - 6 Check the battery charge in terms of electrolyte density and remove batteries for recharging if needed. (Appendix 3)
- Check power electric circuits threaded connections (bolts, screws) and tighten if needed; check battery wire connections on the engine support side bracket as well as terminal and battery cut-off switch, starter and generator connections.
- 7 Check gearbox drive and adjust if needed.
 - 8 Check cabin uplift mechanism and safety wire ropes condition and that of the respective fixtures.
 - 9 Check the propeller shaft flange retaining nut and tighten if needed.
 - 10 To eliminate door deflection, remove door lining, release hinge strap bolts, adjust the door upper hinge and tighten bolts to 32–36 Nm torque.
 - 11 Ensure that distance between hinged support cup and the cabin front springing bracket (Figure 16) is (48 ± 3) mm and adjust the distance if needed.
 - 12 Check steering linkage rod end terminal nuts and adjust if needed.
 - 13 Carry out lubricating operations for the vehicle as specified the chimmotology list.

The next nearest maintenance after A mileage:

It is necessary to carry out the entire scope of maintenance A works, plus:

- 14 Check brake chamber nuts and bolts and tighten if needed.
- 15 Check fixing nuts of muffler inlet pipes with intake manifolds, muffler support brackets and tighten those if need, check leakproof hose condition and its connection tightness.
- 16 Check air intake pipe and filter casing bolts and tighten if needed.

After-maintenance vehicle check: the engine, the instrumentation, the steering, the brake and other systems are checked as the vehicle is moving and at a diagnostics station.

The second maintenance (C)

The second maintenance requires the entire scope of works as required for maintenance (A) (item 1-16), plus:

- 1 Check the front and side engine supports on the frame and tighten if needed.
- 2 Check hinge and shaft drive spline connection condition.
- 3 Adjust gearbox support location.
- 4 Check nuts fixing the gearbox crankcase housing to the drive axle crankcase housing and tighten if needed.
- 5 Check front axle beam condition, toe-in value and turn angles for front wheels.

- 6 Check free travel and turn force while the engine is running.
- 7 Make a visual inspection of the frame, brackets, springs and supporting wedge fixtures.
- 8 Check nuts at the front and rear spring clamp, pins and spring eye clamps and rear suspension balancer brackets and tighten if needed.
- 9 Check nuts fixing receivers, fuel tank and batteries brackets, power steering pump, cabin lock system brackets and tighten if needed.
- 10 Check rubber boots and hoses condition at speedometer plug and terminal connections and ensure that the connections are leak-proof
- 11 Check thickness of brake shoe lining through holes in mechanism plates. Cover plate thickness cannot be less than 7 mm. If the clearance between the cover plate and the control collar or the cover plate rivet is 1 mm, such cover plates are to be replaced.
- 12 Check front and rear wheels journal bearing endfloat and adjust bearing preload if needed (after 4000 km). To check the endfloat rock the wheel while raised off the ground with a jack.
- 13 Check the distance, dipped and fog lights and adjust if needed.
- 14 After the first 16 000 kilometers travelled and thereafter every 16 000 kilometers travelled check and adjust, if necessary, the tapered bearing of the transfer case.
- 15 Check and tighten the bolts of the leading bevel pinion cup of the front axle
- 16 After the first (60 000-80 000) km check and adjust, if necessary, taper bearing and pinions backlash of the gear axle main transmission.
- 17 Check kingpin bearings condition and adjustment and eliminate troubles if any.
- 18 Carry out lubrication operations as specified in the chimmatology list.

After-maintenance vehicle check: the engine, the instrumentation, the steering, the brake and other systems are checked as the vehicle is moving and at a diagnostics station.

Seasonal maintenance (C)

Seasonal maintenance is carried twice a years and simultaneous with regular maintenance (C). Besides works, stipulated for maintenance (C), seasonal maintenance includes the following:

- 1 Remove brake drums, check brake wheel mechanisms condition and friction pads condition and thickness, tighten nuts of the front brake calipers with swivel knuckles and lubricate the shoe axle and the shoe roller axle.
- 2 Check the front axle thrust bearings condition and eliminate troubles if any.
- 3 Check the condition of shock bushings.
- 4 Check cabin mounting brackets bushing.
- 5 In autumn and in spring, replace oil, fuel and cooling fluid with the suitable seasonal oil, fuel and coolant.

VEHICLE LUBRICATION

Vehicle lubrication is carried out as specified in the chimmatology list.

Engine assemblies and units (including clutch and gearbox) are lubricated in compliance with manufacturer specifications.

FUEL, OIL AND LUBRICANTS (FOL) CHIMMATOLOGY LIST

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Engine vehicles supply system: – YMZ -236BE2	1 tank	Summer, winter diesel fuel according to RD 37.319.036-06 (YMZ) “Diesel fuel. Regulatory documents” or to engine operations manual supplied with the vehicle	Summer, winter diesel fuel according to standard EN 590:2004	(339±6) l	(339±6) l		
Engine cooling system :– YMZ -236BE2	1 tank	Cooling liquids according to RD 37.319.037-06 (YMZ) or engine operations manual instructions (included in the engine supply package). According to RD 37.319.037-06 “Cooling liquids and plastic lubricants. Guidance documents” application of the following cooling liquids is allowed: “Tosol-A40M”, “tosol-A65M”, “Tosol-AM” specifications (TU) 6-57-95-96, produced by Ltd. “Lukoil-Nefteorgsintez”, JSC “Orgsintez Dzerzhinsk, Nizhny Novgorod region., JSC JSC “Orgsintez” g . Kazan JSC “Sintezkauchuk” Kazan, JV “Sagoer” Nizhnekamsk, JV “Sinion” Nizhnekamsk, LLC “Himresurs” Moscow, OAO “Perm plant of lubricants and coolants,” Company “Nova Neftekhim” , city of Nizhny Novgorod region Dzerzhinsk.	Ethylene glycol based cooling fluids meeting the requirements of the following specifications: SAE J034 (USA) ASTM D3306, D6210, D4985 (USA) NF R 15-601 (France)	40 l without heater	40 l without heater	daily inspection	Check cooling fluid level, top up if and as required.
				42 l without heater	42 l without heater		

It is forbidden to mix carboxylate coolants with other coolants. Before applying the coolant, drain the old fuel, flush the cooling system with distilled or boiled water and top up with the new coolant

Engine oil pan: YMZ -236BE2	1	List of engine oils is submitted in RD 37.319.034-06 (YMZ) "Engine oils for YMZ engines. Guidance documents" or in the engine operations manual supplied with the vehicle.	<p>Engine oils with API performance characteristics of, at least CG-4 category, and SAE viscosity class as follows:</p> <p>In summer: SAE 30 (up to plus 30°C) SAE 40 (above plus 40°C)</p> <p>In winter: 20W-20(up to minus 10 C)</p> <p>All-season: 5W-50 (up to minus 30°C) 10W-30 (up to minus 20°C) 10W-40 (up to minus 20°C) 10W-60 (up to minus 20°C) 15W-40 (up to minus 15°C) 20W-40 (up to minus 10°C) 20W-50 (up to minus 10°C)</p>	24.0 1	24.0 1	Maintenance in breaking-in period	Change oil after the break-in period with washing the oil filters.
						daily inspection	Check the oil level, top up if necessary
						According to RD 37.319.034-06 (YMZ) and to the maintenance recommendations, presented in the engine manual, supplied with the vehicle	Change oil in the lubrication system, recommendations are presented in RD37.319.034-06 (YMZ), engine manual is supplied with the vehicle

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Central main drive gear crankcase housing: – front axle - rear axle – with round banjo-type axle crankcase housing - with oval banjo-type axle crankcase housing Wheel transmission crankcase: - front axle with central tire inflation system - rear axle with central tire inflation system Crankcase transfer case	1	All-season: Transmission gear oil TAD17 (up to minus 30°C) TM-5-18, API GL-5 *Mixture of diesel class 3,4 (less than minus 30°C)	Transmission gear oils SAE viscosity class: In summer: SAE-90 (from minus 12 °C up to plus 38 °C) In winter: SAE-80W (from minus 26 °C up to plus 21 °C) All-season: 75W-80 (from minus 40 °C up to plus 30 °C) 75W-90 (from minus 40 °C up to plus 38 °C) 80W-90 (from minus 26 °C up to plus 38 °C) 85W-90 (from minus 12 °C up to plus 38 °C) 85W-140 for the tropics Pursuant to American classification API GL-3/4/5 MIL-L-2105 Pursuant to classification ZF TE-ML 02/05/07/12 Pursuant to norms MAN M3343 (API GL-4+5) M341 (API GL-4) M342 (API GL-5)	4,5 l	4,5 l	Maintenance in breaking-in period daily inspection A 2C for TM-5-18	Change oil after the break-in period. Once every two weeks check the impermeability as the vehicle returns from a trip (the presence of leaks) Check the oil level and top up to the filling opening lower edge. Discharge the waste oil, flush the crankcase, fill in with fresh oil to the filling opening lower edge. with the drain hole at the lowest position. Drain norm - 3.5 liter
				15,0 l	15,0 l		
				1,9 l	3,8 l		
				1,8 l	3,6 l		
				4,5 l	4,5 l	Maintenance in breaking-in period daily inspection 2C for TM-5-18	Change oil after the break-in period. Check the oil level and top up to the filling opening lower edge. Discharge the waste oil, flush the crankcase, fill in with fresh oil to the filling opening lower edge

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Hydraulic jack DG 12	1	Hydraulic oil VMGZ or VMGZ-C (MG-15-V(c))	MIL-H-6083D (USA) DX-15 по DID-5540 (England) C-635, C-636 Symbol (NATO) Shell: Tellus 21 Aeroshell Fluid 7 Esso Petroleum Co., Ltd: Esso Univis j 43, Tso Univis j 40 Mobil Oil: Mobil Fluid 93	0,4 l	0,4 l	Maintenance-2000	Change oil while repairing, top up to the filling opening lower edge
Cabin uplift system	1			0,78 l	0,78 l	2C	Change oil while repairing wherefore: 1.Open the fuel cap 2.Disconnect upper hydrocylinder hose from the adapter and lift up the cab to the full angle, herewith the used oil will drain out of the disconnected hose. Top up the pump with fresh filtered oil if necessary to rise the cab completely 3.Connect the upper hose to the adapter 4.Disconnect the lower hose from the hydrocylinder adapter and lower the cabin, pouring, if necessary, fresh oil into the pump, herewith the used oil will drain out of the disconnected hose 5.Connect the lower hose to the adapter 6.Pour oil to the level of lower edge of the filler 7.Close the fuel cap

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Power steering system	1	Vehicle hydraulic system oil, grade R (MG-22-V)	MIL-H-5606D (USA) Pursuant to classification ZF TE-ML 09 Pursuant to "General Motors" classification: ATF Dexron II/III Pursuant to "Ford" classification: ATF Mercon	6,5 l	6,5 l	Maintenance-2000 3C	Change oil after the break-in period. Check the oil level, top up if necessary. Change the oil
Propeller shaft needle bearings:			DIN 51502 (Germany) "Shell" company: Retinax HDX2(MoS ₂) Mobil" company: Mobilgrease Special (MoS ₂) BP" company: Energrease L 21 M(MoS ₂) "Texaco" company: Molytex TP2 (MoS ₂) "Esso" company: Multi-purpose, Lithium	0,04 kg	0,24 kg	C 4C	Lubricate using a pressure lubricator until fresh lubricant appears from under the seals edges Disassemble the hinges, flush and provide a fresh lubricant
1) drive of rear and front axles and transfer box:							
Nominal size VII according to RD 37.001.665-96. Flange with the end slots, T-180 according to ISO 12667. Size between the cross butt ends 143 mm. Crosspin diameter 33,635 mm. Tube diameter 94int. x 4 mm.							
- for 4x4 vehicles	6	Lubricant № 158M					
Nominal size VIII according to RD 37.001.665-96. Flange with the end slots, T-180 according to ISO 12667. Size between the cross butt ends 161 mm. Crosspin diameter 45 mm. Tube diameter 105int. x 6 mm..							
- for 4x4 vehicles	6	Lubricant № 158M	0,048 kg	0,288 kg			

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Binary hinge of equal front axle rotational speeds	2			0,06 kg	0,12 kg	2C	Take out both plugs, put the oiler in one of the holes and fill the hinge with lubricant until it appears from the second hole, close the plugs
Splined joint driveshafts			DIN 51502 (Germany) MIL-G-10924C(USA)			2A	Lubricate through the press-oilcan until the fresh grease appear from the safety valve
Nominal size III according to RD 37.001.665-96. Plain flange, type 3. Size between the cross butt ends 143 mm. Crosspin diameter 16.3 mm. Tube diameter 45int. x 2.5 mm			C.S.3107B copr XG- 279, (England) Shell corp.: Retinax EP2; Mobil corp.: Mobilgrease MP				
-driving axles and transfer case actuator		Lubricant Litol-24	Mobilux EP2/ EP3 BP corp.: Energrease LS-EP2 Texaco corp.: Multifak EP2 Esso corp.: Beacon EP2				
Nominal size VIII according to RD 37.001.665-96. End slot flange, T-180 according to ISO 12667. Size between the cross butt ends 161 mm. Crosspin diameter 45 mm. Tube diameter 105int. x 6 mm.			DIN 51502 (Germany) VV-G-671d (USA) Copr Grease 3 CS.3113 grade XG- 264, (Eng.) Shell corp.:				

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
- for biaxial (4x4) vehicle	2	Graphite grease USsA	Barbatia 2/3 Mobil corp.: Mobiltac 81 BP corp.: Energrease C36/ C2G/GP2-G/GP3-G Texaco corp.: Clissando FMA-20 Esso corp.: VanEstan2	0,07 kg	014 kgr	2A	Lubricate through the press-oilcan until the fresh grease appear from the pressed edge
The switching cylinders - Driving axles differential lock	1	Lubricant Litol-24	DIN 51502 (Germany) MIL-G-10924C (USA) CS3107B copr XG279 (Eng.) Shell corp.: Retinax EP2; Mobil corp.: Mobilgrease MP Mobilux EP2/EP3 BP corp.: Energrease LS-EP2 Texaco corp.: Multifak EP2 Esso corp.: Beacon EP2	0,015 kg	0,015 kg	2C	Disassemble, clean from dirt and lubricate with a thin layer.
- Transfer case differential lock	1			0,015 kg	0,015 kg		
- "Neutral" in the transfer case	1			0,015 kg	0,015 kg		
Internal hub bearings of drive axles with central tire inflation system of on-board vehicle - front	2			0,25 kg	0,5 kg		
- rear		0,35 kg	0,7 kg	While assembling and repairing, lay the lubrication between the outer ring and the inner bearing rollers. Fill the cavities between the head of the central tire inflation system, the hub and bearing lid with the lubrication, cover the sleeves with a thin layer of lubrication.			

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Pivot bearings of the steering knuckles	4			0,02 kg	0,08 kg	A	Lubricate with the push-button oiler until appearance of grease from under the sleeves
Towing hook	2			0,01 kg	0,02 kg	A	Lubricate with the push-button oiler
- Rod	1			0,01 kg	0,01 kg	A	
- Protective cover	1			0,1 kg	0,1 kg	4C	Clean the cavity from the older grease and dirt, lay the new grease

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm	
				Filling norm	Total for a vehicle			
Steering post bearings and splines	1	Lubricant Litol-24	DIN 51502 (Germany) MIL-G-10924C (USA) CS3107B grade XG279 (Eng.) Shell corp.: Retinax EP2; Mobil corp.: Mobilgrease MP Mobilux EP2/EP3 BP corp.: Energol LS-EP2 Texaco corp.: Multifak EP2 Esso corp.: Beacon EP2	0,02 kg	0,02 kg	2C	Remove the decorative cover of the steering column. Lubricate with the press-fitting until the appearance of fresh grease from the gaps	
Steering post propeller shaft splines	1			0,02 kg	0,02 kg	2C		With a raised cabin lubricate the shaft splines with pre-cleaned lubricating surfaces
Steering pump-drive splines	1			0,05 kg	0,05 kg			Lubricate during assembly or repair
Power steering power cylinder: - rear support - hinge joint	1			0,02 kg	0,02 kg	C	Grease the hinges until fresh lubricant shows up from under the seal or until first signs of the seal shape alteration.	
	1			0,06 kg	0,06 kg	A		
Steering joints: - longitudinal - traverse	2			0,06 kg	0,12 kg	C		
	2			0,06 kg	0,12 kg			
Roller brake valve actuator	1			0,02 kg	0,02 kg	C	Lubricate with the press-fitting until the appearance of fresh grease from the gaps	
Axle hubs of brake shoe and shoe roller axis	12			0,005 kg	0,06 kg	CO	Lubricate when assembling, seasonal maintenance, brake shoe repairs and replacement	
Crane drive of the central tire retreads system	1			0,01 kg	0,01 kg	C	Lubricate with the press-fitting until the appearance of fresh grease from the gaps	

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Spherical surface of the air hydraulic booster rod of the clutch and the lever deepening on the roller.	12	Lubricant "Shrus-4"	DIN 51502 (Germany) Shell corp.: Retinax Grease EPX2 (MoS ₂) BP corp.: Energrease L21M (MoS ₂) Mobil corp.: Mobilgrease Special (MoS ₂) Castrol corp.: Castrol LM Fuchs corp.: Renolit MP 2 (MoS ₂)	0,005 kg	0,010 kg		Lubricate when assembling and repairing
Splines of the primary shaft gearbox	1			0,005 kg	0,005 kg		Lubricate when assembling and repairing
Clutch control drive	1	Braking liquid «RosDOT» «RosDOT4»	SAEJ1703, ISO 4925, FMVSS 116 type DOT3 и DOT4 (USA) Shell corp.: Shell Dona B BP corp.: Petrosin Super Fluid J1703P Mobil corp.: Hydraulic Brake Fluid Esso corp.: Attas Brake Fluid CD	0,5 l	0,5 l	Daily maintenance	Check the liquid level and top up, if necessary, once in two weeks. Change the liquid once a year.
External surface and the rod deepening of the breaking crane drive	1	Lubricate GT-72	DIN 51502 (Germany) Shell corp.: Aeroshell 15, 15A, 22C Mobil corp.: Mobilgrease 24, 25, 28 Esso corp.: ArarenBC 290	0,005 kg	0,005 kg	C	Grease the surface with a thin layer of grease with a partial disassembly of the brake crane

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Gearbox crankcase – YMZ-2381	1	<p>The list of gear oils is presented in RD 37.319.035-03 (YMZ) “Transmission oil for YMZ transmissions. Technical requirements” or in the operation manual for the engine, supplied with the vehicle</p> <p>According to RD 37.319.035-03 (YMZ) the following grades of transmission oils are acceptable:</p> <ul style="list-style-type: none"> - TSP-15K state standard 23652-79 production of JSC "Omsk Oil Refinery", JSC "Yaroslavl Oil Refinery", Ltd. "LUKOIL-Volgograd oil processing", Ltd. SPC "IsanTAT"; Angrol-TSP-15K state standard 23652-79 manufactured by JSC "Angarsk Petrochemical Company"; -TAD-17I state standard 23652-79 manufactured by JSC "Factory behalf of. Shaumyan", Ltd. "LUKOIL-Volgograd oil processing " Omskoil K specifications 0253-019-00219158-95 JSC "Omsk Oil Refinery" production YarMarkaT specifications 0253-019-00219158-95 of JSC "Slavneft Yaroslavnefteorgsintez" TM-3-18k specifications 0253-005-57352960-02 of JSC "Orsknefteorgsintez" YarMarka Super E specifications 0253-018-00219158-96 of JSC "Slavneft-Yaroslavnefte-orgsintez"; YarMarkaGipoid specifications 0253-018-00219158-96 of JSC "Slavneft-Yaroslavnefte-orgsintez"; LUKOIL-TM type TSP-14gip type specifications 38.40144-2001 of Ltd."LUKOIL-Volgogradnefte-processing 	8,0 l	8,0 l	Maintenance–2000	Change oil after break-in period, clean the oil intake grid and the magnet from bedding products	
					A	Check the oil level and top up, if necessary.	
					According to RD 37.319.035-03 (YMZ), Operation manual for engine, supplied with the vehicle	Change oil in the transmission crankcase, instructions for replacing are presented in RD 37.319.035-03 (YMZ), in the manual on the engine, supplied with the vehicle	

* - The amount of oil in the primary filling, while changing the required amount of oil may drop to 2-3 liters, if transmission with PTO oil capacity increasing by 0.7-1 liters.

** - At the break-in period for the first 2500 km fill with Class 02D

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Fuel supply drive pedal - Pedal toe - The inner surface of the pedal inserts	1	Lubricant Litol-24	DIN 51502 (Germany) Shell corp.: RetinaxEP2 Mobil corp.: Mobilgrease MP Mobilux EP2/ EP3 BP corp.: Energrease LS-EP2	0,02 kg	0,02 kg	C	Disassemble, clean from the old grease and lay the fresh one
							Lubricate while assembling and repairing
Engine stop cable	1		Texaco corp.: Multifak EP2	0,025 kg	0,025 kg	2C	Disassemble, wash and fill the wrapper with the grease
Fuel supply control cable	2		Esso corp.: Beacon EP2	0,02 kg	0,04 kg		Disassemble, wash, lubricate the wire rope with a thin layer of grease
“Spike” type front support beam of the " of the YMZ engine	1			0,01 kg	0,01 kg		Lubricate with the push-button oiler
The drive of transmission control - Spherical joint of the shear traction - Spherical joint of the liner - Spherical joint of the transmission lever	2			0,0025 kg	0,005 kg		Lubricate the friction surfaces while assembling and repairing
	1			0,005 kg	0,005 kg		
	1			0,01 kg	0,01 kg		
- intermediate mechanism	1			0,03 kg	0,03 kg		

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Spring pins:	4			0,015 kg	0,03	A	Lubricate with the push-button oiler when using the vehicle under normal conditions. When operating the vehicle on dusty and dirty roads it is recommended to lubricate daily
For vehicles with mechanical drive speedometer (tachograph): – a pair of gears of speedometer sensor drive in the transfer box – roller driven by the speedometer sensor drive	1	Lubricant Litol–24	DIN 51502 (Germany) Shell corp.: RetinaxEP2; Mobil corp.: Mobilgrease MP Mobilux EP2/ EP3 BP corp.: Energrease LS-EP2 Texaco corp.:Multifak EP2 Esso corp.: Beacon EP2	0,03 kg	0,03 kg	2C	Put the fresh grease in the change gears cavity of the secondary shaft bearing cover
	1			0,0005 kg	0,0005 kg		
Worm-and-worm pairs of wheel brake adjusting levers: – with automatic gap adjustment – without automatic gap adjustment	4	Lubricant SHRUS–4	DIN 51502 (Germany) Shell corp.: Retinax Grease EPX2(MoS ₂) BP corp.: Energrease L21M (MoS ₂) Mobil corp.: Mobilgrease Special (MoS ₂) Castrol corp.: Castrol LM Fuchs corp.: Renolit MP2 (MoS ₂)	0,02 kg	0,08 kg	2C	Lubricate with the push-button oiler until appearance of fresh grease on the output of the safety valve without removing the lever Lubricate with the push-button oiler until appearance of fresh grease from the gaps
	4			0,02 kg			
Expansion cam space rollers (front)	2	Lubricant Litol–24	DIN 51502 (Germany) MIL-G-10924C (USA) CS3107B	0,025 kg	0,005 kg	A	Lubricate with the push-button oiler until appearance of fresh

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Driving axle expansion cam shaft bearings (IIC-40K)	8		grade XG279 (Eng.) Shell corp.: Retinax EP2; Mobil corp.: Mobil grease MP Mobilux EP2/EP3 BP corp.: Energrease LS-EP2 Texaco corp.: MultifakEP2 Esso corp.: BeaconEP2	0,015 kg	0,12	2A	grease

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Wind-screen wiper hinge joints	3	Lubricant Litol-24	DIN 51502 (Germany) MIL-G-10924C (USA) CS3107B grade XG279 (GB) “Shell” company: Retinax EP2; “Mobil” company: Mobilgrease MP Mobilux EP2/EP3 “BP” company: Energrease LS-EP2 “Texaco” company: Multifak EP2 “Esso” company: Beacon EP2	0,02 kg	0,06 kg		Grease axles and cavities during assembly
Cabin front springing axes	2			0,02 kg	0,04 kg		Grease during assembly or repair using a pressure lubricator until lubricant appears on the sleeve butt end
Cabin door lock actuator friction surfaces	2	Lubricant TsIATIM-201	DIN 51502 (Germany) MIL-G-7711A(USA) DEF STAN 91-12/1 grade XG-271 (GB) “Shell” company: Aeroshell “Mobil” company: Mobiltemp SHC 32 “Esso” company: Beacon 325	0,01 kg	0,02 kg		Grease during assembly
Seat hinge joints	8	Graphite grease USsA	DIN 51502 (Germany) VV-G-671d (USA) grade Grease 3C.S/3113 grade XG264 (GB) “Shell” company: Barbatia 2/3 “Mobil” company: Mobiltac	0,005 kg	0,04 kg		In case of squeaking, disassemble hinge joints and lubricate outside and inside diameters of bushings.
Longitudinal control mechanism	4			0,005 kg	0,02 kg		In case of squeaking, lubricate guides at insert and rollers motion locations.

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Leafs of front and rear springs	4		81 "BP" company: Energrease C36/C2G/GP2-G/GP3-G "Texaco" company: Clis-sando FMA-20 "Esso" company: VanEstan2	0,25 kg	1,00 kg		Cover the leafs with a thin grease layer in the contact points while repairing

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
ABS detector of the back axle and front axle – produced by “Wabco”, Germany	4	Viscous lubricants according to specification JED 564 f. Wabco: - Staburags NBU 30 PTM produced by “Kluber Lubrication”; - Urethyn-E2 produced by “Fuchs Lubritech”; - Mobilith SHC-220 produced by “Mobil Oil”; - Unirex N3 produced by “Esso”; - Eco-Li-Plus produced by Special type provided by BPW Company; - Molycote P40 produced by “Dow Corning”; - TEK-662 (former:EXP-135) produced by “Roy Dean Products Company”/USA; - Moly-Fortified Multi-Purpose Grease produced by “Valvoline/USA”		0,0025 kg	0,01 kg		Apply a thin layer of lubricant to the spring bushing surface and detector metal surface during assembly of repair.
-produced by BPO “Ekran”, RB, Borisov		Viscous lubricants series PEN-TA-200					
Chassis wire fixture on a right side-member	2	Lubricant Litol-24	DIN 51502 (Germany) MIL-G-10924C (USA) CS3107B	0,0025 kg	0,005 kg	A	Apply a thin layer of lubricant to the contact surfaces
Accumulator terminals with main lead lugs	4		grade XG279 (GB) “Shell” company: Retinax EP2; “Mobil” company:	0,005 kg	0,02 kg		

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Accumulator switch terminals with main lead lugs and a control wire	3		Mobilgrease MP Mobilux EP2/EP3 “BP” company: Energrease LS-EP2 “Texaco” company: Multifak EP2	0,003 kg	0,009 kg		
Chassis control wire terminal fixture on the right rear engine support	1		EP2 “Esso” company: Beacon EP2	0,005 kg	0,005 kg	C	Apply a thin layer of lubricant to the contact surfaces.
Control wire and main lead fixture on the starter	2	Lubricant Litol-24	DIN 51502 (Germany) MIL-G-10924C (USA) CS3107B grade XG279 (GB) “Shell” company: Retinax EP2; “Mobil” company: Mobilgrease MP Mobilux EP2/EP3 “BP” company: Energrease LS-EP2 “Texaco” company: Multifak EP2 “Esso” company: Beacon EP2	0,005 kg	0,01 kg		
Two-wire connection to the generator - screw-bolt joints	4			0,00125 kg	0,005 kg		
- rebates and pegs	1	Lubricant VNII NP-510		0,001 kg	0,001 kg		
Harness contacts of the left side-member and back lamp harnesses in the junction box (of the left side-member)	24					C When operating in high humidity - monthly	
Connection contacts of the headlights and front direction indicators	24			0,0004 kg	0,01 kg	C*	Apply a thin layer of lubricant to the contact surfaces

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
Connection contacts of the side direction indicator on the mudguard and in the BUP binder link up point binder and binders of the side-members near the headlights	16			0,0005 kg	0,008 kg		
Connection contacts of the windshield washer pump	4			0,0005 kg	0,002 kg		
Connection contacts of the pneumatic signal electropneumatic valve	2			0,0005 kg	0,001 kg		
Connection contacts of the sound electric signals	2			0,0005 kg	0,001 kg		
Connection contacts of the fuel level detector	3	Lubricant VNII NP-510		0,0003 kg	0,0009 kg	C*	Apply a thin layer of lubricant to the contact surfaces
Connection contacts of the front fog lamps – tip Ø12.5	2	Смазка Литол-24	DIN 51502 (Германия) Фирма Shell: Retinax EP2; Фирма Mobil: Mobilgrease MP Mobilux EP2/ EP3 Фирма BP: Energrease LS-EP2 Фирма Texaco: Multifak EP2 Фирма Esso: Veacon EP2	0,0025 kg	0,005 kg		

Lubrication (filling) point	Lubrication (filling) quantity	Basic grades and application seasons	Foreign equivalents (grade, specification, company)	FOL quantity		FOL change (refilling) intervals. Basic grade	Lubrication (filling, oil change) recommendations. Waste oil discharge (collection) norm
				Filling norm	Total for a vehicle		
binder socket of the side-member and fog-lamps pintle	2	Lubricant VNII NP-510		0,0005 kg	0,001 kg		
Windscreen washer tank	1	A mixture of wind-screen washing fluid "Obzor" and water in the following proportion: 1:9 (up to minus 5 ⁰ C) 1:5 (up to minus 10 ⁰ C) 1:2 (up to minus 20 ⁰ C) 1:1 (up to minus 30 ⁰ C) 2:1 (up to minus 40 ⁰ C)		10,0 l	10,0 l		

* grease the contacts on a monthly basis, when the vehicle is operated in the increased humidity conditions.

Scope of the guarantee provided, procedures for claims submission and drawing up of documents as required are stipulated in the vehicle sale and purchase contract. In case of any damage please fill in the attached form and send it to the vendor.

DAMAGE STATEMENT No.

City
Date

Name and address of the commercial organization, company:		Product model: _____	
		Chassis: _____	
		Engine: _____	
Service station, address: _____		Speedometer readings as of the date when the failure was discovered: _____ km	
Supply date: _____	Commissioning date: _____		
Implemented measures on scheduled maintenance:			
Date: _____	Date: _____	Date: _____	Date: _____
Mileage: _____	Mileage: _____	Mileage: _____	Mileage: _____
Description of damage, its causes and characteristic features:			

Replaced parts, assemblies

Designation	Catalogue No.	Quantity	Price per unit	Amount	Cost of works
1.					
2.					
3.					
4.					
5.					

Date of delivering the Product to the service repair station

Date of sending the Product out of the service repair station

Conclusion:

Purchaser representative responsible for repairs:

Vendor responsible representative in the country of the Purchaser:

Date
L.S.

Signature

Date

Signature
L.S.

Main threaded connections tightening torques, Nm

Assembly	Tightening torque, Nm	Front driving axle	Rear axle	Note
1 HOLD-DOWN BOLTS				
Journal to axle crankcase housing	320–360		+	
Carrier to carrier crankcase housing	420–440	+	+	Drive axles with disk wheels
Driving bevel gear bearing sleeve	90–120	+	+	Bolt connection variant
Gearbox crankcase housing band covers	200–280		+	
Brake chamber bracket	110–160		+	
Brake chamber bracket	320–360	+	+*	*upper location of energy accumulators
Brake chamber bracket	118–157			lower location of energy accumulators
Front axle brake chamber bracket	110–140	+		
Expansion cam supports	118–157		+	*upper location of energy accumulators
Expansion cam sleeve	118–157		+	
Interaxle differential cups	65–80			
Gear crankcase housing to intermediate crankcase housing.	50–62			
Covers to carrier crankcase housing	29–37	+		For 4- planet pinion wheel gearing
Collar covers to hub	24–36	+	+	
Collar covers of back axle bearing sleeve	50–62		+	
Differential nut stops	12–18	+	+	
Brake shoes fulcrum pins locking plates	24–36	+	+	
Front drive axle back plate	24–36	+		
Steering rod lever to steering knuckle	392–432	+		
Journals for the front drive axle and support, lever and steering knuckle bearing lower covers	275–314	+		

Assembly	Tightening torque, Nm	Front driving axle	Rear axle	Note
Bolts and studs for securing steering knuckle lever and upper cover	275–314	+		
Front axle covers and crankcase housings	157–196	+		
Pivot pin bearing covers	16–20	+		
Expansion cam tube shock absorber brackets to caliper	310–315	+		
Pivot stud device adjustment bolt	310–350	+		
2 RETAINING NUTS				
Gear unit to axle crankcase housings	120–160		+	
Driven spur wheel	450–600			
Flanges	450–600	+	+	
Driven gear and interwheel differential cups	210–260	+	+	
Wheel gearing covers	24–36		+	For 5-planet pinion wheel gearing
Wheel hubs	400–500	+	+	
Intermediate axle pinion gear carrier	130–180			
Back axle drive bevel gear bearings carrier	90–120	+	+	For stud fixings
Hubs mounting locknuts	400–500	+	+	
Reducers and back plates retaining nuts	24–36		+	
Interaxle differential cross piece mounting clamp	300–400			
Interaxle differential lock screw fixings	44–56		+	
Cages with steering knuckle hinge joints housings	110–140	+		
Intermediate axle crankcase housing	70–100			
Wheel disk 250–300	+	+		
Wheel disk	250–300	+	+	
Ball pin	275–317	+		
Locknuts of pivot assembly adjusting bolt	216–275	+		
Lever studs and steering knuckle bearings covers	275–314	+		
Steering tie rod ends	69–88	+		

Assembly	Tightening torque, Nm	Front driving axle	Rear axle	Note
Bolts for securing front brake supports with steering knuckles	160–200			
Nuts for securing wheels for vehicles with disk wheels	500–600			
Nuts for front spring U-bolts	450–600			
Nuts for rear spring U-bolts	600–650			
Nuts for front and rear spring eyes U-bolts	200–220			
Front and rear spring eyes bolts	250–320			
Shock absorber housings nuts	120–150			
Nuts for securing steering box to frame	250–320			
Nuts for securing steering linkage ball studs	160–200			
Nuts for securing plain arms on sector shafts	400–440			
Nuts for securing brake accumulators and bolts for securing accumulator bracket	180–200			
Nuts for securing compressor cylinder head	12–17			
Nuts for steering wheel securing	60–80			
Bolts for securing steering post universal-joint forks	27–35			
Bolts for securing propeller shaft flanges	160–200			
Nuts for securing cross members to frame	220–240			
Bolts for securing steering knuckle and steering geometry levers	400–500			
Nuts for securing ball pin to steering geometry levers	220–250			

Battery operation manual

1 Batteries

This manual describes the starting batteries of a 110 a/h capacity and the batteries of a higher performance, dry-charged and fully charged with electrolyte. Security measures, the procedure of bringing the batteries in an operating state, maintenance, operation, storage, transportation and disposal are described in the manual.

2 Safety precautions

2.1 Charge the battery in a room equipped with purge ventilation.

2. A mixture of hydrogen and air is explosive. It is forbidden to smoke and use an open fire near the battery. Prevent sparking and do not close the battery connections.

2.3 While preparing the electrolyte use the utensil (ceramic, plastic, ebonite, leaded), resistant to the sulfuric acid. First pour water in the utensil and then sulfuric acid, continually mixing

To avoid an accident it is forbidden to pour water in concentrated sulfuric acid.

Put on glasses, rubber gloves, rubber boots, apron and suit made of an acid-resistant material, while preparing the electrolyte and filling the batteries.

2.5 If the sulfuric acid is splashed on the skin, immediately, before the medical help, remove carefully the acid with the cotton, wash the affected area with a water jet and then treat the skin with a 5% ash soda solution or ammonia solution

2.6 While working with metal tools exclude short circuits, caused by simultaneous touch to the battery connections.

2.7 Follow the instructions of safety signs placed on the battery case

3 Bringing the battery in the operating state

3.1 Fill the battery with electrolyte

3.1.1 The density of the electrolyte (sulfuric acid), as shown in table 1, depends on the climatic region, where the battery is used

3.2.2 Prepare the electrolyte for the batteries from sulfuric acid and distilled water. Measure the electrolyte density with a battery densimeter. The temperature of the electrolyte, poured into the batteries, should not exceed 30 °C. It is not recommended to fill the batteries with electrolyte if its temperature is below 15 °C

Table 1

Macroclimatic region. Average month temperature of the air in January	Season	Electrolyte density brought to 25 °C, g/cm ³	
		submerged	of a charged battery
Cold: Very cold from -50°C to -30°C	The whole year	1,28	1,30
Cold from -30 °C to -15 °C	-/-/-	1,26	1,28
Moderate: Moderate from -15 °C to -8 °C	-/-/-	1,24	1,26
Warm humid from 0 C to 4 °C	-/-/-	1,21	1,23

Note: Deviations of the electrolyte density from the values in table 1 should be in limits of $\pm 0,001 \text{ g/cm}^3$.

3.1.3 Before pouring the electrolyte, depressurize the battery. For this remove the sealing parts (depending on the cover structure: membrane, protrusions on the stopper etc.). Pour the electrolyte until the electrolyte mirror touches the lower end of the tube neck, in case of tube absence pour the electrolyte to the level of 10-15 mm higher than battery plates

3.1.4 Not earlier than in 20 minutes and not later than in 2 hours after the electrolyte filling, measure the electrolyte density. If the electrolyte density drops by no more than 0.03 g/cm³

against the density of the submerged electrolyte (table 1) than the batteries can be put into operation. If the density of the electrolyte will decrease by more than 0.03 g/cm³, the battery must be charged in accordance with paragraph 3.2.

3.1.5 If necessary to put the dry-charged batteries immediately into operation, its installation on the vehicle is allowed without checking the density after 20 minutes of drenching, in case the period of storage does not exceed one year from the date of manufacture and putting in operation is performed at a battery and electrolyte temperature not below 15 °C

3.1.6 For batteries filled with electrolyte and charged prior the installation on a vehicle or before storage the electrolyte density should be checked. If the density of the electrolyte is less than 1,28 ± 0,01 g/cm³ or the density value of the battery differs by more than 0.01 g/cm³, the battery should be charged in accordance with paragraph 3.2.

3.2 Battery charge

3.2.1 The charger shall conform to the rated voltage of the battery. Connect the positive pole charger output to the positive battery output and the negative – to the negative. Plugs on the batteries should be unscrewed

3.2.2 The electrolyte temperature shouldn't be more than 35 °C while charging.

3.2.3 The battery should be charged in a well ventilated area. Electric current should be equal to 10% of nominal battery capacity. On reaching the voltage not less than 14,4 V on the battery outputs, the charging electric current should be reduced by a half, than proceed charging to the constant voltage and to the constant electrolyte density within two hours, i. e. to the full charge.

3.2.4 Charge the battery until appearance of abundant gas evolution in all the batteries and the constant voltage and electrolyte density within two hours. Control the voltage on the battery outputs with a voltmeter (GOST 8711, accuracy class 1.0 with a scale up to 30 V and value of division 0.2 V).

3.2.5 While charging it is necessary to control the electrolyte temperature and ensure that it does not rise above 45 °C. If the temperature goes above mentioned values, reduce the charging electric current by half or stop charging for the time necessary to reduce the temperature to 30-35 °C.

3.2.6 At the end of charge, if the density of the electrolyte, measured considering the temperature correction given in table 2, will be different from the density specified in table 1, adjust the density of the electrolyte by topping up with distilled water when it is above the norm, and when the density is below the norm top up the electrolyte of 1.40 g/cm³ density, with a continuation of the charge for stirring for 30-40 minutes. While the battery is charged put it into operation.

Table 2

Electrolyte temperature while measuring its density, °C	Amendment to the testimony of the densitometer, g/cm ³
+45	+ 0,02
+30	+ 0,01
+15	0,00
0	- 0,01
-15	- 0,02
-30	- 0,03
-40	- 0,04

4. Operation and maintenance of batteries

4.1 Control of the charging mode

4.1.1 When operating the vehicles and other means of transport it is necessary to check the charging mode of the batteries to prevent over-charging or incomplete charging, that shortens their life-cycle. During maintenance, check the regulator. When operating, the value of the charging voltage should comply with the value specified in the technical description and operating instructions for the appropriate vehicle.

4.1.2 During the operation breaks of the vehicle for more than 3 days disconnect the jumper of the batteries.

4.1.3 During long operation breaks of the vehicle, for over a month, charge the batteries in accordance with paragraph 3.2.

4.1.4 Do not connect 12V appliances (stereos, receivers, etc.) to the batteries.

4.2 Maintenance

4.2.1 At least once every two weeks:

- Check the reliability of the battery mounting in the container and the toughness of the wire tip connection to the battery outputs. Grease the wire tips with litol or solidol after installation on the polar battery outputs;
- If necessary, clean the battery from dust and dirt. Wipe the electrolyte, fallen on the surface of a battery, with a clean cloth soaked in a solution of ammonia or soda ash (10%);
- Clean the air vents, if necessary;
- Check the electrolyte level in all the batteries and, if necessary, top up with distilled water to the required level;
- If the electrolyte density is dropped – charge the battery by the electric current equal to no more than 10% of the nominal battery capacity, it is forbidden to increase the density by adding the electrolyte;

4.2.2 Identify and eliminate the board system troubles of the vehicle: in generator, relay, and starter.

4.2.3 If the electrolyte density is increasing, pour only the distilled water at any season.

4.2.4 Check the operation of the generator and voltage regulator periodically.

4.2.5 Top up the electrolyte in the battery only in case if it is known that electrolyte level was reduced due to splashing. The density of the poured electrolyte must be the same, as the electrolyte density before splashing out of the battery.

4.2.6 Start the engine by depressing the clutch for 15 seconds maximum with an interval of a minute. Driving with the help of starter is not allowed. Violation of the rules of engine start (repeated, prolonged attempts to start) leads to a deep discharge of the battery, sulfation of the electrodes, the destruction of the electrodes and the battery failure.

4.2.7 Undercharging or overcharging of the battery is not allowed. The voltage applied to the battery should be in the range 13,6-14,4 V.

4.2.8 DO NOT OPERATE THE BATTERY WITH THE ELECTROLYTE LEVEL below the norm. The electrolyte level is provided by pouring the distilled water. Refilling the electrolyte is not allowed. In cold weather, pour the distilled water in the running engine for a quick mixing with the electrolyte.

4.2.9 The battery should be maintained in a charged state. Check the electrolyte density at least once a month. If the electrolyte density, which corresponds to a given climatic area, is decreased by 0,03 g/cm³ and more the battery should be charged in accordance with paragraph 3.2.

4.2.10 DO NOT exploit a discharged battery, the electrolyte density of which is decreased by 0.08 g/cm³. This leads to sulfation and battery breakdown, and at low temperatures - to electrolyte freezing and the battery destruction

Table 3

Плотность электролита, приведенная к 25 °С, г/см ³		
Fully charged battery	Discharged battery	
	by 25%	by 50%
1,30	1,26	1,22
1,28	1,24	1,20
1,26	1,22	1,18
1,23	1,19	1,15

4.2.11 The battery, discharged by more than 25% in winter and by 50% in summer (Table 3) should be removed from service and put in charge in accordance with paragraph 3.2

5 Transport and storage

5.1.1 Transportation of batteries is performed in covered vehicles that ensure their protection from mechanical damage and contamination from falling precipitation and direct sunlight.

5.1.2 Charge the batteries temporarily removed from the vehicle for storage, and bring the density value of the electrolyte to the corresponding climatic area. If possible, keep these batteries in a room with a temperature above 0 ° C. Check the electrolyte level and density, refill with distilled water every 30 days if the ambient temperature is above 25 ° C and every 2 months if the ambient temperature is below 25 ° C. Recharge the battery once a month in accordance with paragraph 3.2 of this manual.

6. Utilization

The battery, being in operation set time, taking into account the actual state, should be utilized in a specialized enterprise as evidenced by the appropriate symbol on the label of the battery.

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