Rostselmash Harvester Plant LLC

Self-Propelled Forage Harvester RSM-1403

Operation and
Maintenance Manual

RSM-1403 IE

Revision 3

Self-propelled forage harvester RSM-1403 (hereinafter "harvester") is covered by the compliance certificate No. TC RU C-RU.AE81.B.00917 valid from 09/17/2013 till 09/16/2018 issued by the authority for products and services certification Yuzhny tsentr syertifikatsii i ispytaniy LLC (58 pr. Sokolova, 344000 Rostov-on-Don, Russia).

Each harvester, supplied to the European Union countries, is provided with EU declaration of conformity containing the information about the manufacturer, authorized representative in EU countries, trademark, harvester type, model, purpose, as well as serial number of the harvester.

Rostselmash Harvester Plant LLC hereby declares at its own responsibility that the harvester complies with the basic safety requirements provided in the Directive 2006/42/EC.

Dear Customer!

All manufactured items require care and attention. Before operating the harvester read this operation and maintenance manual carefully, this will help to reduce overhaul costs, to extend fail-free service life, as well as to perform scheduled operations.

Caution!

This operation and maintenance manual is an exclusive product of Rostselmash Harvester Plant LLC and complies with the technical documentation as of 10/01/2015.

Due to continuous improvement of the design, Rostselmash Harvester Plant LLC reserves the right to introduce any modifications, improving its reliability and operator working conditions, which are not included in this edition of the operation and maintenance manual.

ROSTSELMASH - is a registered trademark. Only technical publications with this trademark comply with the valid documentation.

CONTENT

1 INTRODUCTION

1.1 Abbreviations

The following abbreviations are used in this manual:

SB means storage batteries;

ACLS means automatic centralized lubrication system;

POL means petroleum, oil and lubricants;

HGD means hydrostatic ground drive;

PAU means parts and assembly units;

ESM means every shift maintenance;

SC means short-circuit;

GB means gear box;

PTL means power transmission lines;

DWA means drive wheel axle;

MTM means multifunctional terminal module;

SAS means sharpening and adjustment system;

CFS means contour following system;

TM means technical maintenance;

ECEU means engine control electronic unit.

1.2 General

This operation and maintenance manual (hereinafter "manual") is applicable to self-propelled forage harvester RSM-1403 (hereinafter "harvester").

Engine, replaceable operating units, SB and some other harvester components are provided with individual operational documents which shall be referred to during maintenance and operation of such units.

First of all, this manual is intended for the harvester operator. It includes a brief description of the design, information about the harvester operation, as well as service and maintenance guidelines.

The harvester is allowed to be operated by the mechanizers (hereinafter "operators") provided with a duly executed tractor driver's license with "F" permission category, who have undergone an advisory seminar held by the regional service center on harvester operation and maintenance rules, as well as testing of skills and knowledge related to labor safety during harvester operation and maintenance.

The operator shall have the machine registration license together with the respective driving license.

When moving across the roads the operator shall obey traffic regulations of the country where the harvester is operated.

The following symbols are used in this manual:

 means safety alert indications, the failure to comply with which will be hazardous for health and life of the operator and surrounding persons;

 means safety alert indications, the failure to comply with which may result into the damage to machine.

List of kits, tools and accessories supplied with the harvester is provided in Appendix A.

Operation of tires used for the harvester shall comply to GOST 7463-2003 Pneumatic tires for tractors and agricultural machinery. Specifications.

Use of non-original spare parts or spare parts which are not recommended by Rostselmash Harvester Plant LLC for operation may have negative effect on harvester

performance. Rostselmash Harvester Plant LLC bears no responsibility for any losses due to use of non-original or not permitted spare parts. Unauthorized installation of additional systems and equipment results in release of the harvester warranty.

Rostselmash Harvester Plant LLC does not bear responsibility for any consequences resulting from non-observance of operation and fire-safety rules.

Any considerations and proposals concerning design, maintenance and operation of the harvester shall be delivered to Rostselmash Harvester Plant LLC.

Further assembly and repair of the harvester shall be carried out in dedicated shops by specially trained personnel.

CAUTION! DUE TO THE FACT THAT THE POSSIBILITY OF DETECTION OF FOREIGN OBJECTS BY MEANS OF A METAL DETECTOR DEPENDS ON A SERIES OF RANDOM FACTORS, AND NO STRICTLY DETERMINED LEVEL OF DETECTION OF FOREIGN METAL AND NON-METAL OBJECTS IN THE HARVEST CAN BE GUARARNTTED, THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY DAMAGE OF THE HARVESTER CAUSED BY INGRESS OF FOREIGN METAL AND NON-METAL OBJECTS TOGETHER WITH THE HARVEST!

When the design parameters are reached further operation of the harvester may be performed after evaluation of its technical condition. New design parameters may be assigned (design service life, design lifetime, design storage period). The user is responsible for further operation of the machine as well as for its unintended operation after expiry of design parameters.

1.3 Prior to Start

CAUTION!

FOR ALL PERSONS OPERATING, SERVICING OR MAINTAINING/INSPECTING THE MACHINE, THE GUIDELINES OF THIS MANUAL ARE MANDATORY FOR READING IN ORDER TO PREVENT ANY ACCIDENTS; SPECIAL ATTENTION SHALL BE PAID TO THE "SAFETY REQUIREMENTS" SECTION.

IT IS FORBIDDEN TO SWITCH OFF SB WHEN ENGINE IS RUNNING AS IT MAY LEAD TO A MALFUNCTION OF ELECTRONIC UNITS.

CAUTION! IT IS REQUIRED TO STOP THE ENGINE AND REMOVE THE KEY FROM IGNITION LOCK PRIOR TO ANY OPERATIONS OF REPAIR, TM, CLEANING, AIR COMPRESSOR BLOWING AND ELIMINATION OF MALFUNCTIONS.

CAUTION! PRIOR TO HARVESTER COMMISSIONING IT IS REQUIRED TO CHECK THE OIL LEVEL IN ALL GEAR REDUCERS IN COMPLIANCE WITH SUBSECTION 7.5.

CAUTION! OPERATING FLUID LEVEL SHALL BE CONTROLLED WHILE THE HARVESTER IS INSTALLED ON A FLAT HORIZONTAL GROUND.

1.4 Important Ecological Aspects Disposal

Soil, air and water are essential factors for agriculture and for the life on Earth in general.

Dismantled defect PAU of the harvester, spent oil and other operating fluids shall be disposed in accordance with the valid ecological regulatory documents.

If no regulations are available, please contact your oil, fuel, anti-freeze, detergent, etc. suppliers to get the information regarding the impact of these substances on humans and environment, as well as regarding safe methods of their storage, use and disposal.

If valid environmental protection legislation does not regulate disposal issues, apply common sense when disposing the harvester.

CAUTION! LUBRICANTS, HYDRAULIC FLUIDS AND FUEL SHALL BE STORED IN DEDICATED TANKS AND SHALL BE DISPOSED ACCORDING TO THE ESTABLISHED PROCEDURE.

IT IS FORBIDDEN! TO DRAIN OPERATION FLUIDS TO THE GROUND.

During the entire period of harvester operation the following shall be taken into account:

- it is forbidden to fill the harvester with fuel from tanks or with the use of an inappropriate pressurized fuel supply system as this may result into spillage of large amounts of fuel;

- it is forbidden to burn contaminated fuel and/or spent oil;

- avoid spillage when draining engine and ground drive oils, hydraulic system oil, hydraulic fluid and cooling fluid, etc. Do not mix the drained hydraulic or cooling fluid or fuel with lubricants;

- do not open the air conditioning system as it contains gases which must not be released to the atmosphere. The dealer has special equipment for this purpose, the system being opened shall be re-filled with a cooling agent;

- any leakage or defects in the engine cooling system or in the hydraulic system shall be immediately eliminated;

- it is forbidden to increase pressure in the systems (hydraulic, braking, etc.) under pressure as this may destroy harvester PAU;

- all used-up storage batteries (both starter batteries and dry-charge batteries used for electric equipment or electronic circuit power supply) shall be returned to the dealer who shall properly dispose or recycle them as storage batteries contain aggressive chemical compounds, which are harmful for the environment if are not properly disposed.

When junking a harvester consider valid legal provisions regarding the disposal in the country where the harvester was operated, and observe them. If no specific regulation or law is applied, request the information about the possibility of transferring of the machine to a company engaged with such type of activity in your commercial representative office.

Several recommendations for preparing of a harvester for disposal:

- drain operating fluids from hydraulic and hydrostatic systems, engine oil pan, gear box, track gear reducers, etc.;

- drain operating fluid from the cooling system;

- collect operating fluids in special tanks for storage and further disposal;

- sort different materials, for example, plastic, iron, rubber, etc., for the purpose of further recycling.

Contact your dealer for disposing the air conditioning system.

2 GENERAL DESCRIPTION AND SPECIFICATIONS

2.1 Intended Use and Scope

The harvester is designed for mowing and shredding of silage crops, including corn in its yellow ripeness phase, annual and perennial grass and mixtures of sorgo, sunflower and other crops and their simultaneous loading; picking of prewilted mass from rollers at fields with a slope up to 9°, excluding mountainous areas.

The harvester can perform swaths, circular and shuttle runs.

General view of the harvester is shown in Figure 2.1.

The harvester shall be used for its intended purpose only.

2.1.1 Design Features

The harvester is available in different configurations depending on DWA (manufactured by CIT or ZF) and on SWA being installed (driven or driving).

The harvester is equipped with a multifunctional preservative application system, wheels ensuring enhanced flotation ability and a system of soil relief lengthwise contouring.

The harvester is provided with a metal detector (with a shock pick-up) in order to prevent ingress of metal objects into the shredding unit.

2.1.2 Harvester Configuration

The harvester is supplied completed with the following items:

- Kemper 445 corn reaper adapter (hereinafter "rotary header");
- corn cracker;
- corn cracker ACLS kit;
- tools and accessories kit;
- pneumatic accessories kit;
- automated hitch set;
- tower extension;
- spare parts kit for Kemper 445 corn reaper adapter.

Depending on harvesting technique, the harvester may have the following components (under a special user's request):

- spare parts kit. The list of spare parts parts is provided in Appendix B;
- video monitoring system;
- header for grass cutting RSM-1401.70TU 23.5785914.1.81-93 (hereinafter "grass header") for mowing of thin-stalked crops up to 1.5 m high;
- P3000 forage pickup (hereinafter "pickup") for pick-up of preliminarily mowed grass.

Under a special user's request the harvester may be completed with a wagon RSM-100.70.06 TU 23.5785914.1.81-93 to transport the grass header along roads and fields.

Figure 2.1 - General view of the harvester

2.2 Nameplate

In accordance with Figure 2.2, the nameplate (Figure 2.3) is located on the left side of the harvester behind the cab.

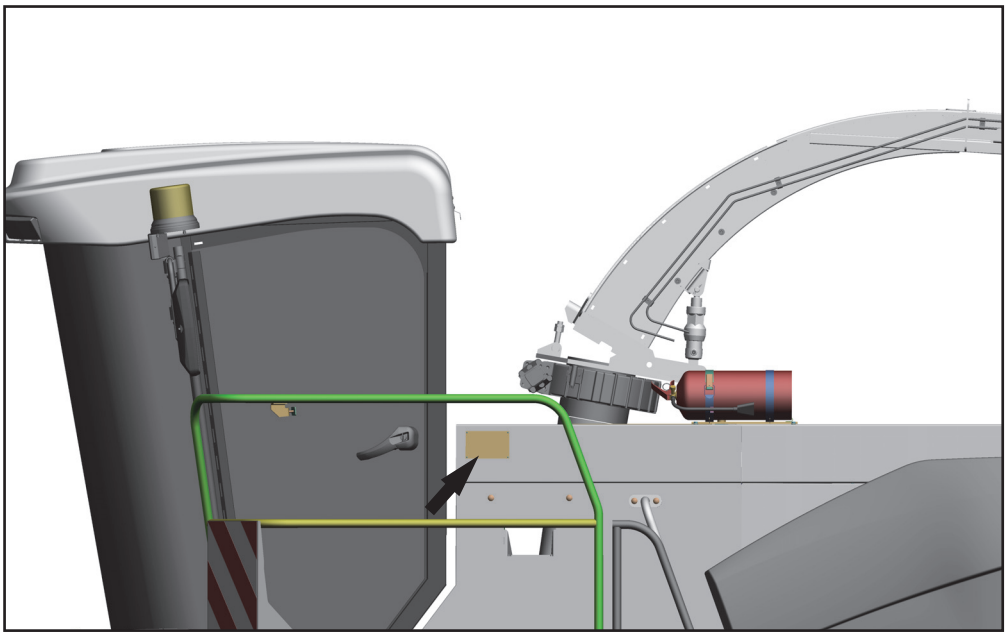


Figure 2.2 - Nameplate location

Figure 2.3 - Nameplate example

2.3 Design Summary

2.3.1 Operation Process of Combining

A pickup or one of headers is attached to the harvester depending on the type of work.

When plants are cut with a grass header, the reel moves a portion of stalks to the cutter bar. Cut stalks are transported by means of the auger to the spacer beater feeding the mass to the harvester feeder rolls.

The rotary header cuts through and feeds corn stalks to the feeder neck.

The mass is delivered by the pick-up mechanism directly from the roller to the platform auger at progressive motion of the harvester.

Plants are picked up by the feeder rolls, compacted and supplied to the shredding unit (hereinafter "shredder"). The mass is shredded by the shredder drum and supplied to the accelerator, then it is conveyed through the transition chute to the tower by the blades. Shredded mass is delivered via tower to the vehicle which is either moving along with the harvester or attached to it from behind. The tower deflector changes the shredded mass flow direction for uniform vehicle filling.

2.3.2 Harvester Structure

The harvester consists of the following: self-propelled wheel shredding unit including: a feeder, a shredder, operator workplace, chassis, hydraulic equipment (hydraulic principal diagram is provided in Appendix C), electric equipment (electric principal diagram is provided in Appendix D), a transition chute, a spout swivel, a tower, fuel system, a motor plant and replaceable adapters.

In order to prevent ingress of metal and foreign hard objects into the feeder, a system of metal detector and stone detector (hereinafter "stone-metal detector") sensors is provided.

Harvester PAU are mounted on the frame 14 (Figure 2.4) installed on a DWA 17 and a steering wheel axle 12.

The front part of the frame contains a feeder 20, a shredder 19, a diffuser 18, a spacer 16, an accelerator 15, a transition chute 3, a spout swivel 4, a tower 5, an entrance platform 2 and a cab 1.

The middle part of the frame contains a fuel tank unit 13, a hydraulic tank 7, a hydraulic control valve unit 6 and a radiator unit 8.

The rear part of the frame contains a motor plant 9, an air filter 11, a muffler 10.

1- cab; 2- entrance platform; 3- transition chute; 4- spout swivel; 5- tower; 6- hydraulic control valve unit; 7- hydraulic tank; 8- radiator unit; 9- motor plant; 10- muffler; 11- air filter; 12- steering wheel axle; 13- fuel tank unit; 14- frame; 15- accelerator; 16- spacer; 17- DWA; 18- diffuser; 19- shredder; 20- feeder

Figure 2.4

2.4 Basic Technical Data

Basic technical data are provided in Table 2.1

Table 2.1

Parameter name	Measure-ment unit	Value
1	2	3
General technical data		
Type	-	self-propelled wheel shredding unit
Dry structural weight, max	kg	10200
Overall dimensions without adapter in transport position: - length: with standard tower with extended tower - width - height	mm	 6785±150 7464±150 3237±50 3914±50
Overall dimensions of the harvester in operating position: - length with grass header with pickup with rotary header with grass header on wagon - width with grass header with pickup with rotary header with grass header on wagon - height	mm	 8577±50 7999±50 8335±50 14064±50 5333±50 3434±50 4545±50 3237±50 3914±50
Road clearance, min	mm	367
Wheelspan: - of drive axle wheels - of steering axle wheels - of drive steering axle wheels	mm	 2634±25 2592±25 2600±25
Base	mm	3000±30
Minimum turning circle by the outside wheel track	m	7.5
Rated power of StageIIIb engine, min	kW (hp)	365 (500)
Rated rotation frequency of engine crankshaft	rpm	2000±50
Specific fuel consumption at rated engine power, max	g/kW-h (g/hp-h)	223 (164)

Table 2.1 (continued)

1	2	3
Movement speed, max: - operating - traveling	km/h	 15 20
Initial cutting length	mm	4.0; 7.0; 10,0; 17.0
Operating personnel number	pers.	1
Average lifetime	years	10 (max. 6000 operating hours)
Design lifetime	operating hours	6000
Design storage period	years	5
Design service life	years	10
Ground pressure of propulsion units, max	kPa	290
Feeder		
Number of rollers	pcs.	4 (2 lower, 2 upper)
Change of cutting lengths	-	by manual switching of the reduction gear
Reverse gear	-	mechanical
Metal detector	-	automated stop of mass feeding in case of ferromagnetic object ingress
Shredder		
Shredding drum type	-	herringbone
Sharpening device	-	moving sharpening stone with automated supply and control from the cab
Delivery of the counter-cutting beam to the shredding drum knives	-	manually by screws or by electric motors with automated deactivation
Discharge unit		
Tower rotation angle in horizontal plane	degree	226±4 (symmetrically in relation to the longitudinal axle of the harvester)
Height of product loading by means of tower, min	m	4.0
Engine assembly		
Engine	-	four-stroke in-line six-cylinder diesel engine with electronic control and turbocharging with intercooling
Engine start system	-	electrical starting
Undercarriage		
DWA	-	with hydrostatic drive (HGD)

Table 2.1 (continued)

1	2	3
Steering wheel rotation mechanism drive	-	hydrostatic
Pressure in tires: - DWA with tires 750/65 R26 166B/169A8 SFT TL MI: - during harvester run-in: without adapters with pickup with rotary header with grass header - during harvester operation: with pickup with grass header with rotary header	MPa	 0.22±0.01 0.22±0.01 0.22±0.01 0.22±0.01 0.18±0.01 0.20±0.01 0.20±0.01
- drive and driven steering axle with tires 480/70 R24: - during harvester run-in - during harvester operation with any adapter		 0.16±0.02 0.097±0.01
Maximum load to axis: - of drive axle - of steering axle	kgs	 10500 4400
Electric equipment		
Type of electric system	-	single-wired with the negative side to the "ground"
Generator: - voltage - power	 V kW	 28 2
SB	-	two 6CT-190 or of similar capacity and power
Rated voltage of harvester circuit	V	24
Hydraulic system		
Operating pressure, max: - of steering control hydraulic system	MPa (kgs/cm^2)	 16.0 (160)
- of main hydraulic system - of HGD hydraulic system - of low-pressure hydraulic system		16.0 (160) 42.0 (420) 2.4 (24)
Transverse static stability angle, min	degree	30
Noise level at the operator's work-place during harvester operation with adapter, max	dBa	85

2.5 Noise and Vibration Level

CAUTION! IN ORDER TO AVOID HARMFUL INFLUENCE OF SOUND ON EARS IT IS RECOMMENDED TO PERFORM OPERATIONS USING PERSONAL PROTECTION EQUIPMENT (LIKE EARPLUGS OR EXTERNAL EAR PROTECTORS).

Full correctable value of vibratory acceleration:

- at the operator's seat, vertically: 0.12 m/s^2;
- horizontally: 0.07 m/s^2;
- at the steering wheel: 0.18 m/s^2.

3 SAFETY REQUIREMENTS

3.1 Tablets (Labels) with Signs and Notices

Hazardous parts of the harvester are equipped with warning signs and notices which serve to provide safety of the operator and people inside the operating area of the harvester.

Tablets (labels) should be kept in their places during the entire lifetime of the machine and remain clean and readable. If the image loses sharpness, changes colors, have ragged edges, they should be replaced.

If parts of the harvester containing warning signs and notices are replaced, new parts shall be equipped with corresponding tablets (labels).

Tablets (labels), their designations and names for order at the manufacturer, as well as their locations on the harvester are listed below (Figures 3.1-3.56).

1403.22.00.012 "Zebra crossing" label (Figures 3.1-3.3)

Figure 3.1

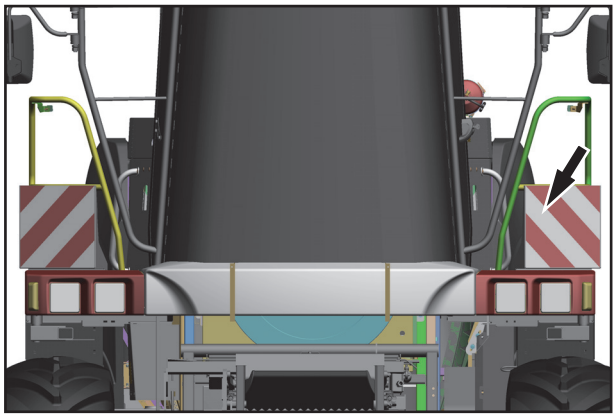


Figure 3.2

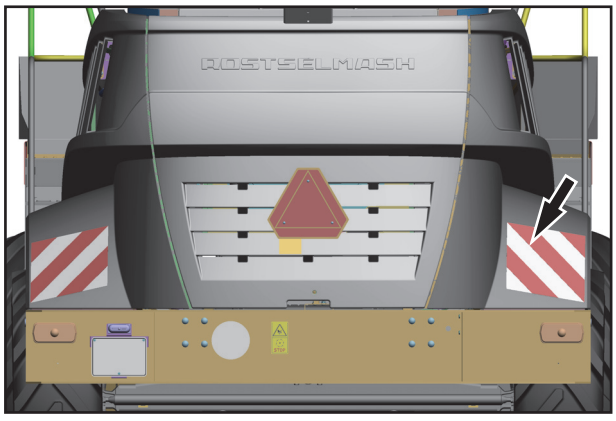


Figure 3.3

1401.22.01.012-01 "Zebra crossing" label (Figures 3.4-3.6)

Figure 3.4

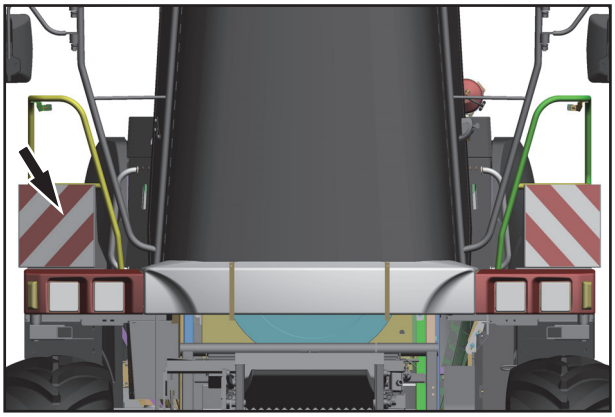


Figure 3.5

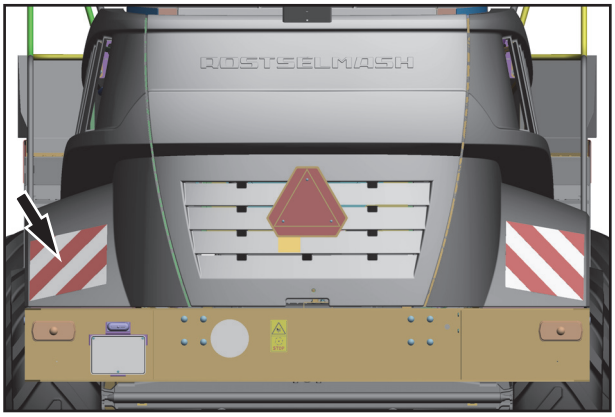


Figure 3.6

1403.22.00.014 "Speed limit sign" label
(Figures 3.7-3.10)

Figure 3.7

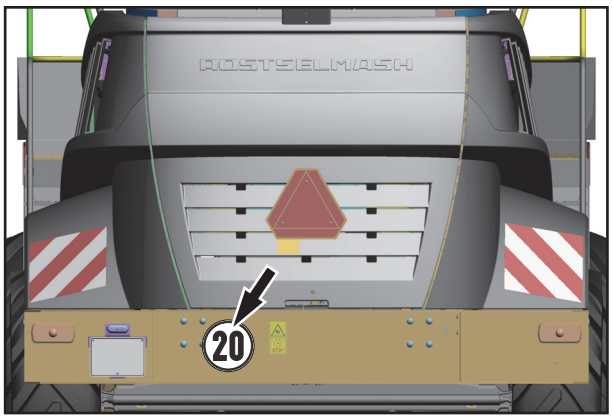


Figure 3.8

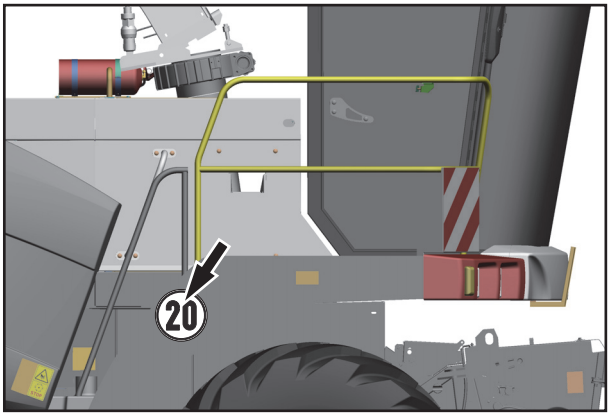


Figure 3.9

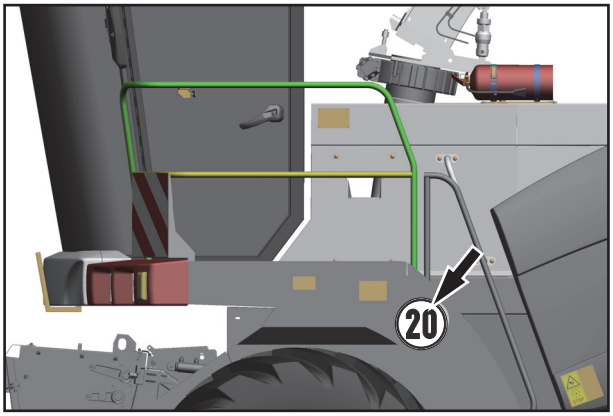


Figure 3.10

РСМ-10Б.22.01.008 Tablet
"Wait until all machine components are at a standstill before touching them" (Figures 3.11-3.14)

Figure 3.11

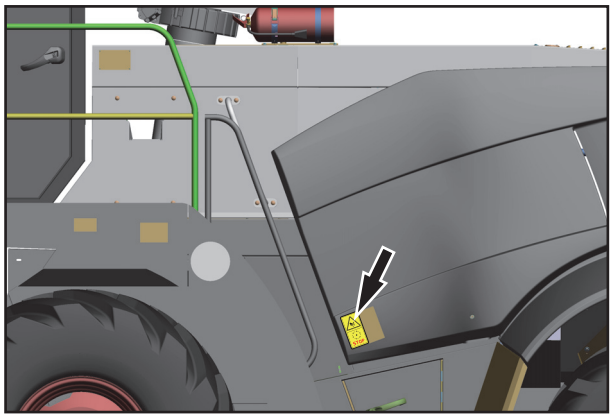


Figure 3.12

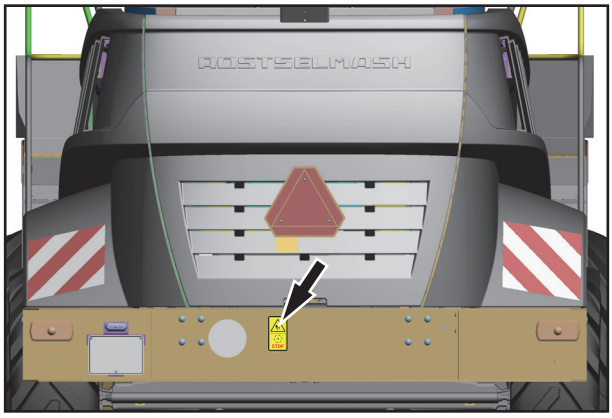


Figure 3.13

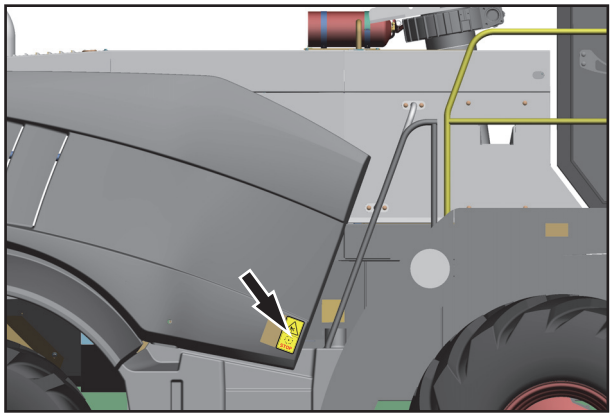


Figure 3.14

181.22.00.063A Warning tablet (Figures 3.15-3.18)

Figure 3.15

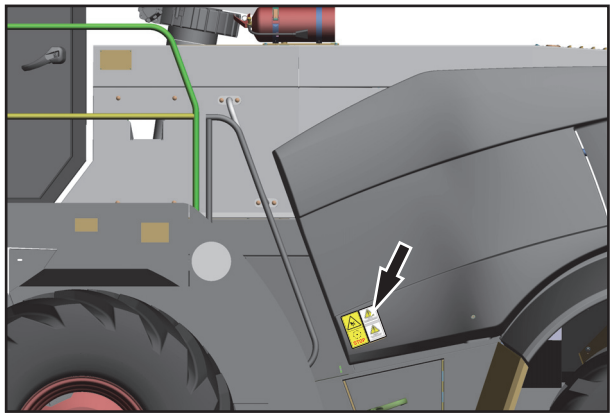


Figure 3.16

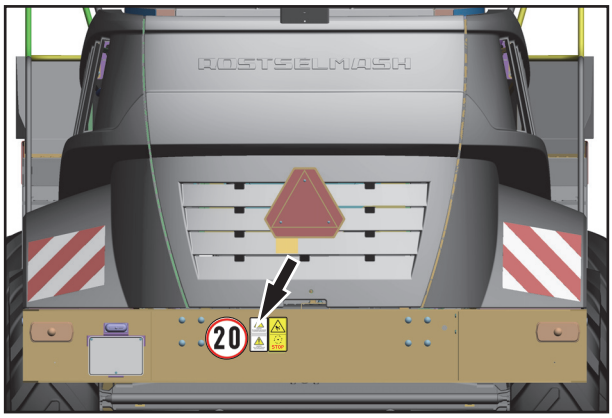


Figure 3.17

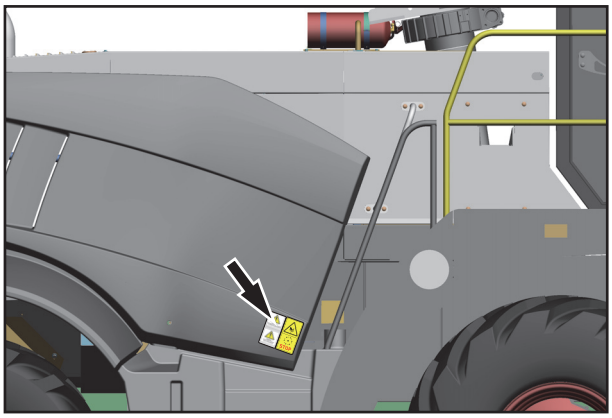


Figure 3.18

RSM-10B.22.01.002 "Portable fire-extinguisher fixation point" tablet
(Figures 3.19, 3.20)

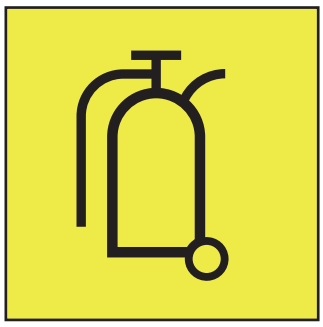


Figure 3.19

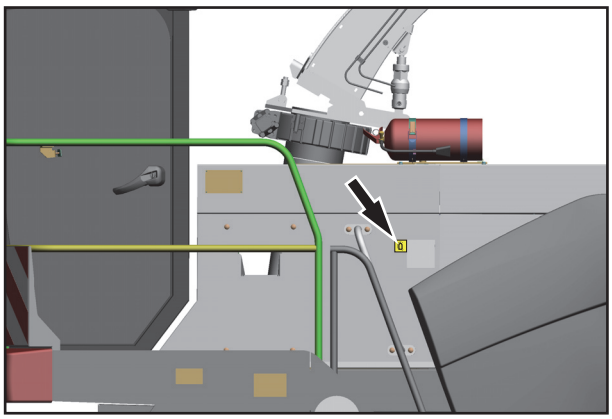


Figure 3.20

1403.22.00.015A "Zebra crossing" label
(Figures 3.21, 3.22)

Figure 3.21

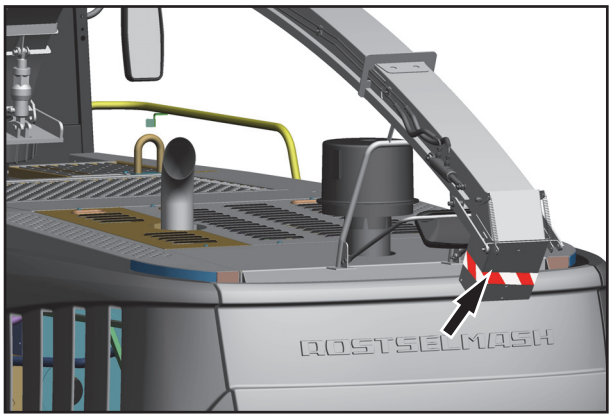


Figure 3.22

RSM-10B.22.00.009 "Center of mass" tablet (Figures 3.23-3.26)

Figure 3.23

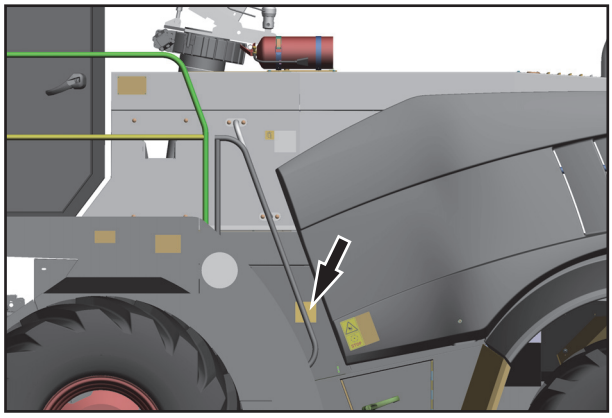


Figure 3.24

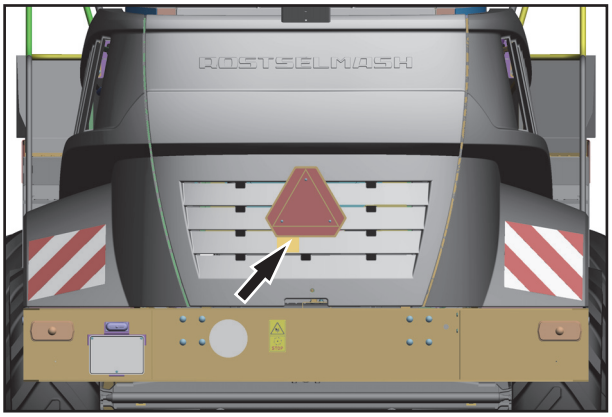


Figure 3.25

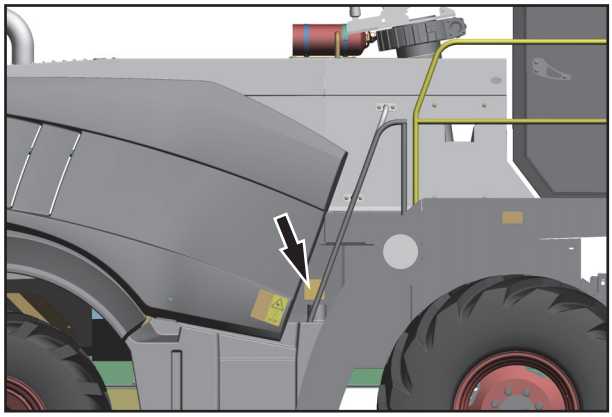


Figure 3.26

RSM-10B.22.00.013 "Earth sign" tablet (Figures 3.27, 3.28)

Figure 3.27

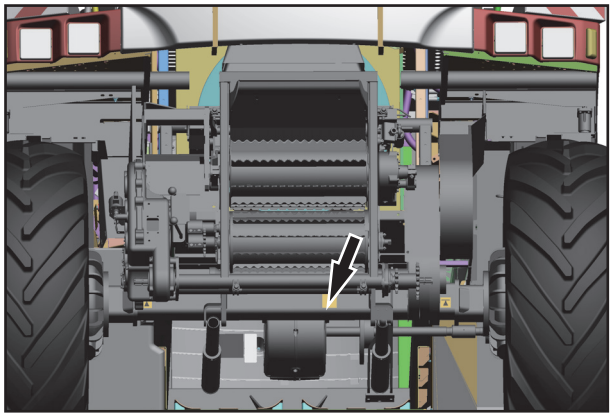


Figure 3.28

RSM-10B.22.01.001 "Jack location point" tablet (Figures 3.29-3.31)

Figure 3.29

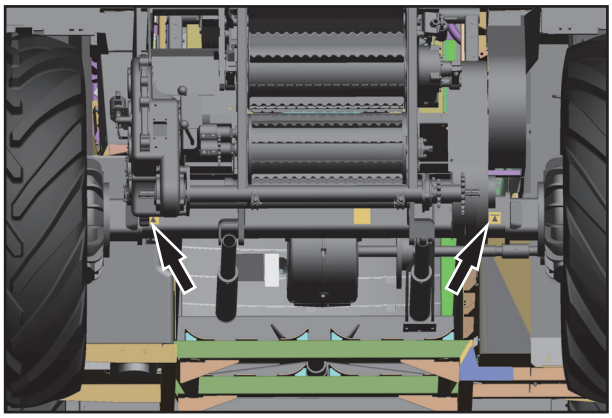


Figure 3.30

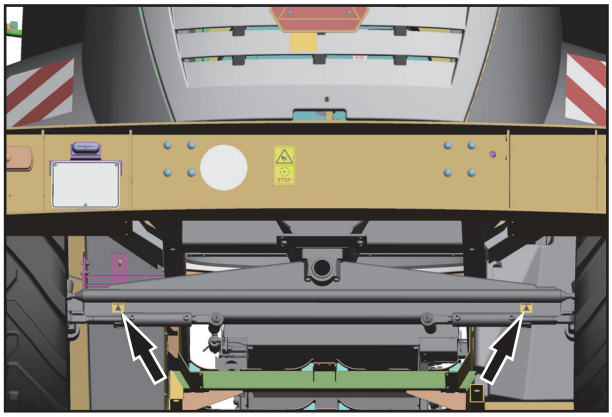


Figure 3.31

RSM-10B.22.01.004"Carefully study the operation manual prior to commissioning" tablet (Figures 3.32, 3.33)

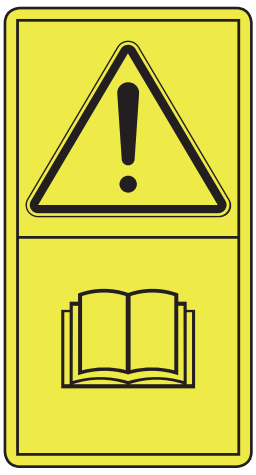


Figure 3.32

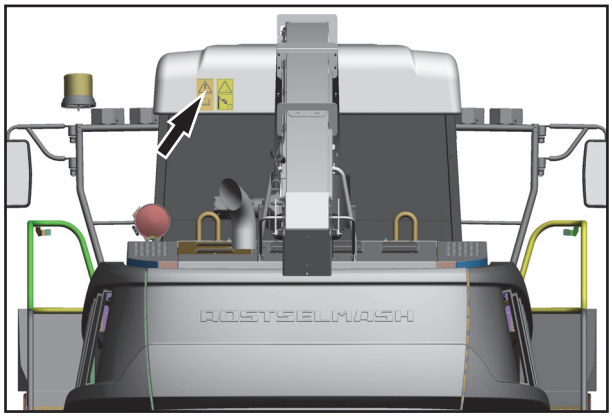


Figure 3.33

RSM-100.22.01.014 "Electric shock hazard" label (Figures 3.34, 3.35)

Figure 3.34

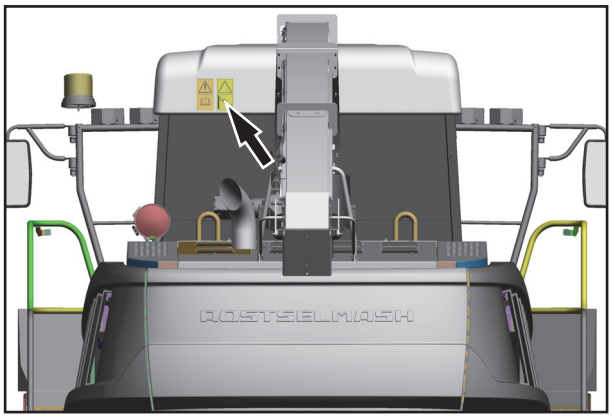


Figure 3.35

RSM-100.22.00.018 "Tire pressure" label (Figures 3.36-3.38)

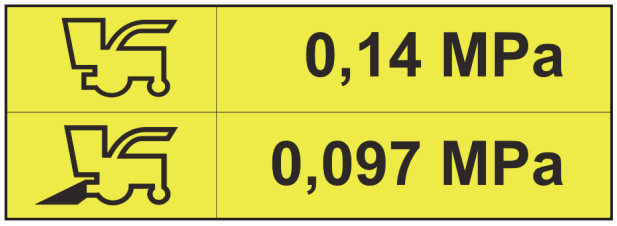


Figure 3.36

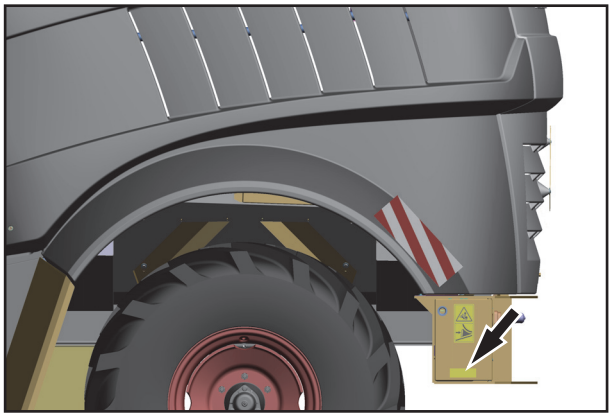


Figure 3.37

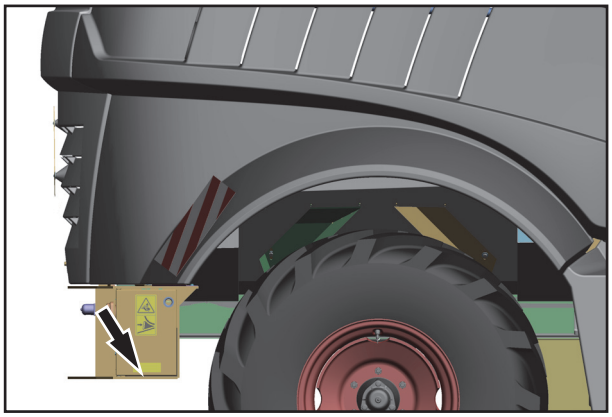


Figure 3.38

1403.22.00.016 "Tire pressure" label (Figures 3.39-3.41)

Drive axle control parameter	Air pressure in the tire, MPa			
	Operating configuration		Transport configuration	
Tire 23,1-26 Ya242AB A6 153	**0.16**	**0.18**	**0.16**	**0.18**
Tire 750/65 R26 166D/ 169A8 SFT TLMI	**0.18**	**0.2**	**0.22**	**0.22**
Tire 28LR26 165 A8 Bel-83M	**0.10**	**0.14**	**0.10**	**0.18**

Figure 3.39

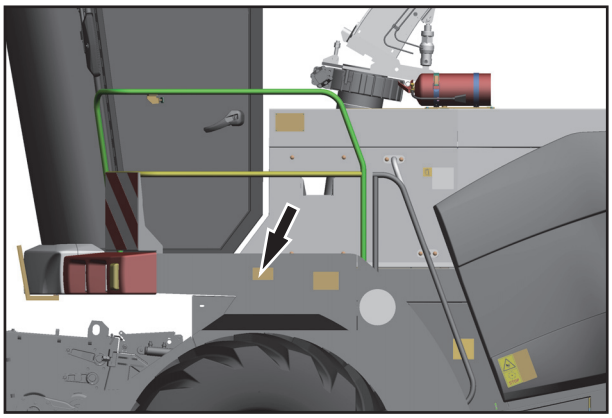


Figure 3.40

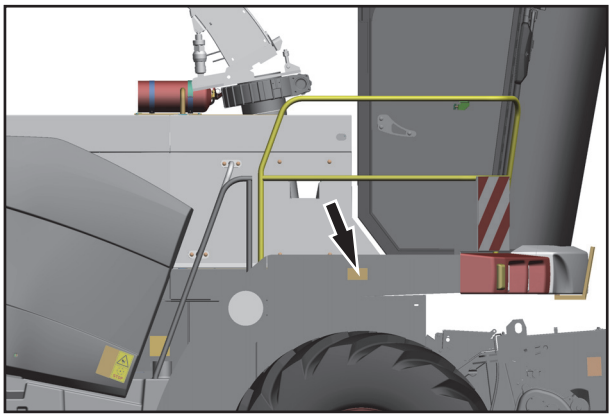


Figure 3.41

RSM-10B.22.00.012 "Slinging sign" tablet (Figures 3.41, 3.42, 3.43)

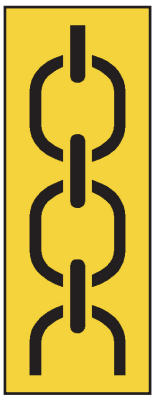


Figure 3.42

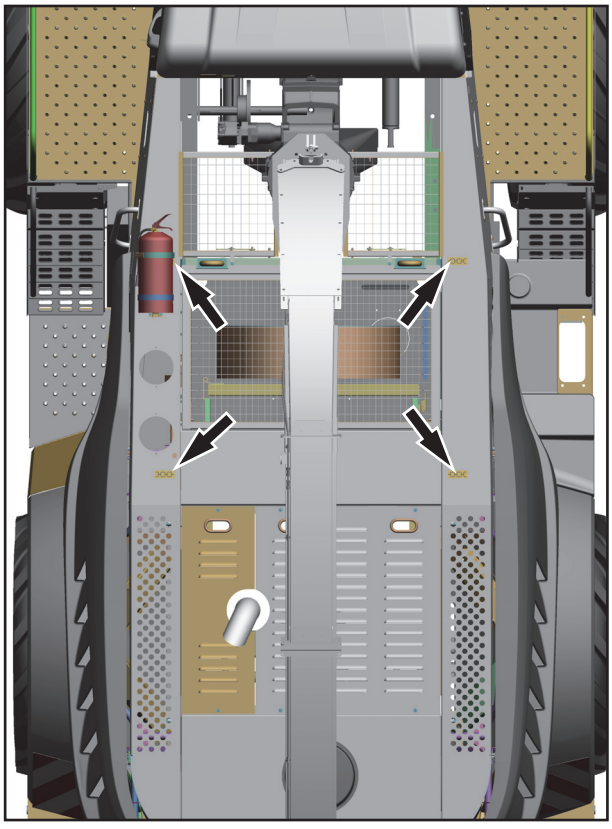


Figure 3.43

1401.22.01.016 "Slinging sign" label (Figures 3.44, 3.45)

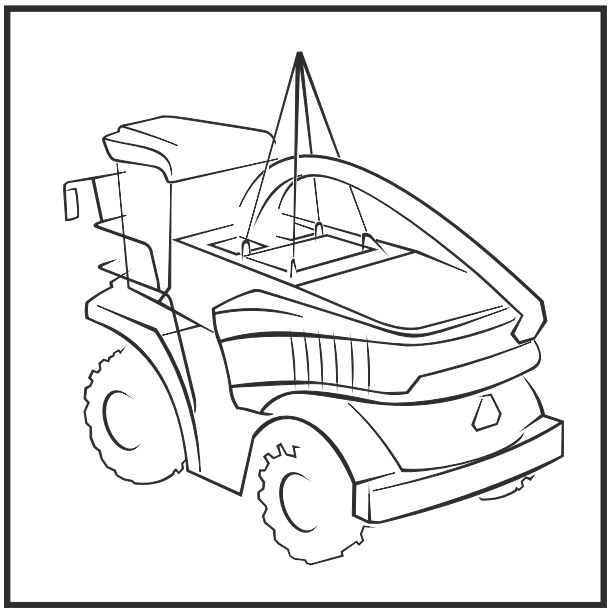


Figure 3.44

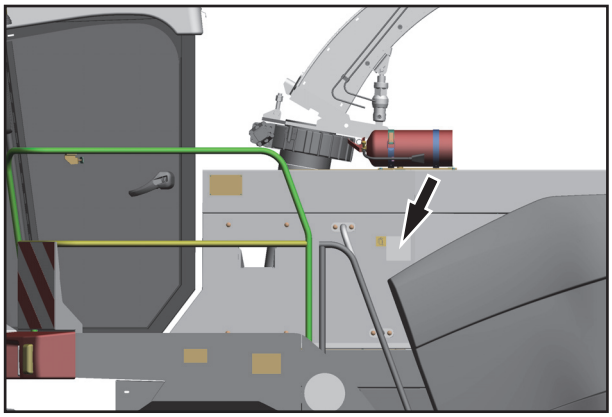


Figure 3.45

101.22.03.033 "In case of fire" tablet (Figures 3.46, 3.47)

Figure 3.46

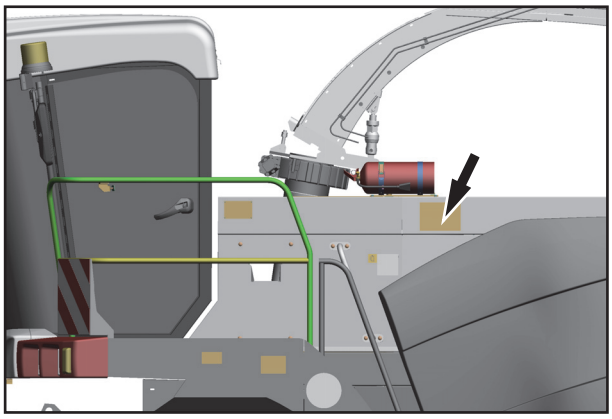


Figure 3.47

1403.22.00.007 "Liquid draining" label (Figures 3.48, 3.49)

Figure 3.48

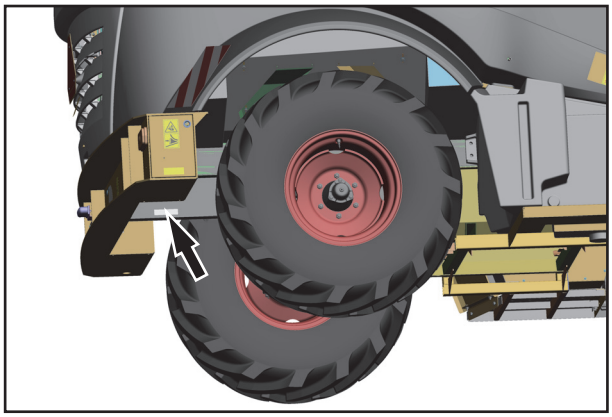


Figure 3.49

142.22.03.037 "Wheel blocks" label (Figures 3.50, 3.52)

Figure 3.50

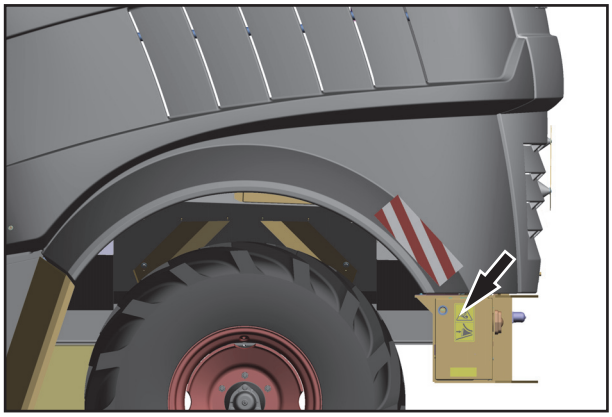


Figure 3.51

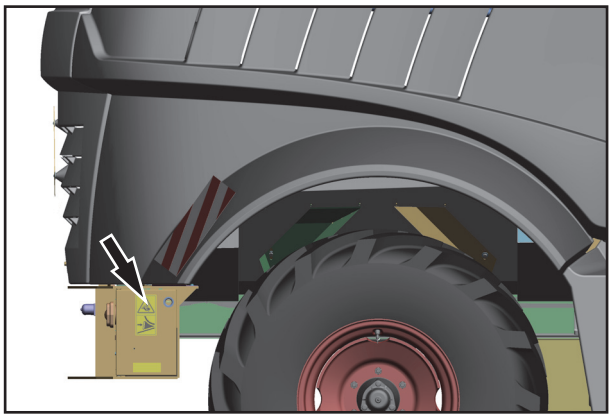


Figure 3.52

RSM-10B.22.01.005 "Place the base before entering the hazardous area" tablet (Figures 3.53, 3.54)

Figure 3.53

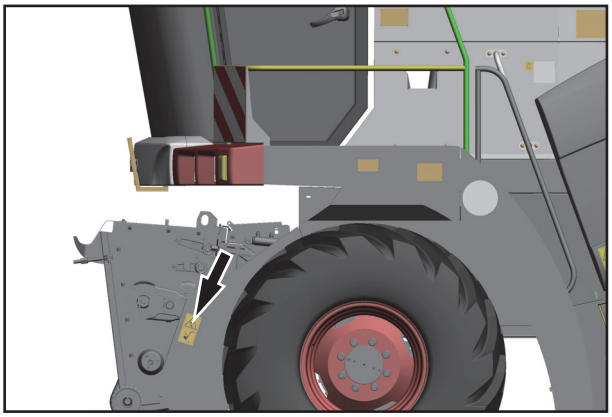


Figure 3.54

101.04.01.031 Symbol tablet

"Stop the engine, remove the key from ignition lock and carefully read the operation manual prior to repair and maintenance!" (Figures 3.55, 3.56)

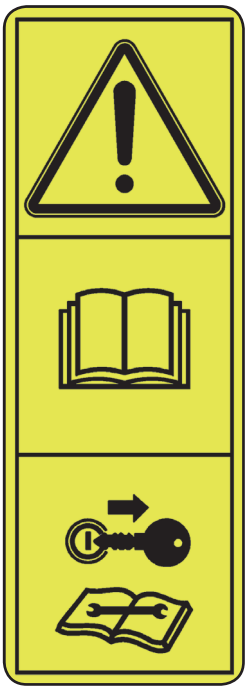


Figure 3.55

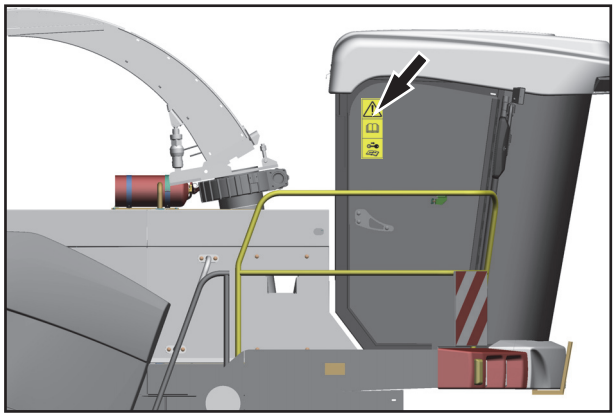


Figure 3.56

3.2 Safety Regulations

When unloading the harvester and its replaceable adapters (headers, pickup) from a railroad platform it is required to:

- perform slinging in designated points and unloading by means of special lifting devices;

- study the requirements of p. 5.1 prior to harvester unloading from the platform;

- use work mittens when detaching fixtures.

IT IS FORBIDDEN TO STAND UNDER THE CRANE BOOM.

If the harvester is transported by road it shall be securely fixed to the platform.

In order to avoid injuries remove all nails from box lids and cut the protruding ends of packaging straps.

CAUTION! GETTING ON THE HARVESTER AND COMING DOWN FROM IT IS ALLOWED ONLY BY MEANS OF STEPS AND HANDRAILS PROVIDED FOR THIS PURPOSE, WITH YOUR FACE TURNED TO THE STAIRS. ALWAYS BE SURE THAT YOU HAVE THREE POINTS OF SUPPORT.

CAUTION! CAB DOORS SHALL BE CLOSED DURING OPERATION. DUST WHICH IS GENERATED DURING HARVESTER OPERATION MAY CAUSE HARM TO HEALTH.

CAUTION! DURING AIR FILTER CLEANING AND REMOVAL OF DUST COLLECTED IN THE HARVESTER, A BREATHING MASK SHALL BE USED.

IT IS FORBIDDEN TO STEP ON CLADDING PARTS AND OTHER STRUCTURAL ELEMENTS WHICH ARE NOT PROVIDED WITH ANTISLIPPING COVERING.

IT IS FORBIDDEN TO WORK IN UNCOMFORTABLE AND FLYAWAY CLOTHING.

CAUTION! THE OPERATOR SHALL NOT LEAVE HIS/HER WORKPLACE UNTIL THE ADAPTER AND THE TOWER ARE STOPPED COMPLETELY.

CAUTION! PRIOR TO LEAVE THE OPERATOR'S WORKPLACE, DISENGAGE THE HARVESTER DRIVE MECHANISM, LOWER THE HEADER, SWITCH THE TRAVEL LEVER TO NEUTRAL, ENGAGE THE PARKING BRAKE AND STOP THE ENGINE, REMOVE THE IGNITION KEY AND SWITCH OFF THE "GROUND" SWITCH.

The following safety procedures shall be adhered to during harvester operation:

- prior to start the motion, check the tightening of wheel fixation nuts of the driven steering axle – from 200 to 230 N·m, drive steering axle – from 550 to 600 N·m, drive wheel axle – from 500 to 550 N·m;

- completely screw in two bolts on the frame which serve as steering wheel axle thrusts during transportation;

- prior to start the engine, switch on the operating units and start the motion, give a sound alarm and start the operations only after making sure that it will cause no harm to anybody;

- all cutter bar knives shall be securely fixed;

- during replacement of knives and tightening of their fasteners, the shredding drum shall be stopped through a side hole;

- check the reliability of sharpening device and emery stone fixation prior to sharpening of shredding drum knives, presence of foreign objects on the sharpening

device cover or inside it is not allowed;

- prior to each activation of header drive, inspect the cardan shaft and switch on the drive only after making sure that the shaft is securely fixed;

- during header trial and running the operator shall be in the harvester cab;

- start of harvester motion and especially increasing of its travel speed at the second and third gears, as well as decreasing of speed and harvester stop shall be ensured by smooth movement of hydraulic pump feed control handle (except for emergency braking). Sharp decrease or increase of hydraulic pump feed at overgears may lead to rupture of high-pressure hoses at the wheel drive;

- before starting the harvester motion from a static position, make sure that the parking brake is not engaged;

- travel speed of the harvester with rotary header shall not exceed 11 km/h;

- maximum slope during operation and transportation of the harvester uphill and downhill is 9°;

- during harvester operation uphill and downhill it shall move along with reduced speed;

- when making turns and reverse turns, speed shall be reduced to 3-4 km/h;

- at transition from one field to another and traveling along the common roads the tower shall be in its transport position;

- all works shall be done when the harvester engine is stopped and the adapter drive is disengaged;

- if a foreign object gets into the feed mass, stop the engine, wait until all moving parts of the harvester are stopped and then proceed with all necessary operations;

- disconnected grass and rotary headers shall be installed on shoes and supports;

- a pickup or a grass header shall be removed from the harvester together with the cardan shaft;

- in case of engine failure the harvester shall be towed by its steering wheel axle using a rigid towline installed instead of trailer and connected by means of hinged mechanism with swivel members providing the synchronous wheel rotation;

- during harvester towing the speed switch lever shall be set to neutral;

- crossing the obstacles (logs, ditches, etc.) during towing is not allowed;

- towing speed shall not exceed 7 km/h at straight ways, 3 km/h at turns;

- for harvester de-electrifying and avoiding of electric shock hazard, the grounding circuit shall be securely fixed;

- it is required to check the reliability of brakes and steering wheel control systems periodically;

- the required tire pressure shall be always maintained. Do not exceed the recommended pressure during tire pumping. Never heat up the wheel and perform welding on it without prior removal of the tire. Warming can increase the tire pressure and blow it up. Welding can weaken or distort the wheel.

- use a chuck and a hose with sufficient length for you to stand beside the tire and not before or above it during tire pumping. Use fencing if available. Check pressure in tires, make sure that there is no cuts, swellings, rim damages.

IT IS FORBIDDEN! TO PUMP TIRES WITHOUT PERIODICAL PRESSURE

CHECK DURING THE PROCESS;

- tire repair may be performed only by professionals and only with the use of proper implements;

- when the harvester moves along tarmac, the possibility of braking with one of drive wheels shall be eliminated (pedals shall be blocked);

- after the harvester is stopped, the control lever of the gearbox shall be switched to neutral position and the operating units shall be deactivated;

- lighting and alarm system shall operate properly;

- it is not recommended to operate a harvester with faulty instruments;

- do not stand under the tower while the harvester is in operation;

- in order to provide safe harvester operation, all gears shall be covered with protective shields; operation without such shields is not allowed;

- preparation of the harvester for operation as well as procedures related to maintenance, elimination of faults and cleaning shall be performed only when the engine is stopped and parking brake is engaged;

- do not shove your hands and do not place any foreign objects into the shredding drum chamber until it is completely stopped as well as during engine operation;

- check the connection of the contact detectors installed on the left and on the right of the counter-cutting beam;

- if wiring of the contact detectors is damaged, faulty or absent, replace it;

- automated adjustment of clearance between the counter-cutting beam and shredding drum knives by means of the SZR-1401 sharpening and adjustment system installed on the control panel in the harvester cab is prohibited if the contact detectors or wiring is damaged;

- use a scraper to clean the cutter bars from grass;

- do not touch the cutting edges of knives and studs with hands while cleaning the cutter bar or replacing a knife;

- in case of adjustment and repair under the adapter: raise the adapter into the upper position and place the safety stop on the lifting hydraulic cylinder rod, then lower the header until it comes into contact with the hydraulic cylinder body;

- always check whether there is enough required medicines in the first aid box;

- harvester operation and travel at the field and road sections with overhead electric lines are allowed only if the distance between the highest point of the harvester (flashing beacon, radio antenna, tower) or of the cargo on vehicles and lines is equal to or exceeds the values given in Table 3.1.

CAUTION! HARVESTER HEIGHT AT THE UPPERMOST POSITION OF THE TOWER IS 6.5 m.

CAUTION! HARVESTER HEIGHT AT THE UPPERMOST POSITION OF THE TOWER WITH THE TOWER EXTENSION IS 6.8 m

CAUTION! BEWARE OF THE ELECTRIC SHOCK AS IT CAN BE LETHAL!

If you have come into contact with a power transmission line, do the following: stop the harvester immediately, stop the engine and engage the parking brake. Make sure you can safely leave the cab without risking to touch the electric cables. If you cannot leave the cab without risking to touch the electric cables stay inside and

call for assistance. If you can leave the cab without risking to touch the electric cables get down till the last step or foot board and jump to the ground without touching any part of the harvester and ground at the same time. Do not touch the harvester until the electric line is de-energized. If you see people approaching the harvester warn them about danger of touching the harvester and ask to contact the power engineers to de-energize the line.

CAUTION! IT IS REQUIRED TO FOLLOW THESE RULES DURING OPERATIONS WITH THE LIFTING JACK:

- DO NOT EXCEED THE LOADING CAPACITY OF THE LIFTING JACK;
- PRIOR TO INSTALLATION OF THE LIFTING JACK ENGAGE THE PARKING BREAK OF THE HARVESTER/INSTALL WHEEL LOCKS;
- THE LIFTING JACK SHALL BE BALANCED AND INSTALLED AT THE RIGHT ANGLE TO SUPPORT SURFACES;
- PUT A STEADY WOODEN PLATFORM (USE RAILWAY TIES, BEAMS, BOARDS WITH THICKNESS FROM 40 TO 50 MM), WHICH IS LARGER THAN THE BASE AREA OF THE LIFTING JACK HOUSING, UNDER THE LIFTING JACK (FIGURE 3.61);
- THE LIFTING JACK HEAD SUPPORT SURFACE SHALL BE FREE FROM BEVELS AND DEFORMATIONS;
- THE LIFTING JACK SHALL BE INSTALLED ONLY UNDER DESIGNATED POINTS OF THE HARVESTER (FIGURES 3.30, 3.31);
- CHECK THE STEADINESS OF THE HARVESTER DURING LIFTING;
- DO NOT STAY IN THE HAZARDOUS AREA DURING LIFTING AND LOWERING.

IT IS FORBIDDEN!

- PRESENCE OF UNAUTHORIZED PERSONS IN THE HARVESTER CAB DURING OPERATION;
- PRESENCE OF PEOPLE IN THE VEHICLE BED WHEN IT IS FILLED WITH THE SHREDDED MASS;
- TRANSPORTATION OF PEOPLE AND CARGO BY THE HARVESTER;
- DISENGAGEMENT OF ENGINE AND HARVESTER MOTION BY INERTIA WHILE OPERATING DOWNHILL;
- HARVESTER OPERATION DURING NIGHT TIME WITHOUT ELECTRIC LIGHTING;
- FEEDING OF MASS BY HANDS OR PUSHING BY OTHER OBJECTS DURING HEADER OPERATION.
- STAYING NEAR NON-FENCED ROTATING IDLERS, OPERATING CHAIN AND BELT DRIVES;
- OPERATION WITH NON-FENCED BELT DRIVES;
- STARTING THE HARVESTER MOTION WITHOUT RELEASING THE PARKING BRAKE;
- LEAVING THE ADAPTERS IN LIFTED POSITION WHEN THE HARVESTER IS STOPPED;
- OPERATION OF A DAMAGED

Table 3.1

Distance, m	Power transmission line voltage, kV					
	up to 1	from 1 to 20	from 25 to 110	from 154	from 220	from 230 to 500
Horizontally	1.5	2	4	5	6	9
Vertically	1	2	3	4	4	from 5 to 6

HARVESTER;

- REPAIR, ADJUSTMENT AND LUBRICATION OF THE HARVESTER AT OPERATING ENGINE, ON SLOPES OR AT LIFTED ADAPTER;

- OPENING OR REMOVAL OF PROTECTIVE SHIELDS AND HOUSINGS AT OPERATING ENGINE;

- INSTALLATION OF CORN CRACKER KIT AT OPERATING ENGINE;

- TOUCHING THE MOVING PARTS OF CORN CRACKER KIT, YOU SHALL WAIT UNTIL THEY ARE FULLY STOPPED.

- STAYING ON THE TRAVEL PATH OR UNDER IT DURING CORN CRACKER LIFTING, LOWERING, TRANSITION TO OPERATING POSITION FROM TRANSPORT ONE AND BACK.

CAUTION! BURN HAZARD. STAY AT THE SAFE DISTANCE FROM HOT SURFACES DURING OPERATIONS WITH ENGINE.

- USAGE OF DEFECTIVE IMPLEMENT FOR WORK

CAUTION! SPECIAL CARE SHALL BE TAKEN DURING OPERATION AND TURNING ON SLOPES. NEVER SWITCH OR DISENGAGE GEARS ON A SLOPE.

Safety precautions during engine operation:

- engine shall be started only after SB is reliably connected;

- do not disconnect SB at operating engine;

- engine shall be started only if the crankshaft rotation rate sensor is connected;

- start of engine by means of SB fast charging device is prohibited. If an emergency start is required, separate SB shall be used;

- SB terminals shall be disconnected

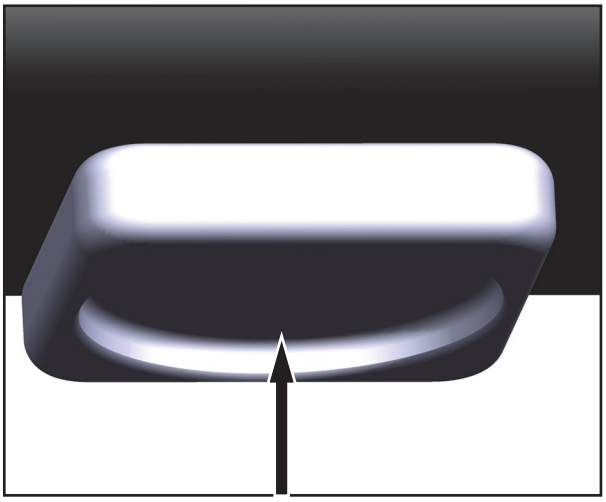


Figure 3.61 – Place for jack installation

prior to application of the fast charging device. This requires adherence to the operation manual for SB fast charging device;

- if electric welding is envisaged, SB shall be disconnected and both cables (+ and -) shall be securely fixed;

- during operation connection/disconnection of conductors and connectors shall be performed only at disconnected power supply.

CAUTION! IF TEMPERATURE INCREASE OVER 80 °C (E.G., IN A DRYING OVEN) IS ENVISAGED, CONTROL UNITS SHALL BE REMOVED AS THEY CAN BE DAMAGED BY EXPOSURE TO SUCH TEMPERATURES.

CAUTION! PHONES AND BILATERAL COMMUNICATION MEANS NOT CONNECTED TO AN EXTERNAL ANTENNA MAY LEAD TO MALFUNCTIONS IN ELECTRONIC COMPONENTS AND THUS ARE HAZARDOUS FOR NORMAL ENGINE OPERATION.

CAUTION:

- OPERATION OF PORTABLE OR MOBILE DEVICES IS ALLOWABLE ONLY WHEN AN EXTERNAL ANTENNA IS CONNECTED;

- COMMUNICATION EQUIPMENT TRANSMITTERS SHALL BE INDEPENDENT FROM OTHER ELECTRONIC EQUIPMENT OF THE HARVESTER;

- WHEN CONNECTING AND USING EXTERNAL ANTENNA FOLLOW THE RECOMMENDATIONS OF MANUFACTURING PLANT OF RADIO-TRANSMITTING EQUIPMENT APPLIED;

- IT IS ALLOWED TO USE PORTABLE OR MOBILE DEVICES WITHOUT CONNECTION OF EXTERNAL ANTENNA IF THE DEVICE IS LOCATED AT A DISTANCE OF NOT LESS THAN 0.8 METERS FROM ELECTRONIC COMPONENTS.

The harvester is equipped with a manually controlled SB (storage batteries) switcher (without the option of deactivation from the cab) which disconnects the "+" terminal from the harvester harness!

CAUTION! THE SB SWITCHER MAY ONLY BE USED AT DEACTIVATED IGNITION (KEY IN THE "0" POSITION) AND NOT EARLIER THAN IN 10 SECONDS AFTER ITS DEACTIVATION. IT IS REQUIRED FOR THE INFORMATION TO BE RECORDED INTO THE ENGINE CONTROL MEMORY.

3.3 Fire Safety Regulations

In the period of preparation for harvesting study and adhere to the following fire safety regulations:

- install operable fire-fighting equipment on the harvester;
- do not allow leaks from the following systems: feed, lubrication, braking and hydraulic;
- if the safety clutch is slipping, stop the harvester immediately and eliminate the cause;
- periodically check the tension of drive belts of harvester operating units;
- prevent overheating of bearings and timely lubricate them;
- verify the presence of isolating caps on terminals of the generator, starter and other electric equipment as well as security of electric cables fixation and availability of additional protection at the points of possible mechanical or chemical damages;
- prevent fuel leaking out the drain tubes from getting on the harvester parts;
- clean the choked pipelines only when the engine is cooled down after termination of fuel supply;
- fill the harvester with POL only in the mechanized way;
- eliminate fuel, oil and hydraulic brake liquid at pipeline joints. Wipe the spilt fuel, oil and hydraulic brake liquid immediately;
- prevent accumulation of crop residues in the vee of the engine block, on fuel lines, in the exhaust gas release area, at the gearbox and calipers. Regularly perform visual inspection of the above-mentioned places and remove any contamination;
- if a long-lasting repair is required the harvester shall be removed from the harvested land and placed at a distance of min. 80 m;
- prior to welding, clean the harvester and the land underneath and around the harvester from grass;
- equip the places of welding and other works which require fire application with fire-fighting devices;
- disconnect SB during welding;
- in case of works with open fire remove the repaired PAU or the fuel tank as fuel vapors in the tank may ignite;

 - do not pour water on burning fuel, use a powder extinguisher;

 - do not use open fire to heat fuel lines and the lower cover of the diesel engine housing in the cold time of year;

 - constantly monitor the state and reliability of harvester wiring fixation, do not allow wire bundles slacking or rubbing against moving parts.

IT IS FORBIDDEN!

 - TO SMOKE AND USE OPEN FIRE DURING POL filling;

 **-** TO FUEL THE HARVESTER AT OPERATING ENGINE;

 - TO FUEL IN THE PTL AREA.

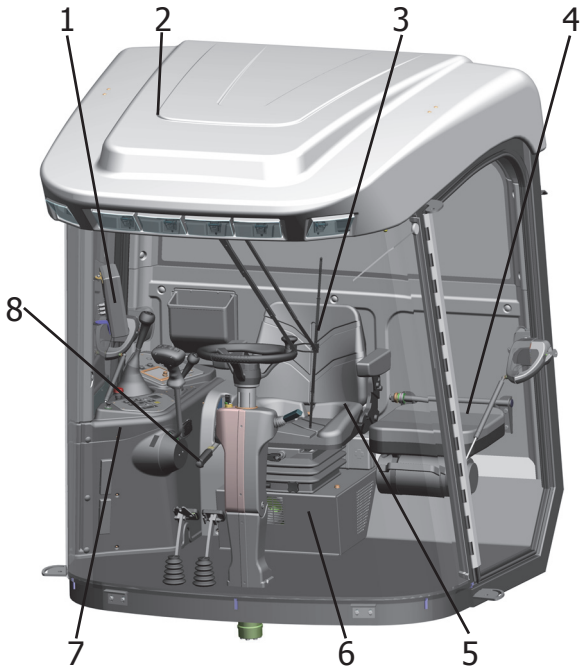
IT IS FORBIDDEN! TO LEAVE THE HARVESTER INDOORS WITH PARKING BRAKE OR ACTIVE GEAR.

4 CONTROLS AND INSTRUMENTS

4.1 Workplace

Operator's workplace is located in the center of the harvester. Workplace cab is of frame type with large glass area, panoramic windscreen and wide rear window, spring-loaded, two-seat, with two doors. The cab is equipped with an electrically-driven wiper 3 (Figure 4.1), a parking brake 8, a spring-loaded seat 5 and an additional seat for trainer 4, air heating and conditioning system, acoustic insulation and trimming made of advanced materials.

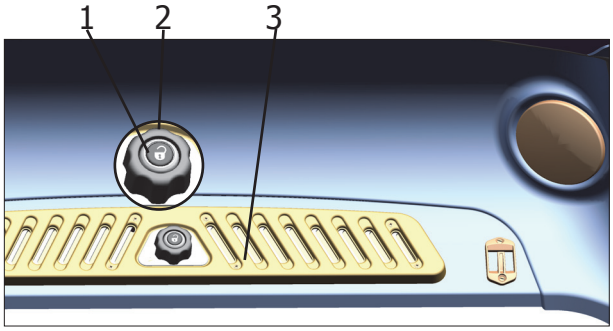
A conditioning unit evaporator and an air filter are installed on the cab roof. For conditioning unit evaporator, air filter and wiper gear reducer maintenance a cab screen 2 shall be opened and fixed. Screen fixation in closed position is provided by means of automated lock. To lift the screen press button 1 (Figure 4.2) located in the upper part of cab rear wall.



1- MTM; 2- cab screen; 3- wiper; 4- additional seat; 5- spring-loaded seat; 6- heater; 7- control panel; 8- parking brake

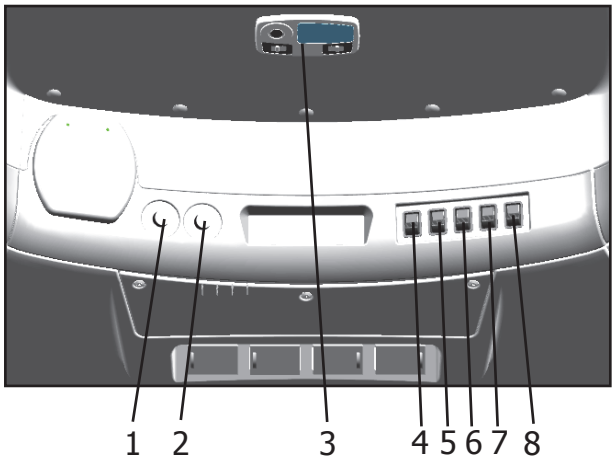
Figure 4.1 – Operator's workplace

Cab front panel contains conditioning unit controls 1 (Figure 4.3) and 2; a flood-lamp 3 and the following buttons: for switching transport lights on mirror brackets 4, for switching front central operating lights 5, for switching tower rear lights 6, for switching flashing beacon 7; wiper switch 8.



1- button; 2- air circulation flaps rotary controller; 3- air filter flaps system

Figure 4.2 – Cab rear wall



1, 2 - conditioning unit controllers; 3 - flood lamp; 4 - operating lights on mirror brackets switch button; 5 - front central operating lights switch button; 6 - tower rear lights switch button; 7 - flashing beacon switch button; 8 - wiper switch

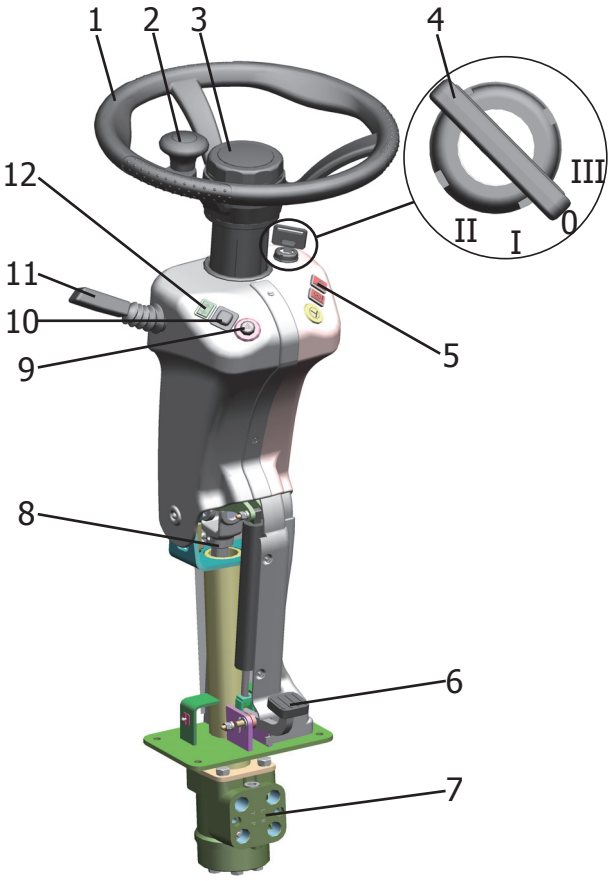
Figure 4.3 – Cab front panel

4.2 Controls

4.2.1 Steering Wheel Column

In accordance with Figure 4.4, the steering wheel column consists of a handle 2, a steering shaft with universal joint 8, a steering wheel 1, a metering pump 7, a tilt mechanism pedal 6, a turn, light and audio signal switch 11.

The light alarm control unit consists of a turn indicator 12, a clearance lighting switch 10, a common failure indicator 5 which indicates faults in harvester mechanism operation and an emergency alarm switch 9.



1 - steering wheel; 2 - handle; 3 - collet mechanism flywheel; 4 - ignition lock; 5 - common failure indicator; 6 - tilt mechanism pedal; 7 - metering pump; 8 - steering shaft with universal joint ; 9 - hazard warning switch; 10 - clearance lighting switch; 11 - turn, light and audio signal switch; 12 - turn indicator

Figure 4.4 – Steering wheel column

Steering wheel height can be adjusted steplessly within 0 - 120 mm as well as by the tilt angle within 5 - 30°.

Height locking is provided by means of the collet clamp located on the steering shaft and the flywheel on the steering wheel hub.

In order to adjust column height, turn the collet flywheel 3 counterclockwise, loosen the thread of collet coupling screw, set a required position of the steering wheel and fix it.

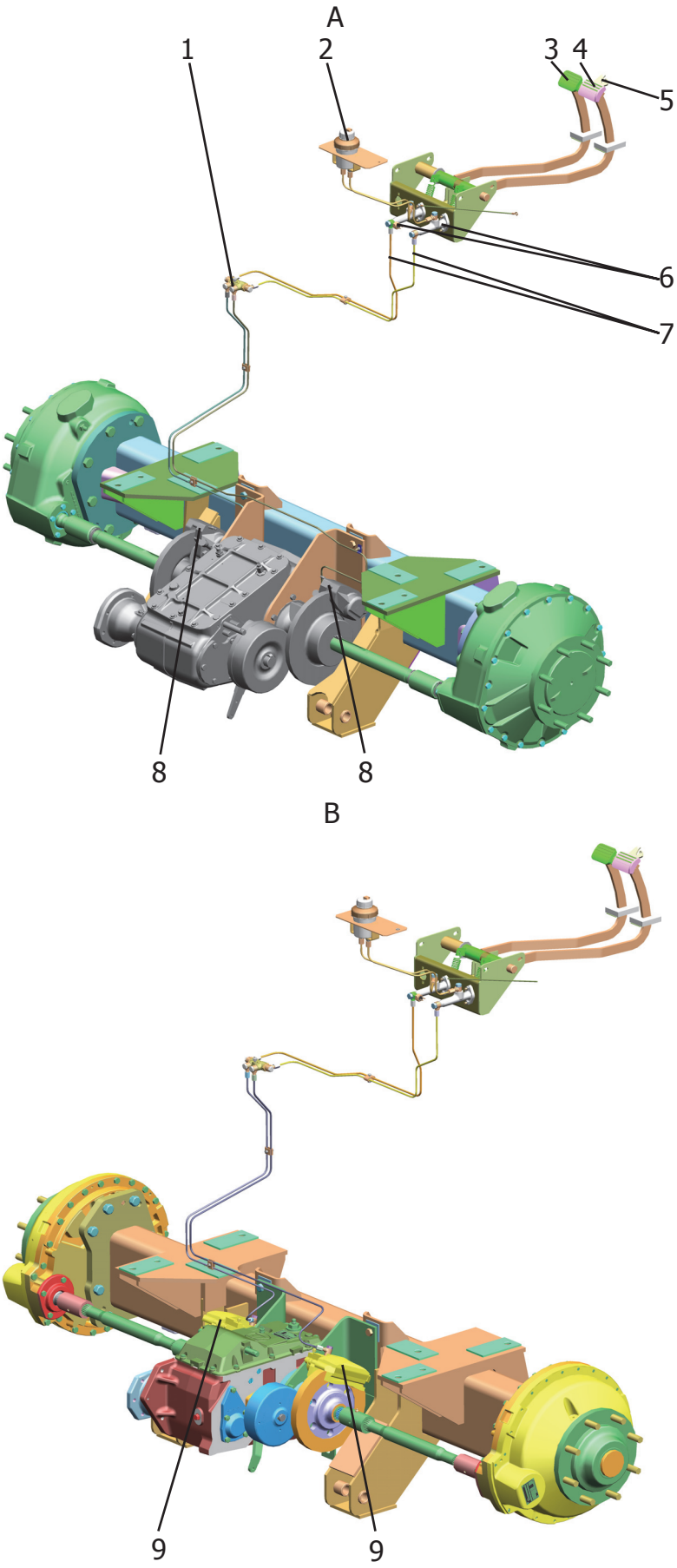
4.2.2 Brake Control

HGD braking is the main method of harvester braking. Braking system is auxiliary and provides either reduction of harvester turning circle in case of short braking with one pedal, or (if HGD lever is in neutral and pedals are blocked) preset braking length.

The braking system consists of: main braking cylinders 6 (Figure 4.5), calipers 8 and 9 on DWA with operating cylinders, connecting pipelines 7, feeding tank (tanks) 2, pressure controller 1. Pressure controller is required for compensation of caliper pads wear irregularity and prevention of subsequent harvester drift.

Brake pedals are installed in the block under the cab floor. Brake pedals 3, 4 are located on the right from the steering column. Blocking slat 5 is installed on right brake pedal 4 for pedals blocking. Normally the brake pedals shall be blocked.

If the main braking cylinder pusher



1 - pressure controller; 2 - tank; 3, 4 - left and right brake pedals; 5 - blocking slat; 6 - main braking cylinders; 7 - connecting pipelines; 8, 9 - calipers
A — for CIT DWA;
B — for ZF DWA

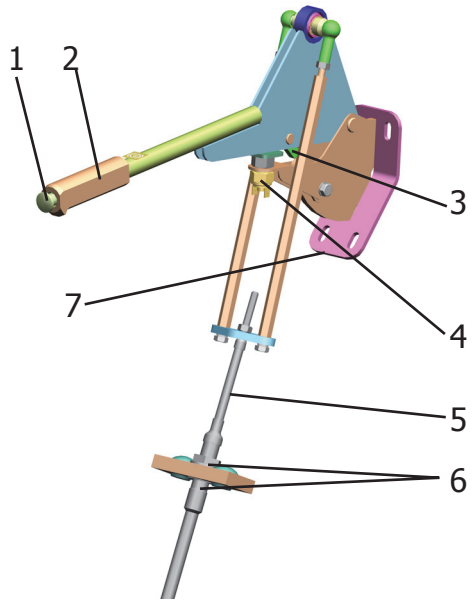
Figure 4.5 – Braking system

is pulled out to the full, the restraining plate of the pedal post shall be at the distance of 10-15 mm from the operator's platform floor. Simultaneous impact on the brakes is provided by the pressure controller.

4.2.3 Parking Brake Control

The parking brake 8 (Figure 4.1) consists of a lever 2 (Figure 4.6) with built-in control mechanism of dog 3, a dog drive rod with spring-loaded button 1 for dog control, a switch of parking brake lever position control indicator 4, one remote control cable 5 and is installed on the right from the operator's seat.

The remote control cable 5 is adjusted by means of cable attachment nuts 6.



1- spring-loaded button; 2- lever; 3- dog; 4- parking brake lever position control signal switch; 5- remote control cable; 6- cable attachment nuts; 7- sector

Figure 4.6 – Parking brake lever

4.2.4 Control Panel

Main controls are located on a control panel 7 (Figure 4.1), on the right from the operator.

Emergency stop switch 2 (Figure 4.7) is designed for emergency stop of feeder drive, main drive and abortion of knives automated sharpening and clearance regulation algorithms.

To switch it on, press the emergency stop switch cover until it is fixed in pressed position. To switch it off, press the cover and pull it up by means of the locking ring in accordance with Figure 4.8.

If emergency situations or faults in harvester assemblies and mechanisms are observed during process press the switch until it is fixed, the main drive clutch and feeder drive are switched off automatically and fast stop mechanism of feeder rollers is engaged. If the switch is in pressed position, main drive activation is automatically blocked. In order to unblock the main drive, deactivate the emergency stop switch.

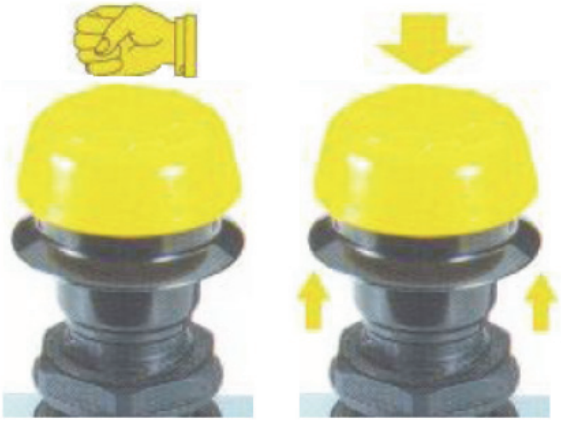
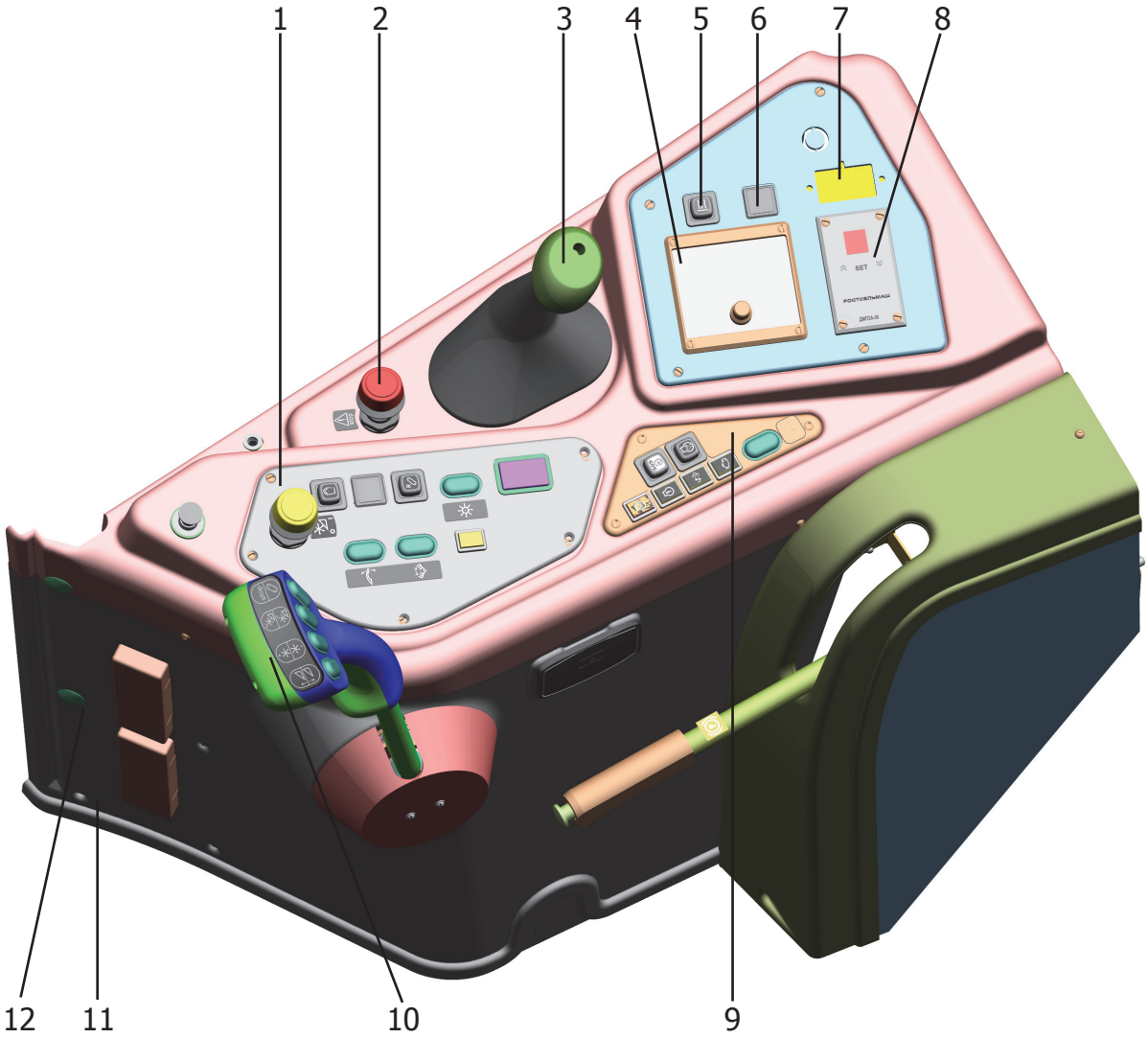


Figure 4.8 – Emergency stop activation/deactivation

CAUTION! DURING TRAVELING ALONG THE COMMON ROADS OR FOR ANY OTHER PURPOSE, KEEP THE EMERGENCY STOP SWITCH 2 (Figure 4.7) PRESSED IN ORDER TO EXCLUDE INADVERTENT OPERATION OF HARVESTER OPERATING UNITS.



1 - control panel; 2- emergency stop switch; 3- gear shift lever; 4- SAS control panel; 5- heater switch; 6- rear axle active drive actuation button; 7- connector; 8- stone and metal detector control unit; 9- engine monitoring and control panel; 10- motion control lever; 11- fuse unit FU8; 12- fuse unit FU7

Figure 4.7 – Control panel

Heater switch 5 (Figure 4.7) is designed for activation/deactivation of cab heater.

Rear axle active drive actuation button 6 is designed for switching on of the rear axle active drive in case of corresponding harvester equipment. LED switches on at activation.

SAS control system 4 is designed for automated control of shredding drum knives sharpening and adjustment of clearance between the counter-cutting beam and shredder knives, as well as for other auxiliary modes. Detailed information is provided in p. 4.2.6.

Connector 7 of OBD II typeis designed for engine diagnostics devices connection.

Motion control lever 10 (Figure 4.7) of the harvester is connected to the HGD pump control lever by means of a flexible remote control cable.

Friction mechanism provides lever 5

(Figure 4.9) fixation in a required position. Force on the handle shall not exceed 80 N (8 kgs). Force on the handle is controlled by means of bolt 3 (Figure 4.10).

Harvester motion shall be controlled by moving lever 5 (Figure 4.9) according to the mnemo located on the side control panel. Provision of clearance A from 0.5 to 1 mm (Figure 4.10) prevents grinding of lever handle stop 1 with guiding flange 2 when switched from the neutral position to forward motion position. Clearance shall be adjusted by means of adjusting screw 4.

Functions of switches located on the motion control lever:

- switch 1 (Figure 4.9) is designed for recording of the first and second position of the feeder during contour following system operation;
- switch 2 is designed for tower turning left or right along harvester movement.

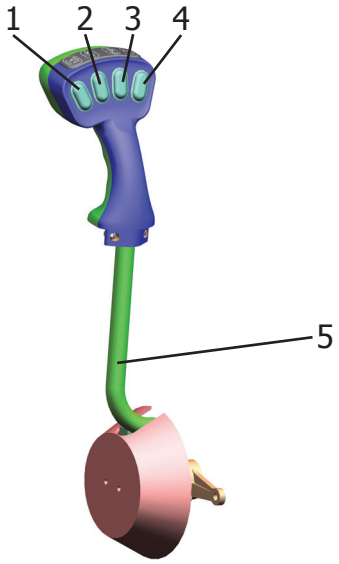
The time of a turn is equal to the time of pressing of the corresponding part of the switch, but the turn is automatically blocked in accordance to signals from lock sensors which are installed on the tower and which fix the leftmost and the rightmost tower positions;

- switch 3 is designed for tower deflector lifting and lowering. The time of tower deflector lifting and lowering is equal to the time of pressing of the corresponding part of the switch;
- switch 4 is designed for feeder drive activation and deactivation.

ATTENTION! FEEDER ACTIVATION IS ALLOWED AT ENGINE CRANKSHAFT ROTATION RATE OF LESS THAN 1200 RPM AND IS AUTOMATICALLY BLOCKED IF THE ENGINE CRANKSHAFT ROTATION RATE EXCEEDS 1200 RPM!

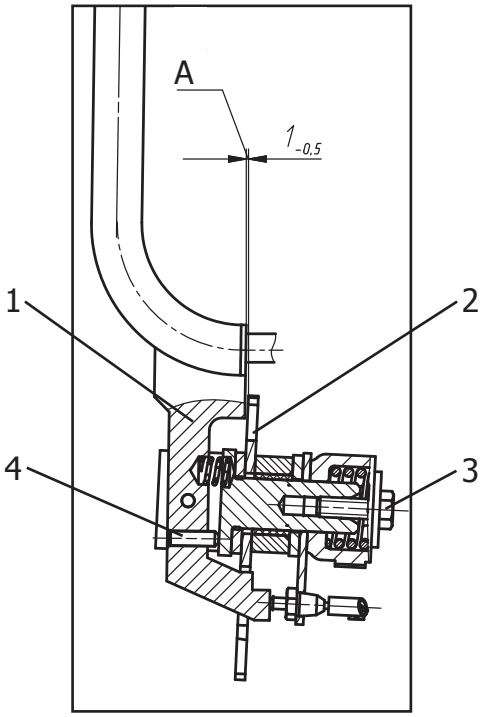
To activate the feeder drive:

- feeder reverse shall be switched off;
- engine crankshaft rotation rate shall not exceed 1200 rpm;



1, 2, 3, 4- switch; 5- lever

Figure 4.9 – Motion control



1 - stop; 2 - flange; 3 - bolt;
4 - adjustment screw

Figure 4.10 – Motion lever clearance adjustment

- press and hold the lower part of the switch; for the first 2 seconds you will hear an audio signal after which the drive is activated. After the drive is activated (rollers have begun to move, and a "  " icon has appeared on the information panel screen), the switch shall be released.

To deactivate the feeder drive:

- press and hold the upper part of the switch until the drive is deactivated completely (rollers have stopped to move, and a "  " icon has disappeared from the information panel screen), then release the switch.

ATTENTION! DURING COMBINING THE DRIVE CAN BE AUTOMATICALLY DEACTIVATED IN THE FOLLOWING THREE CASES:

- IF THE OPERATOR LEAVES HIS SEAT FOR MORE THAN 5 SECONDS;
- IF ROLLERS STOP, E.G. DUE TO FEEDER CLOGGING WITH FEED MASS DELIVERED FROM THE ADAPTER;
- IF THE STONE DETECTOR SIGNALIZES ABOUT A FOREIGN OBJECT IN THE FEED MASS.

Moreover, each automated drive deactivation is accompanied by the corresponding voice notification of the information panel and is recorded to its events log.

The gearbox is controlled with **lever 3** (Figure 4.7).

By shifting the lever edgewise you select a gear, by moving it longwise you change the gear.

Lever handle contains a mnemo for gear switching on a harvester with CIT drive wheel axle (Figure 4.11) and with ZF drive wheel axle (Figure 4.12).

Figure 4.11 – Gear switching mnemo for CIT DWA

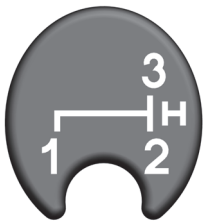
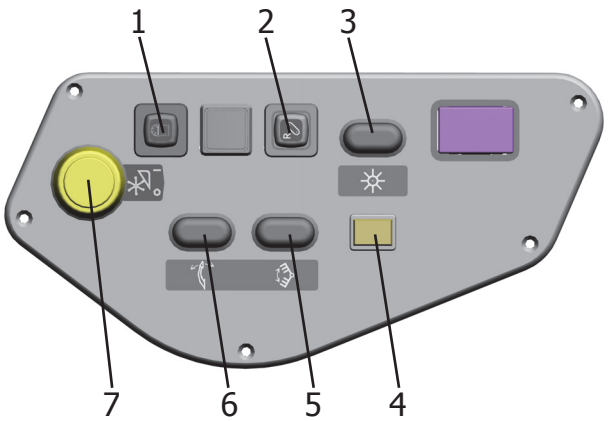


Figure 4.12 – Gear switching mnemo for ZW DWA

Control panel 1 (Figure 4.7) is designed for remote control of harvester operating units.

Switch 1 (Figure 4.13) is designed for activation of the stone and metal detector or its reboot after detection of metal or stone.

Switch 2 is designed for feeder drive reverse activation/deactivation.



1,2- breaker;3,5,6,7- switch; 4 -"Shredder drive is active" indicator

Figure 4.13 – Control panel

To provide the reverse:

- engine crankshaft rotation rate shall not exceed 1200 rpm;

CAUTION! REVERSE ACTIVATION AT ENGINE CRANKSHAFT ROTATION RATE EXCEEDING 1200 rpm IS AUTOMATICALLY BLOCKED.

- press and hold the switch until the mass is completely removed from the feeder. Rotation of feeder rollers is reversed within some time in the following order: feeder drive is automatically switched off (if it was on) when the rollers are completely stopped, the feeder reduction gear is automatically switched to the reverse mode ("  "icon appears on the information panel screen), after which the drive is automatically activated and reverse rotation of rollers takes place as long as the switch is held.

In order to stop the revers, release the switch, feeder drive switches off automatically; when the rollers are completely stopped, the feeder reduction gear is automatically switched from the reverse mode ("  " icon disappears).

For further operation feeder drive shall be activated by switch 4 (Figure 4.9) of the motion control lever.

Switch 3 (Figure 4.13) is designed for main drive clutch activation/deactivation (shredder drive).

To activate the drive:

- feeder drive shall be switched off ("  " icon shall not be displayed on the information panel screen);

- engine crankshaft rotation rate shall be within 800…1050 rpm;

CAUTION! DRIVE ACTIVATION AT ENGINE CRANKSHAFT ROTATION RATE EXCEEDING THE RANGE OF 800…1050 rpm OR AT ACTIVATED FEEDER DRIVE IS AUTOMATICALLY BLOCKED.

- press and hold the front part of the switch; for the first 2 seconds you will hear a warning audio signal, after which the transfer gear multiple disk clutch is activated, and indicator "Shredder drive is active" 4 is switched on the control panel. Then the switch can be released. Indicator "Shredder drive is active" 4 switches on before the drive is fully activated (the shredder drum begins to rotate after the light is on) and remains glowing until deactivation.

To deactivate the drive:

- push and release the rear part of the switch, after which the indicator "Shredder drive is active" 4 and the drive are deactivated.

CAUTION! AFTER THE DRIVE IS DEACTIVATED, THE SHREDDER DRUM CONTINUES TO ROTATE BY INERTIA DURING SOME TIME, BE CAREFUL!

Switch 5 is designed for rotary header transition to transport position (folding) and to operating position (unfolding). The time of transition to transport/operating position is equal to the time of pressing of the corresponding part of the switch.

Switch 6 is designed for tower lifting/lowering. The time of tower lifting and lowering is equal to the time of pressing of the corresponding part of the switch.

Switch 7 is designed for feeder activation and deactivation.

To switch the feeder on, press the switch cover until it is fixed in pressed position by the locking ring. To switch the feeder off, press the cover and pull it up by means of the locking ring in accordance with Figure 4.14.

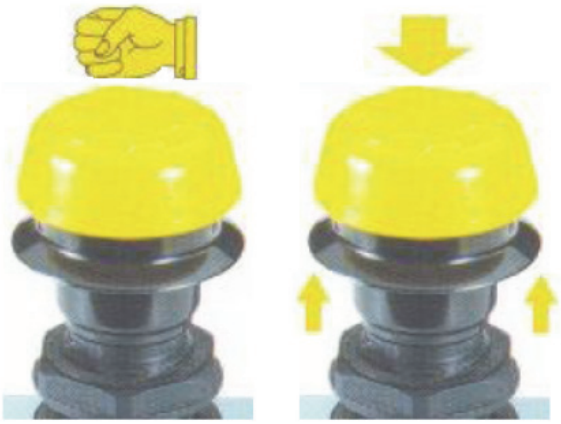
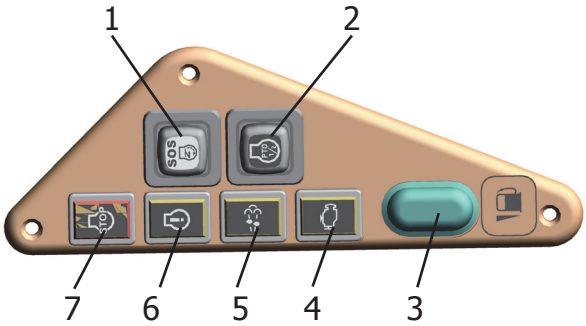


Figure 4.14 – Feeder activation/ deactivation

Engine monitoring and control panel 9 (Figure 4.7) is designed for electronic control of engine operation.

Control of crankshaft rotation rate/ power take-off modes:

Engine crankshaft rotation rate increase/decrease switch 3 (Figure 4.15) allows to change the engine crankshaft rotation rate from minimum to maximum, but it operates only if power take-off modes switch 2 is deactivated.



1 - limitations block button; 2 – power take-off modes switch; 3 - engine crankshaft rotation rate increase/decrease switch; 4 – yellow lamp of exhaust system malfunction; 5 – yellow lamp of exhaust gases neutralizing fluid AdBlue; 6 – yellow engine test lamp; 7 – red engine test lamp

Figure 4.15 – Engine monitoring and control panel

Power take-off modes switch 2 enables automated activation of idle speed or one of two engine power take-off modes. Deactivated position means idling. At each odd (first, third, etc.) activation, the engine crankshaft rotation rate is automatically set as 1000 rpm. It means activation of the first power take-off mode, for example, for activation/deactivation of harvester operating units drives. At each even (second, fourth, etc.) activation, the engine crankshaft rotation rate is automatically set as 2000 rpm.

It means activation of the second power take-off mode, for example, for combining and motion. To switch between modes, switch 2 shall be brought to deactivated position and than switched again within 1 second.

CAUTION! IN CASE OF EMERGENCY SITUATIONS OR ENGINE OPERATION FAULTS, AS WELL AS MALFUNCTIONS OF NEUTRLALIZING AND EXHAUST SYSTEM THE ENGINE IS EQUPPED WITH THE AUTOMATED FUNCTION OF OPERATING LIMITATIONS ACTIVATION.

There may be two types of limitations:

1) primary limitations which decrease the maximum possible torque down to 80% of the maximum possible value d

uring 10 ± 1 minutes;

2) final limitations which decrease the engine crankshaft rotation rate down to 1000 rpm and to 20% of the maximum torque.

Transition from the primary limitations to the final ones is provided due to gradual decrease of engine rotations and torque within 60 minutes, as follows:

- engine torque is decreased from 80% of the maximum value by 1% per minute until 20% of the maximum value;
- engine rotations are simultaneously decreased down to 1000 rpm.

Limitations block button 1 is designed for assistance in emergency situations and for system self-recovery at the confirmation stage in order to assure malfunction elimination (to prove, for example, that AdBlue fluid of the required quality was filled). Pressing of the limitations block button 1 provides engine operation with full power during 30 minutes maximum and it cannot be pressed more than three times. Limitations blocking is possible only when the limitation sequence is started and before the final engine power limitation is reached. As soon as the final limitation of engine operation comes into force (1000 rmp, torque 20% of the maximum value), blocking function becomes inactive. Thus the blocking function does not increase the power decrease durability. If engine is operated with activated limitations blocking, the limitation system continues to calculate the limitation effect time, required engine rotation and torque in the background mode. After switching from the blocking mode, provided that the malfunction has not been eliminated, the engine continues its operation at rotation rate and torque corresponding to the required values without blocking activation. It also means that the maximum blocking time of 90 minutes (pushing the button three times) is possible only in case of early activation when the limitations come into force. For example, when the engine operates for the last 30 minutes before final power decrease, the limitations blocking may be activated only once. If the malfunction was not eliminated within the specified blocking period, the engine switches directly to the final limitations stage where one more blocking activation is impossible.

Engine Operation Monitoring

Engine operation parameters

(engine crankshaft rotation rate, cooling fluid temperature, oil pressure in the lubrication system, engine loading, calurea level and others) and its performance (operating time, spent fuel, current instantaneous fuel consumption) are displayed on the MTM screen in compliance with Subsection 4.2.5;

Yellow engine test lamp 6 is on during unacceptable states of engine operation or active faults detected by the ECU. If the lamp lights on during engine operation, check the engine and the corresponding electronic components.

Causes for yellow engine test lamp 6 activation are:

– high cooling fluid temperature or absence of temperature sensor signal;

– low oil pressure or absence of oil pressure signal;

– low oil level;

– absence of CAN-connection with engine electronic components or implausibility of CAN-data;

– data on active faults in the engine ECU failure memory, medium or high priority of failures;

– data on active faults in the ADM3 adaptive module failure memory, medium or high priority of failures.

Together with yellow engine test lamp 6 activation  icon is displayed on the information panel screen, sound alarm is generated and a fault code "116" is recorded to the events log together with the source code and specific failure type.

Red engine test lamp 7 is on if serious failure signals are received that require the engine to be shut down immediately. If the engine is not stopped, it may result in serious damage to the engine and its potential destruction.

Causes for red engine test lamp activation are:

– exceedance of permissible engine crankshaft rotation rate;

– low-low oil level;

– low-low oil pressure;

– high-high cooling fluid temperature;

– low-low cooling fluid level.

CAUTION! IF THE RED LAMP IS ON, THE ENGINE SHALL BEIMMEDIATELY SHUT DOWN. OPERATIONAL SAFETY OF ENGINE IS AT THREAT (THERE IS A RISK OF ENGINE BREAKDOWN)!

Together with yellow engine test lamp 6 activation STOP inscription is displayed on the information panel screen instead of engine crankshaft rotation rate, sound alarm is generated and a fault code "116" is recorded to the events log together with the source code and specific failure type.

Yellow lamp of exhaust gases neutralizing fluid AdBlue 5 and yellow lamp of exhaust system malfunction 4 are activated at a low level of calurea (AdBlue fluid), unsatisfactory quality of calurea (AdBlue fluid) or current malfunctions in the neutralizing and exhaust system in compliance with the engine operation manual. Activation of these lamps is also reflected on the information panel screen and recorded to the events log.

4.2.5 MTM-02 Multifunctional Terminal Module

4.2.5.1 Intended Use

General view of MTM-02 is shown in Figure 4.16.

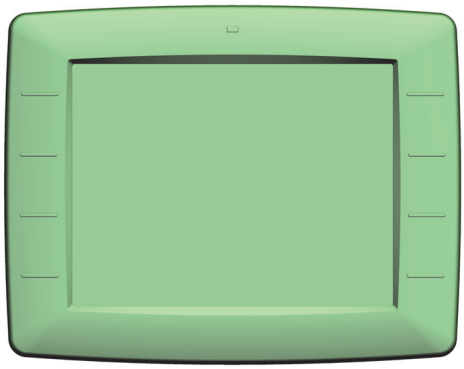


Figure 4.16 – MTM-02 multifunctional terminal module

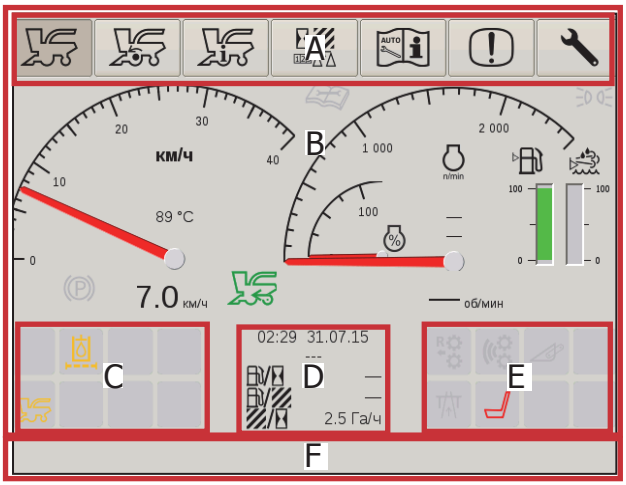
MTM is designed for:

- display of information about state of harvester systems and PAU on the screen;
- calculation, storage and display of harvester performance indices upon operators request (operating time, distance covered, harvested area, number of unloaded hoppers, volume of used fuel, etc.);
- automatic emergency and failures notifications in the form of voice messages, graphic information and sound alarm with capture of code, date and time of identification and elimination in the events log;
- automatic notifications on required scheduled maintenance of the harvester;
- display of textual data on recommended operation modes and adjustment parameters (harvester settings) for specific operating conditions on the screen at the operator's request.

4.2.5.2 General

General view of the MTM screen is given in Figure 4.17. The screen is conventionally divided into the following fields:

- Mode selection field
- Main field
- Emergency field
- State field
- Optimization field
- Control area



A – mode selection field; B – main field;
C – emergency field; D – optimization field;
E – state field; F – control area

Figure 4.17 – General view of MTM screen

If power from SB is available and power from the ignition lock is absent, the screen is off and the power indicator glows yellow.

If power is available from both SB and ignition lock, the screen is on and the power indicator glows green.

If power from SB is absent and power from the ignition lock is available, the screen is on and the power indicator glows red.

4.2.5.3 Information Display on the Screen

Mode selection field

The view of the "Mode selection field" frame on the MTM screen is given in Figure 4.18.

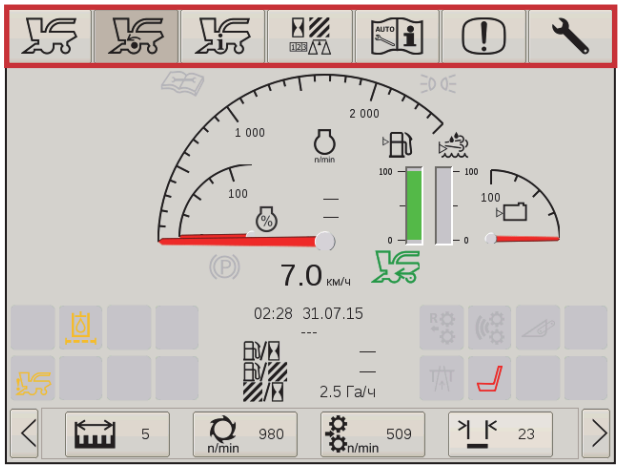


Figure 4.18 – Mode selection field

Mode selection field contains icon buttons enclosed into nine frames. When the operator pushes a frame in the main field, the information corresponding to this mode is displayed.

View and functions of the icons are shown in Table 4.1.

Table 4.1

View	Conventional designation of icons
1	2
	MOTION
	COMBINING

Table 4.1 (continued)

1	2
	DIAGNOSTICS(
	PERFORMANCE INDICES AND TIME REMAINING UNTIL MAINTENANCE
	VIDEO MONITORING*
	COMBINING ASSISTANCE
	EVENTS LOG
	SETTINGS
* If the video monitoring icon is clicked but no camera is connected, the MTM screen becomes black.	

Emergency field

Irrespective of the active mode, the emergency field displays icons of current emergencies and failures in harvester systems and PAU operation.

The view of the "Emergency field" frame on the MTM screen is given in Figure 4.19.

Event description and causes are shown in Table 4.2, where color "R" means red, "A" means amber, "B" means blue. When an event occur, a voice message is played in accordance with Table 4.2. During

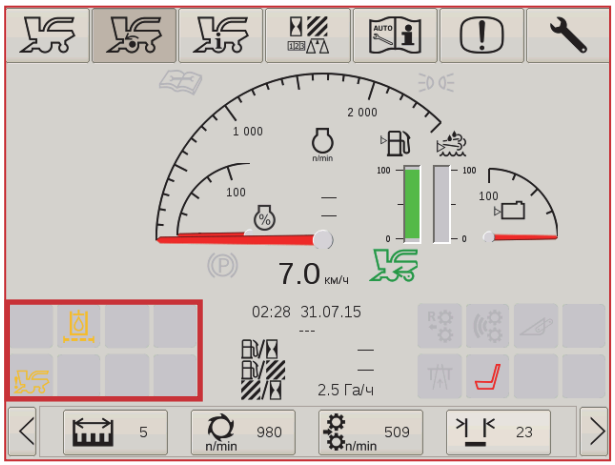


Figure 4.19 – Emergency field

the first 10 seconds after the occurrence, the icon and background are blinking, the sound alarm is activated, then the alarm is deactivated, and the icon and background are displayed steadily until the event is eliminated. Each event shall be recorded in the events log.

Table 4.2 - "Emergency field" frame icons

Icon	Background color	Activation (deactivation) of the common failure indicator	Voice notification	Event description
1	2	3	4	5
	К	+	Engine failure. Stop the engine immediately	Engine failure, high priority
				Common engine failure
or 	Я	-	Engine failure	Engine failure, low or medium priority
	К	+	None	Malfunction of harvester monitoring and control system that requires an immediate stop or deactivation of systems or PAU
or 	Я	-	None	Malfunction of harvester monitoring and control system that does not require an immediate stop or deactivation of systems or PAU

Table 4.2 (continued)

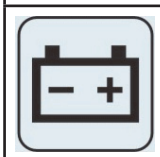
1	2	3	4	5
	К	+	Emergency pressure in the engine lubrication system	Emergency pressure in the engine lubrication system
	К	+	Engine overheated	Engine overheated
	Я	-	Engine oil fine filter is clogged	Engine oil filter is clogged
	К	+	Engine cooling fluid emergency level	Engine cooling fluid emergency level
	Я	-	Caution. Water in fuel	Water in fuel
	С	-	-	HGD oil is not heated
	С	+	HGD oil temperature is below normal	Movement with unheated HGD oil
	К	+	HGD overheat	HGD oil is overheated
	К	+	Hydraulic brake fluid level is below normal	Hydraulic brake fluid level is below normal
	Я	-	Engine air filter is clogged	Engine air filter is clogged
	К	+	Generator failure	Generator failure
	Я	-	Electric system voltage below allowable	Electric system voltage below allowable

Table 4.2 (continued)

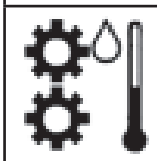
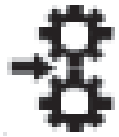
1	2	3	4	5
	К	+	Electric system voltage above allowable	Electric system voltage above allowable
	К	+	Oil level in the hydraulic tank is below rated	Oil level in the hydraulic tank is below rated
	Я	-	Hydraulic tank filter is clogged	Hydraulic tank filter is clogged
	К	+	Oil in the hydraulic tank is overheated	Oil in the hydraulic tank is overheated
	К	+	Feeder drive HGD oil is over-heated	Feeder HGD oil is overheated
	Я	-	Feeder drive HGD filter is clogged	Feeder HGD filter is clogged
	Я	+	Rollers rotation rate is below permissible	Rollers rotation rate is below the permissible range
	К	+	Automated feeder shut-down	Automated shut-down of feeder if clogged
	К	+	Feeder shutdown unit mal-function	Feeder shutdown unit mal-function
	Я	+	Shredding drum rotation rate is below permissible	Shredding drum rotation rate is below normal
	К	+	Shredding drum stop	Shredding drum stop

Table 4.2 (continued)

1	2	3	4	5
	Я	+	Metal detector failure	Metal detector failure
	Я	+	Stone detector failure	Stone detector failure
	Я	+	Failure of communication line with metal detector	Failure of communication line with metal detector
	К	+	Failure of stone and metal detector communication line or control unit	Operation without stone and metal detector

State field

The view of the "State field" frame on the MTM screen is given in Figure 4.20.

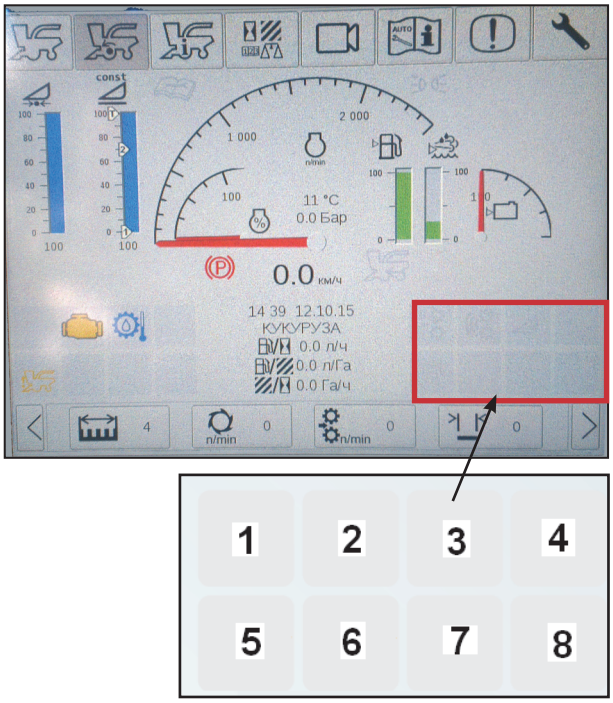


Figure 4.20 – State field

Irrespective of the active mode, the field displays icons of current states of harvester systems and PAU. The display mode, need for sound alarm, event description and causes are shown in Table 4.3.

Table 4.3

Box number in Fig. 4.22	Icon	Audio message
1		Feeder/adapter reverse
2		Stone and metal detector is active
3		Feeder/adapter drive is active
4		Standby

Table 4.3 (continued)

1	2	3
5		Highway motion mode
6		Absence of the operator at the workplace
7		Metal detector is not active
		Stone and metal detector is not active
8		Stone detector is not active

Optimization field

The view of the "Optimization field" frame on the MTM screen is given in Figure 4.21.

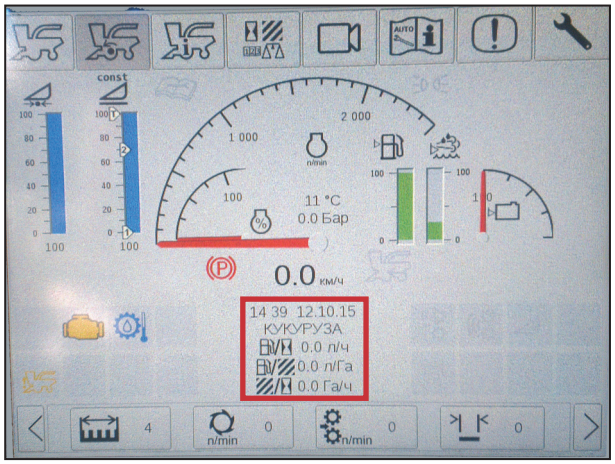


Figure 4.21 – Optimization field

The optimization field shows the current date and time, crop type (set in section SETTINGS/CROP) and harvester current performance parameters according to Table 4.4.

Table 4.4

Symbol	Format	Measurement units	Parameter
	0.0... XXX,X	l/h	Fuel consumption per hour
	0.0... XXX,X	l/ha	Fuel consumption, liters per hectare
	0.0... XX,X	ha/h	Throughput, hectare per hour

Main field

The main field displays information corresponding to the mode activated in the selection field. Modes description is provided in the following sections.

MOTION mode

The main field in the MOTION mode is shown in Figure 4.22.

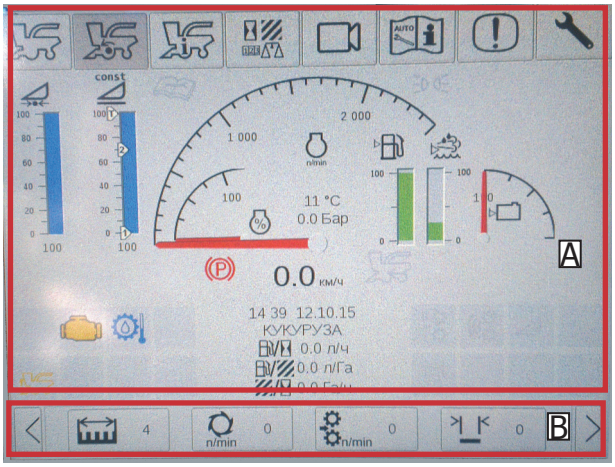
Information is displayed as digitized and scaled arrow pointers with the respective icons according to Table 4.5.

COMBINING mode

The main field in the COMBINING mode is shown in Figure 4.22.

Hand pointers of engine crankshaft rotation rate, engine loading, digital values and measurement units of engine cooling fluid temperature and lubrication system oil pressure are displayed in the center of the main field similarly to the MOTION mode.

Digital value and measurement units of motion speed are displayed under the



А – main field; Б – control area

Figure 4.23 – Screen layout in COMBINING mode

pointers while the parking brake indicator is located to the left. The operator is notified similarly to the MOTION mode. Stripe and digital pointers are displayed to the left from the hand pointers according to Table 4.6.

Button icons designed for adjustment parameter selection are displayed in the control area. The icons are described in Table 4.7.

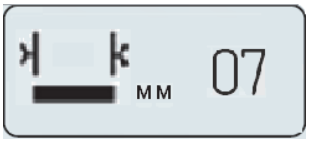
Table 4.5

Icon	Parameter	Pointer type
	Harvester motion speed	Parameter display range from 0 to 25 km/h. The value of travel HGD oil temperature with its measurement unit is displayed in the pointer area. Current digital value and measurement unit are displayed under the pointer. If the parking brake is activated,  red icon of the parking brake is displayed.
	Engine crankshaft rotation rate	Parameter display range from 0 to 2500 rpm. Current values (digital values and measurement units) of engine cooling fluid temperature and lubrication system oil pressure are displayed under the symbol. Green indicator of clearance lights activation is displayed above the pointer, on the right, in case of corresponding signal. When the counter of time until the respective maintenance reaches zero,  or  or  or  icon is displayed in amber.
	Engine loading	Parameter display range from 0 to 125%.
	Fuel level	Parameter display range from 0 to 100%.

Table 4.6

Symbol	Parameter	Pointer type
1	2	3
	Adapter ground pressure	Parameter display range: from 100 to 0%. If a pressure maintaining mode is remembered for CFS mode 1 and/or 2, "1" and/or "2" pointer is displayed in the digitizing area near the scale and points to the place on the scale which corresponds to the remembered value. If one of these modes is active, the pointer is displayed inverted.
	Feeder position	Parameter display range: from 0 to 100%. If a feeder position maintaining mode is remembered for CFS mode 1 and/or 2, "1" and/or "2" pointer is displayed in the digitizing area near the scale and points to the place on the scale which corresponds to the remembered value. If one of these modes is active, the pointer is displayed inverted. A "T" pointer directed to the place on the scale corresponding to the crop feed elevator transport position set in SETTINGS/CFS/ FEEDER TRANSPORT POSITION is also displayed. If there is a message from the CFS control unit in the CAN bus which requires emergency lift of the feeder,  symbol is replaced by  .

Table 4.7

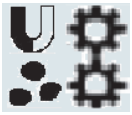
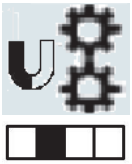
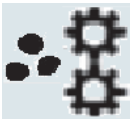
Icon	Description	Range	Measurement units
	Rated cutting width of adapter	from 0 to 24	m
		from 0 to 40	P
	Shredding drum rotation rate	from 0 to 1200	rpm
	Feeder rollers rotation rate	from 0 to 500	rpm
	Cutting length	from 0 to 17 with accuracy of ±1	mm

After each adjustment made by the operator (by means of control panel buttons or from the MTM screen), current parameter value is saved in the MTM memory as the rated one and is further used in algorithms. Range and increment of adapter width variation is set in SETTINGS/ADAPTER CUTTING WIDTH.

In case of parameter sensor malfunction "----" is displayed instead of the digital parameter value.

If a foreign object is identified in the feed mass by the stone and metal detector, sound alarm is generated, and a command is sent to switch on the common failure lamp, a voice message is played once and a pop-up window with the symbol according to Table 4.8 appears.

Table 4.8

Icon	Activation (deactivation) of the common failure lamp	Voice notification	Event description
	+	Foreign object is detected in feed mass	Foreign object is detected in feed mass
	+	Metal is detected in feed mass	Metal is detected
	+	Stone is detected in feed mass	Stone is detected

DIAGNOSTICS mode

The main field in the DIAGNOSTICS mode is shown in Figure 4.24.

Values of all possible harvester parameters controlled by respective sensors are displayed in the main field as icons, digital values and units of measurement according to Table 4.9.

PERFORMANCE INDICES AND TIME REMAINING UNTIL MAINTENANCE mode

In the PERFORMANCE INDICES mode, TM and PERFORMANCE INDICES subsections are displayed in accordance with Figure 4.25.

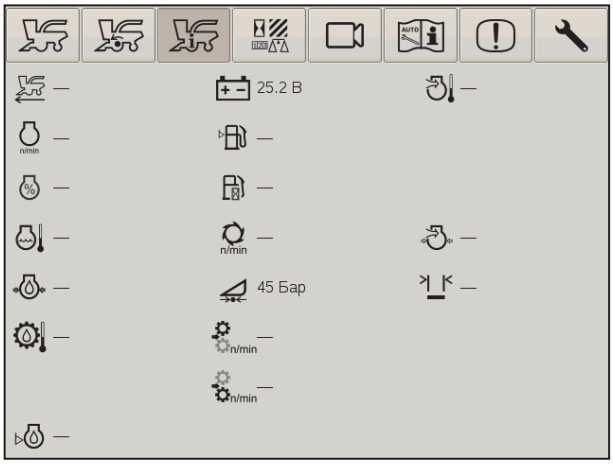


Figure 4.24 – Screen layout in DIAGNOSTICS mode

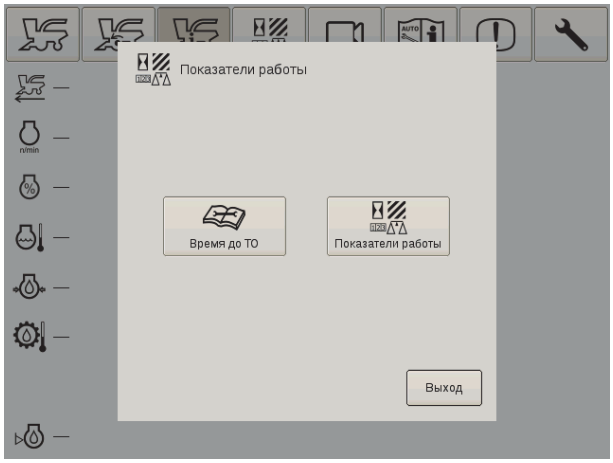


Figure 4.25 – Screen layout in PERFORMANCE INDICES mode

Time remaining until the corresponding type of technical maintenance (hereinafter "TM") is displayed as icons, digital values and measurement units in the PERFORMANCE INDICES/TM subsection. An example of the screen view is given in Figure 4.26.

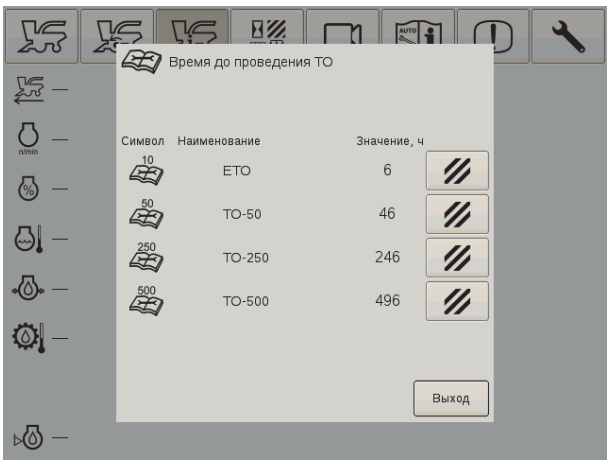


Figure 4.26 – Screen layout in PERFORMANCE INDICES. Time till TM mode

Table 4.9

Icon	Range	Measure-ment unit	Parameter	
	from 0.0 to 30.0	km/h	Motion speed	
	from -20 to +120	°C	Travel HGD oil temperature	
	from 0 to 2500	rpm	Engine crankshaft rotation rate	
	from 0 to 125	%	Engine loading	
	from -20 to +120	°C	Engine cooling fluid temperature	
	from 0.0 to 10.0	bar	Oil pressure in the engine lubrication system	
	from 0.0 to 1.0	x100%	Fuel level	
	from 0 to 33.9	V	Electric system voltage	
	from 0 to 1200	rpm	Shredding drum rotation rate	
	from 0 to 500	rpm	Rollers rotation rate	Sensor 1
	from 0 to 500	rpm		Sensor 2
	from 0.0 to 250.0	bar	Header ground pressure	
	-	kgs/cm^2	Inlet pressure	
	-	°C	Inlet temperature	
	-	l/h	Instantaneous fuel consumption	
	0...100	%	Engine oil level	
In case of signal sensor malfunction "----" is displayed instead of the digital value.				

Harvester performance indices calculated and stored in the non-volatile memory are displayed as icons, digital values and measurement units in the PERFORMANCE INDICES subsection: time, area and fuel according to Figures 4.27, 4.28 and 4.29 and Table 4.10. There are five counters for each value: "counter for session 1", "counter for session 2", "counter for session 3", "for day" and "total" (for the entire harvester operation period).

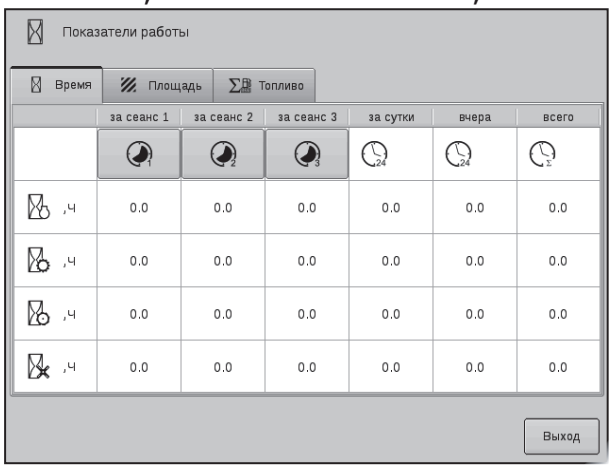


Figure 4.27 – Screen layout in Performance indices/Time subsection

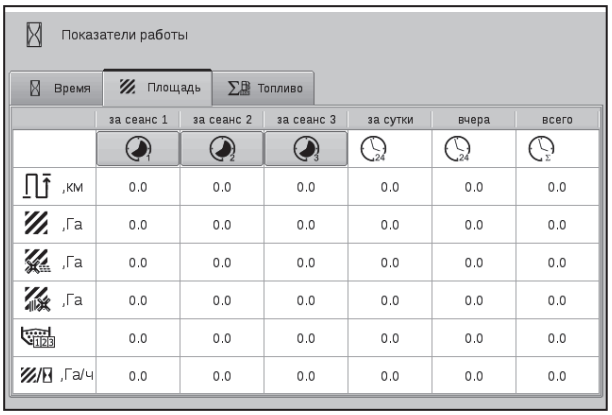


Figure 4.28 – Screen layout in Performance indices/Area subsection

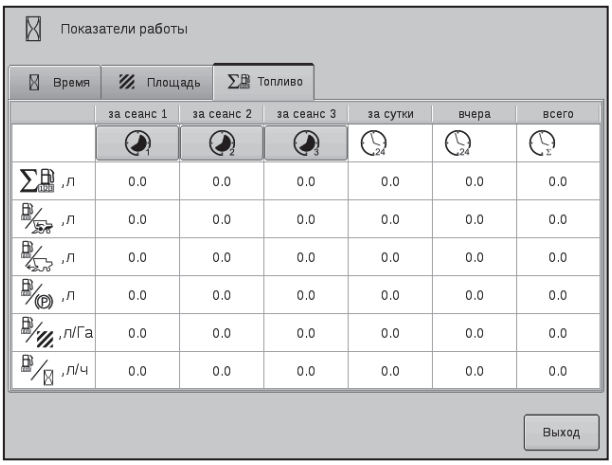


Figure 4.29 – Screen layout in Performance indices/Fuel subsection

Table 4.10

Symbol	Name	Measurement units
1	2	3
	engine operating time	h
	shredding drum operating time	h
	chassis operating time	h
	running time clock	h
	distance covered	km
	total harvested area	ha
	average throughput	ha/h
	number of metal detections	-
	number of rock detections	-
	main drive clutch engagements	-
	total fuel consumption	l
	fuel consumption while combining	l
	fuel consumption while moving	l

Table 4.10 (continued)

1	2	3
	fuel consumption at standstill	l
	average fuel consumption per hectare	l/ha
	average fuel consumption per combining hour	l/h

VIDEO MONITORING mode

This mode can be enabled by clicking on the corresponding icon provided that at least one video camera is connected to MTM.

The video from the first camera is displayed in the left half of the main field and the video from the second camera is displayed in the right half. There is a possibility of brightness, contrast, color saturation adjustment, switching between NIGHT/DAY modes, mirroring of each image, full screen viewing of one of the videos and folding to the previous size.

COMBINING ASSISTANCE mode

Screen view in the COMBINING ASSISTANCE mode is given in Figure 4.30.

The following textual information is displayed on the screen:

- Prior to driving to the field the harvester shall be adjusted according to the state of crop to be harvested and harvesting conditions. Further when driving from one field to another the harvester settings shall be adjusted. The optimal cutting height is determined.

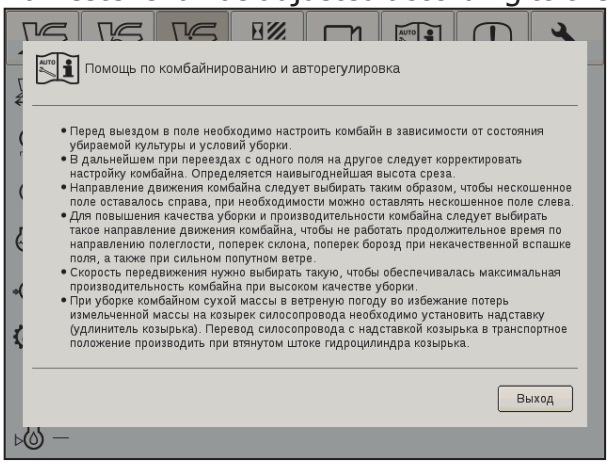


Figure 4.30 – Screen layout in COMBINING ASSISTANCE subsection

Travel speed shall be selected so that to ensure the maximum harvester performance at the high quality of harvesting.

To improve the harvesting quality and harvester performance select the movement direction in order to avoid working for a long time along the lodged grain, across the slope, across the furrow if improper field tillage, as well as in case of strong fair wind.

If the harvester is used for harvesting of dry mass in windy weather, install the extension piece (windscreen extension) on tower windscreen to avoid losses of milled mass.

Set the tower with windscreen extension to transport position only when windscreen hydraulic cylinder rod is retracted.

EVENTS LOG mode

The information about emergency situations and failures of harvester is tabulated in the EVENTS LOG, for example, event 0001 (Figure 4.31). The cause of event occurrence is displayed under the failure number.

SETTINGS mode

The following sections are displayed in the SETTINGS mode:

- CROP
- ADAPTER WIDTH
- MTM
- EQUIPMENT

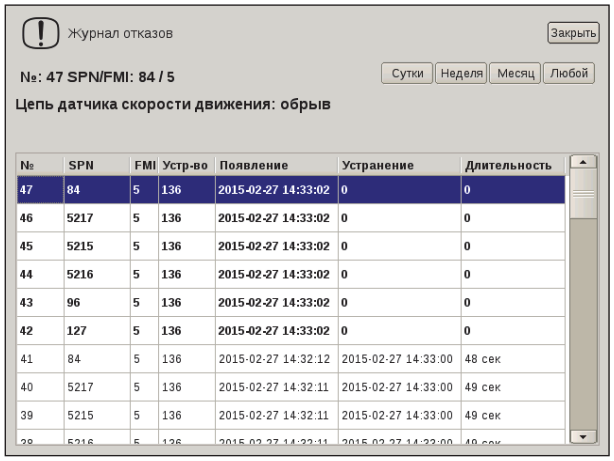


Figure 4.31 – Screen layout in EVENTS LOG subsection

- CALIBRATIONS
- STONE AND METAL DETECTOR
- CFS
- PRINTER*
- SOFTWARE UPDATE

ATTENTION! DO NOT CHANGE THE SETTINGS UNLESS NECESSARY. IN CASE THE MODEL OF HARVESTER IS CHANGED, CHECK AND CHANGE OTHER SETTINGS (ENGINE, DRIVE AXLE, ETC.)!

Screen view in the SETTINGS mode is given in Figure 4.32.

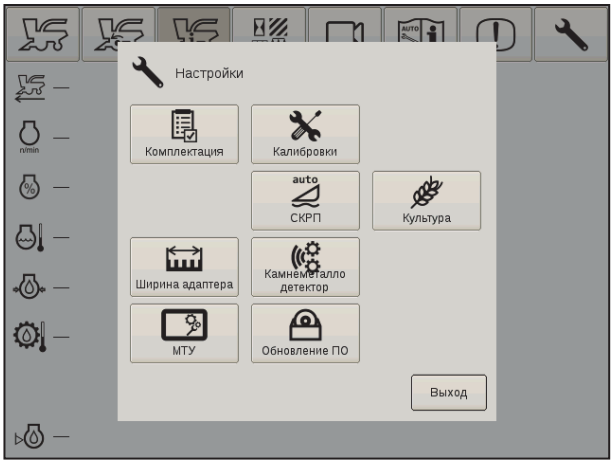


Figure 4.32 – Screen layout in SETTINGS subsection

SETTINGS/CROP mode

Type of harvested crop is selected from the proposed list (Figure 4.33).

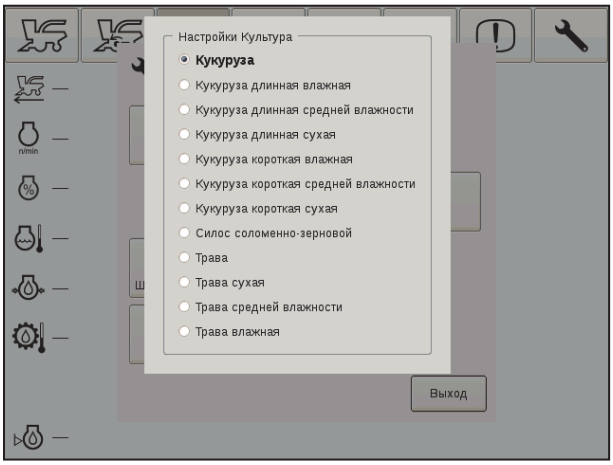


Figure 4.33 – Screen layout in SETTINGS/ CROP subsection

SETTINGS/ADAPTER WIDTH mode

Adapter type is selected: in meters (for headers) or rows (for corn harvesting devices), as well as setup of the rated adapter cutting width or row width. Depending on the chosen option, rated adapter cutting width which influences the accounting of harvested area is adjusted in the COMBINING window.

Screen view in the SETTINGS/ADAPTER WIDTH mode is given in Figure 4.34.

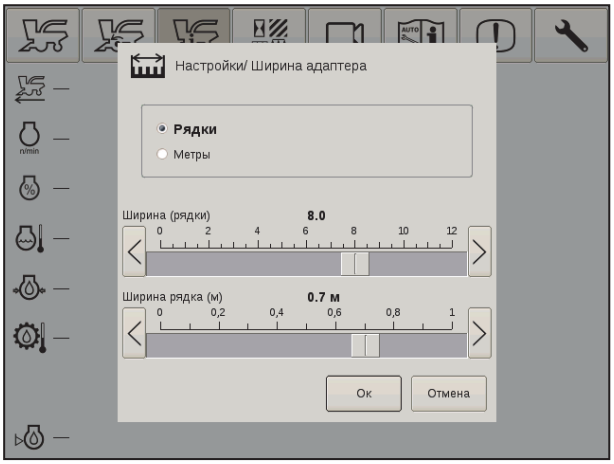


Figure 4.34 – Screen layout in SETTINGS/ ADAPTER WIDTH subsection

SETTINGS/MTM mode

Allows setup of date, time, brightness and sound in accordance with Figure 4.35.

---

* Only if the harvester is equipped with RD-01 recording device or RND-01 recording and navigation device.

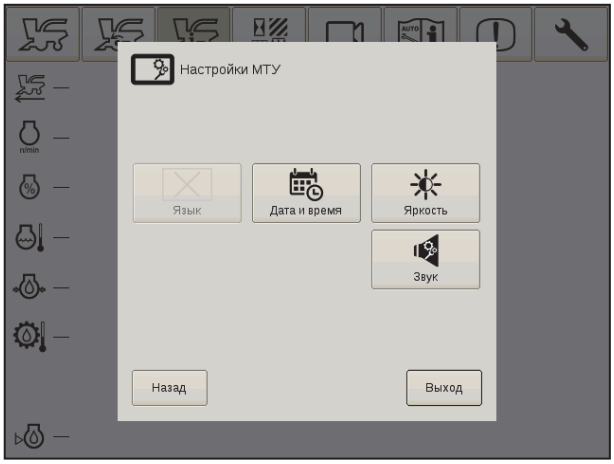


Figure 4.35 – Screen layout in SETTINGS/ MTM subsection

SETTINGS/EQUIPMENT mode

This section provides the opportunity to set up the harvester equipment to be accounted in the corresponding MTM, control panel and CFS control unit operation algorithms.

The main field displays the following information in accordance with Figure 4.36.

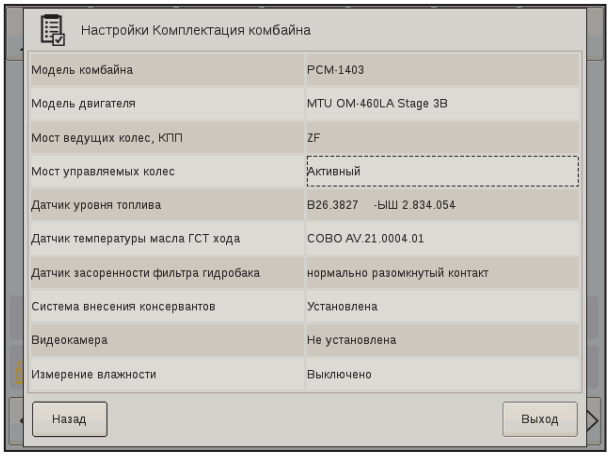


Figure 4.36 – Screen layout in SETTINGS/ CONFIGURATION subsection

SETTINGS/CALIBRATIONS/NOMINAL ROTATION RATES

Provides saving of rotation rates of harvester operating units (Figure 4.37) in order to monitor deviations from the permissible values during combining.

Can be done once during harvester commissioning or each time it is required.

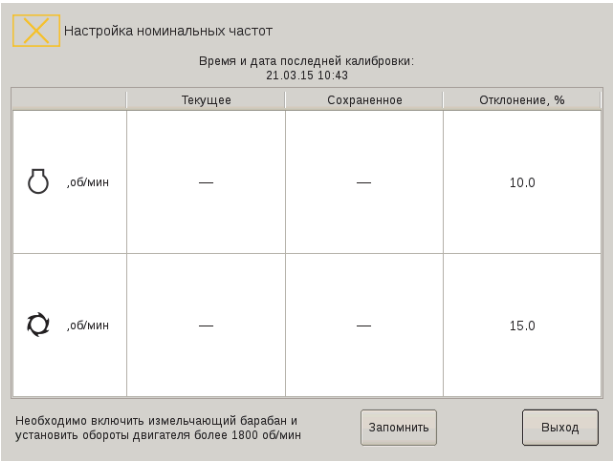


Figure 4.37

- set the nominal rotation rate of the engine crankshaft;

- select "Save" and ensure that the values from the "Current" column were assigned to the values from the "Saved" column;

- the values of permissible deviations are displayed in the "Deviation" column for reference and MTM produces a signal if the rotation speed of appropriate actuating element is reduced by value more than the indicated in this column (see the "Emergency field" section).

SETTINGS/CALIBRATIONS/CFS SENSORS mode

Provides CFS sensors calibration. Screen view is given in Figure 4.38.

The following shall be done each time the adapter is changed:

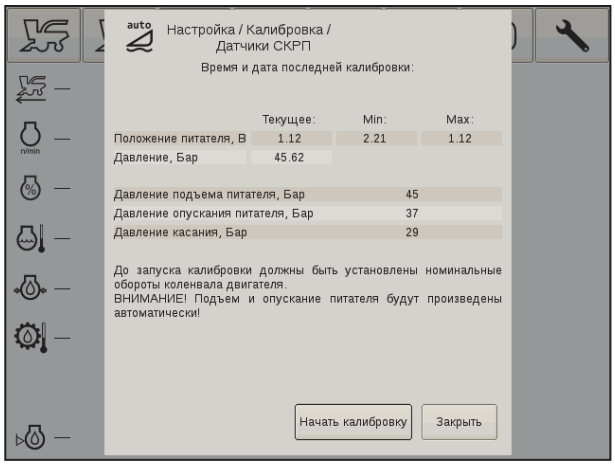


Figure 4.38 – Screen layout in SETTINGS/ CALIBRATIONS/CFS SENSORS subsection

- set the nominal engine rotation rate (more than or equal to 1800 rpm) by means of the corresponding control panel buttons and select  (start calibration). MTM shall generate a short audio signal and transmit commands to start the calibration for the CFS control unit via CAN bus. When calibration is completed, the information on the screen will be updated and a "COMPLETED" inscription will be displayed.

SETTINGS/STONE AND METAL DETECTOR mode

Enables displaying and changing of set values of stone and metal detector sensitivity (Figure 4.39).

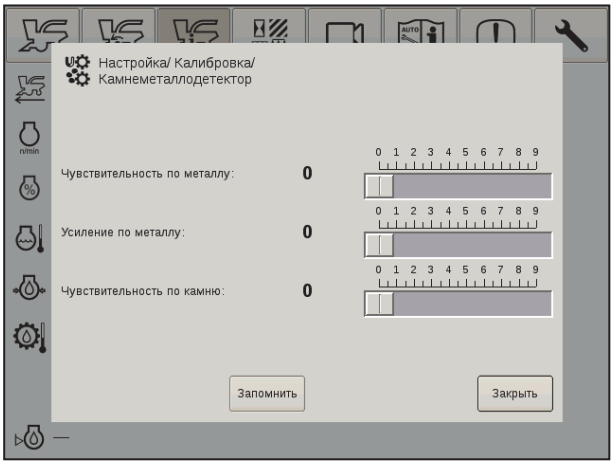


Figure 4.39 – Screen layout in SETTINGS/ STONE AND METAL DETECTOR subsection

Can be done once during harvester commissioning or each time it is required.

Mode "SETTINGS/CFS"

Provides CFS setup. Screen view is given in Figure 4.40.

Can be done once during harvester commissioning or each time it is required.

SETTINGS/SOFTWARE UPDATE mode

Displays corresponding versions of harvester electronic systems software. Screen view is given in Figure 4.41.

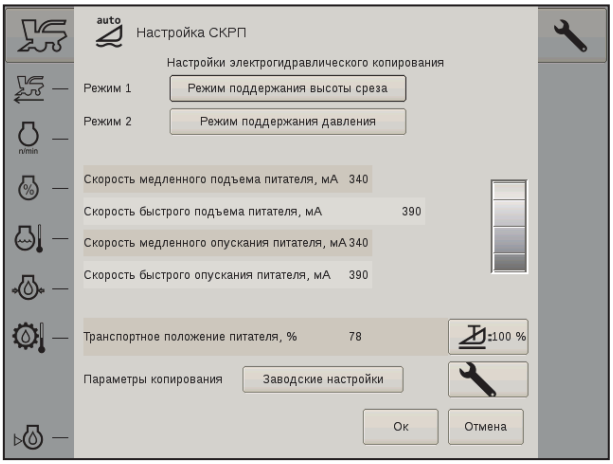


Figure 4.40 – Screen layout in SETTINGS/ CFS subsection

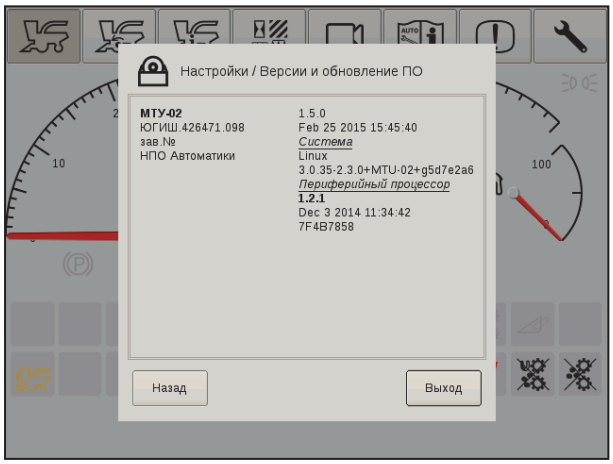


Figure 4.41 – Screen layout in SETTINGS/ SOFTWARE UPDATE subsection

4.2.6 SAS-1401 Sharpening and Adjustment System

4.2.6.1 View of SAS panel is given in Figure 4.42.

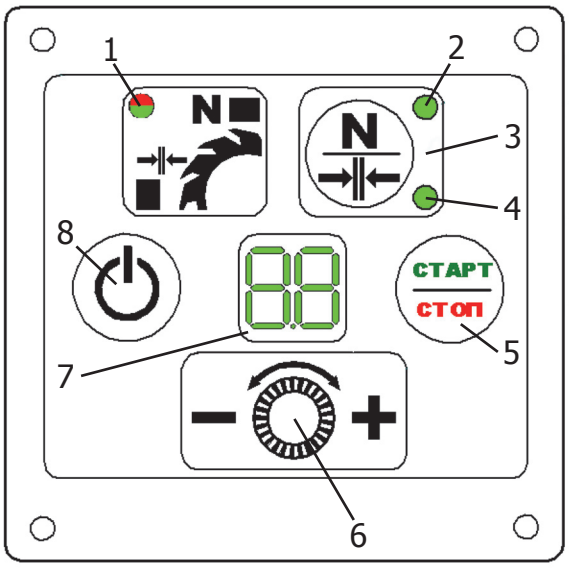
SAS is designed for:

- automated control of the sharpening of the shredding drum knives for the number of sharpening cycle set manually;

- automated adjustment of clearance between the counter-cutting beam and shredding drum knives in accordance with the clearance value set manually;

- automated control of process retraction of the counter-cutting beam from shredding drum knives in accordance with the clearance value which is set manually;

- automated control of the grinding wheel to initial position;



1- "Availability/operability" indicator; 2- "Sharpening mode" indicator; 3- "Modes switch: sharpening mode/clearance adjustment mode" button; 4- "Clearance adjustment mode" indicator; 5- "START/STOP" button; 6- controller; 7- digital table; 8- "SAS on/off" button

Figure 4.42 – General view of SAS panel

- execution of contact detectors operability check algorithm.

4.2.6.2 Functions of SAS Buttons and Indicators:

- "SAS on/off"SAS on/off" button 8 (hereinafter "button 8") is designed for SAS activation/deactivation. When SAS is off, but supply voltage is delivered to it, the dot between positions on the digital display blinks. To activate SAS, button 8 shall be held for at least 2 seconds. When SAS is on, the digital display shows the number of sharpening cycles and the size of clearance between the beam and shredder knives during the last execution of the clearance adjustment algorithm; these parameters are set and stored in the non-volatile memory;

- "Sharpening mode/ clearance adjustment mode switch" button 3 (hereinafter "button 3") is designed for activation of modes of sharpening cycles number and clearance changing, as well as beam process retraction mode;

- "START/STOP" button 5 (hereinafter "button 5") is designed for starting or stopping of the corresponding SAS operation algorithm;

- Availability/operability indicator 1 (hereinafter "indicator 1") is designed for SAS state indication. LED can become red or green, it can blink or glow, depending on executed algorithm and SAS state;

- "Sharpening mode"Sharpening mode" indicator 2 (hereinafter "indicator 2") is designed for indication of SAS operation modes related to sharpening;

- "Clearance adjustment mode"-Clearance adjustment mode" indicator 4 (hereinafter "indicator 4") is designed for indication of SAS operation modes related to clearance adjustment.

Digital display 7 is designed for displaying of information about SAS operation mode.

Controller 6 is designed for changing (increasing/decreasing) of the sharpening cycles number and clearance size.

4.2.6.3 SAS is activated by holding button 8 for two seconds.

After SAS is activated, digital display 7 lights up and all electric circuits connected to SAS are checked for opening or short circuit to the harvester body. In case of failure detection digital display 7 indicates the nominal failure code. Nominal failure codes and their causes are provided in Table 4.11. If several failures are detected, their codes are indicated one by one 3 seconds each while indicator 1 glows red.

When failure codes are indicated, SAS operation is blocked automatically. After the last code is indicated, SAS

switches to the standby mode and digital display 7 displays, one by one, the last number of sharpening cycles and size of clearance between the beam and shredder knives. After completion of codes indication, activation of one or more SAS operation algorithms may be automatically blocked in accordance with 4.11. If algorithms related to clearance adjustment are blocked it does not lead to sharpening algorithms blocking, but activation of these algorithms will require the procedure described in Table 4.11.

CAUTION! TO ENSURE SAFETY AND ELIMINATE DAMAGE OF KNIVES BY THE COUNTER-CUTTING BEAM DURING AUTOMATED CLEARANCE ADJUSTMENT, A SPECIAL MODE OF CHECKING CONTACT DETECTORS AND THEIR WIRING OPERABILITY IS PROVIDED. THIS MODE ALLOWS TO VERIFY WHETHER THE SIGNALS FROM THE LEFT AND THE RIGHT DETECTOR REACH SAS. THE NECESSITY OF SUCH CHECK (IN ADDITION TO ITS EXECUTION DURING DM) IS DETERMINED BY THE OPERATOR. IF YOU ARE SURE THAT THE DETECTORS ARE OPERABLE AND THEIR WIRING IS NOT DAMAGED, THE EXECUTION OF THIS ALGORITHM IS NOT REQUIRED.

If no failures of electric circuits are detected after activation, SAS is switched to the standby mode, indicators 1, 2 and 4 are disabled, and digital display 7 shows the number of sharpening cycles (e.g. "20") and clearance size in millimeters (e.g. "05") between the knives and beam during last operation one by one.

Knives sharpening may be started with existing parameters (number of cycles, clearance size) or other parameters may be chosen.

To change the number of sharpening cycles, push and release button 3 switching on indicator 2 which means that SAS is in the sharpening cycles number changing mode where the value indicated on digital display 7 may be increased or decreased by means of controller 6. In the sharpening cycles number changing mode values can be changed by rotating the controller in the following order "HN" - "--" - "01" - "02" -...- "30" and backwards.

"HN" — only the algorithm of grinding wheel return in its INITIAL POSITION will be activated at sharpening startup.

"--" — blocking of algorithms related to sharpening and blocking of operability control of electric circuits related to this function.

Values from "01" to "30" are the number of sharpening cycles which will be performed when the knives sharpening algorithm is activated.

After the required value is set, press and release button 3 once more, the set value of the sharpening cycles number will be saved in the non-volatile memory until the next change, indicator 2 switches off, and indicator 4 switches on, which means activation of clearance size change where the value indicated on digital display 7 may be increased or decreased by means of controller 6. In the clearance size changing mode values can be changed by rotating controller 6 in the following order "-.-" - "0.1" - "0.2" -... - "0.9" and backwards.

"-.-" — blocking of algorithms related to clearance adjustment and blocking of operability control of electric circuits

related to this function.

Values from "" to "0.1" to "0.9" are the sizes of clearance between the beam and knives at beam retraction after coming in contact with the knives for clearance adjustment.

After the required value of clearance size is set, press and release button 3 to switch SAS to the standby mode, indicator 4 goes off.

Pressing of button 5 initiates knives sharpening and clearance adjustment from the standby mode. However, sharpening and adjustment will be started and executed only if the following conditions are met:

1) shredding drum drive shall be activated;

2) shredding drum rotation rate shall be within the range from 500 to 1100 rpm.

If these conditions are not met, code "80" will be indicated for 3 seconds on digital display 7 (Table 4.11).

If the conditions are met, indicator 1 glows green which means SAS availability for activation of automated sharpening and clearance adjustment mechanisms.

Sharpening and/or clearance adjustment is activated by holding button 5 for 2 seconds. While the button is pressed, harvester audio signal is switched on, then indicator 1 starts to blink which means that the automated algorithm is activated and button 5 can be released. Then the sharpening procedure shall be monitored without leaving the seat, for that SAS LEDs switch correspondingly and digital display 7 shows the relevant information on the following algorithms:

- indicator 1 blinks green which means that SAS is in the automated algorithms execution mode, and indicator 2 glows meaning that the knives sharpening algorithm is executed;

- digital display 7 shows the set number of sharpening cycles and SAS generates the signal for opening of the sharpening device cover;

- when a signal is received from the sensor which fixes cover opening, indicator 2 starts to blink and signals are formed automatically to transfer the grinding wheel to the final position and back. When a signal is received from the wheel final position sensor, SAS stops to transfer the wheel to the final position and generates a signal to transfer it to the initial position and so on. Wheel stroke from the initial position to the final position and back is considered as a sharpening cycle. After each cycle is completed, the value on digital display 7 decreases by one. After the last sharpening cycle being completed, the wheel is stopped in the initial position, indicator 2 glows which means that sharpening is completed, sharpening device cover is closed and indicator 2 switches off meaning that the sharpening algorithm is completely executed;

- if a value from "0.1" to "0.9" (not "-.-") was set in the clearance size changing mode, clearance between the counter-cutting beam and shredding drum knives will be adjusted automatically. Indicator 1 continues to blink, indicator 4 switches on, digital display 7 indicates the set clearance value;

- then SAS checks the level of signal from contact detectors. To do this, SAS automatically checks signals coming from the detectors for approximately 8 seconds and compares them with permissible values

stored in the non-volatile memory. If the signal level is in the permissible range, indicator 4 starts to blink which means the start of automated clearance adjustment and signals are generated automatically to deliver the counter-cutting beam to the shredding drum knives from the left and from the right till contact. When the beam comes into contact with knives it is considered as a zero clearance after which the beam is retracted from the knives in accordance with the set clearance. After that the clearance adjustment algorithm is completed, indicator 4 switches off, digital display 7 shows the clearance size, harvester audio signal is activated three times to indicate the successful (fault-free) execution of sharpening and adjustment algorithms, and SAS switches to the standby mode.

Clearance adjustment procedure may be monitored by means of the digital display. For this, three segments of the left indicator and three segments of the right indicator are used and marked as RL, DL, CL, CR, RR, DR, as shown in Figure 4.43.

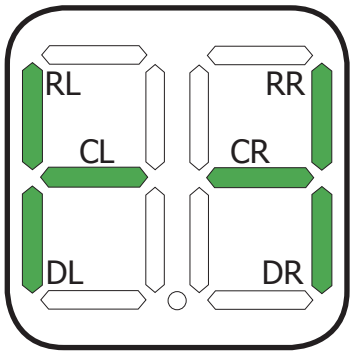


Figure 4.43 – Clearance adjustment procedure on the digital display

Flashing of DL or DR segment means DELIVERY of the LEFT or DELIVERY of the RIGHT end of the counter-cutting beam. If DL or DR segments are glowing, it means that the delivery has been completed or has not been started yet. Flashing of CL and CR segments means that CONTACT with the LEFT or CONTACT with the RIGHT end of the beam with the shredding drum knives has not been yet recorded. When beam contact from the left or from the right is recorded, CL or CR segments start to glow. Flashing of RL and RR means RETRACTION of the LEFT or RETRATION of the RIGHT end of the beam from knives. If RL or RR segments are glowing, it means that the retraction has been completed or has not been started yet.

Sharpening and clearance adjustment algorithms may be aborted by pressing either button 5 (Figure 4.24) or emergency stop switch on the harvester panel. Indicator 1 starts to glow red, short harvester audio signal is generated, digital display 7 shows "CA" (if button 5 was pressed) or "AO" (if emergency stop switch was pressed); if sharpening was performed, the current cycle is completed, the wheel is set to the initial position, the cover is closed and SAS switches to the standby mode; if clearance adjustment was performed, beam delivery/retraction from the left and from the right is stopped and SAS also switches to the standby mode. In case of such interruption of clearance adjustment the beam will be installed in an undetermined position, so for further operation it is recommended to perform automated clearance regulation which provides beam retraction from knives with the same clearance from both sides.

Both after power supply activation and during execution of any algorithm SAS monitors operability of detectors and actuators electric circuits, checks them for opening or short circuit to the harvester body. If such faults are detected (faults from 10 to

12, from 30 to 32, from 13 to 16 and from 33 to 36 in accordance with Table 4.11) indicator 1 glows red, short harvester audio signal is generated, algorithm execution is aborted and SAS switches to the standby mode while failure codes are indicated one by one for 3 seconds on digital display 7.

During execution of knives sharpening and clearance adjustment algorithms, SAS provides automated monitoring of detectors and actuators.

If 51 or/and 53 faults are detected in accordance with Table 4.11, indicator 1 glows red, short harvester audio signal is generated, the wheel is returned to the initial position while failure codes are indicated one by one for 3 seconds on digital display 7. If 50, 52 or/and 54 faults are detected in accordance with Table 4.11, indicator 1 glows red, short harvester audio signal is generated, failure codes are indicated one by one for 3 seconds on digital display 7, but SHARPENING DEVICE COVER IS MAINTAINED OPEN. In this case the following actions are required:

- switch off the shredding unit drive;
- switch off the engine keeping the cover open;
- determine and eliminate the cause of this fault (e.g., the wheel was stuck before reaching its initial position, detectors operation was corrupted, detectors were damaged, wiring opening or short circuit to the harvester body took place);
- start the engine and activate the algorithm of wheel returning to the initial position. After automated installation of the wheel in the initial position, the sharpening device cover will be closed automatically.

If the process of wheel transfer to the initial position was interrupted, "Hn" is added to the list of indicated failure codes to remind about the necessity of wheel return to the initial position.

If any faults were detected during clearance adjustment, the adjustment stops, indicator 1 glows red, short harvester audio signal is generated, and detected failure codes are indicated one by one for 3 seconds on digital display 7 (from 61 to 65 or from 71 to 75 according to Table 4.11).

4.2.6.4 Algorithm of wheel returning to the initial position is provided for automated control of grinding wheel return to its initial position from any other position occurred due to knives sharpening interruption resulting from emergency stop switch pressing after failure detection during sharpening procedure.

Algorithm activation is permitted only when the main countershaft is off. To activate this algorithm:

- in the sharpening cycles changing mode set "Hn" value on the digital display 7 rotating the controller counterclockwise;
- initiate the process of wheel return to the initial position by holding button 5 for at least 2 seconds. While the button is pressed, harvester audio signal is switched on. After the automated algorithm is initiated, indicator 1 starts flashing green, which means that the button can be released, then the signal is generated for opening of the sharpening device cover and for wheel return to the initial position, which is accompanied by indicator 2 flashing; when the signal from the initial posi-

tion sensor is received, indicator 2 starts to glow. After that, generation of cover opening signal is stopped (the cover is closed), harvester audio signal is activated three times, and SAS switches to the standby mode. Automated algorithm execution may be aborted by pressing either button 5 on the SAS panel, or emergency stop switch on the harvester panel. If button 5 is pressed, digital display 7 shows "C0", the wheel is moved to the initial position sensor, then the cover closes, and SAS switches to the standby mode. If emergency stop switch is pressed, digital display 7 shows "A0", the wheel stops in its current position and if it is the initial position (SAS receives the signal from sensor), the cover closes, and SAS switches to the standby mode. If the stone has stopped before reaching the initial position, the COVER IS MAINTAINED OPEN, and digital display 7 shows the failure code in accordance with Table 4.11. To close the cover, the algorithm of wheel returning to the initial position shall be executed without interruption and completed.

4.2.6.5 Mode of maintaining the cover open, which becomes active in case of faults during knives sharpening or during execution of the algorithm of wheel returning to the initial position, is a special mode, in which "P." (cover holding mode) symbols appear on digital display 7 after failure codes indication. SAS in this mode does not response to buttons pressing, and in order to disable this mode SAS shall be de-energized. If SAS has switched to this mode while harvester operating units were active, first of all they should be deacticated, after which SAS shall be de-energized, harvester engine shall be stopped, causes of detected faults shall be eliminated, harvester engine shall be activated and the algorithm of wheel returning to the initial position shall be initiated.

4.2.6.6 A special mode of process retraction of the beam is provided for counter-cutting beam retraction for knives replacement, adjustment and other purposes. To activate this mode:

- switch off the shredder drive (as activation and execution of the process retraction algorithm is allowed at stationary shredding drum ( icon is displayed on IP) and is blocked in any other cases which lead to "E 1" failure code displaying on the digital display 7 (Figure 4.24));

- press and hold button 3 of modes switching for at least 2 seconds until indicator 4 is switched on, then the digital display will show the last set value of beam retraction in "X.0" format (e.g. 1.0, 2.0 or 3.0) , which means 1, 2 or 3 mm. The value is changed by controller handle rotation.

If "0.0" value is displayed, "-.-" value is set in the clearance size changing mode, which automatically blocks initiation of algorithms related to clearance regulation.

If indicator 1 glows green, it means that SAS is available for initiation of the beam process retraction mode. This mode is initiated by holding button 5 for two seconds. While the button is pressed, harvester audio signal is switched on. When the audio signal is over, indicator 1 starts flashing green, and SAS generates signals for activation of relays controlling

the retraction of electric drives, which is accompanied with indicator 4 flashing. As the beam is retracted, digital display 7 shows the remaining value of retraction. This value decreases by 0.1 when the beam is retracted by 0.1 mm. When retraction is completed, indicator 4 starts to glow, harvester audio signal is activated three times, digital display 7 shows the set value of retraction, and SAS switches to the standby mode.

In order to abort beam retraction, press button 5 on SAS or emergency stop switch on the harvester panel, after which signal generation is stopped, the beam remains in its current position, indicator 1 glows red, short harvester audio signal is generated, and the digital display shows "" or "" or "" or "" symbols respectively.

During process retraction of the beam operability of electric circuits of detectors and actuators as well as faults are monitored similarly to the clearance adjustment procedure.

Table 4.11

Nominal failure code	Cause	Actions
1	2	3
00, 01, ... 09	SAS internal failures. SAS operation is blocked.	In case of indication of these failure codes on the digital display, contact the maintenance service.
Faults related to detection of electric circuits failures		
10	Opening of wiring or solenoid controlling the sharpening device cover lifting hydraulic cylinder	In case of indication of these codes on the digital display, initiation of algorithms related to sharpening (knives sharpening algorithm and algorithm of wheel returning to the initial position) is blocked automatically. To execute algorithms related to clearance adjustment (clearance adjustment algorithm or beam process retraction algorithm), set "--" value in the sharpening cycles number changing mode. That will stop sharpening and failures of circuits related to this function will not affect operation of other algorithms
11	Opening of wiring or solenoid controlling the hydraulic cylinder for grinding wheel transfer to the final position	
12	Opening of wiring or solenoid controlling the hydraulic cylinder for grinding wheel transfer to the initial position	
30	Short circuit of wiring or solenoid controlling the sharpening device cover lifting hydraulic cylinder, to the frame	
31	Short circuit of wiring or solenoid controlling the hydraulic cylinder for grinding wheel transfer to the final position, to the frame	
32	Short circuit of wiring or solenoid controlling the hydraulic cylinder for grinding wheel transfer to the initial position, to the frame	

Table 4.11 (continued)

1	2	3
13	Opening of wiring or relay controlling the electric drive of reduction of clearance between the beam and knives on the right	In case of indication of these codes on the digital display, initiation of algorithms related to clearance adjustment (clearance adjustment algorithm or beam process retraction algorithm) is blocked automatically. To execute algorithms related to knives sharpening (knives sharpening algorithm or algorithm of wheel returning to the initial position), set "-.-" value in the clearance size changing mode. That will stop clearance adjustment and failures of circuits related to this function will not affect operation of other algorithms
14	Opening of wiring or relay controlling the electric drive of increase of clearance between the beam and knives on the right	
15	Opening of wiring or relay controlling the electric drive of reduction of clearance between the beam and knives on the left	
16	Opening of wiring or relay controlling the electric drive of increase of clearance between the beam and knives on the left	
33	Short circuit of wiring or relay controlling the electric drive of reduction of clearance between the beam and knives on the right, to the frame	
34	Short circuit of wiring or relay controlling the electric drive of increase of clearance between the beam and knives on the right, to the frame	
35	Short circuit of wiring or relay controlling the electric drive of reduction of clearance between the beam and knives on the left, to the frame	
36	Short circuit of wiring or relay controlling the electric drive of increase of clearance between the beam and knives on the left, to the frame	
19	Opening of wiring or sensor of shredding drum rotation rate	If these failures are detected, SAS operation is blocked in all modes. In order to deactivate blocking, the failures shall be eliminated and SAS shall be restarted.
39	Short circuit of wiring or sensor of shredding drum rotation rate, to the frame	
Failures related to initiation of knives sharpening, clearance adjustment or beam process retraction		
80	A fault takes place if at initiation of knives sharpening or clearance adjustment or during the procedure conditions for execution of these algorithms are not met	To perform knives sharpening and/or clearance adjustment, shredder drive shall be active and shredding drum rotation rate shall be within 500-1100 rpm. When the initiation condition is met, indicator 1 glows green.

Table 4.11 (continued)

1	2	3
81	A fault takes place if at initiation of beam process retraction or during the procedure conditions for execution of the algorithm are not met	To perform beam process retraction from the shredder knives, shredder drive shall be deactivated. When the initiation condition is met, indicator 1 glows green.
Faults related to malfunctions of automated knives sharpening algorithms		
50	A fault takes place if after the beginning of generation of signal to lift the sharpening device cover a signal from the sensor indicating the opening position of cover is not received in 10 seconds. In such a case, indicator 1 glows red, short harvester audio signal is generated, failure code is indicated on the digital display, and the cover closes automatically provided that the wheel is in its initial position (wheel initial position sensor is on). If the initial position sensor is off (which is possible if the grinding wheel is not in the initial position and in case of sensor or wiring failure), the COVER IS MAINTAINED OPEN	If this fault is detected, measures shall be taken to find and eliminate it, then execute the algorithm of wheel returning to the initial position (p.4.2.6.4)
51	A fault takes place if no signal is received from the sensor indicating wheel installation in the final position 10 seconds after activation of the solenoid for grinding wheel transfer to the final position. In such a case, indicator 1 glows red, short harvester audio signal is generated, failure code is indicated on the digital display, the signal to transfer the wheel to its initial position is generated automatically, and, as soon as the signal from the initial position sensor is received, the sharpening device cover is closed, and SAS switches to the standby mode	If this fault is detected, measures shall be taken to find and eliminate it, then execute the algorithm of wheel returning to the initial position (p.4.2.6.4)
52	A fault takes place if no signal is received from the sensor indicating wheel installation in the initial position 10 seconds after activation of the solenoid for grinding wheel transfer to the initial position. In such a case, indicator 1 glows red, short harvester audio signal is generated, failure code is indicated on the digital display, and SHARPENING DEVICE COVER IS MAINTAINED OPEN	If this fault is detected, measures shall be taken to find and eliminate it, then execute the algorithm of wheel returning to the initial position (p.4.2.6.4)
53	A fault takes place if the sensor indicating the opening position of cover does not switch off 10 seconds after deactivation of sharpening device cover opening solenoid. In such a case, indicator 1 glows red, short harvester audio signal is generated, failure code is indicated on the digital display, and SAS switches to the standby mode	If this fault is detected, measures shall be taken to find and eliminate it, then execute the algorithm of wheel returning to the initial position (p.4.2.6.4)

Table 4.11 (continued)

1	2	3
54	A fault takes place if signals from both initial and final wheel positions sensors are present at the SAS input. In such a case, indicator 1 glows red, short harvester audio signal is generated, failure code is indicated on the digital display, and SHARPENING DEVICE COVER IS MAINTAINED OPEN	If this fault is detected, measures shall be taken to find and eliminate it, then execute the algorithm of wheel returning to the initial position (p.4.2.6.4)
Failures related to malfunctions of automated algorithms of clearance adjustment or beam process retraction		
61	Periods of signal transmission from the rotation counter of the shaft of the beam left side clearance adjustment electric drive. Failure of the electric drive itself is possible	If these failures are detected, execution of clearance adjustment or beam process retraction algorithms is stopped automatically, indicator 1 glows red, short harvester audio signal is generated, failure codes are indicated one by one for 3 seconds on the digital display, then SAS switches to the standby mode
62	Rotation speed of the shaft of the beam left side clearance adjustment electric drive is below normal.	
63	Rotation speed of the shaft of the beam left side clearance adjustment electric drive is above normal	
64	Beam left side clearance adjustment electric drive did not stop after deactivation of its solenoid. Electric drive control relay pins sticking or malfunction of brake inside the electric drive are possible	

Table 4.11 (continued)

1	2	3
65	Rotation direction error of the shaft of the beam left side clearance adjustment electric drive. For example, the signal was generated to reduce the left clearance, and the clearance is increased due to twisting of wiring in the control relay of this electric drive or twisting of wiring in the rotation counter of the shaft of this electric drive	If these failures are detected, execution of clearance adjustment or beam process retraction algorithms is stopped automatically, indicator 1 glows red, short harvester audio signal is generated, failure codes are indicated one by one for 3 seconds on the digital display, then SAS switches to the standby mode
71	Periods of signal transmission from the rotation counter of the shaft of the beam right side clearance adjustment electric drive. Failure of the electric drive itself is possible	
72	Rotation speed of the shaft of the beam right side clearance adjustment electric drive is below normal. Identify and eliminate the cause of right clearance adjustment mechanism sticking	
73	Rotation speed of the shaft of the beam right side clearance adjustment electric drive is above normal. Identify and eliminate the cause of right clearance adjustment mechanism malfunction	
74	Beam right side clearance adjustment electric drive did not stop after deactivation of its solenoid. Electric drive control relay pins sticking or malfunction of brake inside the electric drive are possible	
75	Rotation direction error of the shaft of the beam right side clearance adjustment electric drive. For example, the signal was generated to reduce the right clearance, and the clearance is increased due to twisting of wiring in the control relay of this electric drive or twisting of wiring in the rotation counter of the shaft of this electric drive	
Faults related to initiation of clearance adjustment algorithms		

Table 4.11 (continued)

1	2	3
90	Detectors signal level during contact detectors check is above normal.	Faults may take place in case of excessive vibration of the counter-cutting beam, for example, if the feeder drive is active. If faults take place at deactivated feeder drive, all other possible sources of excessive vibration of the counter-cutting beam shall be detected and eliminated. Faults can also take place in case of non-allowable interference at the contact detectors wiring
91	The level of medium signal from the right contact detector is above normal	
92	Level of peak exceedance above the medium signal from the right contact detector is above normal	
93	The level of medium signal from the left contact detector is above normal	
93	Level of peak exceedance above the medium signal from the left contact detector is above normal	

4.2.7 Internal Climate Controls

The harvester is equipped with a heater and a conditioning unit. Conditioning unit compressor is activated by means of a switch located at the conditioning unit control panel installed in the upper panel of the cab.

The heater is activated by heater switch 5 (Figure 4.7) located on the control panel.

The wiper is activated by wiper switch 6 (Figure 4.3)

ATTENTION! PREVENT CONDENSER CLOGGING DURING CONDITIONING UNIT OPERATION.

ATTENTION! IF CONDITIONING UNIT TIGHTNESS IS DAMAGED, SWITCH IT OFF IMMEDIATELY AND PREVENT DIRT INGRESS INTO THE SYSTEM.

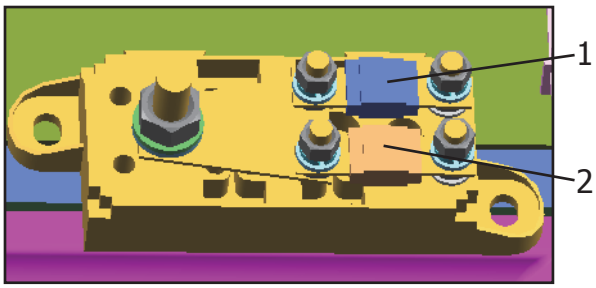
ATTENTION! CONDITIONING UNIT INSTALLATION, REPAIR AND FILLING SHALL BE PERFORMED ONLY BY SPECIALLY TRAINED PERSONNEL IN SERVICE CENTERS!

Operation of the air conditioning system decreases air humidity, that is why at heating system activation the simultaneous activation of conditioning unit fan at one of three speeds set by conditioning unit controller 2, as well as switching of conditioning unit controller 3 (Figure 4.3) to the "off" position are required.

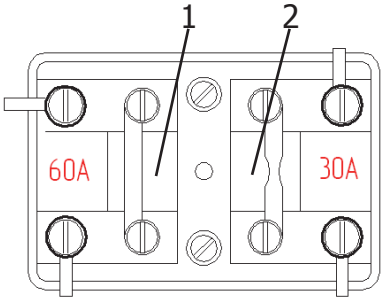
In order to provide comfortable internal climate in the cab during heating system operation, including its activation to remove the condensed moisture from windows, it is required to provide ingress of the outer air. To do this, close air filter flaps system 3 located in the rear part of the cab by means of air circulation flaps rotary controller 2 (Figure 4.2).

4.2.8 Electric Circuit Fuses and Relays, Cab Switch Box Electric Equipment

Fuse units FU1 (100 A) 1 (Figure 4.44) and FU2 (30 A) 2 are installed on the motor unit, fuse units FU3.1 (60 A) 1 (Figure 4.45) and FU3.2 (30 A) 2 are installed in the cab switch box, fuse units FU7 11 (Figure 4.46), FU8 10 are installed on the side control panel, fuse unit FU9 is installed under the removable cover 5 (Figure 4.3) of the cab front panel. These units are designed for electric circuits protection against short circuit to the frame and protection against power consumption excess.



1 - fuse unit FU1 (100A);
2 - fuse unit FU2 (30A)
Figure 4.44



1 - fuse unit FU3.1 (60A);
2 - fuse unit FU3.2 (30A)
Figure 4.45

Fuse units functions:

- FU1 (100 A) : protection of fuse unit FU3.1 supply circuit at the section between the engine and cab switch box;

- FU2 (30 A) : protection of fuse unit FU3.2 supply circuit at the section between the engine and cab switch box;

- FU3.1 (60 A) : protection of fuse unit FU9 supply circuit at the section between the cab switch box and upper panel;

- FU3.2 (30 A) : protection of fuse units FU7 и FU8 supply circuit inside the cab switch box.

Functions of fuse units FU7, FU8, FU9 is provided on tablets (labels) of fuse covers (Figures 4.46 - 4.48).

In case of faults in electric equipment operation, always check the operability of fuse in this circuit at first ; if a fault is detected (fusible plug blowing), measures shall be taken to find and eliminate its causes, then the fuse shall be replaced with similar one.

IT IS FORBIDDEN! TO INSTALL FUSES OF HIGHER CURRENT RATING THAN THAT SPECIFIED ON THE PLATE OR FUSE BODY.

IT IS FORBIDDEN! APPLICATION OF "BUGS" OR "JUMPERS" INSTEAD OF FUSES.

Functions of switch box relays (Figure 4.7) are provided in Figure 4.49.

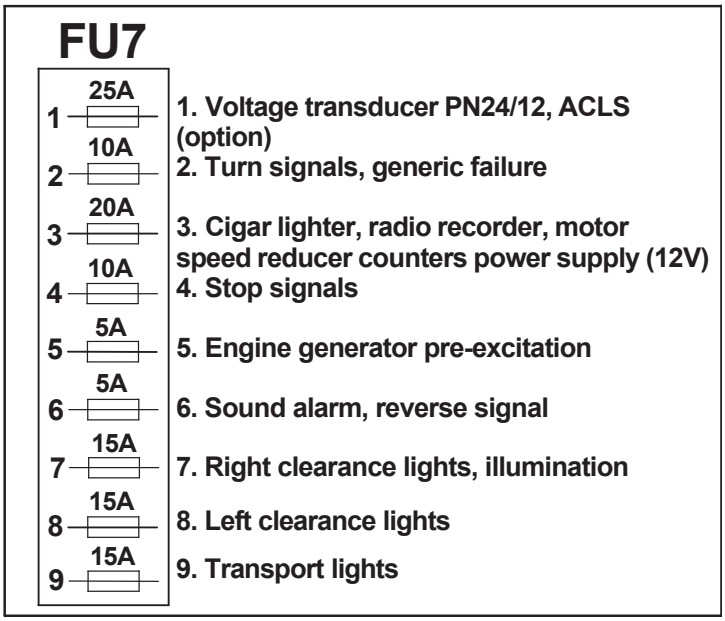


Figure 4.46

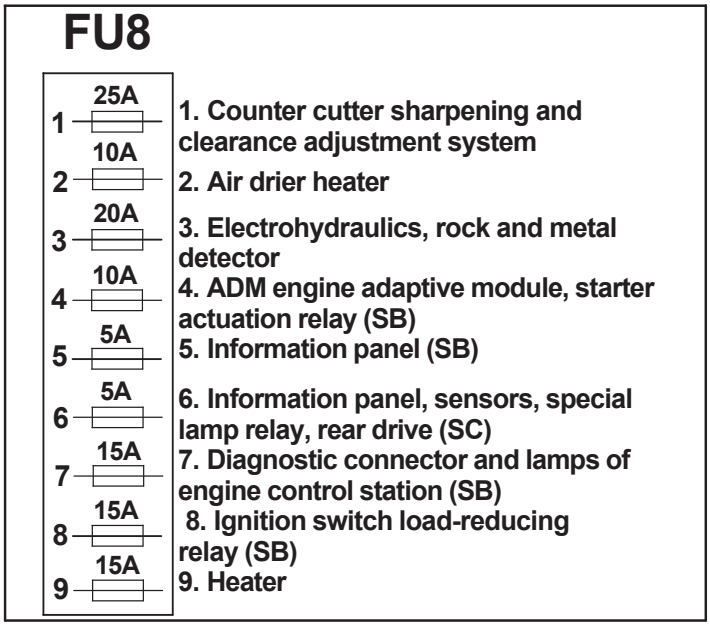


Figure 4.47

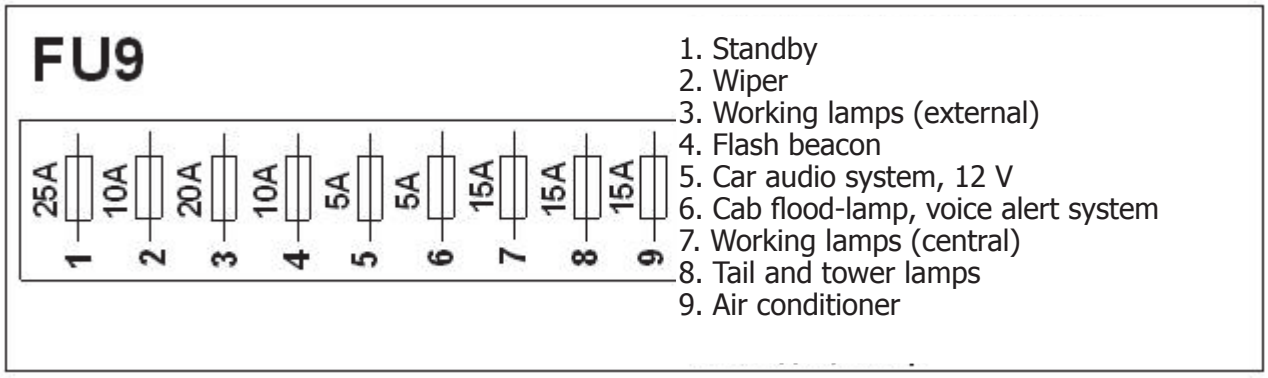


Figure 4.48

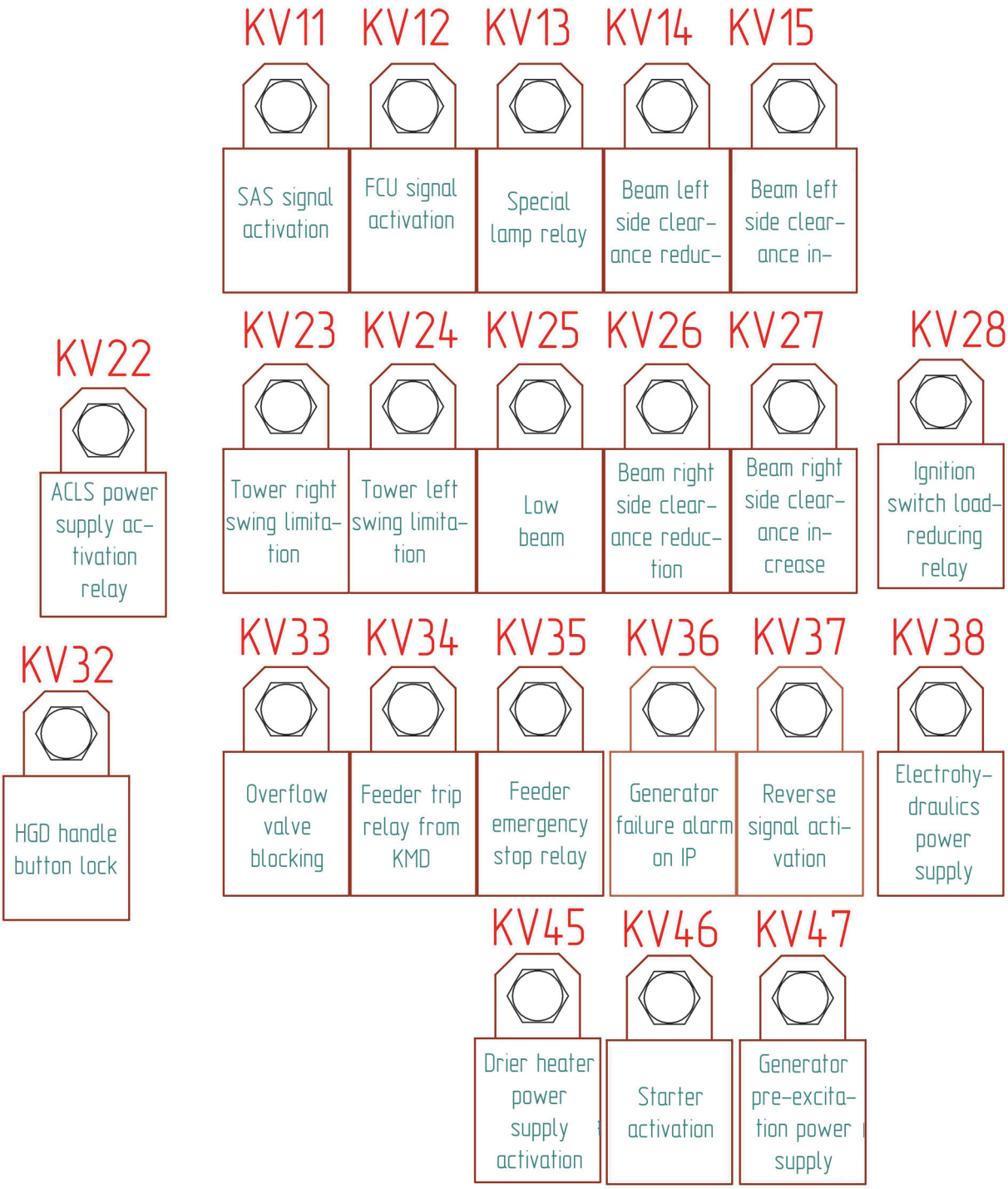


Figure 4.49 – Switch box relays functions

5 FINAL ASSEMBLY, ADJUSTMENT AND ON-LOCATION RUNNING

5.1 Acceptance and Unloading

At harvester acceptance from transportation organizations check the number and good condition of loading ramps. The transportation organization is responsible for losses and damages during transportation.

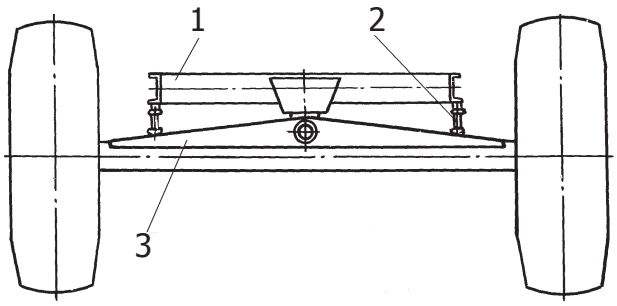
Delivery completeness is checked in accordance with packaging lists.

Prior to remove the harvester from platform screw and sink two bolts 2 in the bushing sockets 1 (Figure 5.1) of the frame to avoid the damage of steering wheels axle if the harvester is transported under its own power. Bolts were completely unscrewed into the steering wheel axle beam 3 in order to provide harvester transversal stability during railway transportation. Movement of harvester under its own power with bolts unscrewed is not allowed.

Make sure that harvester parts are free from fixing guy ropes prior to lifting.

Prepare the engine to operation in compliance with the requirements of the engine operation manual.

The harvester is supplied with tower in transport position.



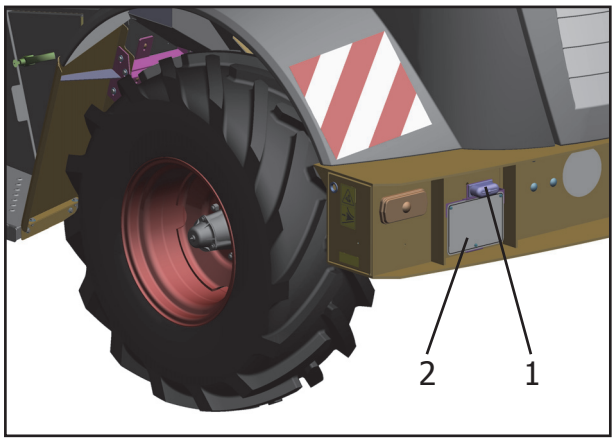
1 - frame pipe; 2 - bolt; 3 - steering wheel axle beam

Fidure5.1 – Diagram of harvester transversal stability fixation during railway transportation

5.2 Final Assembly

Final assembly, adjustment and on-location running of the harvester shall be performed by well-trained personnel of maintenance department at the dedicated site.

The license plate shall be bolted to the rear bumper. License plate 2 installation place is shown in Figure 5.2.



1- light; 2- place of license plate installation

Figure 5.2 – License plate installation place

Install lamp 1 (FP131AB-02) supplied with the harvester to light the license plate.

△ Prior to harvester commissioning after transportation inspect all gears with multiribbed belt on a single basis and clean the space between ribs from foreign objects, if necessary.

△ Harvester braking system is filled with ROSDOT-4 brake fluid TU 2451-004-36732629-99, which can be mixed with NEVA and TOM fluids in any proportions. Application of BSK brake fluid is strictly prohibited!

5.2.1 Hydraulic Equipment Installation

Adjust the distance between the hinge centers of the wheel steering hydraulic cylinders in the compressed state, the

distance shall be between 538 mm and 540 mm.

Reinstall the removed wheel steering hydraulic cylinders using bushings 5 (Figures 5.3), nuts 1, 2, washers 3, and rubber seal from the bag tied to the steering tie rod for installation. Nuts 1, 2 shall be tightened to torque between 130 N·m and 165 N·m (between 13 kgf·m and 15 kgf·m).

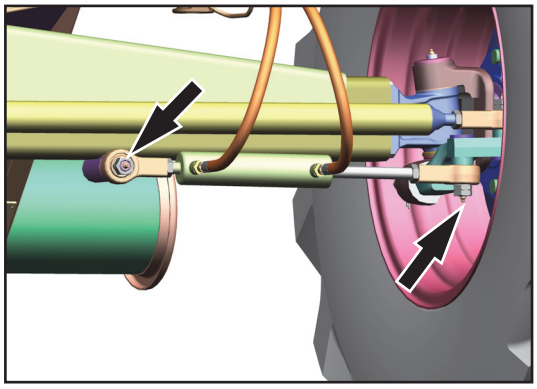
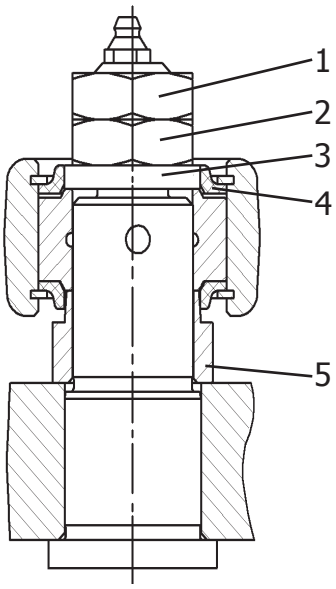


Figure 5.3 – Installation of wheel turn hydraulic cylinders



1, 2- nut; 3- washer; 4- rubber sealing; 5- bushing

Figure 5.4 – Hydraulic cylinder fasteners

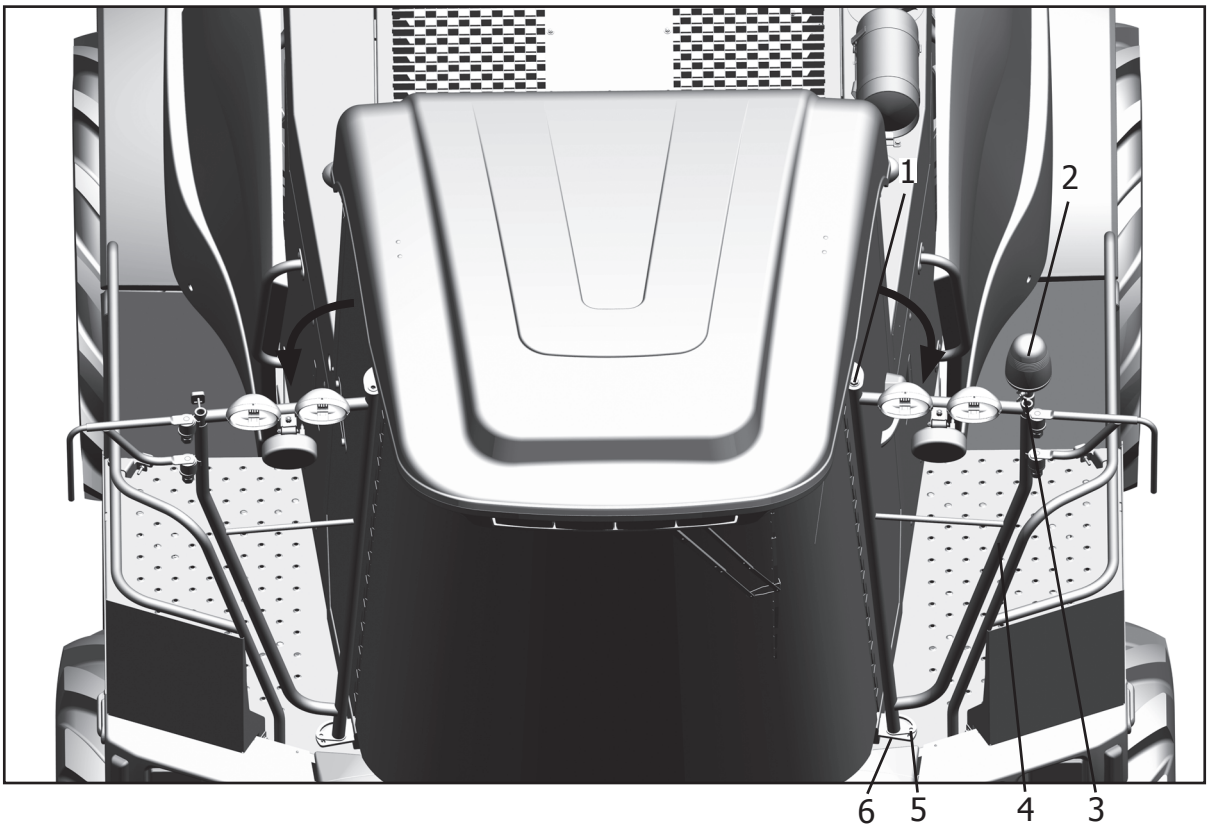
CAUTION! IN ORDER TO PREVENT BREAKING OF THE HINGE CENTERS OF THE WHEEL STEERING HYDRAULIC CYLINDERS DUE TO NON-SYMMETRICAL INSTALLATION, THE HINGES SHALL BE SCREWED ONTO THE THREADED ENDS OF HYDRAULIC CYLINDERS TO AT LEAST 10 mm AND LOCKED!

5.2.2 Mirror Brackets Installation

After transportation of the harvester the brackets of rear-view mirrors shall be installed from transport position to operating position, for this purpose the following actions shall be performed:

- loosen bolts 1, 6 (Figure 5.5) on the mirror bracket axle 4;
- remove fixing bolt fastening 5;
- transfer mirror brackets 4 to operating position;
- fix mirror brackets 4 by tightening bolts 1, 6 and fixing bolt fastening 5. During mirror brackets installation to operating position their contact with the open door shall be excluded.

Then install flashing beacon bracket 3 with mounted flashing beacon 2.

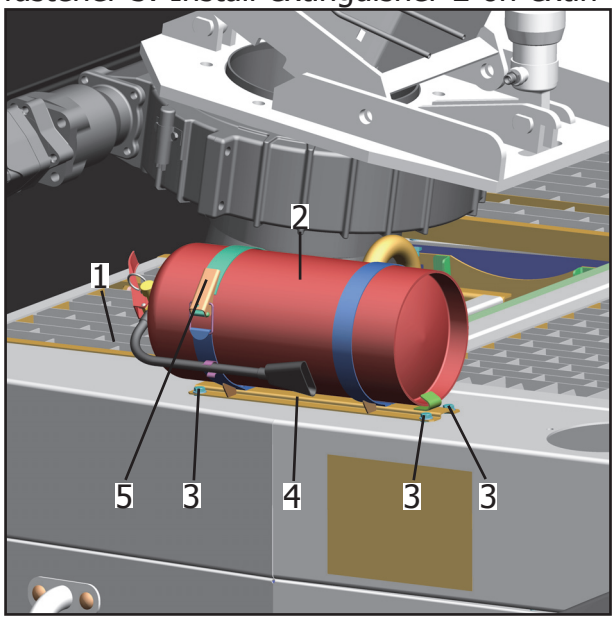


1, 6- bolt; 2- flashing beacon; 3- flashing beacon bracket; 4- mirror bracket; 5- fixing bolt fastening

Figure 5.5 – Operating position of mirror brackets

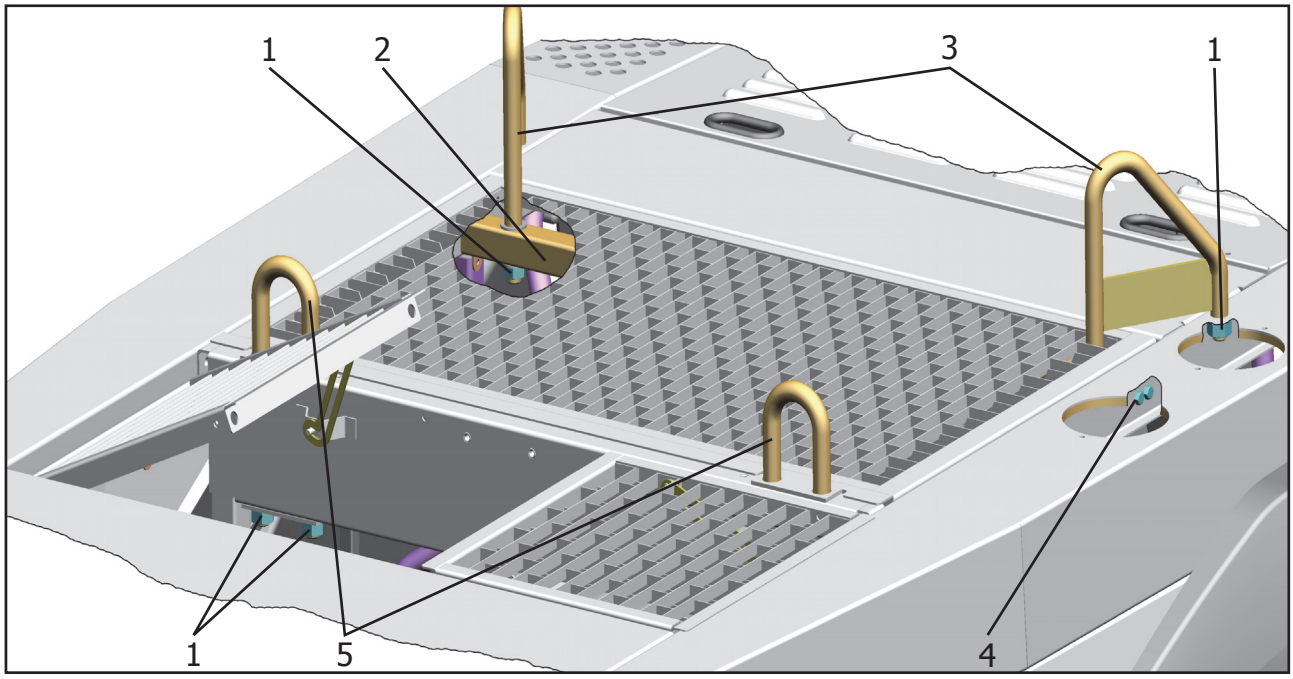
5.2.3 Fire Extinguisher Installation

Install extinguisher bracket 4 (Figure 5.6) from the implements and accessories kit (Table A.1 of Appendix A) on the hood frame from the left. Fix with bolt fastener 3. Install extinguisher 2 on extinguisher bracket 4 as shown in the Figure and fix with lock 5.



1- shield; 2- fire extinguisher; 3- bolt fastening; 4- extinguisher bracket; 5- lock

Figure 5.6 Fire extinguisher installation



1- nut (M24); 2- beam; 3, 5- lug; 4- bolt (M12x20)

Figure 5.7 – Slinging lugs location

5.2.4 Slinging Lugs Removal

Prior to harvester commissioning, remove lugs 3, 5 (Figure 5.7) for harvester slinging during loading and unloading. For this purpose, unscrew nuts 1 and bolts 4 holding lugs 3, 5 and beam 2.

5.2.5 Radio Recorder Installation

Harvester cab is designed for audio management solution with two sound systems located in the rear end of the ceiling, and antenna located at windshield with the place for the radio recorder at the ceiling front compartment, fitted with a plug.

To install the radio recorder in the harvester cab, remove the plug in the ceiling. Behind it there is a supporting bracket for the rear side of the radio recorder.

The system shall be connected according to its operation manual provided by the manufacturer and by means of fasteners included into the recorder kit. Two ISO connectors are installed at bundles under the plug in the cab ceiling specially for radio recorder connection. The antenna connector is also located there.

5.2.6 Gas Springs Installation

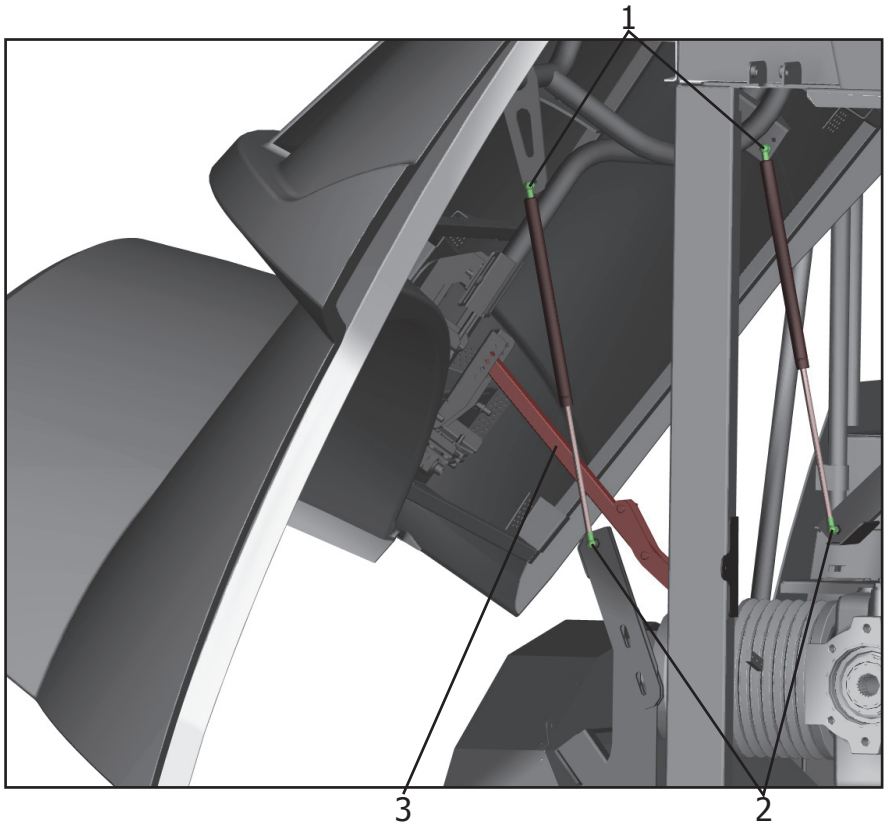
For smooth opening/closing of the harvester hoods and their hold-down in the open position, gas springs are provided. Two gas springs are installed on each hood.

To install the gas springs on the side hoods:

- open the hoods and lock them open by means of stop 3 (Figure 5.8);
- fasten gas spring hinges 1 to the hoods using fastener 3 (Figure 5.9) (nut M8, washer 8 WGR 1518);
- press the gas springs and screw hinges 2 on the harvester frame.

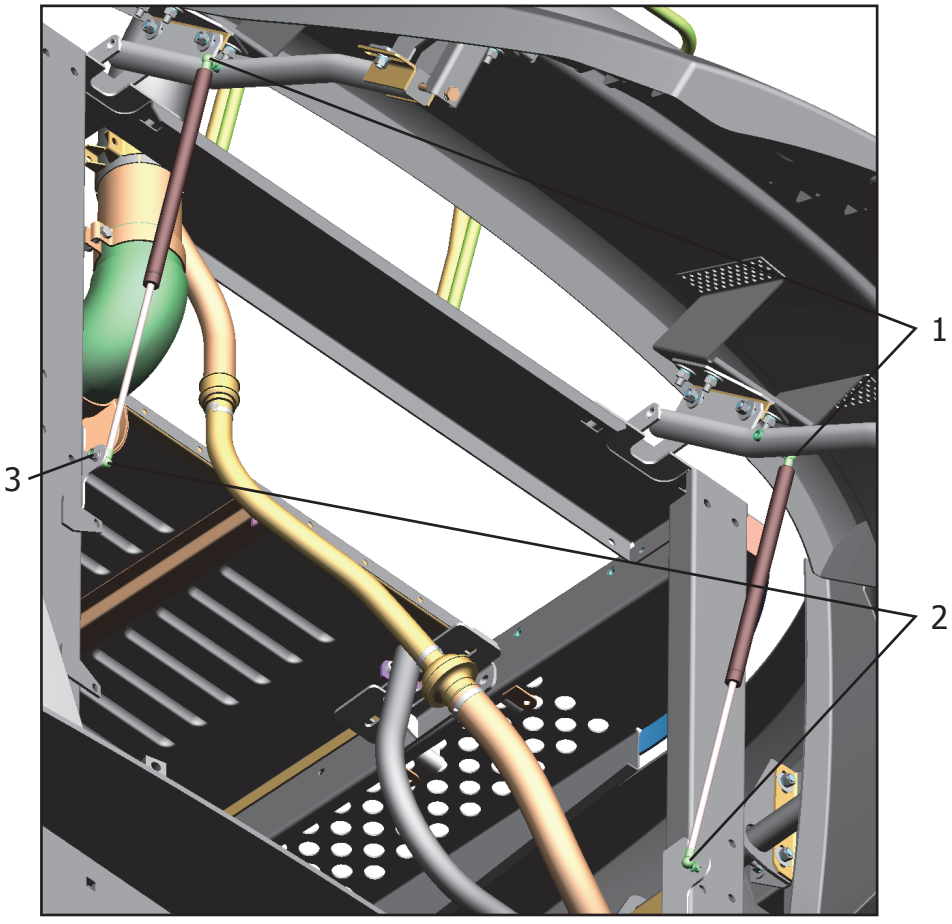
To install the gas springs on the rear hood:

- open the hood;
- fasten hinges 1 (Figure 5.9) to the hood holding the hood in the open position;
- screw hinges 2 on the harvester frame using fastener 3 (nut M8, washer 8 WGR 1518) adjusting the hood position.



1, 2- hinge; 3- fastener

Figure 5.8 – Gas springs installation on the side hood



1, 2- hinge; 3- fastener (nut (M8), washer (8 WGR 1518)

Figure 5.9 – Gas springs installation on the rear hood

CAUTION! TAKE CARE WHILE SCREWING THE SPRING HINGES NOT TO DAMAGE THE HINGE THREAD OR SEAT. THE HINGES SHOULD BE TIGHTENED WITH NO EFFORTS IMPLIED.

5.2.7 Lighting Devices Installation

Install the following elements removed during transportation:

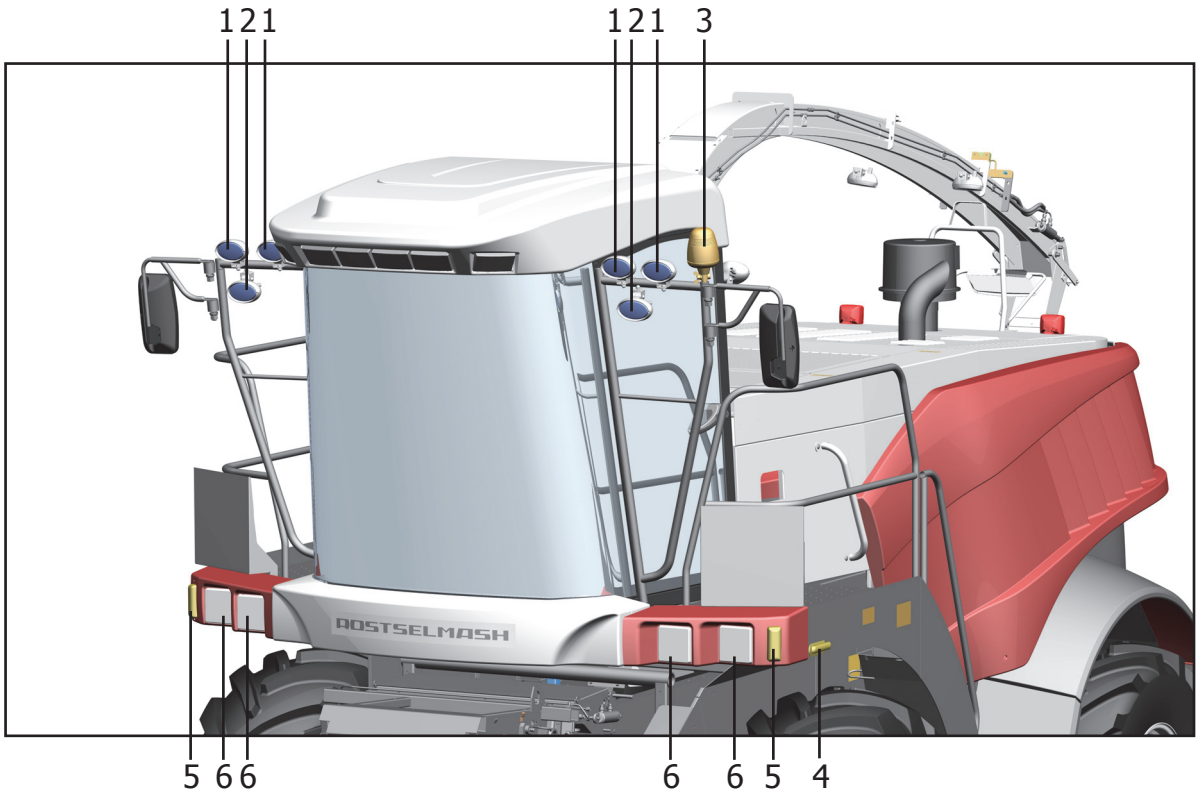
- eight operating lights 1 (Figure 5.10), two are installed on the tower, two at the back of the cab, and to per each mirror bracket by means of attached fastening and shock absorbers;
- two additional transport lighting lamps 2;
- flashing beacon 3;
- two rear lights 8 on the hood;
- combilight 7 on the tower providing functions of clearance lights, stop-signal and reflector;
- two turn indicators 5 installed on the front bumper by means of attached fastener;
- two side repeat flashers 4: LED repeat flashers are installed on both sides of the bumper.

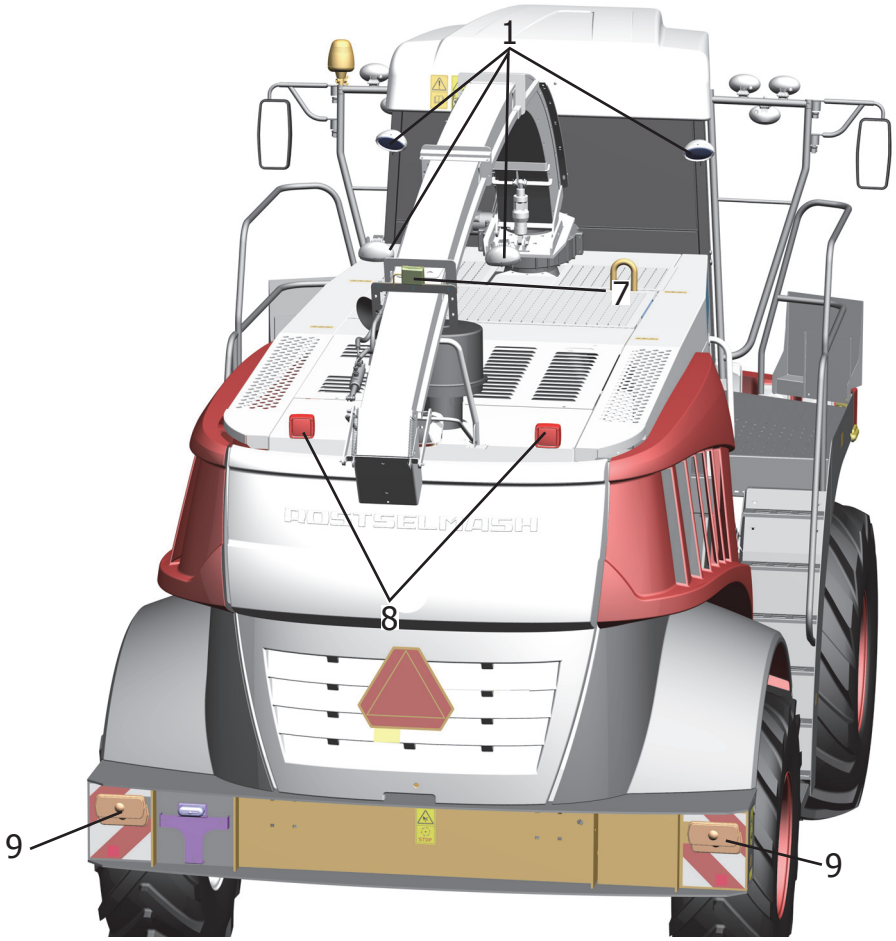
- four transport lights 6 installed on the front bumper by means of attached fastener;

- two rear lights 9 installed on the rear bumper by means of four nuts, four spring washers and four flat washers from the fasteners kit.

In order to provide electric contact between the studs of operating lights 1, rear lights 8 and their installation brackets, space under flat washers shall be cleaned from paint.

CAUTION! DURING FINAL ASSEMBLY OF ELECTRIC EQUIPMENT PLACES OF "GROUND" CABLES FASTENING SHALL BE CLEANED FROM PAINT AND RUST TO PROVIDE THE ELECTRIC CONTACT.





1- operating light; 2- additional transport lighting lamp; 3- flashing beacon; 4- side repeat flasher; 5- front turn indicator; 6- transport lighting lamp; 7- combined light; 8- rear light; 9- rear lamp

Figure 5.10 – Alarm and lighting devices

5.2.8 Reflectors Installation

Install reflectors 1 (Figure 5.11) on the stairs frame on both sides of the harvester.

Install reflectors 2 on the left and on the right of the hood frame.

5.3 Transportation and Towing

Harvester transportation by towing is allowed at small distances within the territory of the final assembly site. In this case towing may be performed with the steering wheel axle. The steering hydraulic system shall be operational and filled with oil.

At towing with the steering wheel axle, the rigid towline shall be connected by means of hinged mechanism with swivel members providing the synchronous wheel turn. Crossing the obstacles (logs, ditches, etc.) during towing is not allowed. Towing speed shall not exceed 7 km/h at straight ways, 3 km/h at turns. During harvester towing the speed switch lever shall be set to neutral position.

5.4 Wheel Blocks Installation

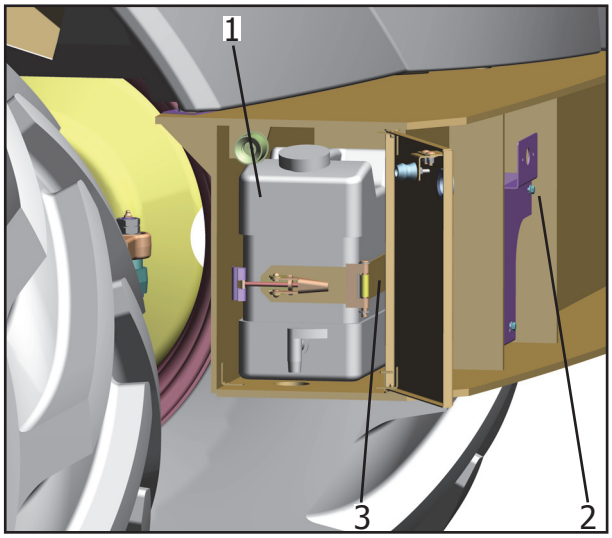
After transportation wheel blocks shall be installed for storage into the right part of the bumper.

5.5 Canister Installation

Install canister 1 (Figure 5.12) removed during transportation into rear bumper 2 on the left and fix with grip 3.

1, 2- FP311-3731000 reflector

Figure 5.11 – Reflector installation



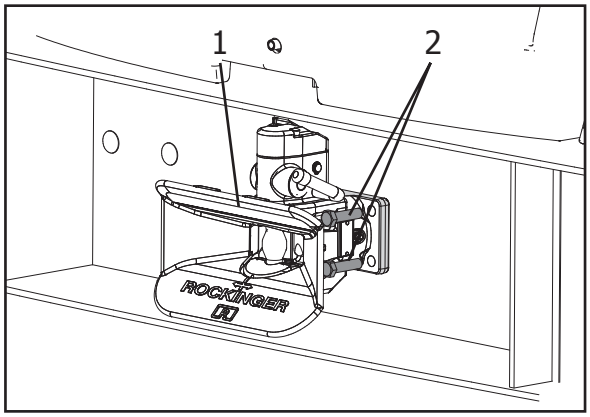
1- canister; 2- bumper; 3- grip

Figure 5.12 – Canister installation

5.6 Automated Hitch Installation

The harvester is equipped with an automated hitch for mechanical attachment of the wagon.

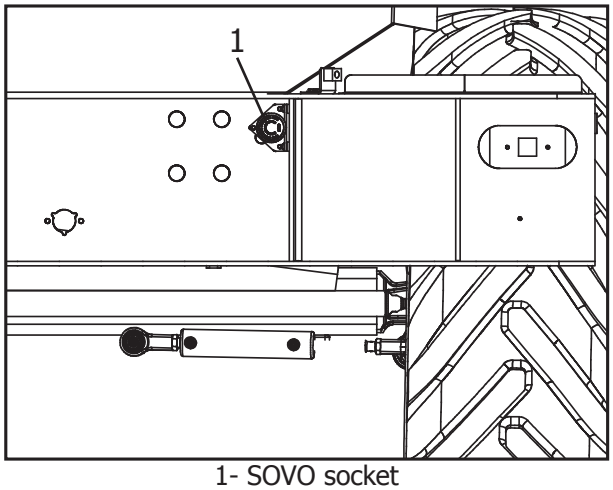
Screw hitch 1 (Figure 5.13) from the automated hitch set (Table A.3 of Appendix A) by means of bolt fastener 2 to the rear bumper.



1- hitch; 2- bolt fastening

Figure 5.13

Connect power utilities to SOVO 1 socket (Figure 5.14).



1- SOVO socket

Figure 5.14

5.7 Video Monitoring System Installation

Video monitoring system is installed on the harvester in accordance with the attached installation, startup, adjustment and running manual.

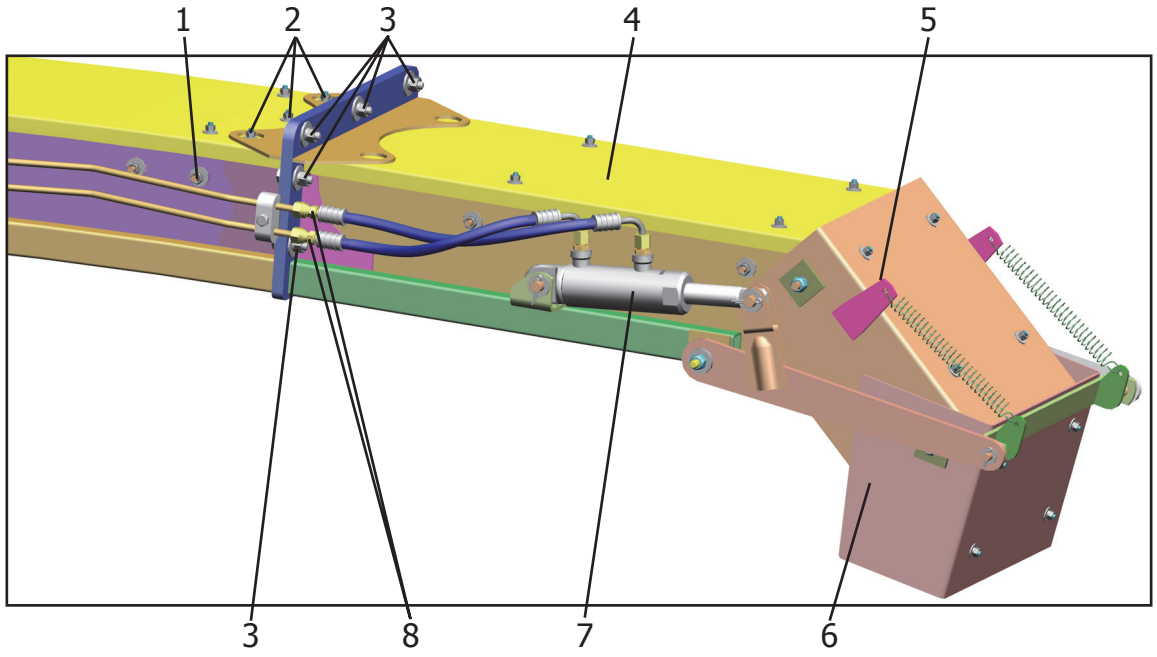
5.8 Corn Cracker ACLS Installation

The corn cracker ACLS is installed and connected in accordance with the attached installation, startup, adjustment and running manual.

5.9 Tower Extension Installation

Prior to tower extension installation the following shall be done:

- transfer the tower to the transport position;
- place the harvester near the process area;
- stop the engine;
- disconnect high-pressure hoses 8 (Figure 5.15) of deflector 6 lifting/lowering hydraulic cylinder 7;
- unscrew three screw connections 2 (screw B.M6, nut M6, washer 6T, washer C.6) of upper pad attachment and



1- bolted connection; 2- screw connection; 3- bolted connection; 4- extension; 5- spacer; 6- deflector; 7- lifting/lowering hydraulic cylinder; 8- high-pressure hose

Figure 5.15 - Tower spacer removal

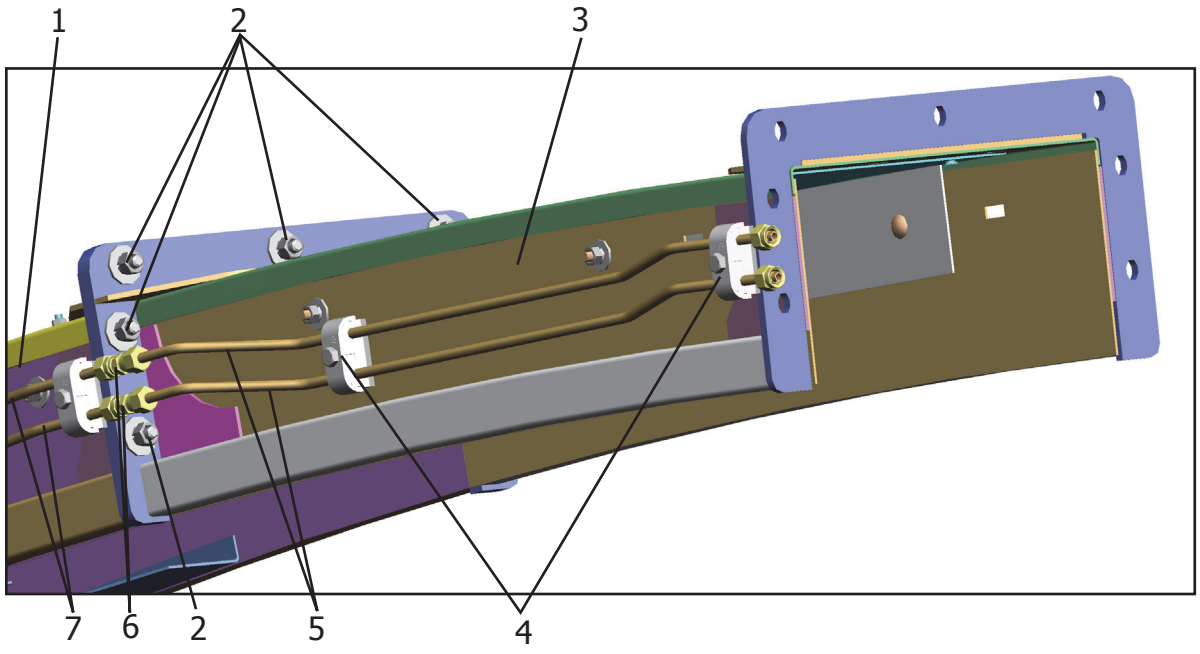
two bolted connections 1 (bolt M8, nut M8, washer 8T, washer C8) of side pads attachment from both sides of the tower;

- unscrew seven bolted connections 3 (bolt M10, nut M10, washer 10T, washer C10) of extension 4 attachment with spacer 5 and deflector 6;

- remove extension 4 with spacer 5 and deflector 6.

Installation of tower extension:

- attach extension 3 (Figure 5.16) from the tower extension kit (Table A.2 of Appendix A) to frame 1 by means of seven



1- frame; 2- bolted connection; 3- extension; 4- grip; 5, 7- pipeline; 6- straight-through nipple

Figure 5.16 – Tower extension installation

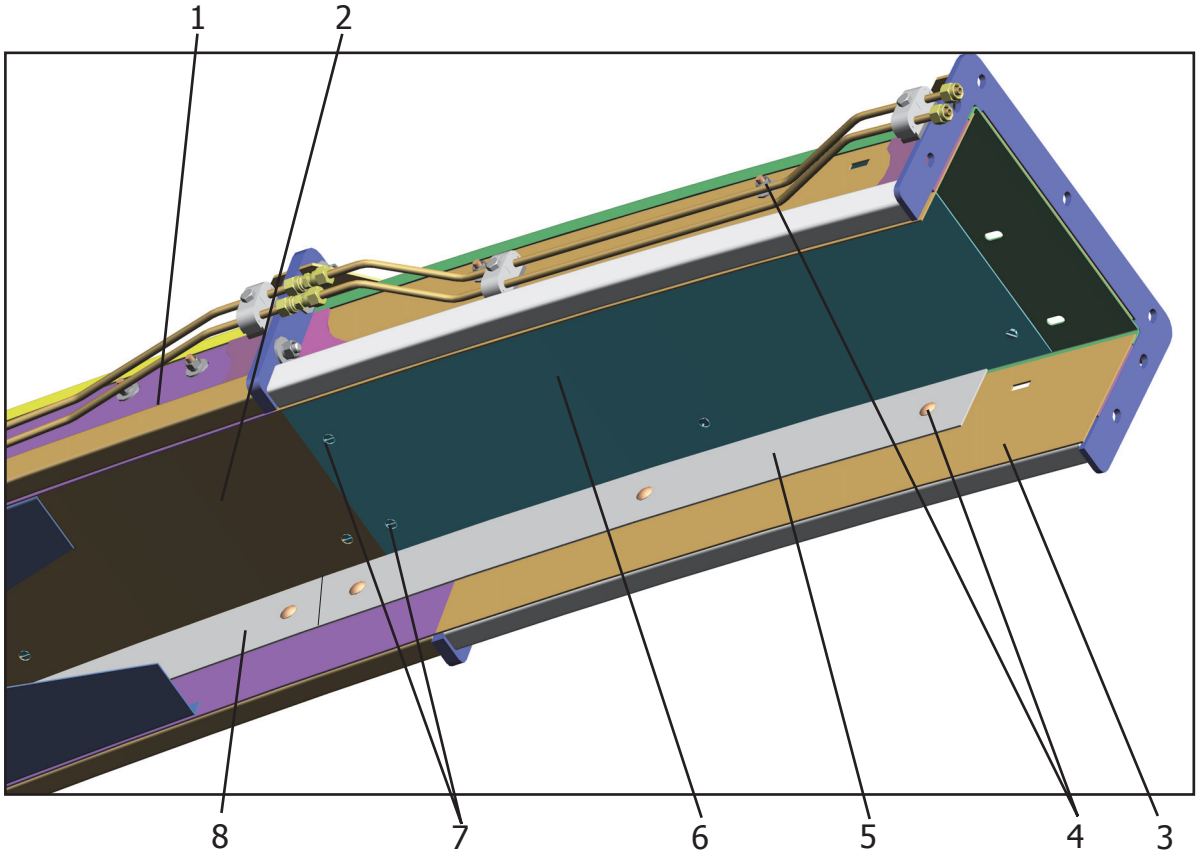
bolted connections 2 (bolt M10, nut M10, washer 10T, washer C10);

- install two side pads 5 (Figure 5.17) from both sides of extension 3 end-to-end with side pads 8 of frame 1 and fix by means of six bolted connections 4 (bolt M8, nut M8, washer 8T, washer C8);

- install pad 6 end-to-end with pad 2 of frame 1 и fix by means of seven screw connections 7 (screw B.M6, nut M6, washer 6T, washer C.6);

- connect pipelines 5 (Figure 5.16) to pipelines 7 of the tower via straight-through nipple 6 and fix them with grips 4 (bolt AS M8, bushing LBBU-HUE 1, grip body LBBU 108, pad LBBU-DP 1D M8) on extension 3;

- install extension 4 (Figure 5.15) with spacer 5 and deflector 6 in the order opposite to dismantling.



1- frame; 2- pad; 3- extension; 4- bolted connection; 5- side pad; 6- pad; 7- screw connection; 8- side pad

Figure 5.17

6 OPERATION AND ADJUSTMENT RULES

6.1 General

The following process parameters shall be adjusted during harvester operation:

- throughput;
- cutting length;
- cutting height of herbs.

Harvester throughput is adjusted by means of changing its velocity of translation.

Stalks cutting length is adjusted by means of changing of feeder rollers rotation rate which is achieved by switching the feeder reduction gear ranges.

Herbs cutting height is set depending on the harvested crop and field relief.

6.2 Harvester Transportation Rules

During loading (unloading) operations, conditions shall be provided preventing the damage of component parts.

6.2.1 Harvester Transportation by Railway

The harvester is transported by railway in compliance with Technical conditions for stowing and fastening of goods in cars and containersNo. TSM-943 APPROVED by the Russian Ministry of Railways as of May 27, 2003. The harvester is transported with the removed adapter (header, pick-up platform).

Drive wheels shall be blocked by the parking brake, gear speed shall be activated, drawbars shall be installed.

Edge longitudinal and end sides shall be closed, middle transversal shall be open and fastened with wire.

Prior to harvester loading pump the drive wheels up to 0.22 MPa, reduce the pressure in drive wheel tires down to 0.17 MPa; steering wheels shall be pumped up to 0.17 MPa before loading and to 0.14 MPa after unloading.

After the harvester is installed on a platform, drain the fluid from the cooling system; it is allowed to leave 15 l of diesel fuel in the fuel tank.

IT IS FORBIDDEN! TO CLIMB THE HARVESTER DURING ITS RAIL TRANSPORTATION TO AVOID INJURIES BY AN ELECTRIC SHOCK FROM THE CONTACT CIRCUIT!

6.2.2 Transportation to Facilities

Transportation under the own power is allowed at temperature not lower than minus 5°C provided that the following order is adhered to: start the engine and warm it up till the cooling fluid temperature reaches 40-50°C without moving the harvester. At first, crankshaft rotation rate shall be at minimum, then it shall be smoothly increased up to the nominal value, and motion can be started.

The prepared harvester shall be transported to the facilities by an experienced operator who is familiar with harvester arrangement and operation rules, as well as with the location relief peculiarities.

During harvester transportation the road shall be observed carefully. Harvester passage over the obstacles (logs, ditches, etc.) is allowed at the first speed only.

Descending the mountain is allowed at the first speed only, with reduced rpm of the engine. During descending the harvester straight forward from a slope, braking is performed by means of engine and additionally by means of brakes. If the harvester is stopped aslope, brake it down with the parking brake and install the wheel blocks beneath the wheels. The angle of slope shall not exceed 9°, larger angle is not allowed.

Headers shall be transported to the facilities by road; grass header can be delivered in a header transportation wagon.

6.3 General Guidelines on Harvester Operation

Prior to driving to the field the harvester shall be adjusted according to the state of crop to be harvested and harvesting conditions. Further when driving from one field to another the harvester settings shall be adjusted. The optimal cutting height is determined.

Set the shredder in accordance with the required cutting length for the harvested crop (p. 6.4.1.1).

△ At transition from one field to another and traveling along the common roads the tower shall be in its transport position;

Travel speed shall be selected so that to ensure the maximum harvester performance at high quality of harvesting.

To improve the harvesting quality and harvester performance select the movement direction in order to avoid working for a long time along the lodged grain, across the slope, across the furrow if improper field tillage, as well as in case of strong fair wind.

6.4 Harvester Operation

△ **ATTENTION!** OPERATE THE HARVESTER ONLY IF THE BRAKING SYSTEM IS FUNCTIONING PROPERLY, WITH ENOUGH OIL IN THE ENGINE CRANKCASE, HYDRAULIC TANK, GEAR BOX, TRACK GEAR REDUCERS, TRANSFER GEAR, FEEDER REDUCTION GEAR.

6.4.1 Feeder

6.4.1.1 Cutting lengths are switched by transferring the feeder reduction gear handles to one of four positions. A label with indication of cutting lengths and corresponding positions of handles is located at the feeder frame side.

For switching, transfer the handle to one of the position indicated on the label (Figure 6.1).

ATTENTION! SWITCH THE CUTTING LENGTH ONLY WITH THE FEEDER ROLLS STOPPED.

If switching is difficult, rotate the reducer gear input shaft to match teeth for switching.

6.4.1.2 Sometimes, when operating the rotary header, the mass is accumulated under the lower rollers of the feeder, which causes process abnormalities.

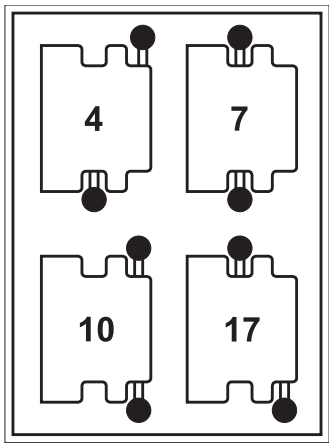


Figure 6.1 – Cutting length

To eliminate this shortcoming, a bottom (metal sheet) is supplied with the rotary header to be installed under the lower rollers of the feeder.

To install it:

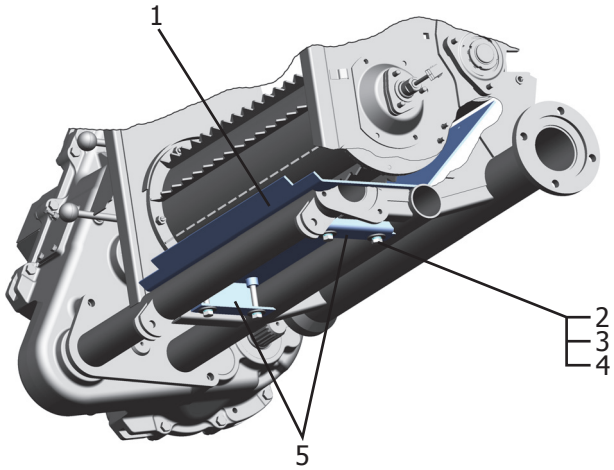
- take bottom 1 (Figure 6.2), bracket 5 and bolting 2, 3, 4 from the rotary header kit;

- lift the feeder to the upper position;

- slide bottom 1 under the rollers;

- fix it by means of brackets 5 and bolting 2, 3, 4.

After the bottom is installed, mount the header; the harvester is ready for operation.



1- bottom; 2, 3, 4- bolting (bolt (M12x75), washer (C12), spring washer (12T); 5- bracket

Figure 6.2 – Bottom installation

For operation with other adapters bottom installation is not required.

6.4.1.3 Upper rollers position is adjusted by moving levers 1 and 2 (Figure 6.3) at the premolding mechanism shafts.

Lower rollers position is adjusted by means of bearing tightening bushings.

Compacting (packing) of the vegetation is performed by two upper rollers automatically.

It is recommended to remove one spring from each spring unit 5 when picking up low-yield grass from the rollers.

To remove springs:

- put the feeder in the middle position;

- unscrew two bolts 7 fastening shield 8 under the springs;

- loosen tie rods 6 and remove springs from axis 9 (one per each side);

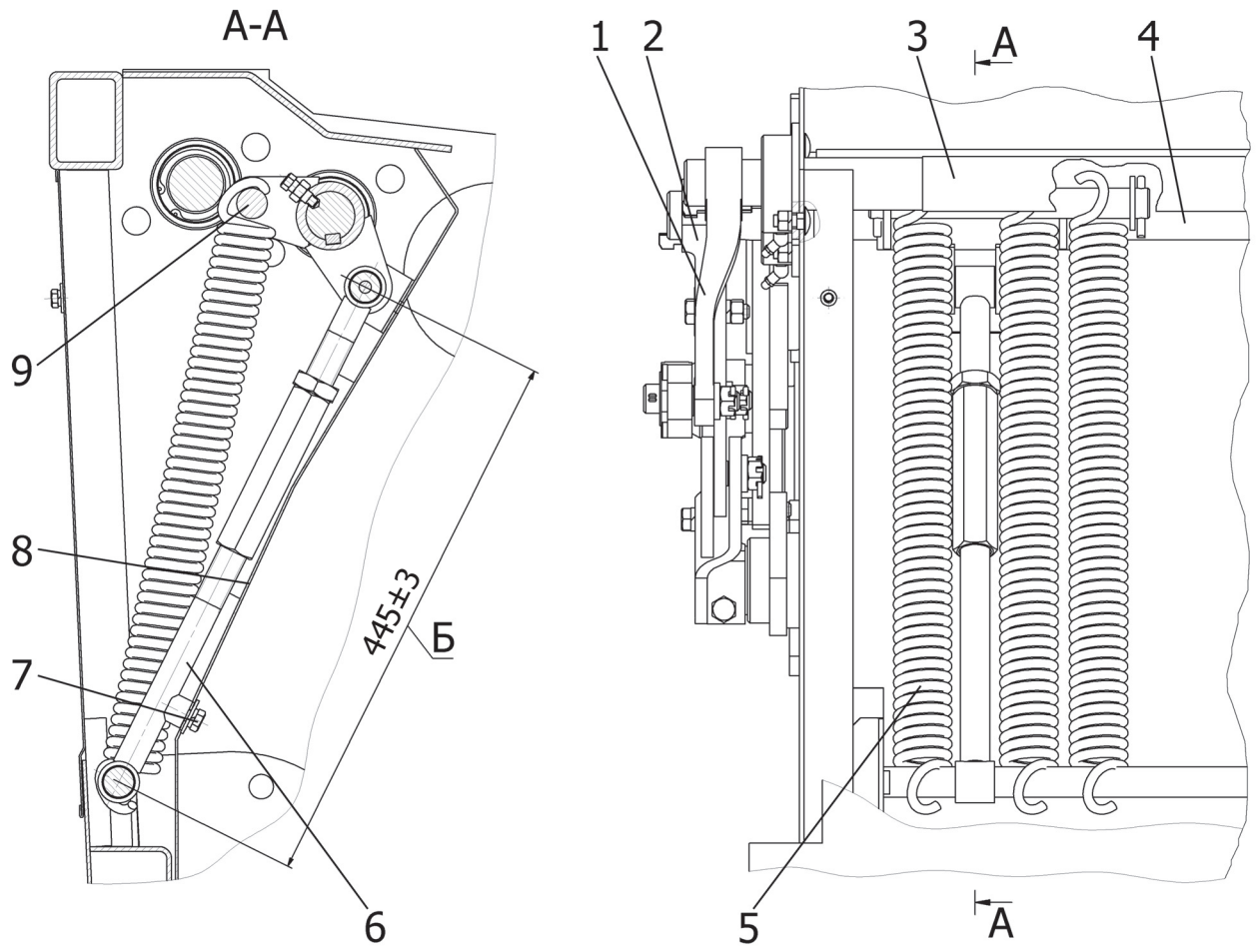
- tension the springs using tie rod 6 to the tie rod size (445±3) mm;

- fasten the shield under the springs with two bolts 7.

Clearance B (Figure 6.4) between scraper 1 and smooth roller surface 2 shall be max. 0.5 mm. Increased clearance will result in feed mass sticking to the roller which creates additional resistance against roller rotation.

ATTENTION! ROLLER GRINDING WITH SCRAPER IS NOT ALLOWED.

To adjust the clearance, loosen bolts 3 of scraper fastening and move scraper 1 along the slots in the frame sides



1, 2- lever; 3, 4- torsion bars; 5- spring unit; 6- rod; 7- bolt; 8- guard; 9- axis
Figure 6.3 – Premolding mechanism

to set a required clearance.

Metal sensor located in the lower front roller shall be turned forward at an angle of β, equal to 44°±2° (angle between the dash on the roller axis and vertical axis).

To adjust the metal sensor:

- loosen three fastening nuts of roller left support 4;

- turn the sensor by the flattened surface to angle β;

- fix the sensor in place by tightening the three fastening nuts of roller left support 4.

ATTENTION! IF THE METAL SENSOR IS INSTALLED INCORRECTLY, THE METAL DETECTOR MAY MISS METAL OBJECTS WHICH ARE DELIVERED WITH THE HARVESTED FEED MASS, AND THAT WILL RESULT IN SERIOUS DAMAGE OF THE SHREDDING DRUM.

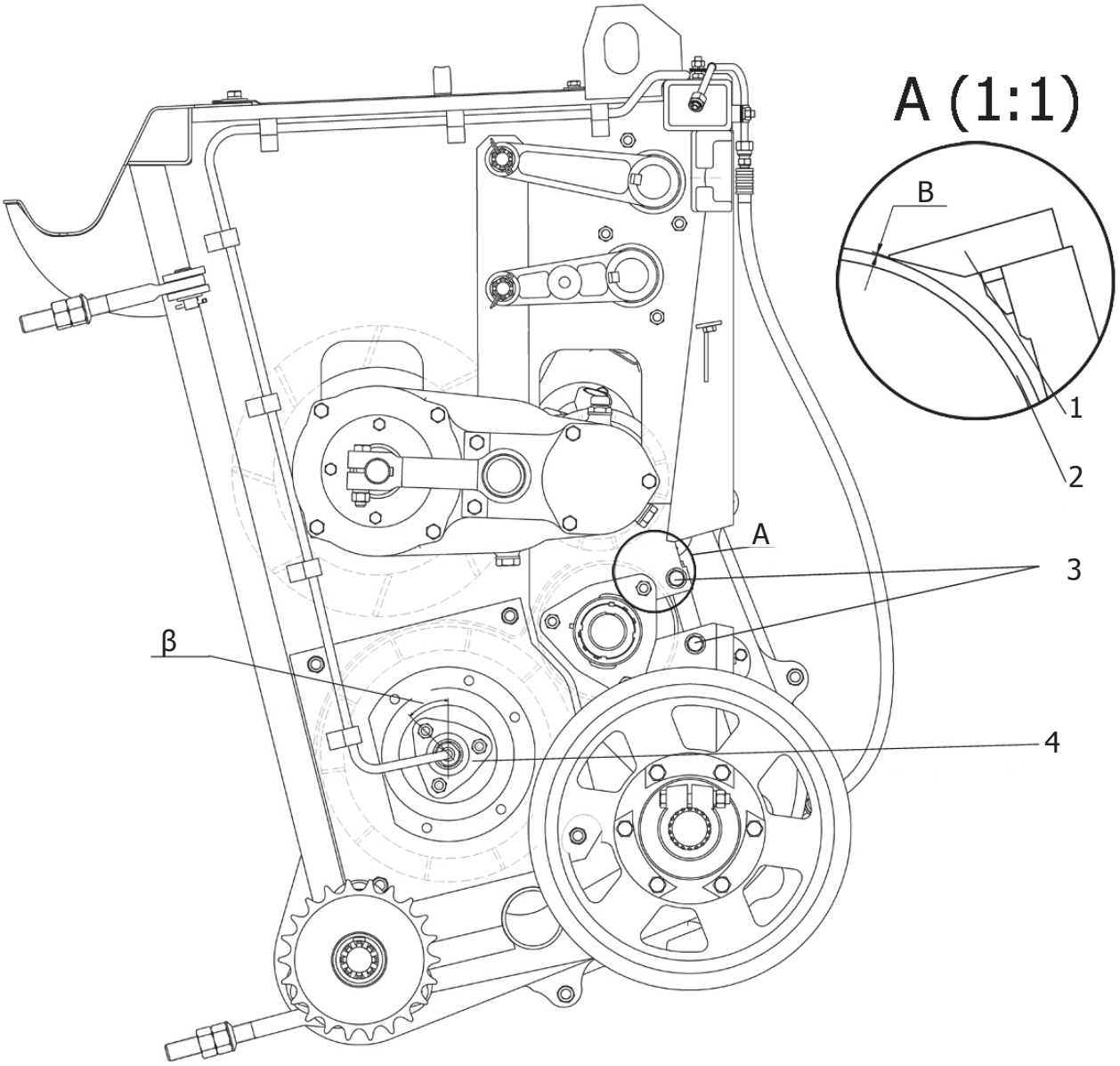
6.4.1.4 To remove the feeder at installed adapter:

- lower the adapter to the ground. Lower supports 6 (Figure 6.5) on both sides of the rotary header and pickup to the ground and lock; the grass header shall be only lowered to the ground;

- remove the enclosure of the feeder drive belt gear;

- disconnect the feeder reverse sleeve, plug the sleeve and the tube;

- disconnect wires from the stone and metal detector control unit (in the cab)



1- scraper; 2- roller; 3- bolt; 4- support

Figure 6.4 – Feeder

and pull the cable out of the cab;

- remove wraps from the feeder drive belt gear;

- remove the feeder drive belt from the feeder pulley;

- unscrew nuts 3 at drawbars 4 (one drawbar on each side) fastening feeder 1 to shredder 5 and take the drawbars out of brackets 2 on the feeder frame;

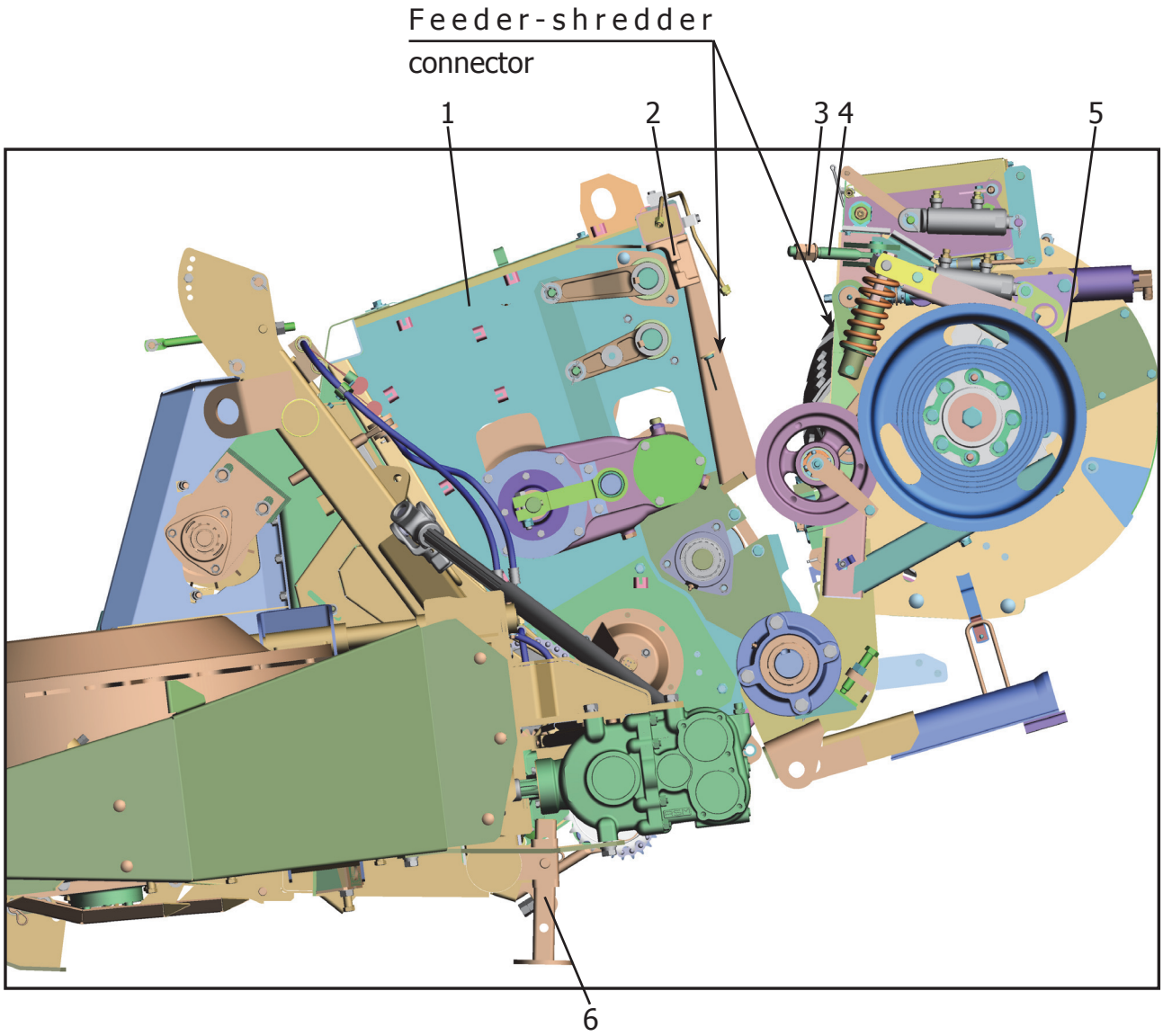
- open the feeder-shredder connector, pull out the feeder lifting hydraulic cylinders. Lower the supports on both sides of the rotary header and pickup to the ground and lock; the grass header shall be only lowered to the ground;

- use bolt 4 (Figure 6.6) to loosen lever 5 with hooks that secure the feeder lower pipe in the shredder grips;

- lower the shredder until the feeder pipe is released from the grips and move the harvester from the feeder.

Feeder installation at installed adapter:

- move the harvester to the feeder



1 - feeder; 2 - bracket; 3 - nut; 4 - drawbar; 5 - shredder; 6 - support

Figure 6.5

and pick up its lower pipe by means of the shredder grips, lift the feeder;

- use bolt 4 (Figure 6.6) to tighten lever 5 with hooks that secure the feeder lower pipe in the shredder grips;

- lift and lock the supports on both sides of the rotary header and pickup platform;

- lower the shredder until the feeder-shredder connector is closed, slide the drawbars into the feeder frame brackets and tighten the nuts;

- install the feeder drive belt on the feeder pulley;

- install the wraps of the feeder drive belt gear, sizes shall comply with the requirements of p. 6.4.3.1;

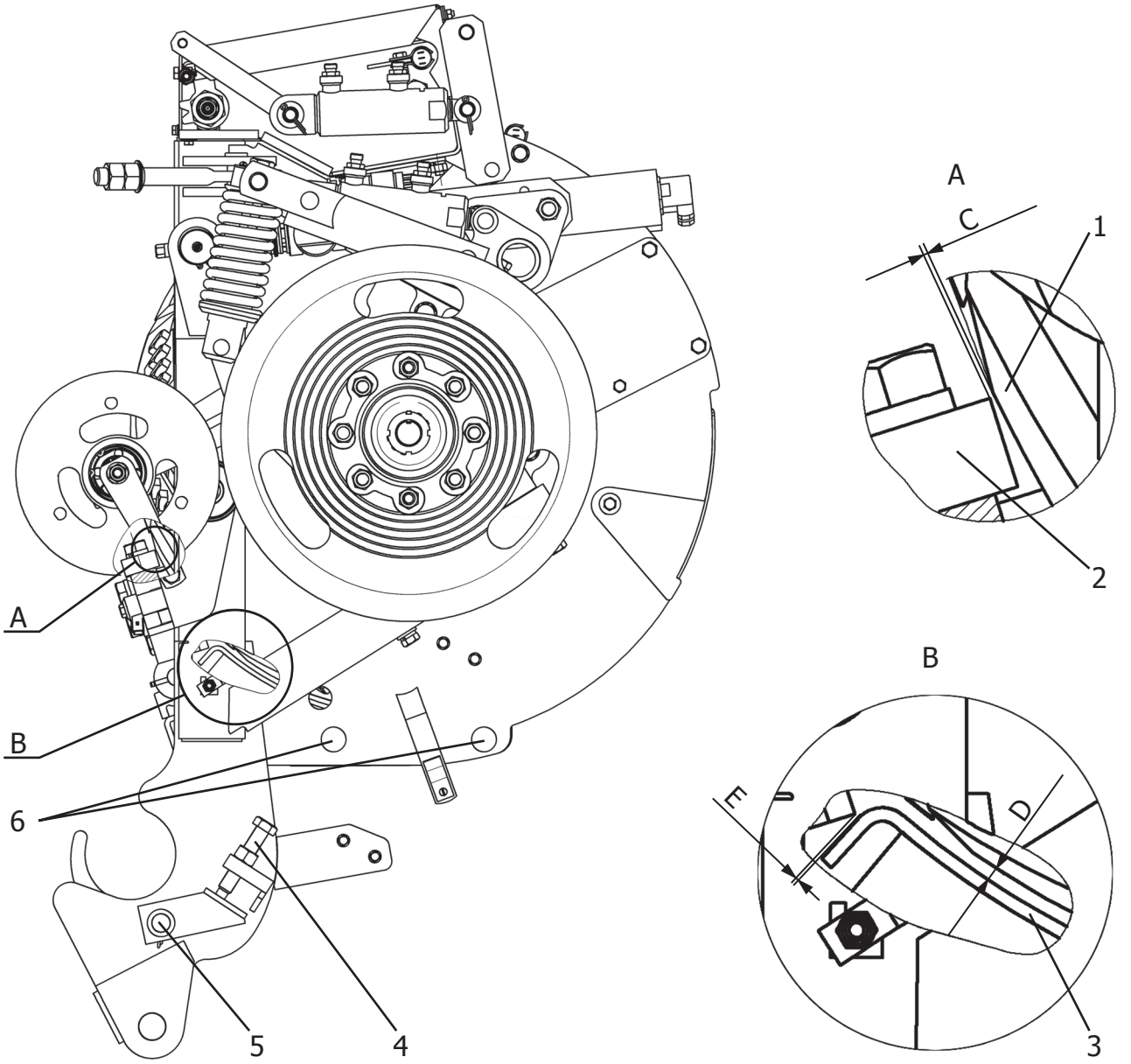
- pull the cables from the stone and metal detector sensors to the cab and connect them to the control unit;

- connect the feeder reverse sleeve;

- install the enclosure on the feeder drive belt gear.

6.4.2 Shredder

CAUTION! The shredder shall be enabled and disabled at the crankshaft speed from 960 to 1000 rpm. The feeder drive shall be enabled and disabled at the



1- knife; 2- counter-cutting beam; 3- bottom; 4, 6 - bolt; 5- lever

Figure 6.6 – Shredder

crankshaft speed from 960 to 1000 rpm.

Disable the shredder prior to engine stop.

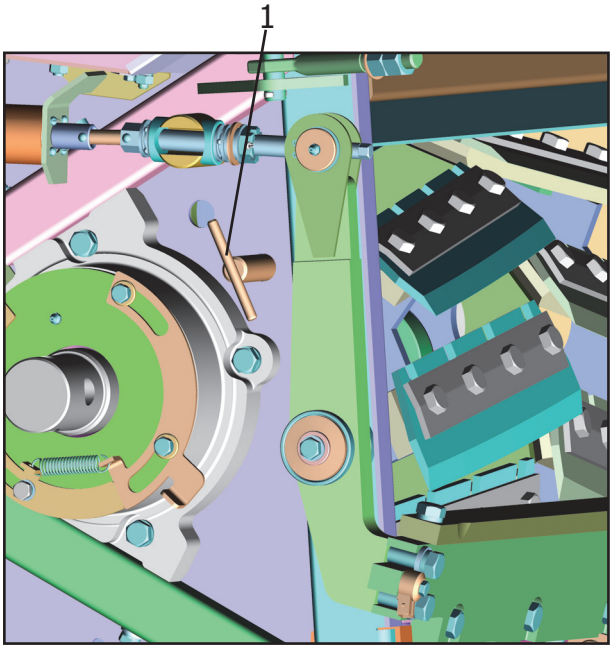
CAUTION!

DO NOT SHOVE YOUR HANDS AND DO NOT PLACE ANY FOREIGN OBJECTS INTO THE SHREDDING DRUM CHAMBER UNTIL IT IS COMPLETELY STOPPED.

WHILE LOOSENING OR TIGHTENING OF KNIVES FASTENING BOLTS, THE SHREDDER SHALL BE SECURED BY MEANS OF FASTENER 1 (FIGURE 6.7) FROM THE IMPLEMENTS AND ACCESSORIES KIT (APPENDIX A) IN ORDER TO EXCLUDE ITS ROTATION.

WEAR GLOVES DURING DRUM MAINTENANCE AS THERE IS A HIGH INJURY HAZARD.

BLUNT KNIVES OF THE SHREDDING DRUM AND INCREASED CLEARANCE BETWEEN THE KNIVES AND COUNTER-CUTTING BEAM RESULT IN EXCESSIVE FUEL CONSUMPTION, BAD QUALITY OF SHREDDING AND INCREASED WEAR OF KNIVES



1 - fastener

Figure 6.7 – Fastener installation

AND THE COUNTER-CUTTING BEAM.

Operation on sandy soil and sharpening intervals have a significant impact on the shredder drum wearing.

Frequent sharpening with a small amount of cycles is more effective than occasional sharpening with a lot of sharpening cycles.

6.4.2.1 Sharpening Procedure:

- start the engine;

- install the feeder in the lower position, if an adapter is installed it shall be lowered to the ground;

- activate SAS by pressing button 8 (Figure 4.42) and holding it for two seconds;

- enter the sharpening cycles number setup mode by pressing button 3;

- set a required number of sharpening cycles (recommended number is from 10 to 15 cycles at daily sharpening; sharpening cycles number may be increased depending on knives wear) by rotating controller 6 handle;

- enter the clearance size setup mode by pressing button 3;

- set a required clearance by rotating controller 6 handle (from 0.2 to 0.3 mm for a new beam, 0.1 mm for a run-in beam), display readings are in millimeters. If no clearance adjustment is required, set "- -";

- leave the clearance size setup mode by pressing button 3, both indicators 2, 4 shall stop glowing;

- activate the shredding drum drive and set the drum rotation rate at 500-1100 rpm;

- indicator 1 which permits execution of sharpening and adjustment shall glow on SAS;

- to activate the system, press button 5 and hold it for two seconds; after an audio signal the system starts its operation in automatic mode;

- after completion of operation, the system generates an audio signal;

- deactivate SAS by pressing button 8 and holding it for two seconds.

ATTENTION! LOWER THE INSTALLED ADAPTER TO THE GROUND PRIOR TO SHARPENING.

AT THE FIRST SHARPENING, AFTER THE FIRST HARVESTER COMMISSIONING AND AT WET MASS HARVESTING, METAL CHIP MAY STICK TO THE FEEDER ROLLERS. METAL CHIP IS DETECTED BY THE METAL DETECTOR. CLEAN FEEDER ROLLERS PRIOR TO OPERATION.

ATTENTION!

FEEDER ROLLERS SHALL BE CLEANED ONLY IF THE ENGINE IS DEAC-

TIVATED.

RESTRAIN THE HARVESTER AGAINST ROLLING BACK. SWITCH OFF THE GEAR.

CLEAN THE AREA AROUND THE SHARPENING DEVICE FROM THE HERBAL MASS (SPARK SPRAY AREA) DUE TO THE FIRE HAZARD!

ATTENTION! AFTER SHARPENING OF SHREDDING DRUM KNIVES, ADJUSTMENT OF CLEARANCE BETWEEN THE KNIVES AND COUNTER-CUTTING BEAM IS MANDATORY.

6.4.2.2 Adjustment of clearance between the shredding drum knives and counter-cutting beam may be performed both immediately after cycle sharpening, as described in p. 6.4.2.1, and separately, without knives sharpening.

Clearance adjustment order:

- start the engine;
- install the feeder in the lower position, if an adapter is installed it shall be lowered to the ground;
- activate SAS by pressing button 8 (Figure 4.42) and holding it for two seconds, enter the sharpening cycles number setup mode by pressing button 3;
- set the "--" number of sharpening cycles by rotating controller 6 handle;
- enter the clearance size setup mode by pressing button 3;
- set a required clearance by rotating controller 6 handle (from 0.2 to 0.3 mm for a new beam, 0.1 mm for a run-in beam);
- leave the clearance size setup mode by pressing button 3, both indicators 2, 4 shall stop glowing;
- activate the shredding drum drive and set the drum rotation rate at 500-1100 rpm;
- indicator 1 which permits execution of sharpening and adjustment shall glow on SAS;
- to activate the system, press button 5 and hold it for two seconds; after an audio signal the system starts its operation in automatic mode;
- after completion of operation, the system generates an audio signal;
- deactivate SAS by pressing button 8 and holding it for two seconds.

ATTENTION! IN CASE OF FAULTS DURING SHARPENING/BEAM DELIVERY SAS DIGITAL DISPLAY WILL SHOW THE CODE NUMBER OF FAULT. THE LIST OF FAULTS IS PROVIDED IN TABLE 4.3.

6.4.2.3 Counter-cutting beam is retracted in case of adjustment/replacement of shredding drum knives, as well as replacement of the counter-cutting beam.

ATTENTION! COUNTER-CUTTING BEAM SHALL BE RETRACTED ONLY IF THE ENGINE IS DEACTIVATED.

To perform retraction:

- install the feeder in the lower position, if an adapter is installed it shall be lowered to the ground;
- activate SAS by pressing button 8 and holding it for two seconds;
- enter the beam retraction distance setup mode by pressing button 3 (Figure 4.42);
- set the required retraction value (1,

2 or 3 mm) by rotating controller 6 handle;

- activate the system by pressing button 5 and holding it for two seconds; after an audio signal the system starts its operation in automatic mode. After completion of operation, the system generates three audio signals;

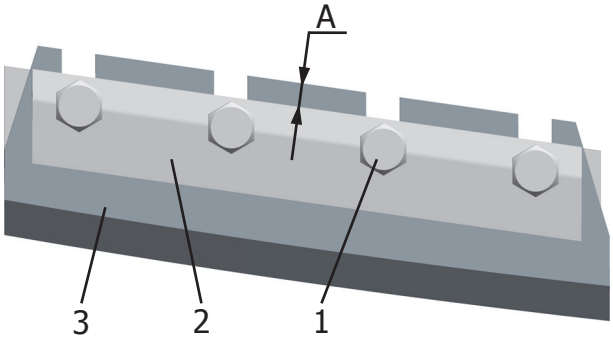
- deactivate SAS by pressing button 8 and holding it for two seconds.

ATTENTION! TO RETRACT THE BEAM AT A DISTANCE WITH MILLIMETER DECIMALS (E.G., 1.5 mm), THE BEAM RETRACTION VALUE SHALL BE SET TO 2.0 mm. WHILE RETRACTION IS PERFORMED, SAS DIGITAL DISPLAY SHOWS THE COUNTDOWN; PRESS BUTTON 5 WHEN **0.5** mm VALUE IS DISPLAYED TO STOP THE COUNTER-CUTTING BEAM RETRACTION.

6.4.2.4 Operation results in natural wear of knives; the limiting wear is the size of shredding drum which does not allow adjustment of clearance between the counter-cutting beam and shredding drum knives.

For reference: Clearance adjustment mechanism provides adjustment at shredding drum diameters ranging from 635 to 615 mm.

In order to compensate wear, fastening holes on the knives are made as slots which allows to pull out the knives several times to increase the shredding drum diameter. The knives can be pulled out as long as the rear part of a knife projects from clamping bar 2 (Figure 6.8) for A size of min. 3 mm, otherwise the knives shall be replaced.



1- bolt; 2- clamping bar; 3- knife
Figure 6.8

To adjust the knives position:

- open the feeder-shredder connector or remove the feeder;

- retract the counter-cutting beam by means of SAS, as shown in p. 6.4.2.3, at a required distance to achieve the shredding drum diameter of 630-632 mm;

- lock the shredding drum against rotation by means of fastener 1 (Figure 6.7) from the implements and accessories kit (Table A.1 of Appendix A) aligning the hole in the shredding drum frame side with the hole in the shredding drum disc;

- loosen bolts 1 (Figure 6.8) fastening knives 3 and pull them out as required to achieve clearance C from 0.3 to 0.8 mm (Figure 6.6) between counter-cutting beam 2 and knives 1;

- tighten bolts 1 (Figure 6.8) fastening the knives, the torque shall be from 250 to 280 N·m (from 25 to 28 kgs·m);

- free the shredding drum by removing the fastener;

- adjust the grinding wheel position as shown in p. 6.4.2.7; to do this, unscrew the bushing with the grinding wheel as the shredding drum has increased after knives adjustment;

- close the feeder-shredder connector (or reinstall the removed feeder);

- sharpen the shredding drum knives;

- adjust the clearance between the beam and drum knives.

If the knives are damaged as a result of metal, stones, etc. ingress, they shall be replaced.

ATTENTION! ADJACENT KNIVES (LOCATED OPPOSITE TO EACH OTHER) ARE REPLACED IN PAIRS ACCORDING TO THE WEIGHT CATEGORY.

ATTENTION! USE NEW BOLTS WHILE REPLACING THE KNIVES. KNIVES SHALL BE FIXED BY M16X1.5-6GX-40.109.40X.019 BOLTS PER GOST 7798-70 ONLY.

To replace the knives:

- open the feeder-shredder connector or remove the feeder;

- lock the shredding drum against rotation by means of fastener 1 (Figure 6.7) from the implements and accessories kit (Table A.1 of Appendix A) aligning the hole in the shredding drum frame side with the hole in the shredding drum disc;

- loosen bolts 1 (Figure 6.8) fastening knife 3, take out the damaged knife and install a new one, pull it out as required to achieve clearance C from 0.3 to 0.8 mm (Figure 6.6) between the beam and the knife;

- tighten bolts 1 (Figure 6.8) fastening the knives, the torque shall be from 250 to 280 N·m (from 25 to 28 kgs·m);

- free the shredding drum by removing the fastener;

- close the feeder-shredder connector (or reinstall the removed feeder);

- sharpen the shredding drum knives;

- adjust the clearance between the beam and the drum knives.

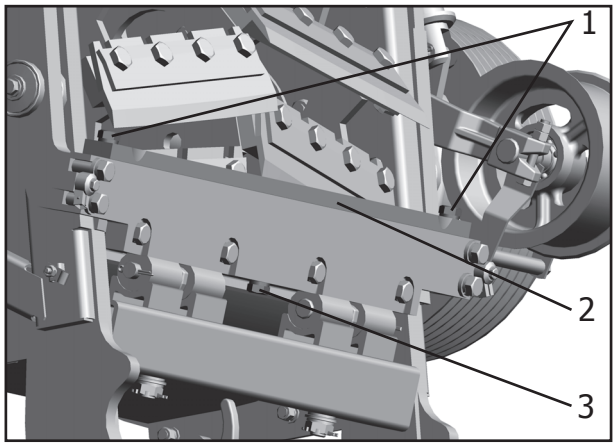
6.4.2.5 Operation results in natural wear of the counter-cutting beam; if both edges of the beam become worn, it shall be replaced. Maximum allowable wear of the beam edge is radius of more than 5 mm.

To replace the counter-cutting beam:

- retract the beam for 1 mm;

- open the feeder-shredder connector or remove the feeder;

- unscrew two bolts 1 (Figure 6.9)



1- bolt; 2- counter-cutting beam; 3- bolt

Figure 6.9 – Adjustment of the counter-cutting beam

fastening counter-cutting beam 2 at the ends and one bolt 3 in the middle (under the beam support);

- remove the beam;

- install a new counter-cutting beam or turn to the new edge with preliminary cleaning of the installation place;

- secure the beam by two bolts 1 at

the ends and one bolt 3 in the middle;

- close the feeder-shredder connector or reinstall the removed feeder;

- adjust the clearance between the knives and beam.

6.4.2.6. The shredder knives and bottom become worn during operation, in particular during greens pick-up. Knives wear result in D and E sizes (Figure 6.6) increase between the bottom and knives, which leads to clogging of the transport channel after shredder 19 (Figure 2.4) (diffuser 18 and spacer 16).

To perform adjustment:

- remove the adapter;

- lift the shredder to the upper position;

- place a mechanical support on the left hydraulic cylinder;

- loosen four bolts 6 (Figure 6.6) fastening bottom 3;

- adjust dimension D to 5 mm to 7 mm against the shredding drum knives and E to 2 mm to 4 mm by moving the bottom along the grooves;

- tighten bolts 6 fastening bottom 3;

- rotate the shredding drum manually, the knives shall not touch the bottom.

To replace the bottom:

- disconnect the adapter;

- lift the shredder to the upper position;

- place a mechanical support on the left hydraulic cylinder;

- loosen four bolts 6 (Figure 6.6) fastening bottom 3 and remove it from the drum frame;

- install new bottom 3 and secure it with bolts 6, maintaining dimension D to 5 mm to 7 mm against the shredding drum knives and E to 2 mm to 4 mm;

- rotate the shredding drum manually, the knives shall not touch the bottom.

6.4.2.7 As knives sharpening procedures are performed, the grinding wheel becomes worn. In order to compensate wear, wheel position in the sharpening device carriage may be adjusted. Depending on the wheel wear, adjustment can be performed 4-5 times, then the wheel shall be replaced.

Grinding wheel position shall be adjusted in case if wheel projection from the carriage is less than 5 mm (dimension D, Figure 6.10).

To perform adjustment:

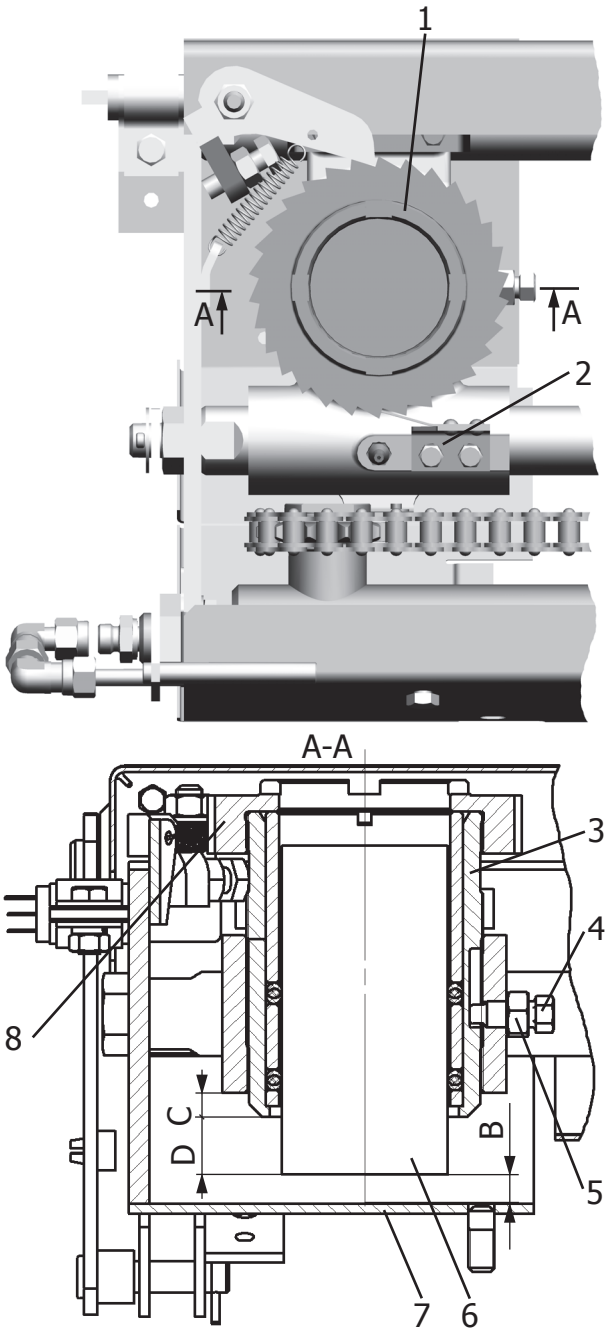
- open cover 1 (Figure 6.11) of the sharpening device manually by means of left axis 2;

- remove spring stop 2 (Figure 6.10) in carriage 1 of the sharpening device;

- measure distance B from grinding wheel 6 to the plane of frame 7 of the sharpening device (shall be recorded);

- unscrew bushing 3 with grinding wheel 6 by means of the special wrench (Figure 6.12) from the implements and accessories kit (Table A.1 of Appendix A) to dimension C of 7-11 mm (Figure 6.10) and rotate until the bushing slot is aligned with retaining screw 4 installed on the sharpening device carriage housing;

- screw in retaining screw 4 up to the stop and lock it with nut 5 to secure



1- carriage; 2- spring stop; 3- bushing; 4- screw; 5- nut; 6- grinding wheel; 7- frame; 8- nut

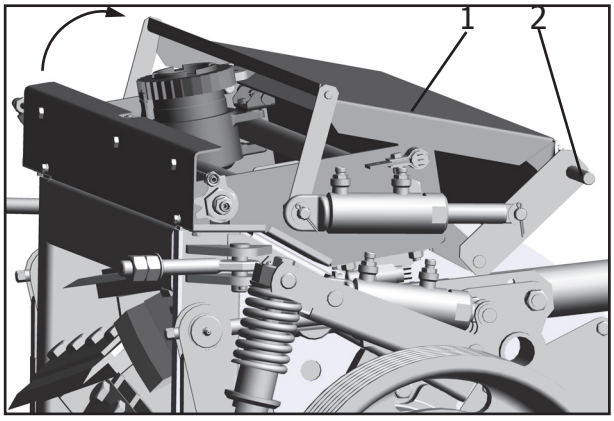
Figure 6.10 – Adjustment of grinding wheel position

bushing 3 with grinding wheel 6 against turning;

- unscrew nut 8 on bushing 3 by means of the special wrench, thus loosening the fastening of wheel 6 in bushing 3;

- move grinding wheel 6 down to the dimension of (B+1) mm;

- tighten nut 8 on bushing 3, the torque is 100 N·m;



1- cover; 2- axis

Figure 6.11 – Shredder sharpening device

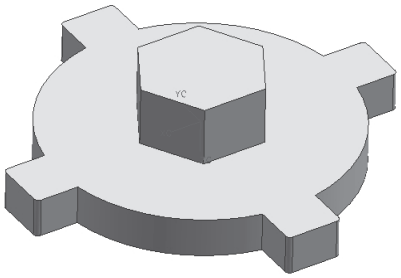


Figure 6.12 – Key

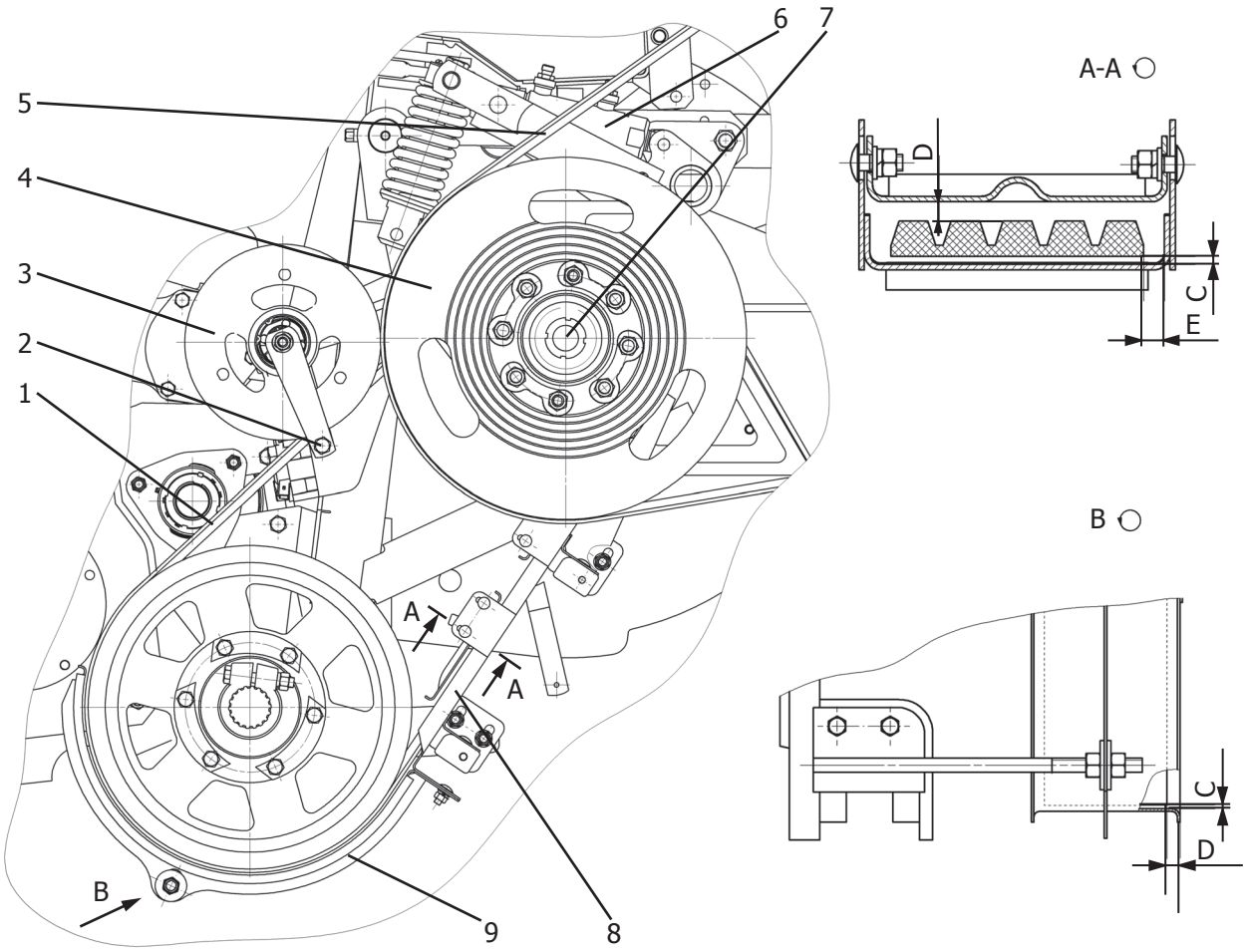
- unscrew retaining screw 4 to provide free rotation of bushing 3 with grinding wheel 6 and lock it in position by nut 5;

- install spring stop 2 in place. Cover 1 (Figure 6.11) of the sharpening device will close automatically after the engine is started.

6.4.3 Feeder Drive Belt Gear

6.4.3.1 Normal operation of the belt gear presumes its capability to transfer a required torque. Main adjustment parameter is idler 3 position (Figure 6.13).

When the feeder drive is active and idler 3 is in the lower position, a required tension of belt 1 and clearances C from 3 to 5 mm, D from 5 to 10 mm, E from 3 to 7 mm between belt 1 and enclosures 8 and 9 shall be provided. When the feeder drive is inactive and idler 3 is in the upper posi-



1- belt; 2- axis; 3- idler; 4- drive pulley; 5- main drive belt; 6- hydraulic cylinder; 7- bolt; 8, 9- enclosure

Figure 6.13 – Feeder drive activation mechanism

tion, drive pulley 4 shall be completely free from belt 1.

6.4.3.2 To replace the feeder drive belt:

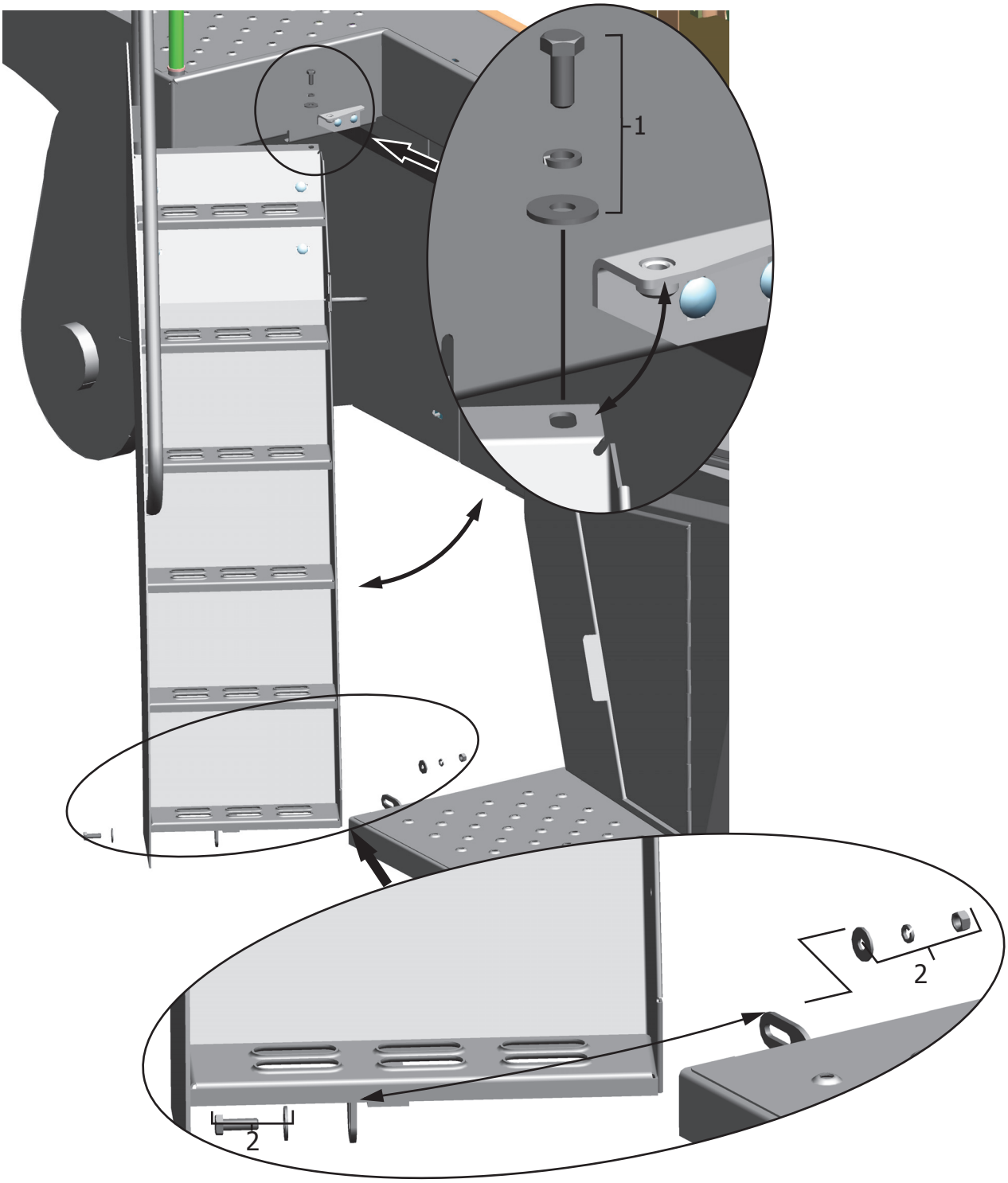
- remove the protective shields;
- switch off the feeder drive;
- loosen the main drive belt 5 tension, as shown in p. 6.4.4.2;
- remove main gear drive belt 5 from drive pulley 4;
- unscrew bolting and remove enclosures 8 and 9;
- unscrew bolting and remove axis 2;
- unscrew bolt 7, tap the pulley hub and remove the split taper collar;
- pull out drive pulley 4 for a distance of 35-40 mm by means of a pulley puller;
- remove belt 1.

The assembly procedure is in the reverse order.

6.4.4 Main Drive Belt Gear

CAUTION! IN ORDER TO FACILITATE ACCESS PRIOR TO BELT TENSION ADJUSTMENT OR BELT REPLACEMENT THE LADDER SHALL BE TURNED 90 DEGREES INSIDE-OUT, BOLTING 1 AND 2 SHALL BE PRELIMINARILY UNSCREWED (FIGURE 6.14).

AFTER MAIN DRIVE BELT GEAR ADJUSTMENT IS COMPLETED, INSTALL THE LADDER IN THE OPERATING POSITION AND FASTEN WITH BOLTING 1 AND 2.



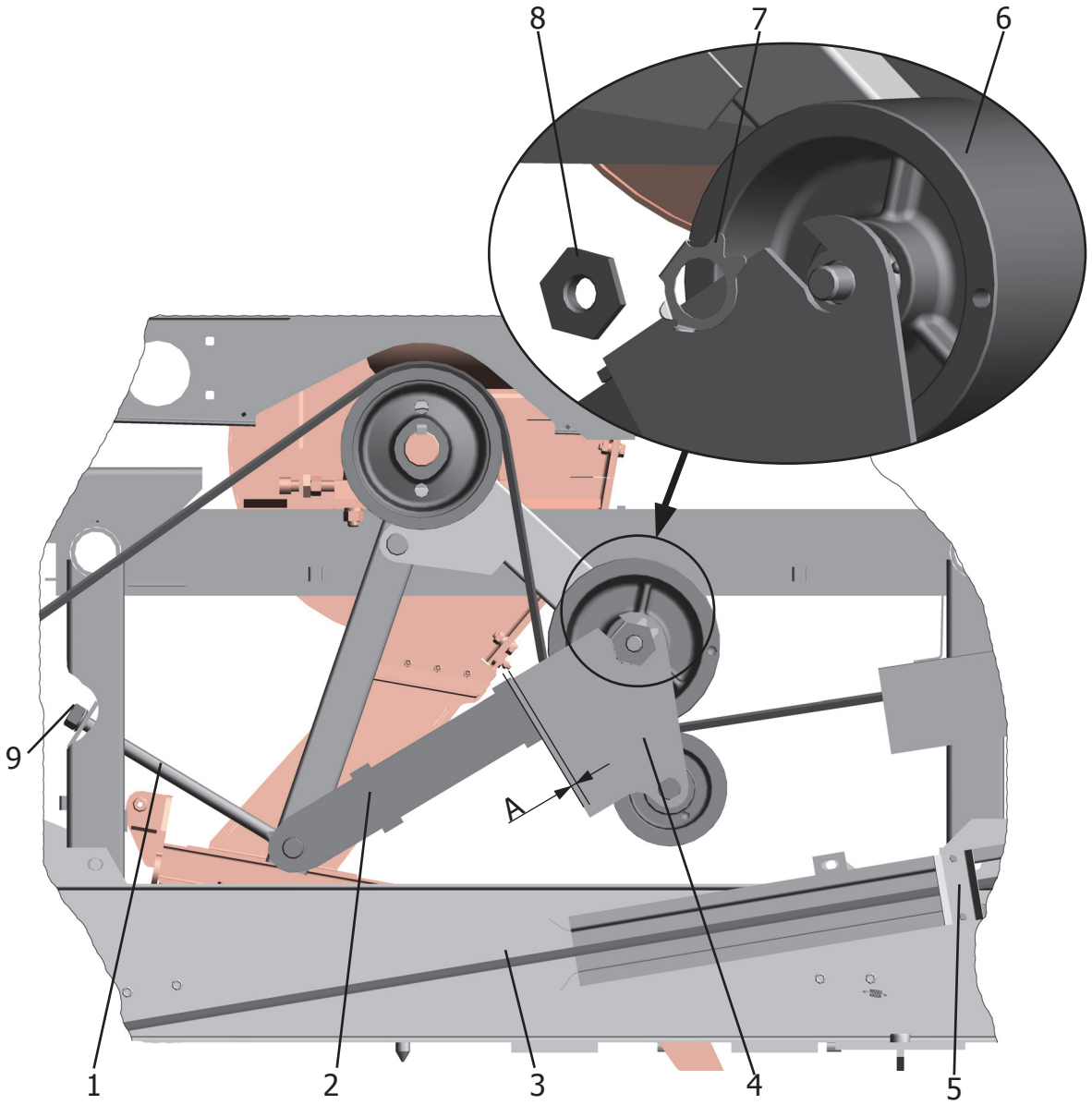
1, 2- bolting

Figure 6.14 – Ladder position during main drive belt gear adjustment

6.4.4.1 Main drive belt 3 (Figure 6.15) tension is adjusted by means of rod 1. When belt 3 is tightened, it is required to provide clearance A from 10 to 15 mm between support 2 and bracket 4 of idler 6; this clearance provides the best value of belt 3 tension force.

6.4.4.2 To replace main drive belt 3:

- remove the protective shields;
- loosen the tensioning of belt 3 by unscrewing nuts 9 on rod 1 of the tensioning unit;
- remove rod 1 from the frame bracket;



1- rod; 2- support; 3- belt; 4- bracket; 5- pad; 6- pulley; 7- locking washer; 8- nut; 9- nut

Figure 6.15 – Main drive belt replacement

- unbend the wings of lock washer 7;
- unscrew nut 8 on tensioning pulley axis 6 until it comes out of the hole;
- pull the tensioning pulley axis from bracket 4 slots;
- remove pads 5 from the lower belt drive shroud;
- disconnect the hydraulic sleeve from the main drive shift clutch;
- remove belt 3.

The assembly procedure is in the reverse order.

6.5 Headers and Pickup Operating Procedure

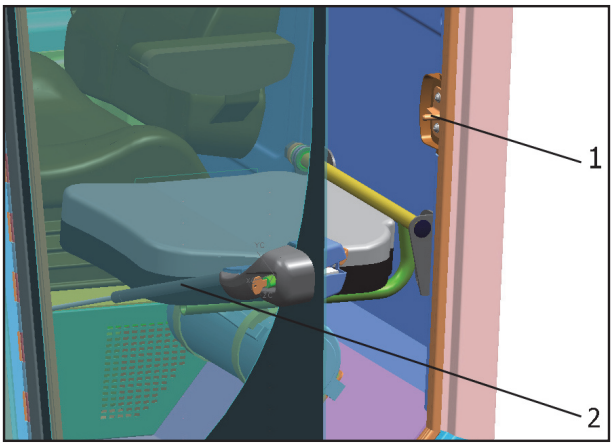
Headers and pickup operating procedure is in compliance with their operation manuals.

6.6 Use of Workstation

The cab is installed upon four shock-absorbers. During operation, tightening of shock-absorbers bolts and cab to platform fastening bolts shall be monitored.

The cab is provided with an emergency exit located on the side opposite to cab entrance. The second door is used as an emergency exit.

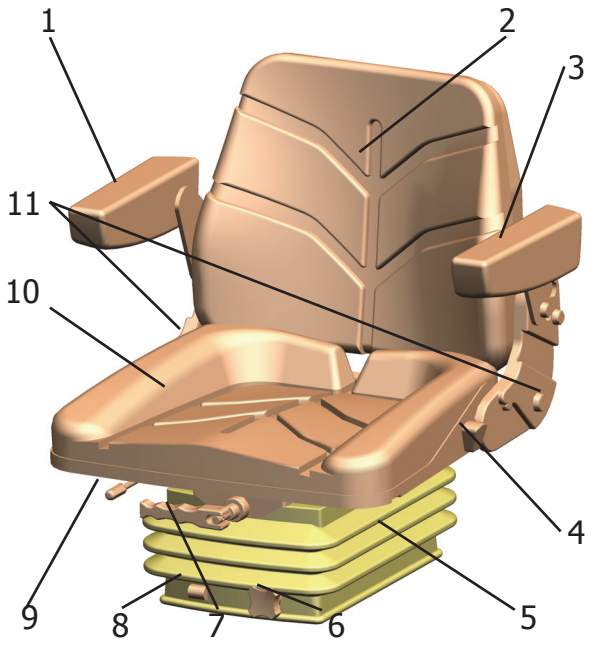
Fixation in a closed position and locking of the cab door is ensured by the lock located on the door. The left door is opened from the outside by means of the key, from inside by a handle; the right door is opened only from inside by a handle. When the lock handle is pressed, the door opens due to actuation of gas spring 2 (Figure 6.16) and is fixed in open position by means of this spring. Door tightness is adjusted by fastener 1 on the rear cab frame risers.



1- fastener; 2- gas spring

Figure 6.16 – Left door fixation in open position

Operator's seat (Figure 6.17) is adjusted according to the operator's weight within the range of 60-120 kg, within 80 mm by height, within 150 mm by length



1- right armrest; 2- back; 3- left armrest; 4- seat tilt adjustment lever; 5- suspension enclosure; 6- seat height adjustment lever; 7- springing system handle; 8- springing system indicator; 9- seat horizontal displacement lever; 10- cushion; 11- broken-out element

Figure 6.17 – Operator's seat

and till 20° of backward tilt. The armrests are of swing type.

On the cab seat adjust the springing system depending on your weight. To increase the load mass turn springing system handle 7 clockwise, to reduce the mass –counterclockwise, until a red stripe appears on springing system indicator 8. Upon the completion of adjustment, set the springing system handle 7 to horizontal position, as shown in Figure 6.17.

To tilt the seat, press seat tilt adjustment lever 4.

To adjust the seatback by height, use seat height adjustment lever 6. Turning it clockwise will increase the height, turning it counterclockwise will decrease it.

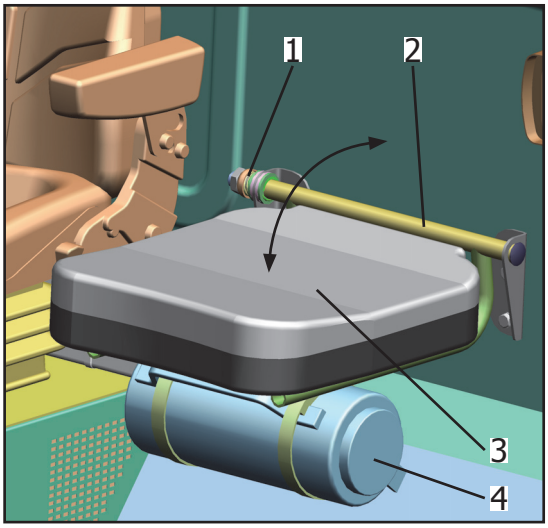
You can adjust seat positioning by means of seat horizontal displacement lever 9. For this purpose pull the lever aside (to the right) and move the seat forward or

back.

ATTENTION! DO NOT CHANGE THE OPERATOR'S SEAT POSITION DURING MOTION!

Broken-out element 11 is provided in the operator's seat for safety belts installation. A similar element is located on the right to install a complementary part of the belt system.

Trainer's seat 3 is installed in the cab (Figure 6.18). Trainer's seat 3 can be folded. It is secured in folded condition by means of friction washers 1 on axis 2 on the left. Thermos 4 is installed under the trainer's seat.



1- friction washers; 2- axis; 3- trainer's seat; 4- thermos

Figure 6.18 – Trainer's seat

6.7 Hydraulic System Operation

IN THE HYDRAULIC SYSTEM IT IS FORBIDDEN:

- TO APPLY USED SLEEVES/HOSES;
- WELD PIPELINE NOZZLES.

CAUTION! DAMAGED HOSES AND PIPES SHALL BE REPLACED IMMEDIATELY.

CAUTION! DURING WELDING WORKS PROTECT SLEEVES/HOSES AGAINST SPATTERS OF MELT METAL, WHICH MAY DAMAGE OR LOOSEN THEM, THUS LEADING TO OIL, COOLING FLUID LEAKAGES.

ATTENTION! IN CASE OF HYDRAULIC EQUIPMENT, RIGID OR FLEXIBLE PIPELINES REPLACEMENT, MAKE SURE THAT THE TOWER IS IN ITS LOWEST POSITION (AT A STOP), THE FEEDER IS IN ITS LOWEST POSITION OR FIXED AT A STOP, FEEDER AND SHREDDER DRIVES ARE SWITCHED OFF (HYDRAULIC CYLINDER RODS ARE RETRACTED).

CAUTION! IN CASE OF HIGH-PRESSURE HOSE RUPTURE OR DETECTION OF ANY OTHER FAILURES OF HGD, STOP THE ENGINE IMMEDIATELY IN ORDER TO PREVENT HYDRAULIC PUMP DAMAGE.

IT IS FORBIDDEN! TO START THE ENGINE UNTIL THE FAILURES ARE ELIMINATED.

To provide hydraulic system oil temperature increase up to the required value during winter operation and maintenance, it is recommended to close the oil radiator (radiators) with a process enclosure from the air intake side in order to

restrict blowing of the oil radiator.

6.7.1 Steering Wheel Hydraulic System

In the cold season, it is recommended to warm up the operating fluid prior to motion start by letting the pump operate for 1-2 minutes without rotating the steering wheel. Then rotate the wheel to transfer the hydraulic cylinder from one extreme position to another and back. Repeat the operation until the steering wheel and driven wheels are synchronized. The beginning of normal volumetric steering is indicated by sharp reduction of the steering wheel torque.

6.7.2 Volumetric Hydraulic Drive System

Prior to the daily start of the hydraulic drive:

- perform external inspection of hydraulic drive elements;

- tighten the threaded connections of oil pipelines or replace damaged or broken-down elements, if necessary;

- monitor the oil level in the hydraulic tank, oil level shall be monitored at feeder lifting hydraulic cylinder plunger fully retracted.

Prior to engine start, the HGD control handle shall be free and set to the neutral position.

During harvester operation, the following shall be monitored:

- operating fluid temperature (shall not exceed 90 °C);

- filtering elements contamination.

Filtering elements in the HGD filter and hydraulic tank shall be replaced at the following intervals:

a) first replacement — after 100 operating hours,

b) second and further replacements — after 500 operating hours.

First hydraulic system oil replacement is made after 100 operating hours, subsequent replacements — every 500 operating hours, but not less than once per season.

IT IS FORBIDDEN! TO REPLACE HGD HIGH-PRESSURE HOSE FASTENING SCREWS WITH MATING IN THE BRITISH SYSTEM WITH SCREWS PRODUCED BASED ON THE METRIC SYSTEM.

IT IS FORBIDDEN TO START HGD AT TEMPERATURES BELOW 15 °C!

6.7.3 Provisions on preservation of the hydraulic system from contamination during operation

Operating fluid purity is vital for secure operation of harvester hydraulic system. Therefore, take care to prevent fluid from dirt contamination during all operations connected with hydraulic system mounting, dismounting and maintenance.

6.8 Motor Unit Operation

Description of the engine structure, as well as provisions related to its operation and TM are given in the engine operation manual supplied with the harvester.

CAUTION! MOTOR UNIT TM AND REPAIR SHALL BE PERFORMED AT STOPPED ENGINE AND SWITCHED OFF

SB.

Engine shall be started only if the main drive clutch is deactivated.

In case of engine start in the cold season, when the ambient temperature falls below minus 12 °C, the following procedure shall be complied with: start the engine and warm it up till the cooling fluid temperature reaches 20°C without moving the harvester, then crankshaft rotation rate can be smoothly increased up to the nominal value, and operation can be started.

In order to avoid damage of power-controlled gear **IT IS FORBIDDEN TO:**

- START THE ENGINE WHEN THE HYDRAULIC SYSTEM IS NOT FILLED WITH OIL;

- START THE ENGINE WHEN THE HARVESTER IS BEING MOVED BY A TOW ROPE AND TO TOW THE HARVESTER WHEN GEAR IS ENGAGED;

- CHANGE GEARS WHEN THE HARVESTER IS MOVING;

- MOVE THE HARVESTER WHEN PARKING BREAK IS ENGAGED.

6.8.1 Engine Start

IT IS FORBIDDEN! TO START THE ENGINE IN A CLOSED PREMISE (WITHOUT ARTIFICIAL VENTILATION). EXHAUST GASES ARE HIGHLY TOXIC!

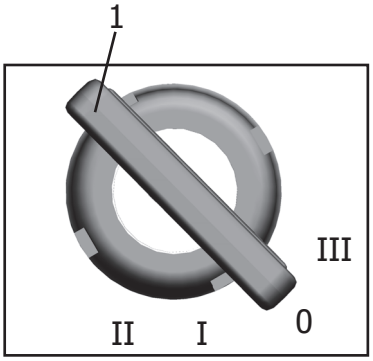
Prior to the first start of the harvester engine after a long-term storage and preservation, make sure that all fasteners are securely tightened.

Prior to engine start and beginning of motion, take your seat.

Prior to engine start, make sure that the parking brake is active.

ATTENTION! IF GB LEVER IS NOT IN NEUTRAL POSITION, ENGINE START WILL BE BLOCKED.

Turn ignition key 1 (Figure 6.19) clockwise to "I" position, all lamps on the engine monitoring and control panel 9 (Figure 4.7) shall switch on for a short time which indicates their operability, switch off if there are no failures or faults in the engine monitoring and control system.



1 - ignition key

Figure 6.19 – Ignition key position ("0"-"III" are shown conventionally)

Turn the ignition key to "II" position (Figure 6.19), which activates the engine electric starter and initiates startup. When stable idle speed is reached, release the key.

After engine startup, let it operate at idle speed until IP screen displays the value of oil pressure in the engine lubrication system. If the oil pressure value is not displayed in approximately 10 seconds, stop the engine and detect the cause.

If the engine does not start, startup procedure shall be stopped in max. 30 seconds.

Repeat the procedure in approx.

1 minute.

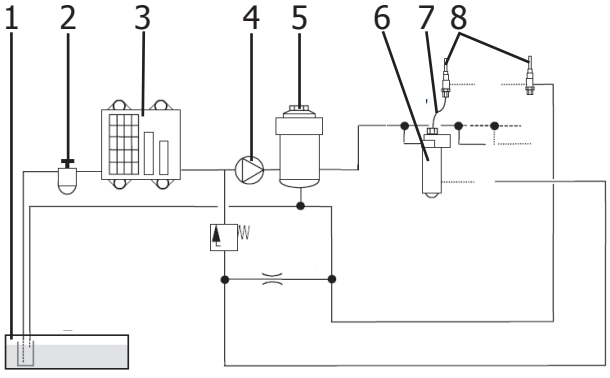
After three startup attempts, wait for approx. three minutes prior to the next attempt.

To stop the engine, turn the ignition key to "0" position.

ATTENTION! IT IS FORBIDDEN TO SWITCH OFF SB WHEN ENGINE IS RUNNING AS IT MAY LEAD TO A MALFUNCTION OF ELECTRONIC MONITORING SYSTEM UNITS.

6.8.2 Fuel Feeding System

Due to discharging created by fuel pump 4, fuel from fuel tank 1 (Figure 6.20) is delivered via fuel pipelines to coarse fuel filter 2 with a moisture separator and integrated manual defueling pump. Then the fuel is delivered to the integrated engine ECU cooler 3. Fuel pump 4 delivers fuel to fine filter 5 and further to individual pumps 6 which deliver the fuel via high-pressure pipelines 7 to jets 8. Jets 8 inject fuel into the engine cylinders under high pressure according to their operation procedure.



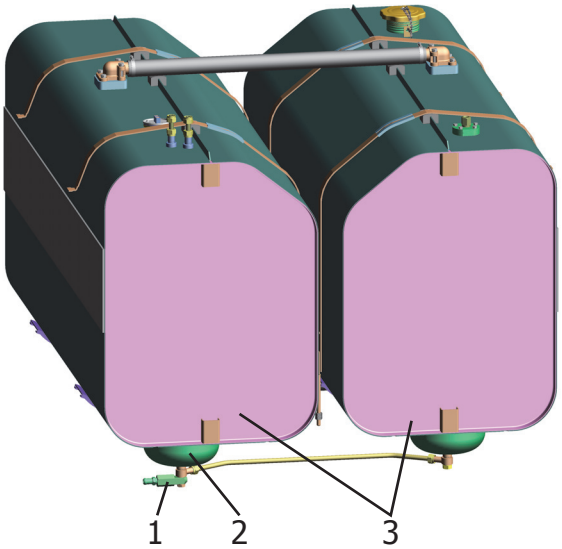
1 - fuel tank; 2 - coarse fuel filter; 3 - engine ECU; 4 - fuel pump; 5 - fine filter; 6 - individual pumps; 7 - high-pressure pipelines; 8 - jets

Figure 6.20 – Fuel feed system diagram

Fuel injection start and duration are controlled by ECU installed on the engine.

Excess fuel and air got into the system are discharged via valve and fuel pipelines to fuel tank 1. Fuel permeated through the precision parts of jets is also discharged to fuel tank 1.

Two fuel tanks 3 (Figure 6.21) are a single communicating vessels system, that's why the volume of fuel in the tanks is measured by an electric fuel level sensor installed in one tank, and monitored by means of an icon on the information panel.



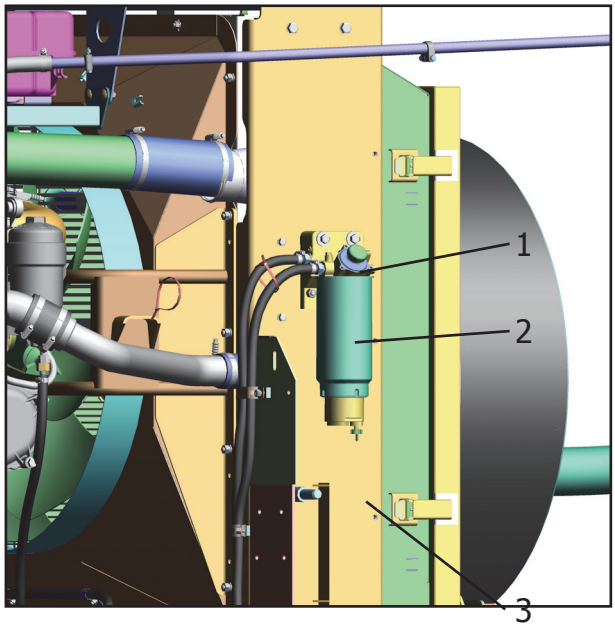
1 - drain valve; 2 - sump; 3 - fuel tank

Figure 6.21 – Fuel tanks

Fuel tanks 3 are installed between harvester side members in its middle part. Capacity of each tank is 500 l.

Condensed water, dirt and rust from the fuel tank are drained during one-two shifts through drain valve 1 screwed to sump 2.

When the engine is started, manual defueling pump 1 (Figure 6.22) installed on coarse fuel filter 2 is used for fuel pumping. Coarse fuel filter 2 with a moisture separa-



1- manual defueling pump; 2- coarse fuel filter; 3- radiator

Figure 6.22 – Coarse fuel filter installation

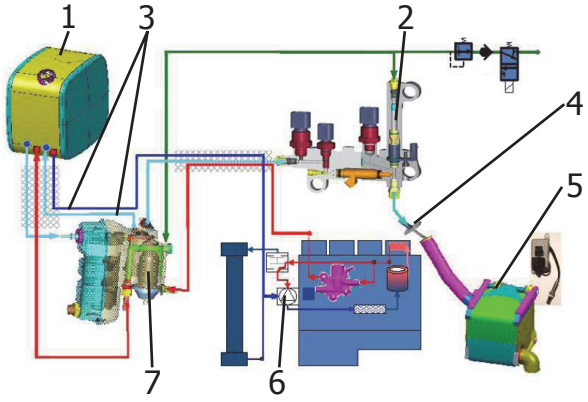
tor and integrated manual defueling pump is installed on the right riser of radiators unit 3.

6.8.3 Exhaust Gases Selective Catalytic Neutralization System

Exhaust gases selective catalytic neutralization system (SCR) for diesel engines is used to reduce pollutant emissions due to additional purification of exhaust gases. Toxic nitrogen oxides contained in the exhaust gas disassimilate into nitrogen and water vapors.

SCR system operation requires an additional product - AdBlue fluid - which is filled into a separate tank. AdBlue fluid is a non-toxic colorless synthetic solution (water solution of calurea).

Pump 7 (Figure 6.23) intakes AdBlue fluid from tank 1. The fluid is filtered in the pump and delivered via pipeline 3 to dosing unit 2 under pressure. Dosing unit 2 provides accurate dosing of AdBlue fluid



1- tank; 2- dosing unit; 3- pipelines; 4- jet; 5- muffler with catalyser; 6- tank heating solenoid; 7- pump

Figure 6.23 – Exhaust gases catalytic neutralization system

by means of electrically controlled dosing valve. When the SCR system is ready for operation, a continuous flow of compressed air flows through the dosing unit further to jet 4.

The required compressed air is taken from the additional consumers loop. AdBlue injected through the dosing valve to dosing unit 2 is mixed with the compressed air and stirred till it becomes spray. The spray is delivered to the exhaust gas flow via jet 4 orifice. The injected AdBlue disassimilates in the exhaust gas flow and forms ammonia and carbon dioxide. In the muffler with catalyser 5 ammonia reacts with undesirable nitrogen oxides forming nitrogen and water. The condition of AdBlue injection is achievement of the operating temperature by the catalyser.

For SCR system control and diagnostic, a required software is integrated in the engine control unit.

To defrost AdBlue after a cold start and/or to prevent its freezing during motion, the entire AdBlue loop is heated by the cooling fluid.

AdBlue and cooling fluid pipelines 3 are collected into a bundle, the pump module and AdBlue tank 1 are heated by the cooling fluid. Depending on the temperature, tank heating solenoid 6 controls a circulating loop of cooling fluid for AdBlue heating.

Tank 1 is made of plastic. Tank capacity is 95 liters. The tank is equipped by a combined fluid level and temperature sensor 2 (Figure 6.24). The tank is heated by means of engine cooling system loop. A mesh filter is installed in the filler cap. Tank filler cap cover 3 is locked. Breather 1 provides tank interface with the atmosphere.

1- breather; 2- combined fluid level and temperature sensor; 3- filling cap cover

Figure 6.24 – Adblue tank

ATTENTION! ADBLUE pipelines AND ALL CONNECTED COMPONENTS ARE UNDER PRESSURE DURING OPERATION AND EVEN AFTER THE ENGINE IS DEACTIVATED, THEY CAN BE HOT AS WELL. BURN HAZARD. OPENING OF A PRESSURIZED SYSTEM CREATES A RISK OF BURNING BY ADBLUE spatters.

Wait at least for 5 minutes after engine deactivation until operation of the exhaust gas neutralization system is completed.

Slowly open the pipe connections and system component covers. Cover the disconnected section with cloth.

Wear protective gloves, clothes and goggles.

ATTENTION! IF THE AdBlue TANK FILLING CAP COVER STAYS OPEN AT HIGH TEMPERATURES, AMMONIA VAPORS LEAKAGE IS POSSIBLE. AMMONIA VAPORS HAVE A RACY SMELL AND CAUSE IRRITATION OF: SKIN, MUCOUS MEMBRANES, EYES.

VAPORS CAN CAUSE A BURNING SENSATION IN EYES, NOSE AND THROAT, AS WELL AS THROAT IRRITATION AND LACRIMATION. AVOID AMMONIA VAPORS INHALATION.

ATTENTION! AVOID AdBlue CONTACT WITH SKIN, EYES AND CLOTHES.

In case of eye or skin contact with AdBlue, wash eyes or skin with clean water immediately.

In case of AdBlue swallowing, immediately rinse your mouth with a big volume of water and drink enough water.

Change clothes contaminated by AdBlue immediately.

In case of allergic reactions immediately call the doctor.

Keep AdBlue away from children.

If AdBlue contacts painted or aluminum surfaces during tank filling, the contaminated areas shall be immediately washed with a sufficient volume of clean water.

ATTENTION! INGRESS OF AdBlue INTO THE COOLING FLUID LOOP (EVEN IN EXTREMELY SMALL AMOUNTS) WILL LEAD TO THERMOSTATS AND TEMPERATURE SENSORS DAMAGE.

Always store AdBlue separately from other service products.

Do not use the same canisters and pallets for collection of AdBlue and other service products.

Do not use service products containing traces of AdBlue. Certain components of BlueTec system are highly sensitive even to smallest traces of admixtures in AdBlue.

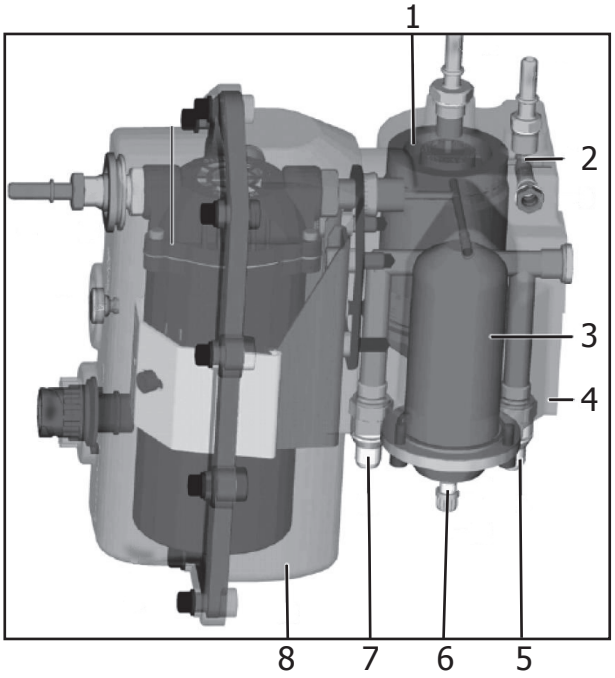
Only clean and specially assigned canisters and pallets shall be used for AdBlue fluid collection.

Do not continue to use AdBlue containing traces of admixtures.

AdBlue pump is designed for filtration and delivery of AdBlue to the dosing unit under pressure. AdBlue consists of plastic housing 8 (Figure 6.25) protected against spatters and water and of aluminum unit 4. The electric pump is located in plastic housing 8. Pressure accumulator 3 with filling valve 6, filter 1, cooling fluid delivery and discharge channels 7, 5 and pneumatic switching reverse valve 2 are incorporated in aluminum unit 4.

To replace AdBlue filter:

- place a suitable reservoir under the pump unit to collect leaking AdBlue fluid;



1- filter; 2- pneumatic switching reverse valve; 3- pressure accumulator; 4- block; 5- cooling fluid discharge; 6- filling valve; 7- cooling fluid delivery; 8- housing

Figure 6.25 – Adblue pump

- unscrew the filter housing from the filter pump assembly;

- detach the filtering element;

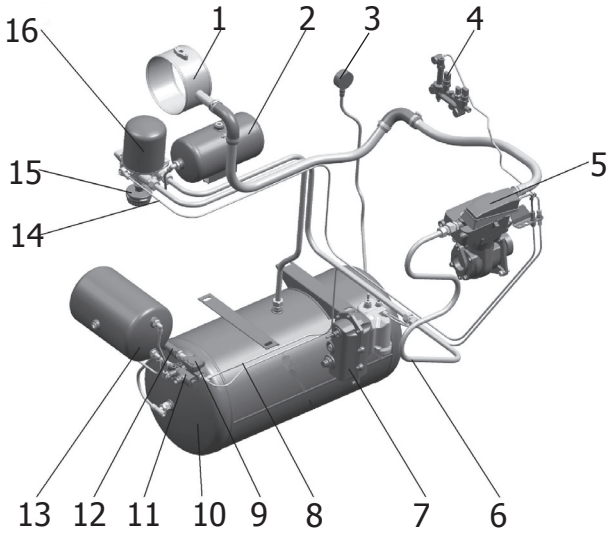
- finely spread the O-ring on the new filtering element

- insert the new filtering element into the filter housing;

- screw the filter housing to the pump module and tighten. Tightening torque is 32 N·m, width across flat S46.

6.8.4 SCR System Pneumatic Communications

Purified air from the intake duct is delivered to pneumatic compressor 5 installed on the engine via nozzle 1 (Figure 6.26). After pneumatic compressor 5 the heated air is delivered under pressure to the air-dryer with pressure controller after preliminary cooling in metal tube 6. The air-dryer consists of the air-dryer with pressure controller 16 and



1- nozzle; 2, 10,13- receiver; 3- manometer; 4- dosing unit; 5- pneumatic compressor; 6, 8, 14- tube; 7- pump; 9- pressure limiting valve; 11- solenoid; 12- reverse valve; 15- muffler; 16- air-dryer with pressure controller

Figure 6.26 – Pneumatic communications

muffler 15 designed for noise level reduction. The dryer cleans and dries air. After the dryer, air is delivered to receiver 10 of 110 l capacity, then to receiver 13 of 10 l capacity via solenoid 11 under the pressure of 8.5 bar.

Receiver 13 is designed for blowing of pump 7, dosing unit 4 and pipeline of Adblue fluid delivery after engine deactivation. After receiver 13, compressed air, via solenoid 11, reverse valve 12 and pressure limiting valve 9, where compressed air pressure is reduced from 8.5 to 5.5 bar, is delivered to Adblue fluid dosing unit 4 via tube 8. A part of the compressed air is delivered after the dryer to receiver 2 of 5 l capacity where it is kept under 8.5 bar pressure. In order to reduce drive losses, controlled pneumatic compressor 5 is installed on the engine. Pneumatic compressor 5 performance is controlled via air-dryer port connected to the pneumatic compressor via tube 14.

If the temperature of air delivered to the dryer is less than 7°C, the heater is activated automatically. When the temperature above 29.5°C is reached, the heater deactivates.

6.8.5 Recommendations on Engine Oil Filling and Draining

Engine shall be filled in compliance with the requirements of Table 7.3. Monitor the oil level against the oil level gage dashes, not earlier than 5 minutes after the engine is stopped provided that the harvester is installed on a flat surface. If the oil level is below the upper mark, add oil of the same grade up to the upper mark.

Oil from the engine crankcase shall be drained through the hose attached to the drain hole in the engine crankcase. Be careful while draining the hot oil.

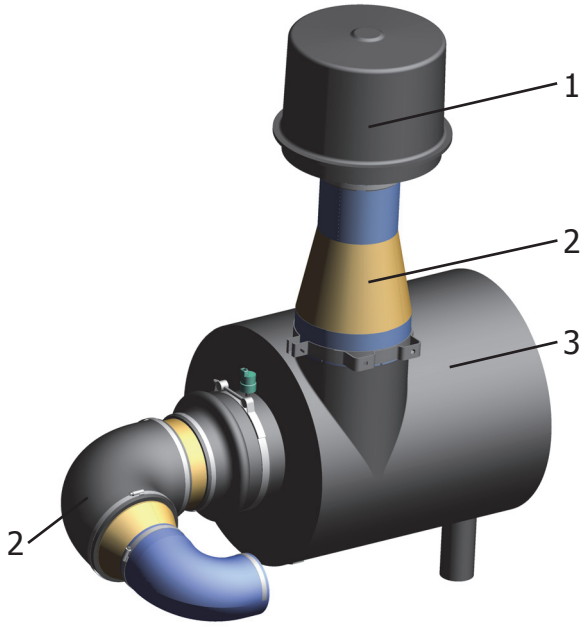
6.8.6 Air Feeding System

The engine air feeding system is designed for air intake from the atmosphere, purification and delivery to the engine.

The engine air feeding system consists of precleaner 1 (Figure 6.27), air filter 3 and air ducts 2. Air filter with installed precleaner are located on rear risers of the harvester frame.

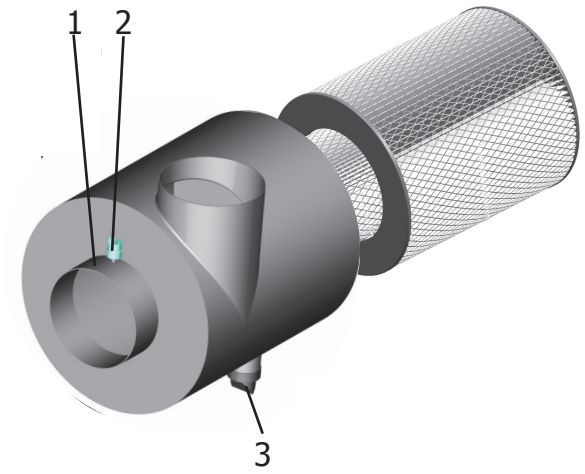
Air is delivered to the filter unit via precleaner 1, which filters up to 94% of pollution. Then the purified air passes through the filtering element where its final treatment takes place.

Air filter 3 is equipped with tenuity sensor 2 (Figure 6.28) indicating the maintenance necessity and with dust discharge



1 - precleaner; 2 - air duct; 3 - air filter

Figure 6.27 – Engine air feed system



1- exhaust pipe; 2- tenuity sensor; 3- dust discharge vacuum valve

Figure 6.28 – Air filter

vacuum valve 3. Tenuity sensor 2 is located at the exhaust pipe 1.

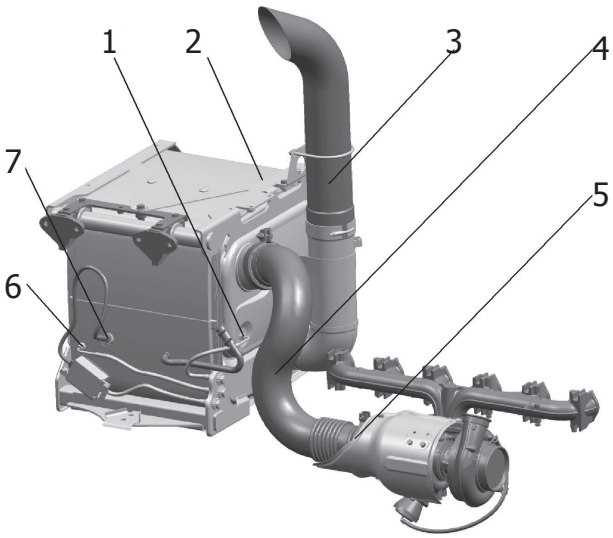
Air filter maintenance frequency depends on harvester operation conditions.

Filtering element maintenance necessity is determined by tenuity sensor 2 activation of which is followed by "  " icon displaying on MTM.

CAUTION! IN CASE OF MECHANICAL DAMAGE, CORRUGATION FLUTE RUPTURES, CARDBOARD EXFOLIATION, SEALING GASKETS BREAKS, FILTER ELEMENTS SHALL BE REPLACED FROM SPTA KIT.

6.8.7 Exhaust System

The exhaust system is designed for discharge of engine exhaust gases and reduction of exhaust noise level. The exhaust system consists of suction pipe 4 (Figure 6.29) with a bellow, catalytic neutralizer 2 with a muffler and exhaust pipe 3. The bellow serves for temperature variations compensation. The muffler is attached to the transfer gear support. Catalytic neutralizer 2 and muffler are located within the same housing of 175 l capacity. Exhaust gas temperature sensors 1 and 6 are installed at the input and output of the catalyser. Exhaust gas temperature sensors transmit the current temperatures to the SCR system control unit. The received message is decrypted and transmitted to the engine control unit via CAN bus. If the temperature required for exhaust gas catalytic neutralization (approx. 200°C) is



1, 6-exhaust gas temperature sensor; 2- catalytic neutralizer; 3- exhaust pipe; 4- suction pipe; 5- jet nozzle; 7- NOx sensor

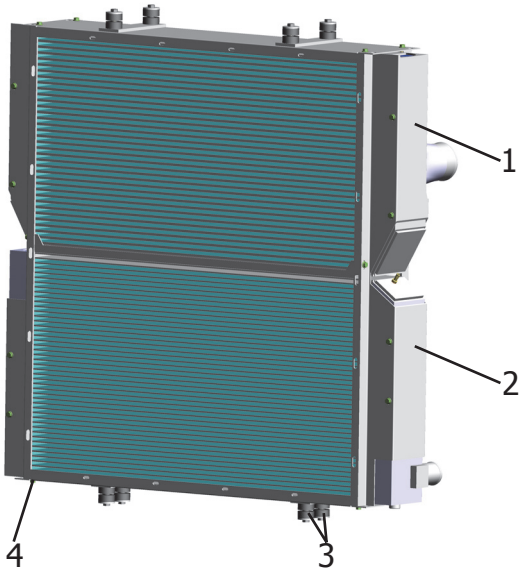
Figure 6.29 – Exhaust system

achieved, AdBlue injection is started. The content of nitrogen oxide in exhaust gases is monitored by means of NOx sensor 7. If the maximum permissible limit of exhaust gases toxicity is exceeded, a yellow light blinks. In case of significant exceedance of limit values of exhaust gases toxicity, engine torque is reduced. The jet is installed in nozzle 5 and serves for the most uniform injection of AdBlue solution delivered from the dosing unit into the exhaust gas flow.

6.8.8 Engine Cooling System

Engine cooling system consists of boost air cooling system and water cooling system.

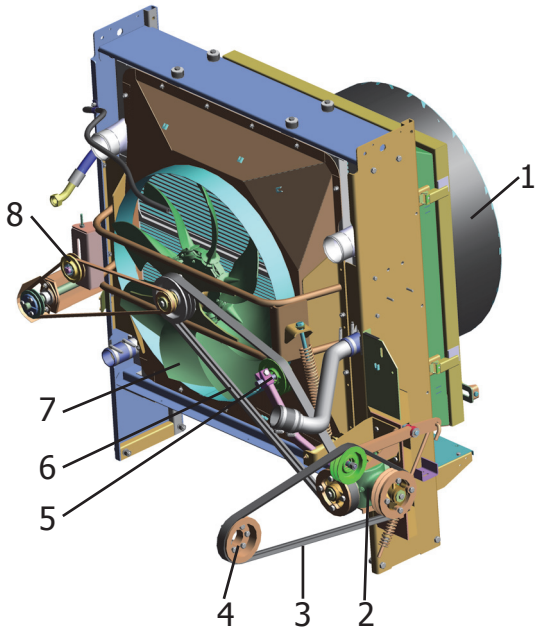
Heat exchangers of both systems are located in a single radiators unit and consist of boost air radiator 1 (Figure 6.30) and cooling fluid radiator 2. Water from the cooling fluid radiator 2 is drained by means of drain valve 4 located in the lower part of the radiators unit. Radiators unit is installed upon elastic supports 3.



1- boost air cooler; 2- cooling fluid radiator; 3- support; 4- drain valve

Figure 6.30 – Radiators unit

Radiators unit is made as a single module with cooling system fan 7 (Figure 6.31) and air intake 1. Fan 7 is driven from pulley 4 installed on the engine crankshaft toe by means of belt gears 3, 6 and right angle reducer 2; belt tension is ensured by idlers 5, 8.



1- air intake; 2- right angle reducer; 3, 6- belt gear; 4 - pulley; 5, 8- idler; 7- fan

Figure 6.31

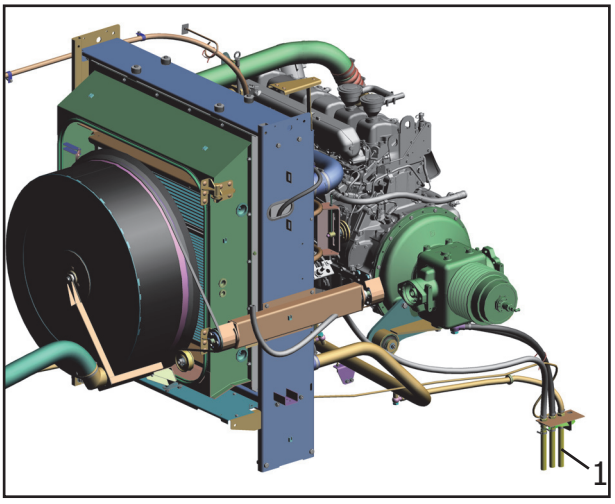
It is recommended to perform periodic cleaning of the radiators block with compressed air depending on the dust and crop residue accumulation.

The engine is equipped with an expansion tank with a cooling fluid level sensor designed for compensation of thermal expansion of fluid in the cooling system, removal of air, vapor from the fluid and creation of delivery head in the water pump suction line.

Harvester engine cooling system is filled by the cooling fluid recommended for application as per RD 37.319.037-12. Cooling system fullness is checked according to

the expansion tank half volume level. After filling, activate the engine for a short time, check the cooling system fullness once again and add fluid if necessary.

To drain the cooling fluid from the system, install the harvester on a horizontal platform and open cooling fluid valve 1 (Figure 6.32) and cab heating system drain valves. The expansion tank filler cap plug shall be open.



1- cooling fluid drain valve

Figure 6.32

6.8.9 Transfer Gearbox

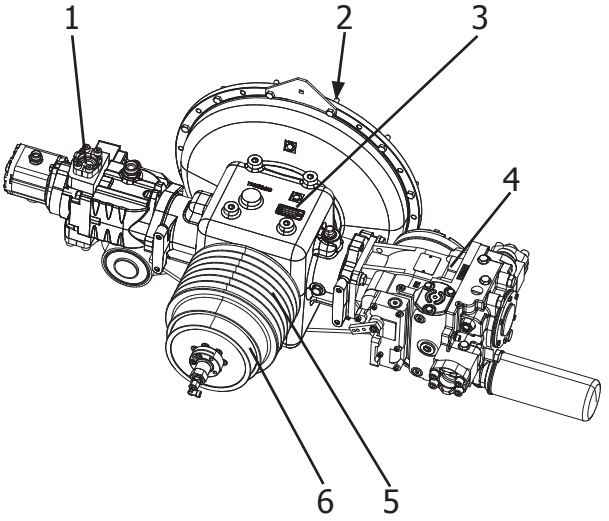
The transfer gearbox consists of elastic clutch 2 (Figure 6.33), right angle reducer 3 and multiple disk clutch with hydraulic switch 6.

Elastic clutch 2 connects the engine flywheel with the reducer gear and serves for attenuation of engine torque vibrations.

The transfer gear has three outputs and provides driving of:

- pump 4 of harvester undercarriage volumetric drive hydraulic system;

- gear pump block 1 of the main harvester hydraulic system and of volumetric steering hydraulic system;



1- pump unit; 2- elastic clutch; 3- right angle reducer; 4- hydraulic pump; 5- pulley; 6- multiple disk clutch with hydraulic switch

Figure 6.33 – Transfer gear

- pulley 5 (for harvester operating units drive).

Multiple disk clutch with hydraulic switch 6 integrated in the pulley is used for activation of harvester operating units drive.

Activation is done by delivery of operating fluid to the clutch piston cavity.

CAUTION! TO PROVIDE LIFETIME OF MULTIPLE DISK CLUTCH WITH HYDRAULIC SWITCH 6, ITS ACTIVATION BY MEANS OF SWITCH 3 (FIGURE 4.13) SHALL BE PERFORMED AT ENGINE CRANKSHAFT ROTATION RATE OF MAX. 1000 rpm.

Visual inspection of the transfer gear for possible leakages shall be performed after the first operation day.

If any leakages are detected, take actions to eliminate them (during warranty period this work is to be done by service providers).

If no oil leakages are detected, oil level in the transfer gear shall be monitored

based on the level in transparent oil level plug, add oil to the transfer gear, if necessary, in compliance with the requirements of Subsection 7.5.17.

6.9 Undercarriage Operation

CAUTION! OPERATION OF A HARVESTER WITH HIGH OR LOW TIRE PRESSURE, FOREIGN OBJECTS IN TIRE TREAD OR TIRES CONTAMINATED WITH PETROLEUM, OIL AND LUBRICANTS MAY CAUSE ITS PREMATURE WEAR.

6.9.1 Steering wheel axle

Notable wheel axial play is not permissible during operation. For adjustment, remove cap 1 (Figure 6.34) of hub 4 and unbend washer 3. While rotating the wheel in both directions (for proper installation of rollers on the bearing ring tapered surfaces), tighten nut 2 to the torque at which the wheel, if pushed by hand, will stop immediately. Then loosen the nut by 1/12...1/10 turn and unbend lock washer 3.

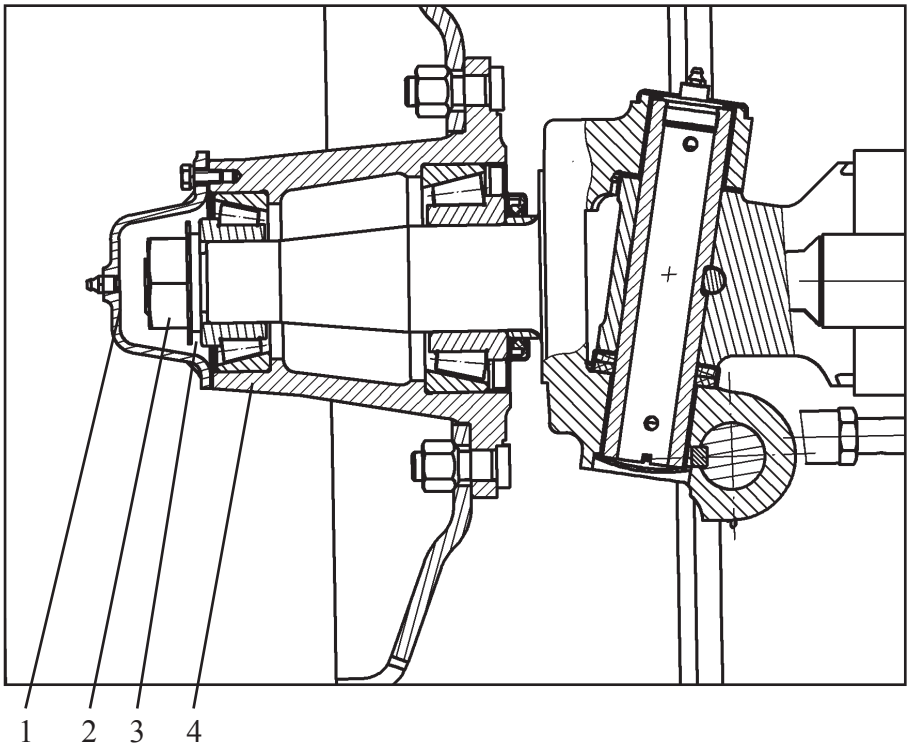
Check the wheel rotation by rotating it in two directions. The wheels shall rotate smoothly and easily, no notable axial play is acceptable.

6.9.2 TDS DRIVE Drive Steering Axle

At the ends of beam 2 (Figure 6.35) of the TDS DRIVE steering wheels axle (drive) power-wheels 6 on pivoting frame 6, hydraulic control valves 3 and high-pressure hoses 1 are fastened by means of swivel heads 5. Power-wheels are attached to the axle by nuts 7. Nuts tightening torque is from 550 to 600 N·m. Torque wrench is used for nuts tightening.

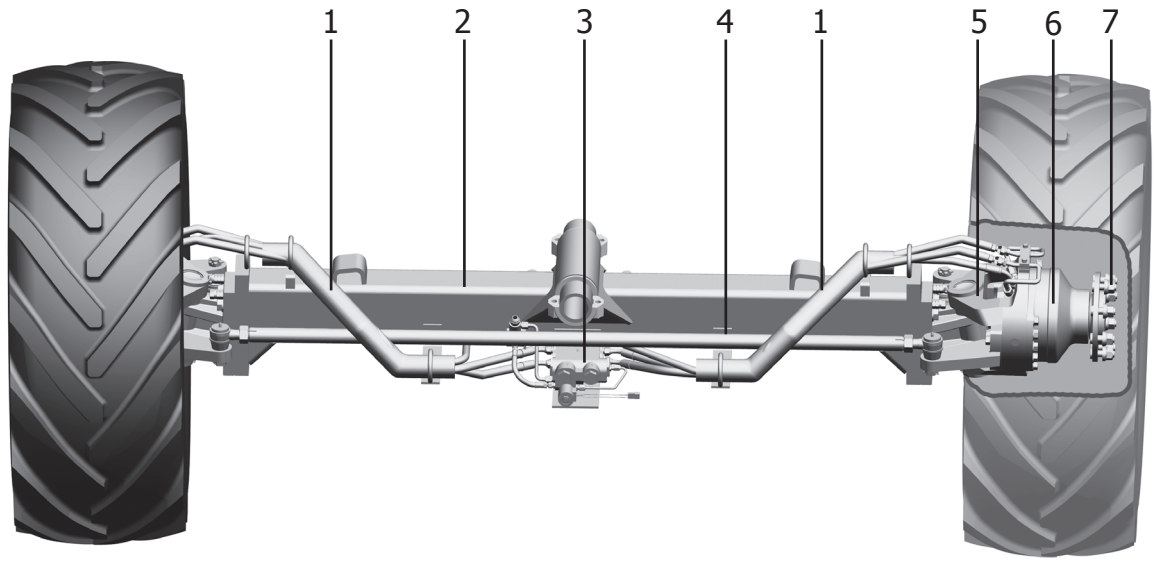
6.9.3 Drive Wheel Axle

6.9.3.1 Drive axle service life without major repair corresponds to the service life of the harvester on which it was set. Therefore,



1- cap; 2- nut; 3- washer; 4- hub

Figure 6.34 – Wheel hub



1 - high-pressure hose; 2 - beam; 3 - hydraulic control valve; 4 - pivoting frame; 5 - swivel head; 6 - power-wheel; 7 - nut

Figure 6. 35 – TDS DRIVE drive wheels steering axle

drive axle needs disassembly only in case of its accidental failure in order to estimate its technical condition or to replace worn out parking and operating brake pads.

Drive axle disassembly shall only be made by skilled specialists in shops provided with necessary devices and equipment. Measures shall be taken to prevent ingress of dirt and foreign objects into the internal cavities of assemblies.

ATTENTION! ANY GEAR SHALL BE ACTIVATED ONLY WHEN THE HARVESTER DOES NOT MOVE AND THE HGD CONTROL HANDLE IS IN NEUTRAL POSITION, I.E. THE LEVER MOVES FREELY IN LONGITUDINAL DIRECTION (FROM THE RIGHT TO THE LEFT). INITIAL ENGINE START-UP IS POSSIBLE ONLY WHEN THE GEAR SHIFT LEVER IS IN NEUTRAL POSITION.

By shifting the lever edgewise you select a gear, by moving it longwise you change the gear.

6.9.3.2 DWA GB control system shall be adjusted starting with the third gear and is performed in the following order:

a) for DWA of CIT kits:

- check the position of rods 1, 2, 3 (Figure 6.36) on GB: in neutral position, rods 1, 2 shall be pulled out and rod 3 shall be rotated manually by 20° (initial inclination of rod bolt hole 14 is 40°);

b) for DWA of ZF kits:

- rod 3 (Figure 6.37) shall be rotated manually by 18° (initial inclination of rod bolt hole 14 is 30°);

c) for both DWAs:

- install lever 5 (Figure 6.36, 6.37) at an angle of 90°±2° with lever shoulder 6 facing rod axis 13 so that axis 7 entered the 10 mm hole of lever 5, no grinding of lever 5 and rod clevis 8 shall take place. Holes of clevis and lever shall be aligned by movement along the slots (with a turn) of switch unit 12. Pin 9 axial play shall be adjusted from 0.22 to 0.6 mm by means of installation if a required amount of gaskets 11 at the free state of disc spring 10 and neutral position of lever 5;

– connect the cables and adjust gear switching in accordance with Figures 6.36 and 6.37. To activate GB gears, it is allowed to rotate the GB output shaft by braking disc 4 at unblocked parking brake.

CAUTION! THE ADJUSTMENT SHALL BE PERFORMED ONLY WHEN THE PARKING BRAKE IS ACTIVE AND OPERABLE AND THE ENGINE IS STOPPED.

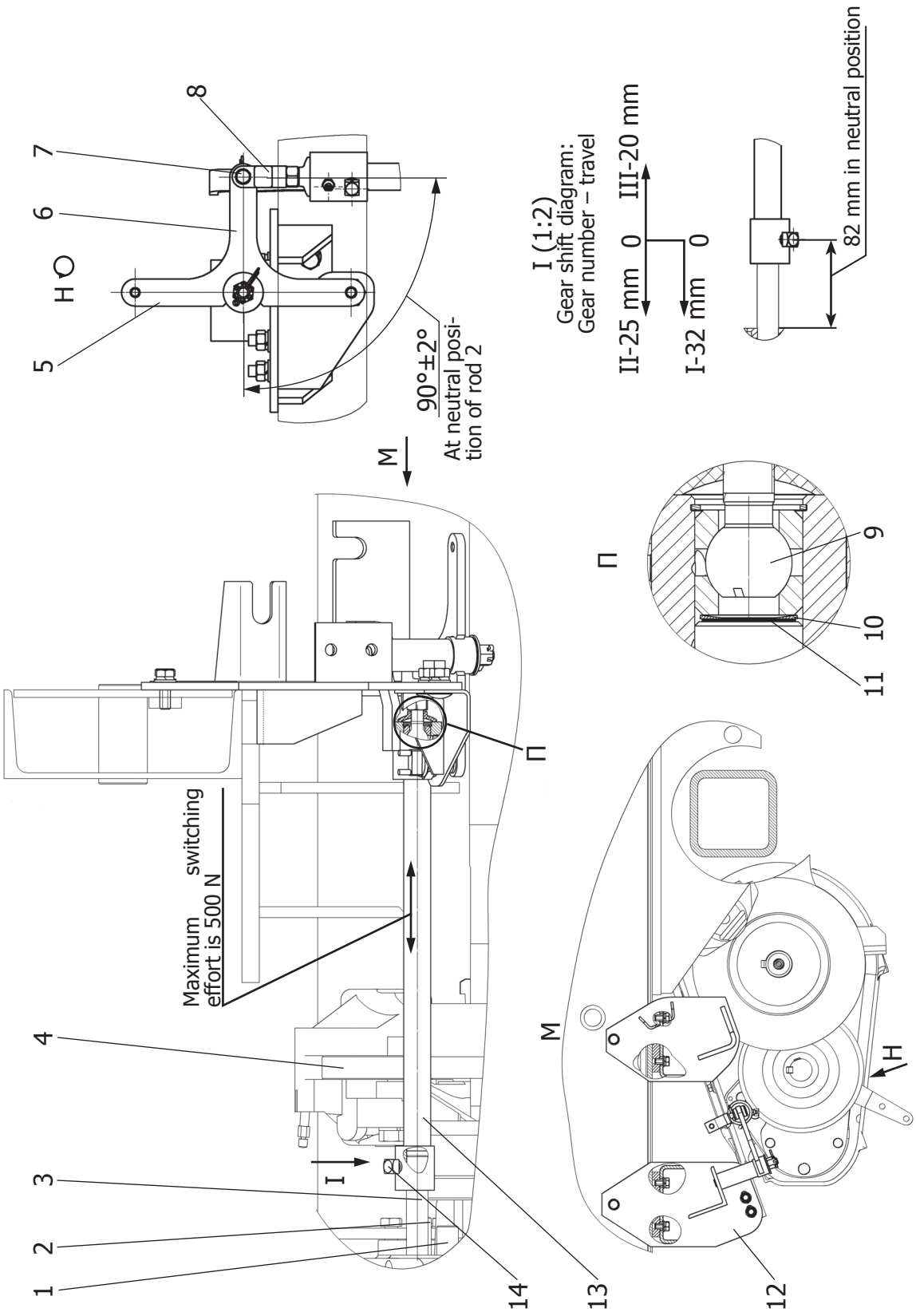
6.9.3.3 Brakes do not require any adjustment during operation. Friction pads wear is compensated by shifting of the actuating hydraulic cylinder piston and filling of the developing capacity by hydraulic fluid from the feed tank. When friction pads thickness reduces down to 2 mm or traces of incomplete braking are observed, pads shall be replaced by the new ones. Caliper pads shall be replaced in pairs only.

During operation hydraulic fluid level in feed tanks shall be monitored. Parking brake adjustment means changing of remote control cable length by screwing its terminations.

6.9.3.4 In the initial position clevis 4 (Figure 6.38) is connected to the upper hole of lever 5 of the parking brake drive, the clearance between pads and breaking drum shall be 0.3-0.5 mm.

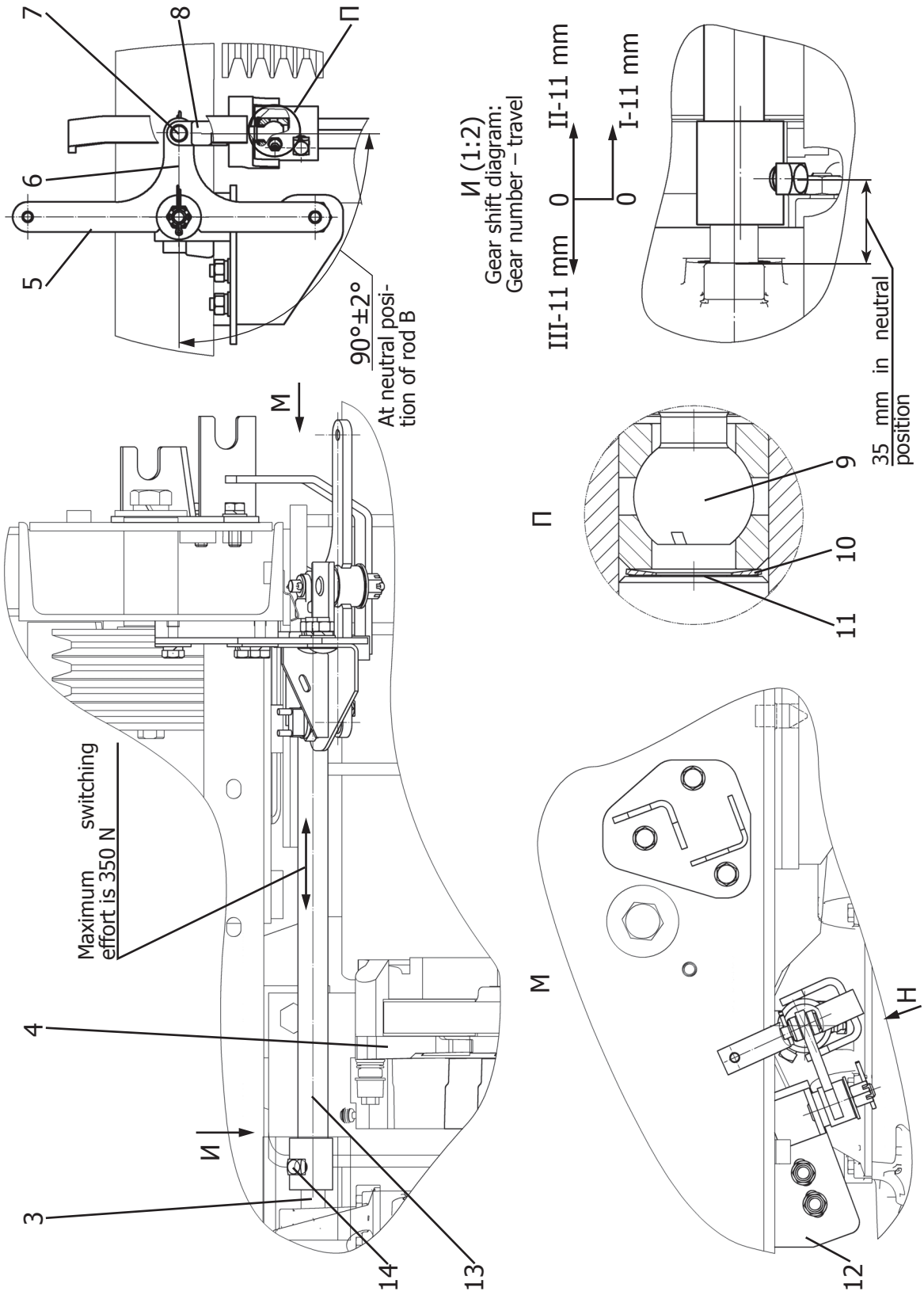
When lever 2 in the cab is transferred from the lower position up by three-four clicks (fourth-fifth tooth of the gear sector), parking brake 6 is activated.

The maximum acceptable brake pads wear corresponds to 2 mm pad thickness in the lower pad (near lever 5), after that pads shall be replaced. The maximum acceptable brake pads wear of the main brake also corresponds to their 2 mm thickness. If the thickness is less than specified, these pads shall also be replaced.



1, 2, 3 - rods; 4 - brake disc; 5 - lever; 6 - lever shoulder; 7 - axis; 8 - rod clevis; 9 - pin; 10 - disk spring; 11 - gasket; 12 - switching unit; 13 - rod axis; 14 - rod bolt

Figure 6.36 – CIT kits DWA GB control system adjustment



3 - rod; 4 - brake disc; 5 - lever; 6 - lever shoulder; 7 - axis; 8 - rod clevis; 9 - pin; 10 - disk spring; 11 - gasket; 12 - switching unit; 13 - rod axis; 14 - rod bolt

Figure 6.37 – ZF kits DWA GB control system adjustment

6.10 Electric Equipment Operation

6.10.1 General Safety Measures for Electronic Systems

IT IS FORBIDDEN:

- TO DISCONNECT SB, TO CONNECT JUMPER CABLES WHEN THE IGNITION KEY IS ACTIVE. IT CAN CAUSE PEAK VOLTAGE PULSES WHICH LEADS TO ELECTRONIC COMPONENTS BREAKDOWN;

- TO START THE HARVESTER AT VOLTAGE EXCCEDING THE SET OPERATING VOLTAGE OF THE HARVESTER. THIS MAY LEAD TO ELECTRONIC COMPONENTS DAMAGE.

ATTENTION! DISCONNECT SB DURING WELDING. HIGH WELDING CURRENTS MAY CAUSE WIRE DAMAGE IN THE EARTHING LOOP. WELDING MAY ALSO CAUSE VOLTAGE DROPS THAT MAY LEAD TO THE DAMAGE OF ELECTRONIC COMPONENTS.

IT IS FORBIDDEN:

- TO START THE ENGINE USING EXTERNAL POWER SOURCES;

- HARVESTER FERRY WITHOUT SB;

- HARVESTER OPERATION WITH DEACTIVATED SB;

- TO SWITCH OFF THE "GROUND" BY MEANS OF MECHANICAL SWITCH WHEN ENGINE IS RUNNING;

6.10.2 Storage Batteries

The harvester is equipped with two SB connected in series which gives the total onboard harness voltage of 24 V. SB are located on both sides of the motor unit.

ATTENTION! SB GAS IS POTENTIALLY EXPLOSIVE. AVOID SPARKLES AND OPEN FIRE NEAR SB.

Use electric light while checking the battery fluid level. Never check the charge of SB by touching its terminals with a metal object. Use a voltmeter or a current meter. Always disconnect SB cable from the "ground" (-) first and connect its termination after all others.

ATTENTION! ALWAYS KEEP SB CLEEN AND FREE OF CHAFF.

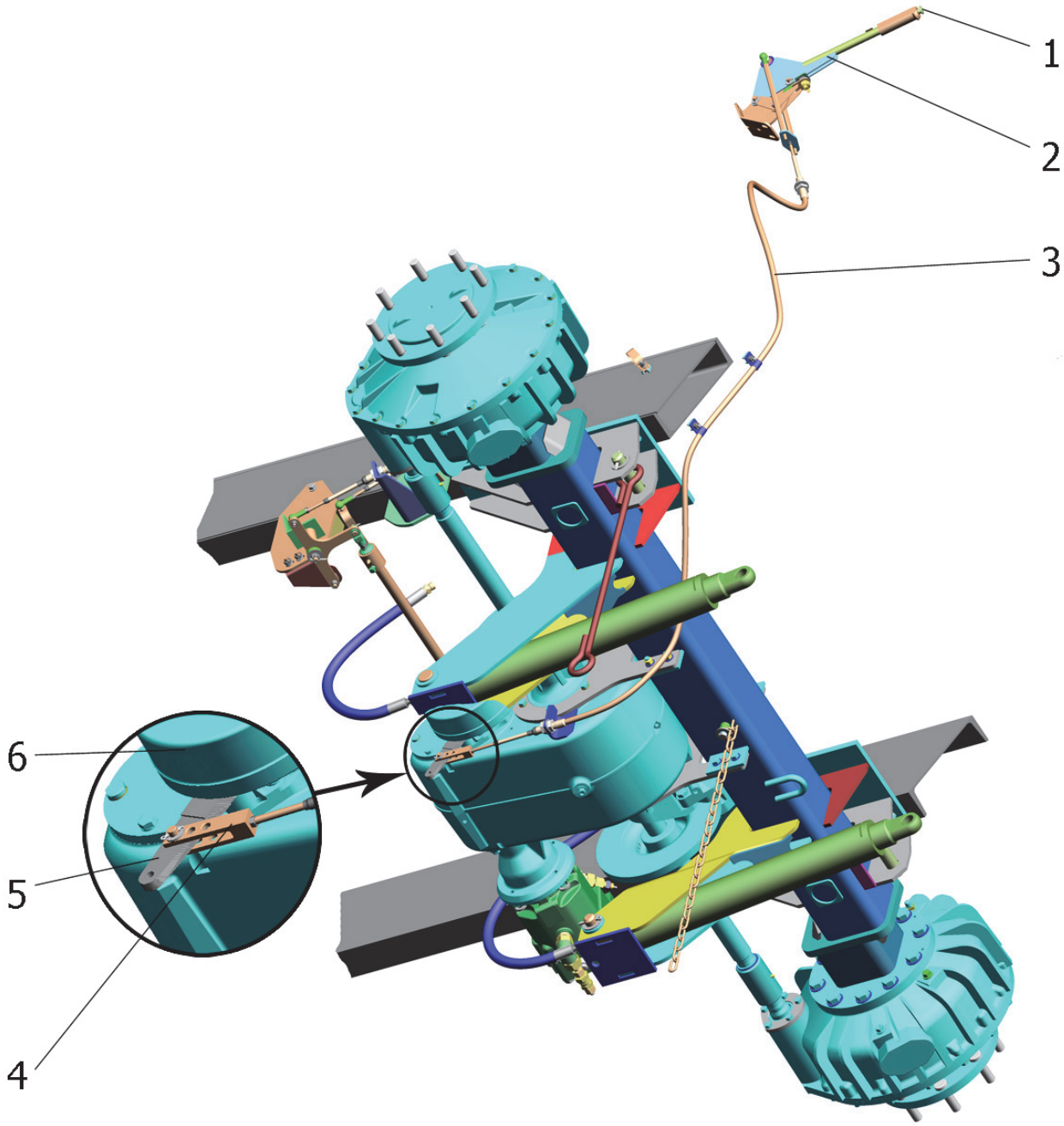
Always disconnect the "ground" cable from SB prior to any operations related to the electric system.

ATTENTION! ALWAYS DISCONNECT SB BEFORE CHARGING. CHARGING CAN GO SLOWER WHEN SOME POWER CONSUMERS ARE PRESENT IN THE SYSTEM. SB CHARGERS MAY ALSO CAUSE VOLTAGE DROPS THAT MAY LEAD TO THE DAMAGE OF ELECTRONIC COMPONENTS.

If the harvester is not operated for a long time,SB shall be removed and stored in a cool and dry place. Charge SB not less often than once in three months to prevent destruction of their plates. Weekly, at idle running wash the exterior of SB, clear oxides off the terminals, grease SB and cable terminals, check ventilation holes in filler caps for clogging.

6.10.3 Storage Batteries Deactivation

SB switch is located in the rear part of the harvester under its hood and is designed for SB "+" terminal disconnection from the harvester electric equipment system.



1- control button; 2- lever; 3- parking brake remote control cable; 4- clevis; 5- parking brake drive lever; 6- parking brake

Figure 6.38 – Setting of parking brake

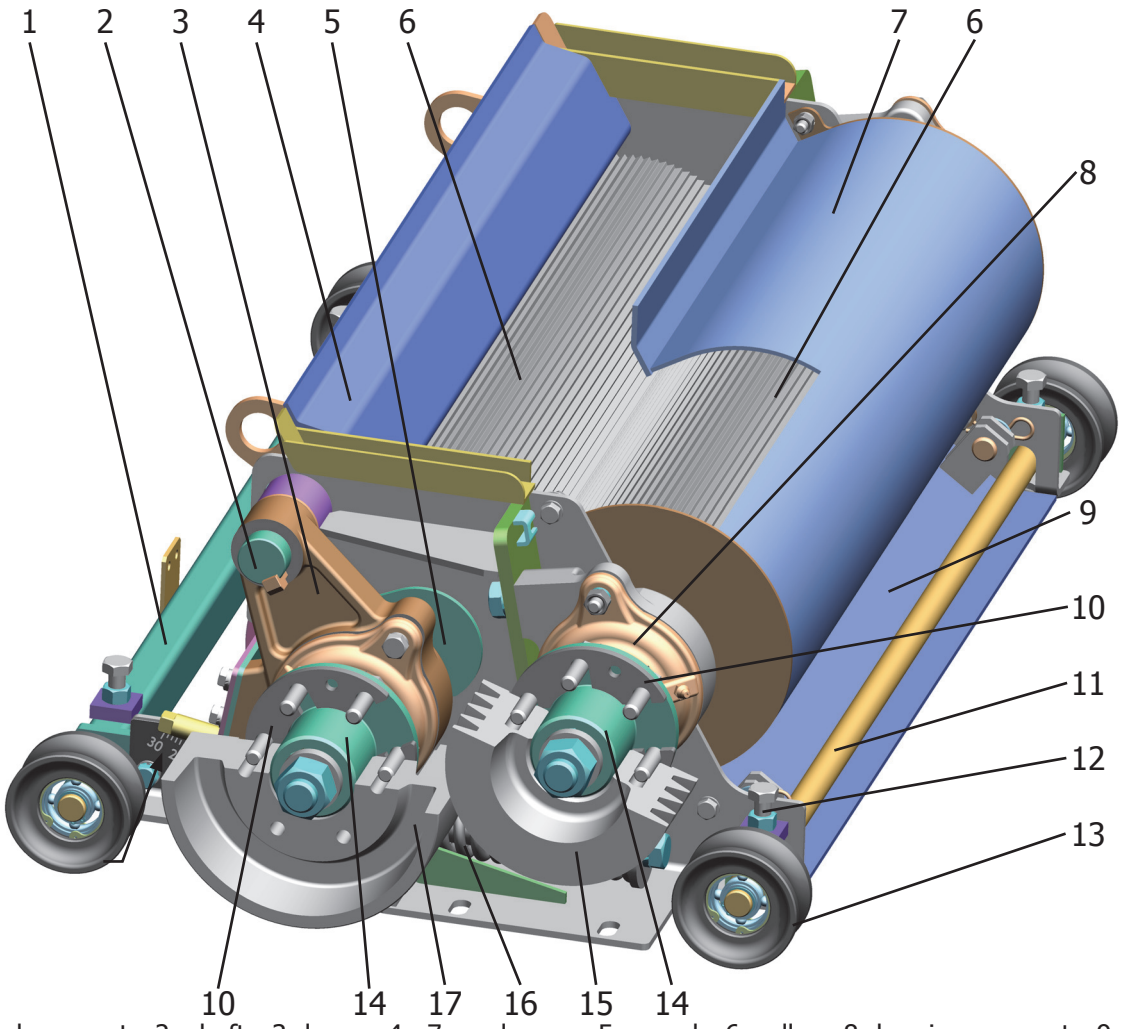
ATTENTION! THE SB SWITCHER MAY ONLY BE USED AT DEACTIVATED IGNITION (KEY IN THE "0" POSITION OR PULLED OUT) AND NOT EARLIER THAN IN 10 SECONDS AFTER ITS DEACTIVATION. IT IS REQUIRED FOR THE INFORMATION TO BE RECORDED INTO THE ENGINE CONTROL MEMORY.

6.11 Corn Cracker Kit

6.11.1 General

Corn cracker kit is designed for harvester modification in order to achieve more thorough crushing of corn in its yellow ripeness or full ripeness phase.

The corn cracker consists of wheel support 1 (Figure 6.39), shaft 2, levers 3, enclosure 4, guards 5, rollers 6, enclosure 7, bearing supports 8, frame 9, adjusting washers 10, front wheel axis 11, adjust-



1- wheel support; 2- shaft; 3- lever; 4, 7- enclosure; 5- guard; 6- roller; 8- bearing support; 9- frame; 10- adjusting washer; 11- front wheel axis; 12- adjusting bolt; 13- wheel; 14- hub; 15- pulley; 16- spring; 17- smooth pulley

Figure 6.39 – Corn cracker

ing bolts 12, wheels 13, hub 14, pulley 15, springs 16, smooth pulley 17.

6.11.2 Corn Cracker Settings

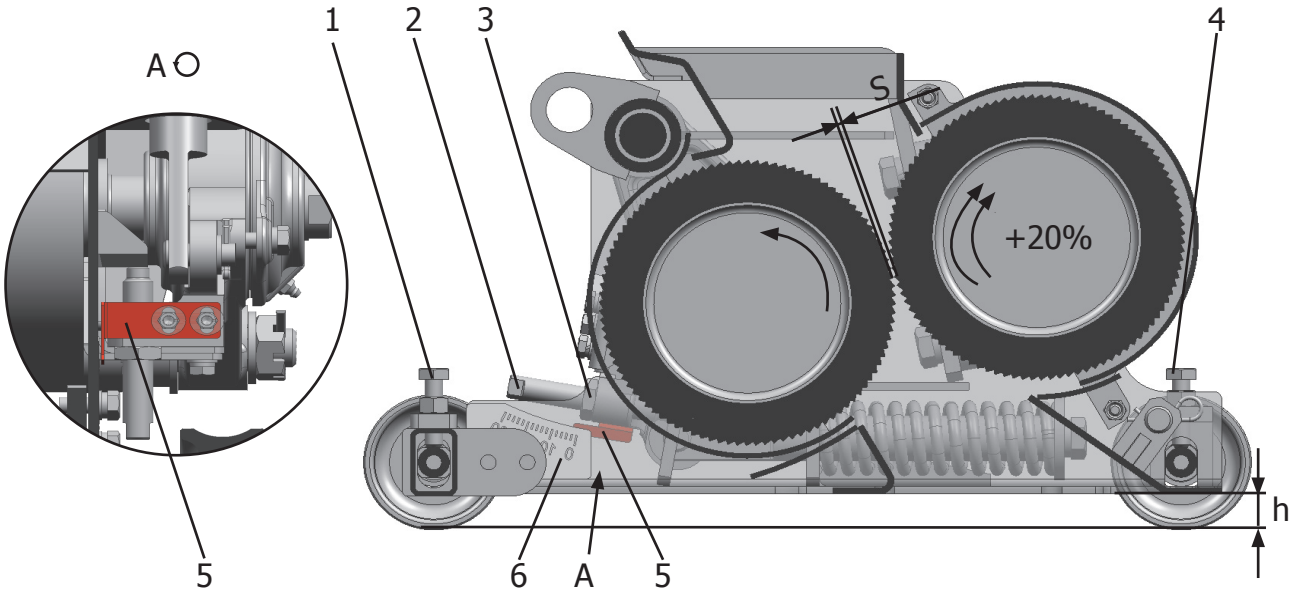
6.11.2.1 Corn crushing and rolling is provided by means of two riffled rollers which rotate in the opposite direction at the rate difference of 20%.

Prior to corn cracker installation, monitor the correctness of clearance between rollers S (Figure 6.40) and pointer 5.

The manufacturer sets the minimum clearance S from 1 to 1.5 mm. The minimum clearance S is fixed by stud 2 and locknut 3, pointer 5 is set to the "0" position according to scale 6 on both sides, due to the slots.

ATTENTION! IN ORDER TO AVOID AN EMERGENCY DAMAGE, DO NOT REDUCE THE CLEARANCE AS THE ROLLERS SHALL NOT COME IN CONTACT. POINTER LOCATION IN THE "0" SECTOR OF THE SCALE SHALL CORRESPOND TO THE INTER-ROLLER CLEARANCE OF 1-1.5 mm ON BOTH SIDES.

Operating clearance between the rollers shall be set by means of stud 2 and locknut 3 according to scale 6, it shall be the same on both sides. One scale mark corresponds to 2 mm of inter-roller clear-



1, 4- adjustment bolts; 2- stud; 3- locknut; 5- pointer; 6- scale

Figure 6.40

ance.

Reduced clearance increases corn crushing degree but decreases harvester throughput.

It is recommended to use the corn cracker for yellow ripe or fully ripe corn harvesting:

- for the yellow ripeness phase, the clearance shall be set between 4 mm and 6 mm according to Table 6.1;

- for the full ripeness phase, the clearance shall be set between 2 mm and 4 mm.

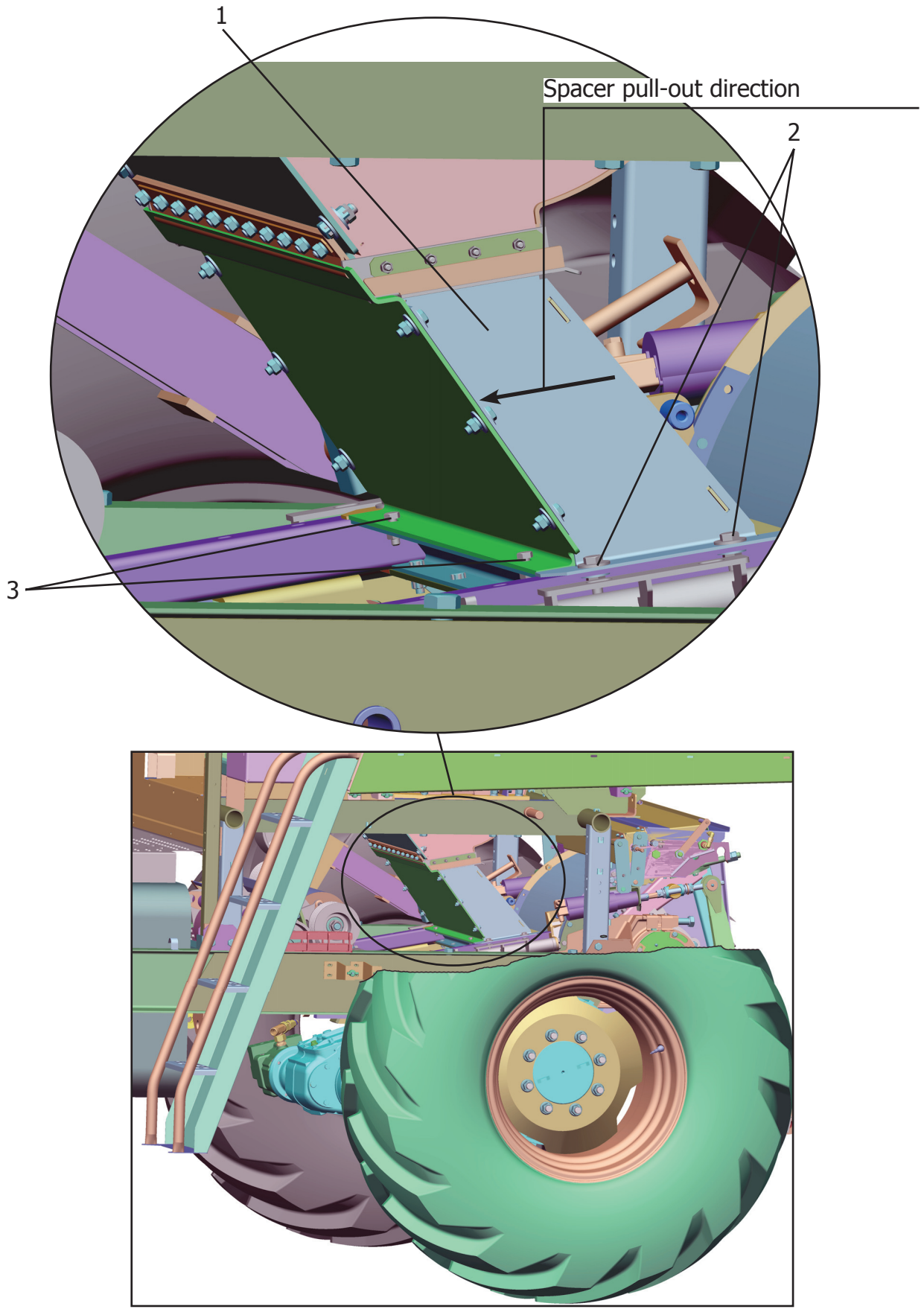
It is recommended to set the feeder cutting length of 10 or 17 mm.

To harvest herbs and corn of milky or milky-yellow ripeness, as well as for operation with a pickup instead of the corn cracker, spacer 1 (Figure 6.41) shall be installed.

6.11.2.2 In order to facilitate corn cracker movement along the guides and to provide complete tightness of corn cracker frame mounting surface against the diffuser mounting surface at corn cracker installation in its operating position, the corn

Table 6.1. Corn ripeness phases

Ripeness phase	Characteristic	Moisture content,%		
		Stalk	Leaf	Grain
Milky	The number of grains per ear reaches normal. Food-value and weight of grains is small	90-92	88-90	90-92
Milky-yellow	The contents of the majority of grains are of milky consistency, the other are of wax consistency	80-90	78-92	70-82
Yellow	The contents of the majority of grains is waxy-plastic	50-70	60-70	35-40
Full	Grains are fully ripe, other parts begin to die	40-60	15-35	30-20



1 - spacer; 2, 3 - bolting

Figure 6.41 – Spacer installation

cracker structure envisages clearance h adjustment (Figure 6.40). Prior to corn cracker installation on the harvester, it is recommended to set clearance h of 24 mm by means of adjusting bolts 1, 4.

6.11.3 Corn Cracker Installation on the Harvester

The corn cracker is installed on the harvester directly from the ground without involvement of any additional equipment.

The corn cracker kit shall be installed on the harvester in the following order:

- unscrew ladders bolting 3 in points A and B (Figure 6.42) on both sides of the harvester;

- turn the ladders to the repair position;

ATTENTION! IN ORDER TO AVOID THE SWING BRACKET DAMAGE USING THE LADDER IN REPAIR POSITION IS NOT ALLOWED;

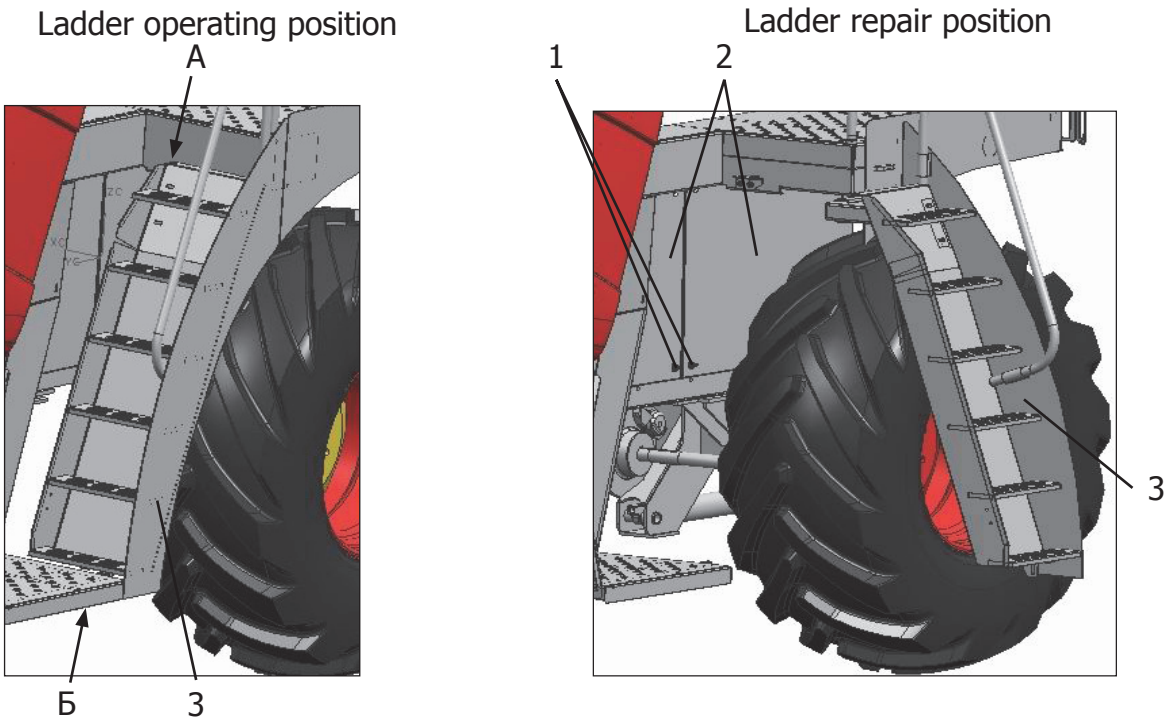
- unscrew special nuts 1 and remove front side guards 2 from both sides;

- remove bolting 2, 3 (Figure 6.41) of the spacer and remove spacer 1;

- after removal, clean the operating area, joints and mating surfaces from herbal mass and dirt;

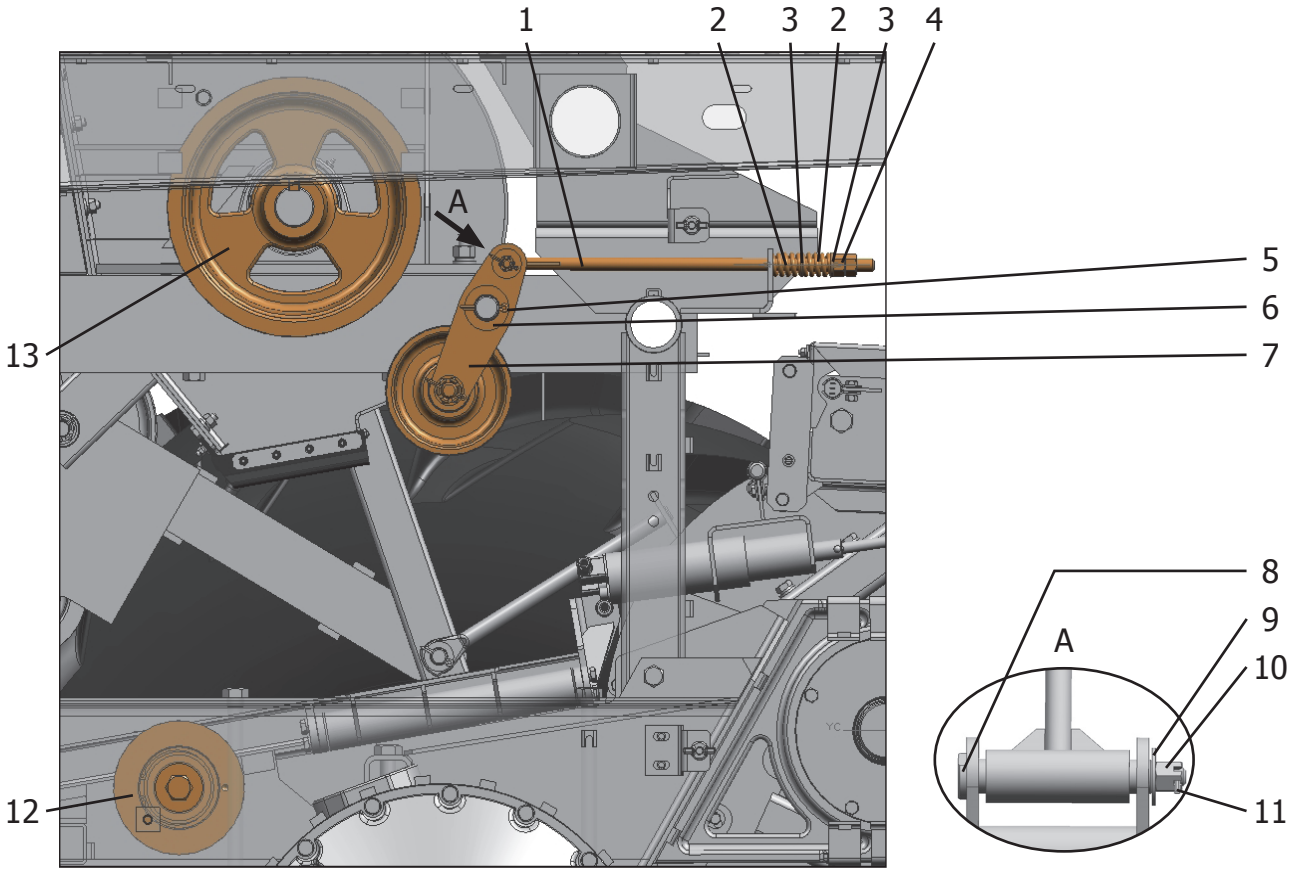
- install idler 7 (Figure 6.43) on the platform frame axis, apply Litol-24 GOST 21150-87 to the axis surface prior to installation, secure the pulley by means of C.30 6 washer and 6.3x45 5 cotter pin. Install rod 1 into the hole of the bracket on the platform frame, connect it with the idler by means of axis 8 greased by Litol-24 GOST 21150-87, washer 9, nut 10, cotter pin 11. Install spring 2, washer 3, spring 2, washer 3, nuts 4 on the opposite end of the rod in the specified sequence;

- install bypass pulley 1 (Figure 6.44) in the hole of the bushing on the frame, set the preliminary clearance of 17 mm between the bypass pulley and frame chan-



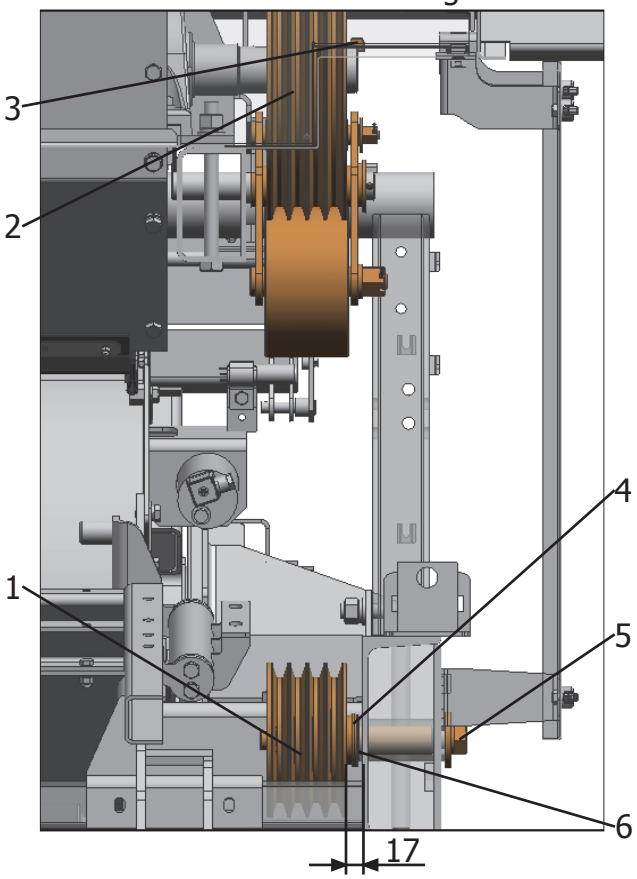
1- special nut; 2- guards; 3- ladder

Figure 6.42 – Ladder installation to repair position



1- rod; 2- spring; 3, 6 - washer; 4- nut (M16); 5- cotter pin; 7- idler; 8- axis; 9- washer (C 12x2); 10- nut (M12); 11- cotter pin (3,2x32); 12- bypass pulley; 13- accelerator pulley

Figure 6.43 – Pulleys installation



1 - bypass pulley; 2 - accelerator pulley; 3gib-head key (14x9x90); 4 - washer (C.30) (max. 4 pcs); 5 - bolting (bolt (M20), washer (20T), washer (C 20x5); 6- washer (C.30x2) (max. 2 pcs)

Figure 6.44 – Pulleys installation

nel by means of installation of washers 4, 6 in the required amount, secure the bypass pulley by bolting 5;

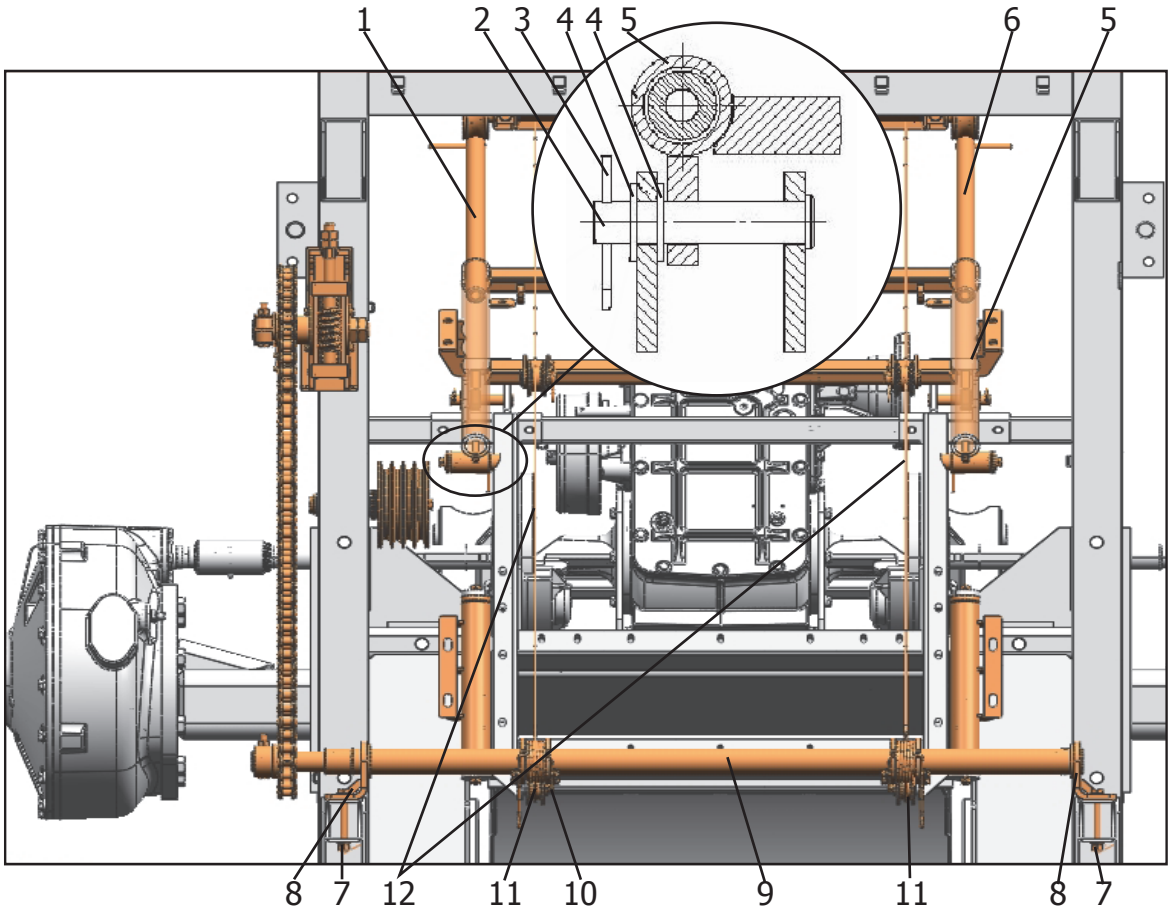
- install accelerator pulley 2 on the accelerator shaft, install tapered key 3, but do not tap it in to the full.

The final position of bypass pulley and accelerator pulley shall be fixed after the corn cracker is installed to its operating position and belt gear plane is adjusted;

- install brackets 8 (Figure 6.45) on pipe 9. Secure brackets 8 on the platform frame by means of bolting 7;

- install blocks 11 and secure with bolting 10;

- install guides frame 5 into the diffuser frame shoes and secure it by axis 2, washers 4 and cotter pin 3. Guides frame shall be installed symmetrically in relation



1, 6 - guides; 2 - axis; 3 - cotter pin 2.4,5x64; 4 - washer C.20 (max. 8 pcs); 5 - guides frame; 7 - bolting (bolt M12, nut M12, washer 12T, washer C.12); 8 - bracket; 9 - pipe; 10 - bolting (bolt M10, washer 10T, washer C 10x3); 11 - block; 12 - cable

Figure 6.45 – Corn cracker kit elements installation

to diffuser frame channels. A permissible transversal play shall not exceed 2 mm. The play shall be adjusted by means of installation of the required amount of washers 4;

- insert guides 1, 6 into the guides frame pipes, transfer the guides frame to the corn cracker lifting position in accordance with Figure 6.46;

- install brackets 9 on both sides of the harvester frame;

- install stop 10 on the harvester frame;

- deliver the corn cracker under the harvester to guides 8. Remove securing plates 1 (Figure 6.47), unscrew bolting 3 to unwind cables 2. Cables 7 (Figure 6.46) shall be laid in accordance with Figure 6.50;

- fix both cables on the corn cracker by means of axes 2 (Figure 6.53), cotter pins 1, washers 3;

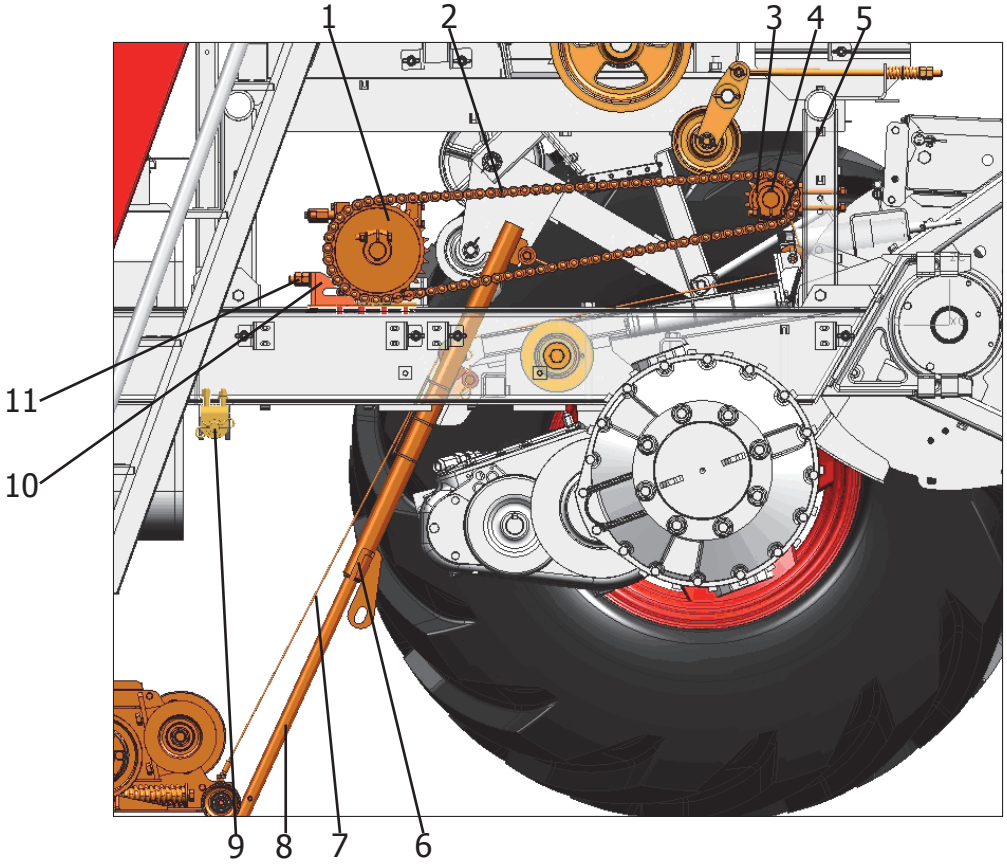
- install reduction gear 1 (Figure 6.46) into the slots and hole of stop 10 of the harvester frame;

- install sprocket 3, key 4 on pipe 9 (Figure 6.45), tighten by bolting 5 (Figure 6.46);

- install chain 2 on the reduction gear sprocket and sprocket 3. Chain gear flatness shall be adjusted by movement of sprocket 3. Gear plane displacement shall not exceed 3 mm.

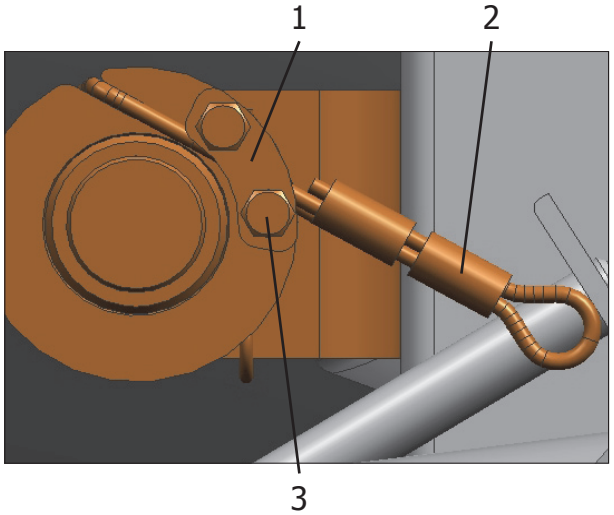
After the chain gear plane is adjusted, sprocket 3 shall be secured.

Chain tension is provided by move-



1 - reduction gear; 2 - chain; 3 - sprocket; 4 - key (12x8x63); 5 - bolting; 6 - guides frame; 7 - cable; 8 - guides; 9 - bracket; 10 - stop; 11 - nut

Figure 6.46 – Corn cracker kit elements installation

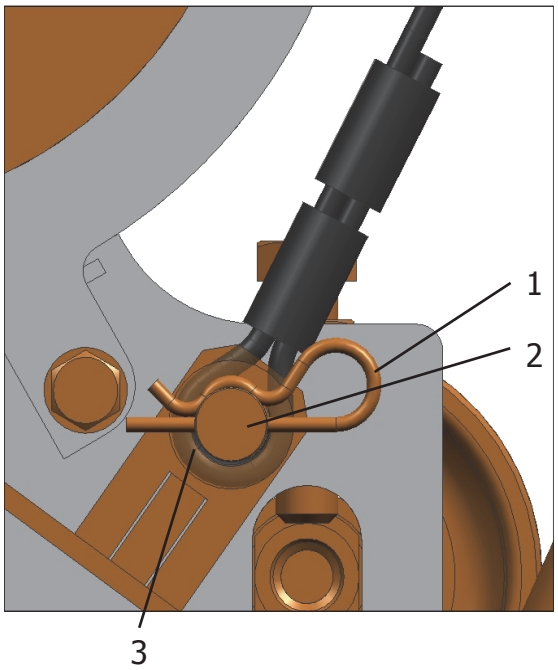


1- plate; 2- cable; 3- bolting (bolt (M8), washer (8T)

Figure 6.47 – Cable fastening on the pipe

ment of reduction gear 1 while tightening nuts 11. The tension shall be monitored in the middle of active chain run under a load of 10-20 N (1-2 kgs) applied at the right angle. The allowed deflection of the active run is 13-19 mm;

- pull corn cracker 4 onto diffuser

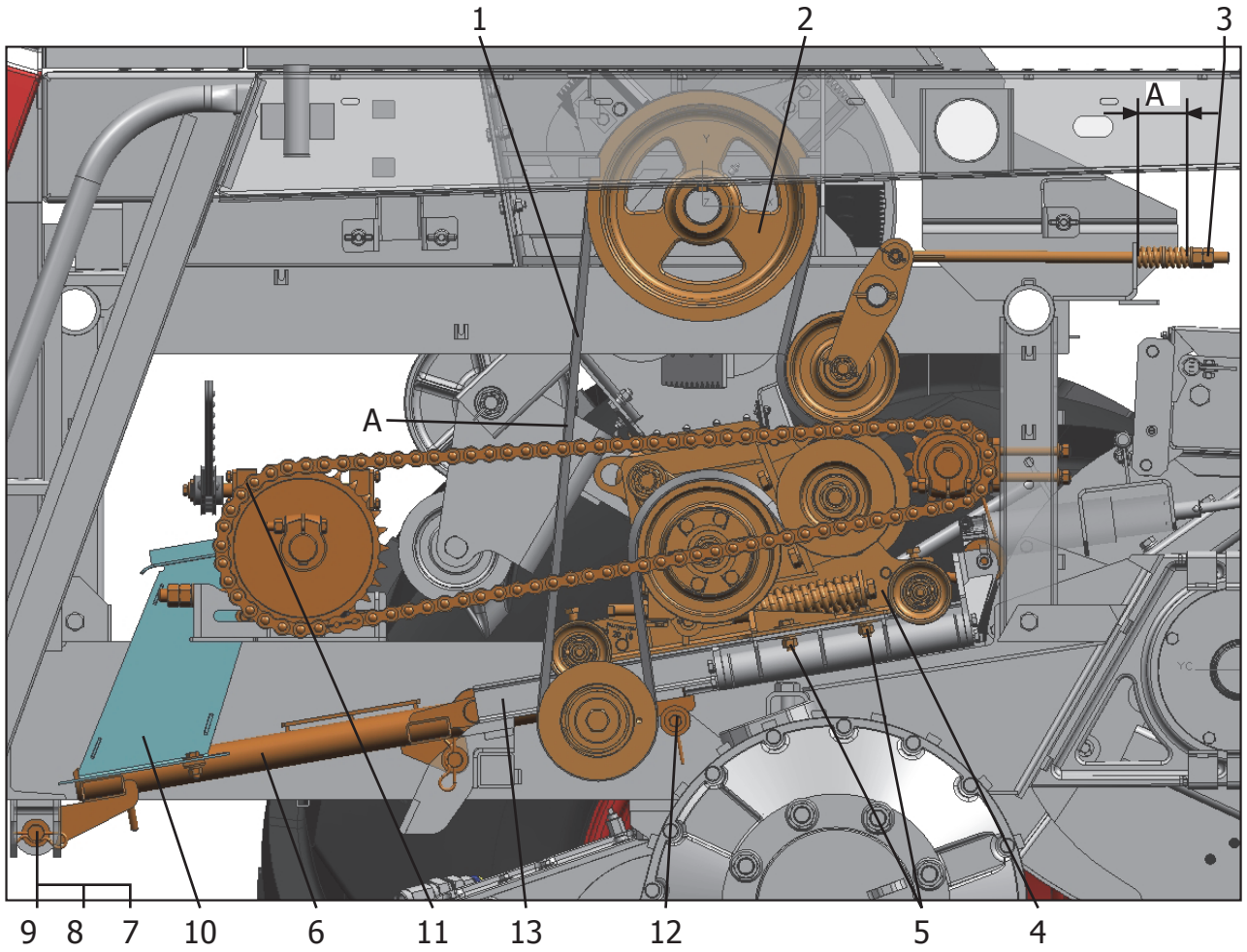


1- cotter pin (2.2,8x40); 2- axis; 3- washer (C 14)

Figure 6.48 – Cable fastening to the corn cracker

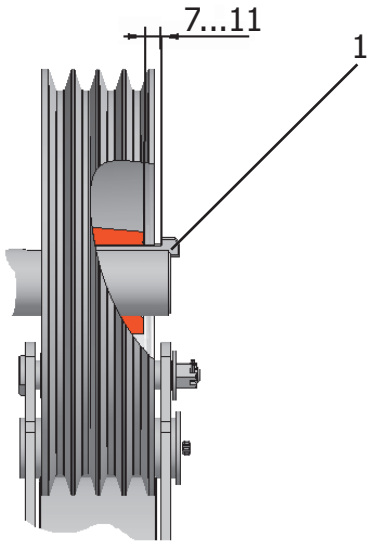
frame 13 by rotating reduction gear worm shaft 11 (Figure 6.49) by means of a wrench.

When corn cracker 4 is pulled



1- belt; 2- accelerator pulley; 3- nut; 4- corn cracker; 5- bolting (bolt (M12), nut (M12), washer (12T), washer (C 12); 6- guides frame; 7- cotter pin (2.4,5x64); 8- axis; 9- washer (C.22x3,9); 10- spacer; 11- reduction gear; 12- guides frame fastener; 13- diffuser frame

Figure 6.49 – Corn cracker operating position



1- gib-head key

Figure 6.50 – Accelerator pulley fixation

completely onto guides frame 6, guides 8 (Figure 6.46) shall be inserted into the guides frame pipes and secured in the slots.

When corn cracker 4 (Figure 6.49) approaches diffuser frame 13 guide frame fasteners 12 shall snap shut;

- fix guides frame 6 on both sides by axis 8, cotter pin 7, washer 9.

IT IS FORBIDDEN TO INSTALL OR REMOVE AXIS 8 OF GUIDES FRAME 6 IF GUIDES FRAME FASTENERS 12 ARE NOT SHUT, CORN CRACKER 4 IS NOT NEAR DIFFUSER FRAME 13 AND NOT SECURED WITH CABLES. LOOSENING OF CABLES FOR MORE THAN HALF-TURN OF PIPE 9 (FIGURE 6.45) IS NOT ALLOWED.

After the corn cracker is installed on the harvester it shall be transferred either to operating or to transport position.

6.11.4 Corn Cracker Installation to the Operating Position

Corn cracker shall be installed to the operating position in the following order:

- pull the cracker under the accelerator into the transport channel area by rotating reduction gear worm shaft 11 (Figure 6.49). Th corn cracker neck front wall shall stop at the rubber located at the accelerator inner wall;

- secure corn cracker 4 on diffuser frame 13 by bolting 5;

During fastener installation, corn cracker 4 shall remain on the diffuser frame. The required tightness is achieved by cracker adjustment by height (see p. 6.11.2.2);

- check the flatness of the accelerator-corn cracker belt gear. Pulleys deviation from the general plane shall not exceed 2 mm.

Accelerator-corn cracker belt gear flatness shall be adjusted by moving accelerator pulley 2 (Figure 6.44). If required, a possibility to move bypass pulley 1 by means of adjusting washers 4, 6 installation and cracker pulleys 15, 17 (Figure 6.39) movement by means of adjusting washers 6, 10 installation is provided.

After the gear plane is adjusted, accelerator pulley 2 (Figure 6.49) shall be finally secured by gib-head key 1 in accordance with Figure 6.49.

- install belt 1 in accordance with Figure 6.49;

Belt tension shall be provided by tightening nuts 3. Deflection in the middle of belt A active run at effort of 60 N (6 kgs) shall be 14-20 mm, which corresponds to the size of 77 mm on the tensioner rod;

- install spacer 10 to transport position and secure by bolting 3 (Figure 6.41) of the spacer;

- remove the ratchet wrench from the worm shaft, remove front side guards and reinstall the ladders.

6.11.5 Corn Cracker Installation to the Transport Position

If it is required to operate the harvester with the spacer, the corn cracker shall be transfered to the transport position.

Corn cracker shall be installed to the transport position in the following order:

- fold the ladders, remove front side guards, install the wrench on the worm shaft;

- loosen the belt tensioning, remove the belt;

- remove the spacer from the transport position;

- check the attachment of cables to the corn cracker. Remove the fasteners which attach the corn cracker to the diffuser frame;

- unwind the cables for pipe half-turn by rotating reduction gears worm shaft. If corn cracker movement under its own weight has not begun, adjust the cracker position by height above the diffuser frame (set clearance from 1 to 2 mm) and pull it from the place by the rear wheel axis;

IT IS FORBIDDEN TO REMOVE THE FASTENERS WHICH ATTACH THE

CORN CRACKER TO THE DIFFUSER FRAME IF THE CABLES ARE NOT SECURED IN THE CRACKER OR ARE UNWINDED FOR MORE THAN PIPE 9 HALF-TURN (FIGURE 6.45);

- move the corn cracker to its transport position (Figure 6.51) by unwinding the cables and rotating the reduction gear worm shaft, fix the unit by its bolting;

- detach the cables from the corn cracker and wind it to the pipe, fix in accordance with Figure 6.46;

- install spacer 1 (Figure 6.51) in the transport channel and secure it by spacer bolting 2, 3;

- reinstall front side guards 2 (Figure 6.42) and ladders 3.

6.11.6 Corn Cracker Removal from the Harvester

Corn cracker shall be removed from the harvester in the following order:

- fold the ladders, remove front side guards, install the wrench on the worm shaft;

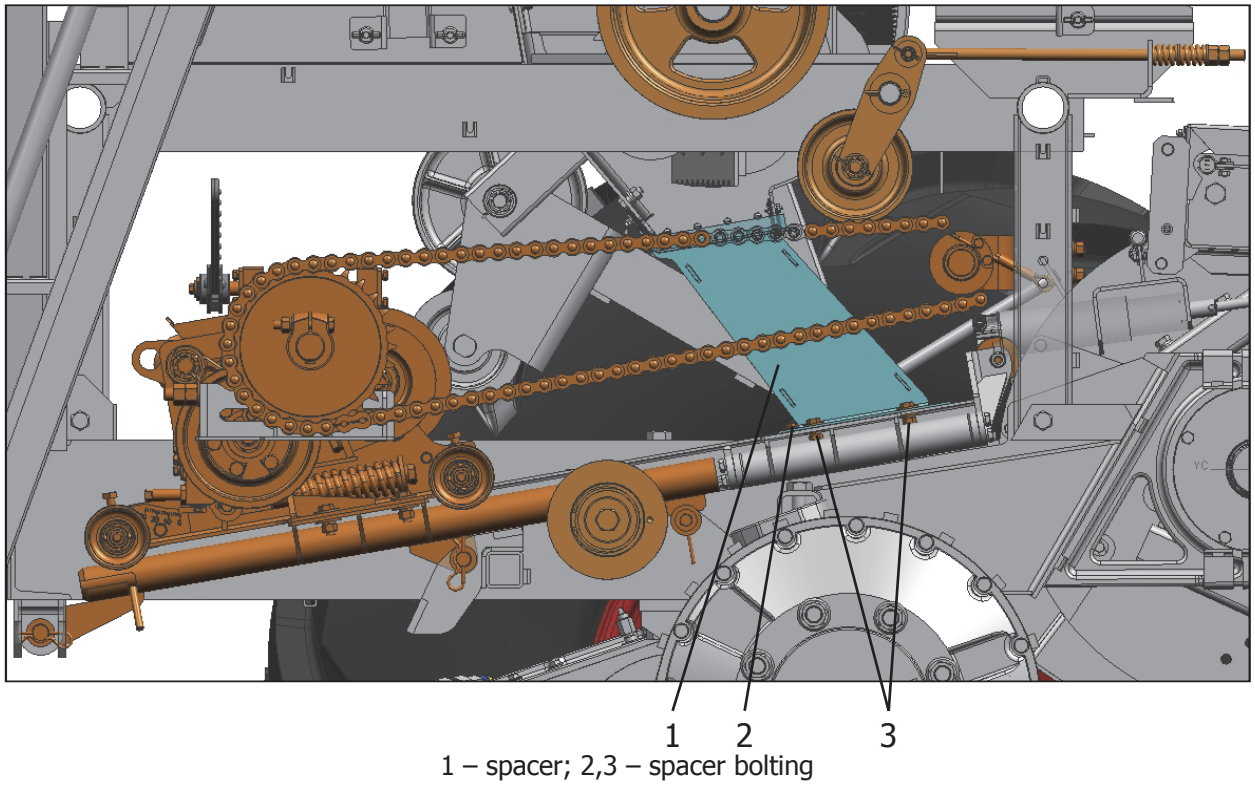
- if the corn cracker is in its operating position, perform the sequence of its transfer to the transport position. If the cracker is in the transport position, remove the spacer, secure the cables on the cracker, remove the cracker bolting and pull the unit into the diffuser frame 13 (Figure 6.48) area;

- remove cotter pin 7, washer 9, axis 8 fastening the guides frame to the harvester frame;

- disengage guides frame fasteners from the diffuser frame;

- move the corn cracker down the guides frame by unwinding the cables and rotating the reduction gear worm shaft. When the guides frame pipes are on the diffuser frame shoes, pull out guides 8 (Figure 6.46) to the corn cracker lowering position.

IT IS FORBIDDEN TO REMOVE



1 – spacer; 2,3 – spacer bolting

Figure 6.51 – Corn cracker transport position

THE AXES FASTENING THE GUIDES FRAME TO THE HARVESTER FRAME AND TO DISENGAGE GUIDES FRAME FASTENERS 12 (FIGURE 6.49), IF CORN CRACKER 4 IS NOT NEAR DIFFUSER FRAME 13 AND NOT SECURED WITH CABLES. LOOSENING OF CABLES FOR MORE THAN HALF-TURN OF PIPE 9 (FIGURE 6.45) IS NOT ALLOWED.

6.11.7 Monitoring of Cracker Rollers Wear

After corn harvesting, check the cracker rollers for wear and replace with new rollers, if necessary.

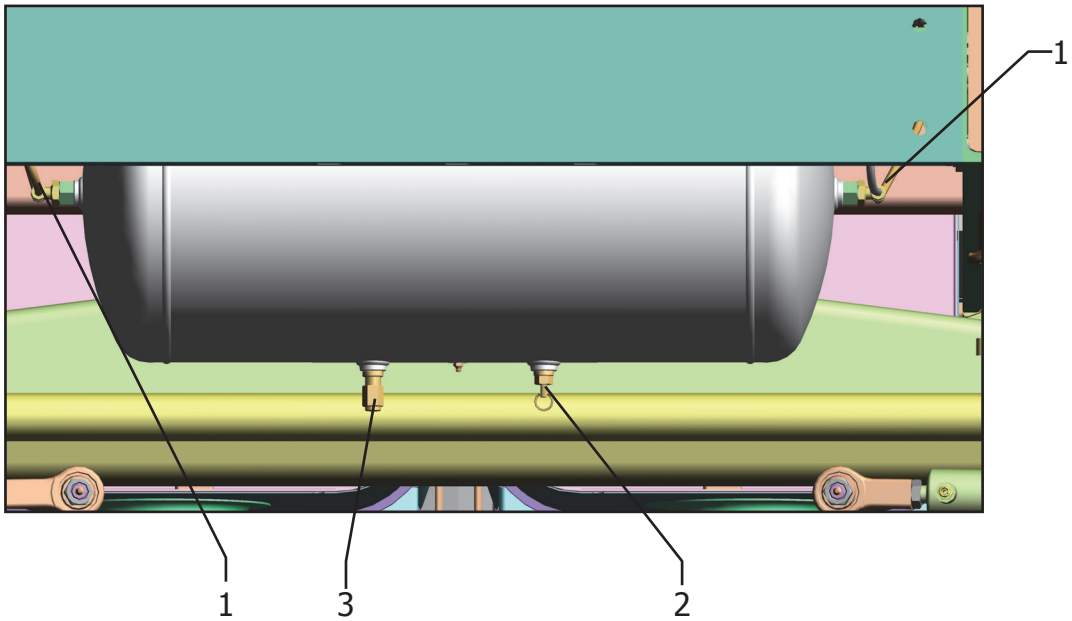
Corn cracker rollers do not wear uniformly along their full length. The first sign of rollers wear is frequent wear of the transport channel before the cracker and low quality of crushing.

6.12 Pneumatic Unit Operation

The pneumatic unit consists of two parts, one of them is designed for harvester PAU cleaning and tire pumping, the second one is used by SCR and reviewed in Section 6.8.4. Pneumatic principal diagram is provided in Appendix E.

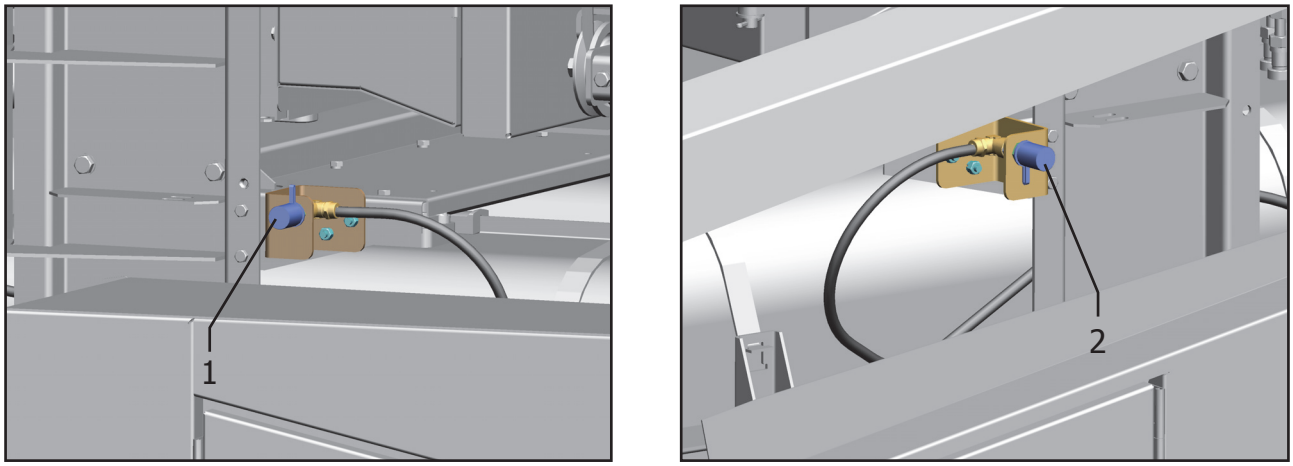
Harvester parts and assemblies cleaning and tire pumping system consists of:

- pneumatic compressor 5 (installed on the combustion engine) (Figure 6.26);
- receiver 10 (mounted on the frame in the rear part of the harvester);
- air-dryer with pressure controller 16;
- manometer 3;
- safety valve 2 (Figure 6.52);
- condensate drain valve 3;
- connection sockets 1, 2 (Figure 6.53);
- pneumatic blowguns 4, 5



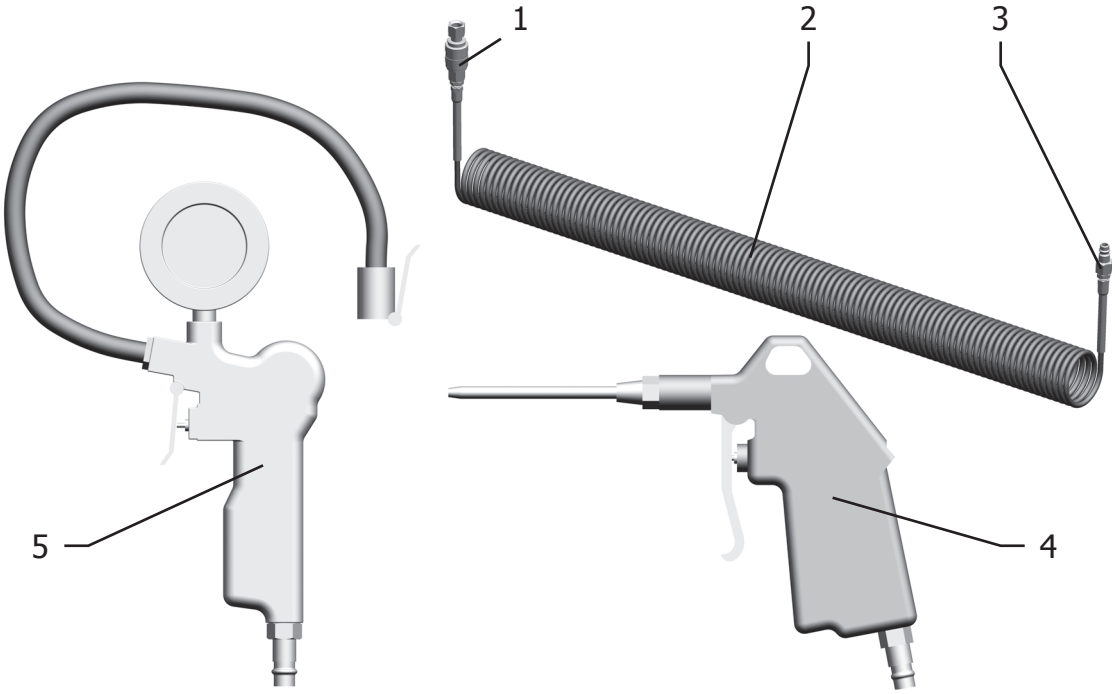
1- system pipeline; 2- condensate drain valve; 3- safety valve

Figure 6.52 – Receiver



1, 2- connection socket

Figure 6.53 – Connection points



1- detachable connector; 2- connector pipe; 3- jackplug; 4, 5- pneumatic blowgun

Figure 6.54 – Pneumatic unit kit

(Figure 6.54) from the pneumatic accessories kit (Table A.4 of Appendix A) with connector pipe 2;

- system pipelines 1 (Figure 6.52).

The compressor starts automatically when the engine is activated. For system pressure regulation, air-dryer with pressure controller 16 (Figure 6.26) is provided, which is installed on the harvester air filter frame. The pressure controller provides pressure of 8.5+/-0.2 bar.

ATTENTION! COMPRESSOR MAINTENANCE SHALL BE PERFORMED ACCORDING TO ENGINE OPERATION MANUAL.

Manometer 3 is installed to provide pressure control on the left rear riser of the hood frame. In order to protect the pneumatic system against excessive pressure the receiver is equipped with safety valve 3 (Figure 6.53) which triggers at 10 bar pressure. The valve is set-up by the manufacturer and does not require any additional adjustment.

Two connection points for

compressed air intake are provided at the harvester (connection sockets 1, 2 (Figure 6.53). One point is located on the left side of the harvester on the bracket fixed upon the radiators unit between the upper and the lower enclosures of the main drive belt. The second point is located on the right side of the harvester on the bracket fixed upon the radiators unit above the tool box.

Pneumatic blowguns 4 and 5 (Figure 6.54) with connector pipe 2 are located in the tool box. Blowgun 4 with a nozzle serves for blow-off and cleaning of harvester nodes and assemblies, blowgun 5 has a built-in manometer for tire pressure measurement and a connector hose for tire inflation. Connector pipe 2 connects the blowguns to the main system. One end of the pipe is provided with jack-plug 3, which is connected to one of the connection points, the other end has a detachable connector 1 for connection of one blowgun.

Prior to pneumatic blowguns and connector pipe installation:

- connect the blowgun (for tire pumping or for blowing) to the pipe, having preliminarily ensured that connecting elements are free of dirt;

- remove the safety cap from one of the connection sockets, make sure that the connecting elements are free of dirt and make the connection.

6.13 Multifunctional Preservative Application System

The multifunctional preservative application system is designed for high-concentration or diluted fluid preservative dosing to the silage during its preparation. The preservative is applied in the form of sprayed mist through the pneumatic spray nozzle with or without additional water.

The order of operator's action during multifunctional preservative application system operation is described in the attached preservative dosing unit operation manual.

6.14 Stone and Metal Detector

Stone and metal detector is the system designed to prevent metal and firm foreign objects ingress into the feeder by means of their detection and generation of a signal for feeder stop.

The boost unit is installed to increase the speed of feeder stop (located under the cab) and provides the minimum time between detection of foreign objects in the feed mass and termination of feed mass delivery to the shredder.

Operational documentation of the stone and metal detector is included into the harvester operational documentation set.

The stone and metal detector includes two channels of foreign objects detection:

- ferromagnetic object detection channel;

- large-sized objects (stones) detection channel.

By means of the ferromagnetic object detection channel the stone and metal detector is able to detect magnetic objects getting between the front rollers of the feeder. The possibility of metal part detection in this area depends on its size, shape and movement speed in relation to the metal sensor located in the front lower harvester roller, that is why there is no strictly defined level (size, weight) of metal objects detection in the harvested crop.

By means of large-sized objects detection channel the stone and metal detector is able to detect objects capable of causing acute impact displacement of the feeder upper roller. The detection capability depends on the foreign object size, form and weight, its hardness and movement speed, its position in the flow of the harvested material, as well as the point of contact with the feeder upper roller, that is why there is no strictly defined level (size, weight) of objects detection in the harvested crop.

CAUTION! DUE TO THE FACT THAT THE POSSIBILITY OF DETECTION OF FOREIGN OBJECTS BY MEANS OF A STONE AND METAL DETECTOR DEPENDS ON A SERIES OF RANDOM FACTORS, AND NO STRICTLY DETERMINED LEVEL OF DETECTION OF FOREIGN METAL AND NON-METAL OBJECTS IN THE HARVEST CAN BE GUARANTEED, THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY DAMAGE OF THE HARVESTER CAUSED BY INGRESS OF FOREIGN METAL AND NON-METAL OBJECTS TOGETHER WITH THE HARVEST!

The procedure of stone and metal detector operation is detailed in its operational documentation.

After the stone and metal detector is powered (if the ignition lock key is turned to “I” or “III” position), self-diagnostic is activated and performed. In case of failure, a light and signal indication is displayed on MTM and the stone and metal detector control unit. The failure code is recorded to the MTM events log. After activation, the stone and metal detector is ready to be switched to the operating mode.

If necessary, stone and metal detector sensors sensitivity is adjusted prior to operation.

If the stone and metal detector actuates, the harvested material shall be pushed out of the feeder by activation of reverse until feeding rollers are free from

the material. Then stop the engine and remove a foreign object from the feeder area (together with the harvested material, if necessary), so that it could get into the harvester feeder once again.

Magnetic material objects detected by the metal sensor (examples):

- rake teeth;
- metal tools;
- steel wire;
- pins and metal studs.

Objects that cannot be detected by the metal sensor (examples):

- stainless steel;
- aluminum and parts made of its alloys;
- copper and brass;
- non-ferrous metal parts.

Impact sensor steadily detects any hard objects causing acute impact displacement of the feeder upper roller. These objects include:

- bricks and large stones;
- large pieces of concrete;
- large firm objects made of any metal;
- large pieces of hard wood.

The impact sensor cannot detect objects which do not cause acute impact displacement of the feeder upper roller. Objects destroyed or deformed by feeder rollers, as well as objects which move in or under the harvested material layer cannot be detected as well. These objects include:

- cable, rope, wire;
- plastic products;
- glass products;
- rubber products.

6.15 Belt Gears

All V-belts shall be tightened according to Table f.1 of Appendix E. If new belts are installed, check the tension in the first 2...3 hours of operation. Tighten if necessary.

6.16 Bearing Supports Operation

Provisions related to bearing supports operation are given in Appendix G.

6.17 Automatic Centralized Lubrication System and Corn Cracker Automatic Centralized Lubrication System

ACLS kit and corn cracker ACLS kit

are installed on the harvester. The system is designed to supply lubricant to difficult-to-access friction units of the harvester.

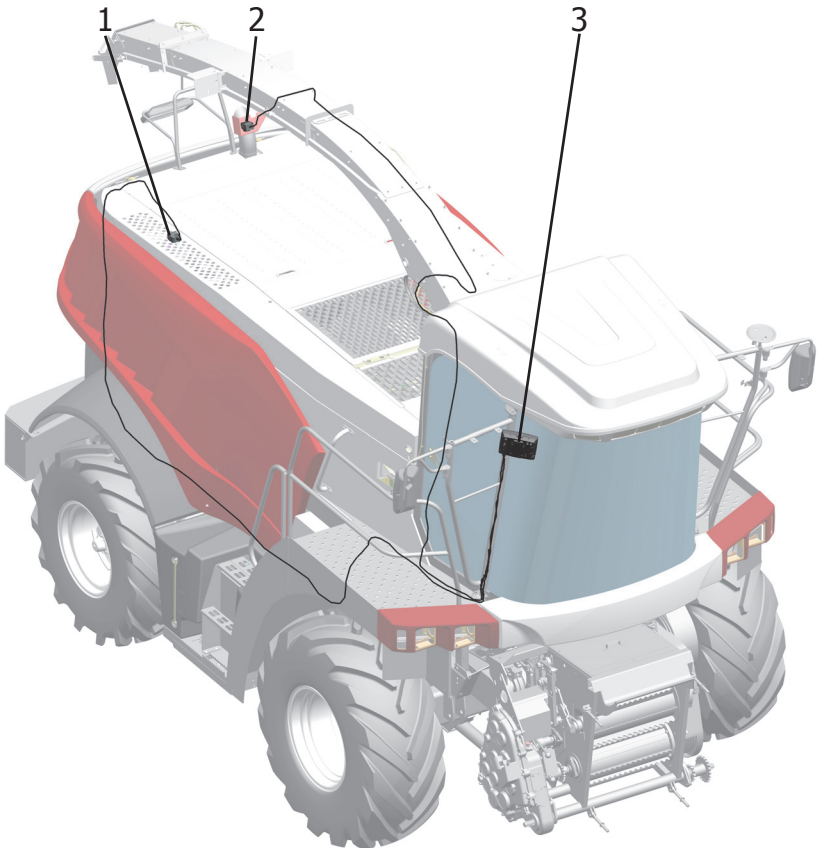
If automatic centralized lubrication system is installed, points which are connected to the system and have lubrication periodicity marks are not subject to manual lubrication. Lubricant is delivered to these points by the lubrication system in the automatic mode.

All necessary information related to safe and economical usage of ACLS is provided in the ACLS operation manual supplied with the harvester equipped with the system.

6.18 Video Monitoring System Operation

Video monitoring system is either installed at the harvester or supplied upon an individual customer request.

Video monitoring system which includes two video cameras is installed on the harvester. Video camera 2 (Figure 6.55) on the tower is designed to monitor unloading to the vehicle bed from the operator's workplace. Video camera 1 on the rear hood is designed to facilitate backwards movement as well as to monitor hitch mating with the wagon.



1, 2 - video camera; 3 -MTM

Figure 6.55

The image from both video cameras is displayed on the screen of harvester cab MTM located on the right forward pillar. MTM is fixed by means of a special ball bracket permitting to set it at an angle convenient for the operator.

Visibility area is adjusted in horizontal and vertical planes by turning of video camera 2 body in the fixation bracket.

6.19 Electrohydraulic Contour Following System

6.19.1 Control of Contour Following System Automated Modes

Switch 1 (Figure 4.9) enables saving (programming) of the first/second position of the feeder, as well activating of the position for a turn.

To save the feeder position:

- adjust the longitudinal position of the feeder by means of switch 1;

- press switch 4 up or down for approx. 3 seconds, MTM will generate the confirmation audio signal while pointer of the second saved position 2 (Figure 6.56) or pointer of the first saved position 7 moves to the corresponding position at the pickup ground pressure indicator 1 or feeder position indicator 3.

CAUTION!

- POSITION OF SECOND SAVED POSITION POINTER 2, TRANSPORT POSITION POINTER 4 AND FIRST SAVED POSITION POINTER 7 DEPENDS ON THE PROGRAMMED VALUES;

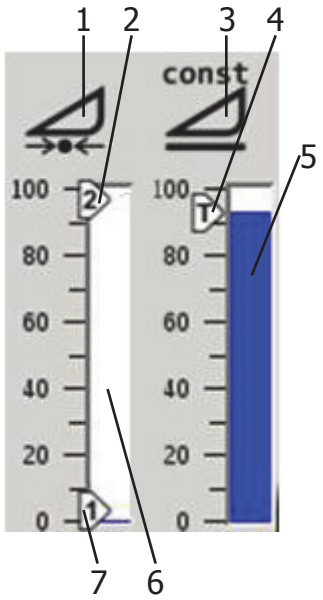
- FILLING OF FEEDER POSITION SCALE 5 AND PICKUP GROUND PRESSURE SCALE 6 DEPENDS ON THE CURRENT POSITION OF THE PICKUP AND FEEDER.

Pickup position saved preliminarily for a solid surface does not consider harvester wheels submersion into the soft soil of the field, that is why the feeder position is recommended to be saved directly in the field.

CAUTION! Mode of maintaining of saved position (of the crop feed elevator, cutting height or pressure) and position of the index on scale shall be defined depending on the option selected in the SETTINGS/CFS mode of MTM. The selected option may be changed, if necessary.

To activate the automatic mode of saved position maintaining:

- press and release switch 4 (Figure 4.9) up or down, pointer of the second saved position 2



1 - pickup ground pressure indicator; 2 - pointer of the second saved position; 3 -feeder position indicator; 4 - transport position pointer; 5 - feeder position scale; 6 - pickup ground pressure scale; 7 - pointer of the first saved position

Figure 6.56 – CFS indicators on the MTM screen in the COMBINING frame

(Figure 6.56) or pointer of the first saved position 7 is highlighted by a black frame, the pickup moves automatically and is maintained in the saved position according to the option selected in the SETTINGS/CFS mode of MTM.

To activate the pickup turn, press and release switch 4 (Figure 4.9) up or down twice, transport position pointer 4 (Figure 6.56) is highlighted by a black frame, and the feeder is automatically lifted.

Turn position is adjusted in the SETTINGS/CFS mode of MTM.

CAUTION! WHEN THE FEEDER IS POSITIONED ABOVE TRANSPORT POSITION POINTER 4 THE COUNT OF THE HARVESTED AREA IS BLOCKED AUTOMATICALLY.

To return to the previous mode, for instance to enter a new stint, press and release switch 4 (Figure 4.9) up or down.

ATTENTION! To deactivate the automatic mode, press and release switch 1 of manual feeder position control.

It is recommended to save two different pickup positions for subsequent fast switching.

Recommendations for selection of feeder saved position maintaining mode in the MTM SETTINGS/CFS section and for its application are provided in Table 6.2.

Table 6.2

Mode	Description
	Feeder position maintaining Use as the basic one. Series compensation (lifting/lowering) in this mode is provided only at pickup contact with soil
	Header ground pressure maintenance. Shall be used as a mode, alternative to the mode of feeder position maintaining in case if operation with minimal cutting height (e.g. for harvesting laid or low height crops) is required. In this mode the pickup slides above the field with a preset pressure caused by series compensation.

Recommendations for modes:

- at small cutting heights in the feeder maintaining mode the adapter may hit the ground and be lifted automatically which is accompanied by activation of  emergency lift indicator above the mode indicator on the MTM screen; sharp poundings may be felt in the cab at the same time To reduce the possibility of such cases it is required to set the maintained position higher.

- in case if the adapter diggers into uneven or cut soil, that gets into the adapter and interrupts feeding of the mass into the feeder, it is required to increase the maintained position. In case it is not acceptable for the current harvesting conditions, use the alternative mode;

- in the mode of maintaining of the feeder position situations are possible when the adapter bottom bumps into field unevens (technical track, furrow, ant hill, mole hill, etc.) while lowering to the set position, which results in alternate lifts and lowerings of the adapter. In such a case, it is required to pass through this uneven point in order to eliminate the contact between the adapter and soil;

- in the pressure maintaining mode reduction of maintained pressure may lead to adapter swinging and bumping into soil while a pressure increase leads to more intense tension of the adapter to soil. Due to this fact it is required to change the maintained pressure depending on harvesting conditions (type and state of harvested crop, required cutting height, soil hardness, etc.): Increase to eliminate swinging or reduce to eliminate digging;

- parameters used in CFS automatic modes may be adjusted for certain harvesting conditions to such a degree up to series compensation of the header position is switched off or response on field unevens is reduced.

6.19.2 Sensor Calibration

Sensors shall be calibrated in order to provide correct operation of CFS in the following cases:

- first installation of a pickup on the harvester;

- replacement with a similar one.

Prior to the first calibration, feeder lifting/lowering speed shall be adjusted.

ATTENTION! THE FEEDER MOVES AUTOMATICALLY UP AND DOWN DURING CALIBRATION, THEREFORE ENSURE THAT THIS MOVEMENT IS SAFE BEFORE START-

ING THE CALIBRATION.

To perform calibration:

- install the harvester on a flat horizontal ground;

- bring the engine to the rated rpm;

- completely lower the pickup;

- enter the SETTINGS/CALIBRATION/ CFS SENSORS section of the MTM menu, MTM generates an audio confirmation signal and the header starts to rise automatically.

ATTENTION! FOR EMERGENCY STOP OF CALIBRATION, PRESS AND RELEASE SWITCH 1 (FIGURE 4.9) ON THE MOTION CONTROL LEVER.

After calibration, check the the feed position sensor data in the "Min" and "Max" columns of the table displayed on the MTM screen. If the values are below 0.7 V or above 4.3 V, adjust the sensor drive and repeat calibration.

Sensor drive is adjusted in the following order:

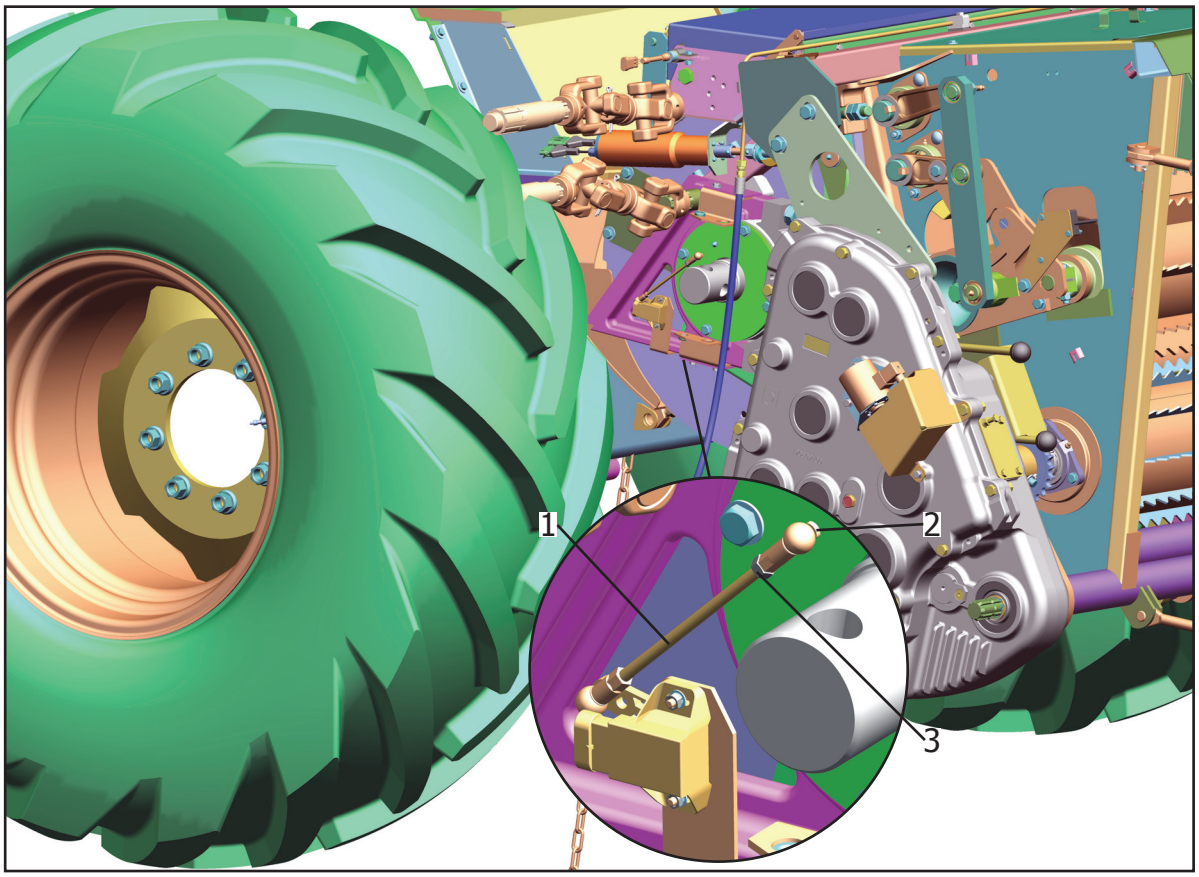
- detach angle hinge 2 (Figure 6.57) from the shredder cover;

- unlock nut 3;

- adjust the length of rod 1 by screwing and unscrewing it;

- lock nut 3;

- reinstall the angle hinge on its



1 - rod; 2 - angle hinge; 3 - nut

Figure 6.57

place.

6.19.3 Adjustment of Feeder Lifting/Lowering Speed

Feeder lifting/lowering speed is adjusted in the SETTINGS/CFS section of the MTM menu.

Factory setting ensures optimal operation of FCFS in average conditions.

For more rapid or slow series compensation of the feeder position it is possible to change speed, if necessary. To do this move the digital pointer to the required position, change the time of complete movement by lifting/lowering the feeder by means of switch 1 (Figure 4.9). You may also increase/reduce the movement speed, increase or reduce the value depicted to the right from the name of the corresponding speed.

ATTENTION! ADJUSTMENT SHALL BE PERFORMED AT A RATED ENGINE SPEED WHEN TEMPERATURE OF OIL IN THE HYDRAULIC SYSTEM IS NOT BELOW 40° C. IN CASE IF SPEED MODULATION RESULTED IN AUTOSWINGING (ALTERNATE LIFTING AND LOWERING OF THE FEEDER) IN AUTOMATIC CFS OPERATION MODES, IT IS REQUIRED TO RETURN TO FACTORY SETTINGS.

6.19.4 Adjustment of Contour Following Parameters

Selection and change of CFS operation parameters adjusting the quality of feeder set position maintaining in automatic modes (Table 6.3) shall be performed in the SETTINGS/CFS mode of MTM. FACTORY SETTINGS ensure optimal operation in average conditions, USER SETTINGS 1, 2 and 3 are designed for selections and changes performed by the user, if necessary.

ATTENTION! It is recommended to change the value of one parameter and check CFS operation in the field, and then change the value of others parameters, if necessary. In case if a change makes quality of set header position maintaining worse, it is required to return to factory settings.

Table 6.3

Parameter	Modification recommendations
ALLOWANCE FOR FEEDER POSITION	Regulates the accuracy of feeder transition to the set position in the feeder position maintaining mode. Value increase will lead to more coarse positioning.
LIFTING THRESHOLD AFTER BUMPING	Regulates the bumping force actuating the emergency lift of the header after its contact with soil in the feeder position maintaining mode. Value reduction decreases the bumping force but may result in frequent lifts; value decrease may lead to insensitivity of header contact with soil.
ALLOWANCE FOR PRESSURE MAINTENANCE	Regulates the maintaining precision of the set header bottom ground pressure in the pressure maintaining mode.
PRESSURE MAINTENANCE DELAY	Regulates time after which the header position series compensation is executed in the pressure maintenance mode. The lower the value is, the less frequently lifting/lowering is performed.
LIFTING/LOWERING DELAY	Regulated time after which the header position series compensation is executed in the feeder position maintaining mode. The lower the value is, the less frequently lifting/lowering is performed.

7 TECHNICAL MAINTENANCE

7.1 General

IT IS FORBIDDEN! TO OPERATE THE HARVESTER WITHOUT TM!

TM is a set of operations related to maintaining of harvester operability during intended operation, running, storage and transportation.

TM includes: adjustment and diagnostics, washing, lubricating and fueling.

TM shall be performed by a special service team or by the operator.

Harvester filling with fuel, oil and water is performed by means of refueling units MZ-3904, 18026 ATO 9994.

Frequency of the harvester TM is given in operating hours. TM frequency may be specified in other units (based on the number of harvested hectares, number of tons of shredded mass, etc.) equivalent to operating hours.

Deviation of the actual frequency (advance or delay) up to 10% is allowed for TM-1, TM-2 and TM-3.

Harvester TM system includes:

- TM during transportation;
- TM during operational trial (preparation performance and completion);
- TM during intended operation (ESM every 10 operating hours, TM-1 every 50 operating hours, TM-2 every 250 operating hours, TM-3 every 500 operating hours);
- TM during storage (preparation for storage, storage period, taking out of storage).

CAUTION! AFTER THE FIRST 50, 100, 500 AND 1000 OPERATING HOURS PERFORM THE OPERATIONS LISTED IN TABLE 7.1 IN ADDITION TO SCHEDULED TM OPERATIONS.

CAUTION! ANY OPERATIONS RELATED TO REPAIR, TM AND CLEANING AS WELL AS FAILURE ELIMINATION SHALL BE PERFORMED ONLY AT DEACTIVATED DRIVE AND ENGINE (THE IGNITION KEY SHALL BE PULLED OUT)!

BEAR IN MIND MOTION OF THE CUTTING DRUM AND OUTPUT ACCELERATOR BY INERTIA!

DURING HARVESTER WASH WITH HIGH-PRESSURE WASHING MACHINES **IT IS FORBIDDEN** TO DIRECT WATER JETS ON ELECTRONIC DEVICES, SENSORS, WIRING TERMINALS, ELECTRIC MECHANISMS, LIGHTNING AND SOUND EQUIPMENT, STORAGE BATTERIES, STARTER, GENERATOR, SEALING GASKETS, FILLER CAPS, ETC.

7.2 List and Recommended Order of Operations for Each Type of Harvester Technical Maintenance

List of operations and TM intervals are given in Table 7.1.

Instruments, tools and equipment required for TM: TM assembly of ATO-9994 type; implements and accessories kit supplied with the harvester; torque wrench.

Materials: rags, brush, washing fluid or kerosene.

ATTENTION! OIL LEVEL SHALL BE CONTROLLED WHILE THE HARVESTER IS INSTALLED ON A FLAT HORIZONTAL PLATFORM.

ATTENTION! IT IS REQUIRED TO STOP THE ENGINE AND REMOVE THE KEY FROM IGNITION LOCK PRIOR TO ANY OPERATIONS OF REPAIR, TM, CLEANING, AIR COMPRESSOR BLOWING AND ELIMINATION OF MALFUNCTIONS.

It is required to perform ESM operations prior to TM-1.

It is required to perform ESM and TM-1 operations prior to TM-2.

It is required to perform ESM, TM-1 and TM-2 operations prior to TM-3.

In case if the harvester will not be further used for harvesting after 250 operating hours, TM-3 operations shall be performed together with operations of preparation of the harvester for storage.

7.2.1 Technical Maintenance during Transportation

During preparation for transportation, check the following:

- driving and steering wheel tires' air pressure;

- Hydraulic fluid level in braking system tanks;

- oil level in hydraulic tank, track reduction gears, transfer gear, fan driver gear, feeder gear and GB;

- operability of lighting and alarm system, steering, brakes at operating engine;

- GB switching mechanism;

- security of feeder lifting hydraulic cylinders fastening;

- fastening torque of drive and steering axle wheels, DWA track reduction gears; tighten the threaded connections, if necessary.

The following shall be checked during transportation:

- each hour of movement: heating degree of hydraulic equipment, GB, track reduction gears, transfer gear, fan driver gear;

- tightness of hydraulic, fuel and braking systems connections; detected leaks shall be eliminated.

At the end of transportation:

- clean the harvester and place it in the storage area;

- check the threaded joints and tighten them if necessary;

7.2.2 Technical Maintenance during Operational Trial

During preparation of trial, perform the following:

- depreserve the harvester;

- install the removed parts and assembly units (see Section 5 Final Assembly, Adjustment and Running);

- check air pressure in the DWA and steering axle wheels and set the normal pressure if necessary;

- check the oil level and add oil to the hydraulic tank, GB and the following gears if necessary: track reduction gears, transfer gears, feeder cutting length change gears, fan drive gears, upper roller gears;

- lubricate friction joints according to the lubrication table (p. 7.4);

- check threaded joints and tighten them if necessary;

- adjust the tension of all belt drives;

- add fuel to fuel tanks, add hydraulic fluid to tanks;

- check the GB switching mechanism operation;

- check the toe-in and perform it if necessary, eliminate the steering axle wheel axial play;

- start the engine and check operation and interaction of all assembly units and mechanisms.

After idle running (during 2.5 hours without load):

- check the heating degree of bearing housings, tightness of fuel, hydraulic and braking systems pipelines;

- check the tension of all belt drives and adjust it if necessary;

- check the fastening of track reduction gears to DWA beam flanges, of shredder knives, grinding beam, tighten if necessary.

During operational trial:

- clean the cab;

- check the tension of all belt drives and adjust it if necessary;

- check and add, if required, the cooling fluid to the engine cooling system extension tank; diesel fuel to fuel tanks; hydraulic fluid to tanks; oil to the hydraulic tank, GB and reduction gears.

Perform ESM every 10 hours of operational trial.

At the completion of trial:

- inspect and clean the harvester of herbal residues deposition;

- check the leak tightness of fuel, hydraulic and braking systems connections. Eliminate the detected leaks;

- drain fuel sediment from fuel tanks;

- check the hole in the fuel tank neck cover and clean it if necessary;

- check the fastening of the shredder, DWA to the frame, of track reduction gears to axle beam flanges, of GB to the axle beam and of steering wheels to hubs, as well as of all reduction gears; tighten if necessary;

- check the tension of all belt drives and adjust it if necessary;

- check and add, if required, fuel to fuel tanks; hydraulic fluid to tanks;

- lubricate friction joints according to the lubrication table (p. 7.4);

- pay attention to oil stains on reduction gear, their presence may indicate leaks in reduction gears; eliminate the cause of such leaks;

- replace filtering elements in the hydraulic system and oil in GB, hydraulic tank and the following reduction gears: track reduction gears, feeder gears, transfer gears, fan drive gears, upper roller gears.

Table 7.1

Technical maintenance operations	Technical maintenance intervals										
	Before harvesting	Every day	After first operating hours			TM-1 (every 50 operating hours)	TM-2 (every 250 operating hours)	TM-3 (every 500 operating hours)	1000** operating hours	When required	After harvesting
			50*	100*	500**						
HYDRAULIC EQUIPMENT											
- check the oil level in hydraulic tank	•	•									
- replace hydraulic oil				•				•			
- check and replace the hydraulic tank filter				•				•			
- replace the HGD filter				•				•			
- clean and wash the harvester hydraulic system tank breather				•				•			
- check tightness of the hydraulic system pipeline	•	•									
- pump the steering wheel hydraulic system				•				•		•	
BRAKES											
- check the hydraulic fluid level	•					•				•	
- replace the hydraulic fluid and relieve air from the device	Every 2 years										
- check the operability of operating brakes	•					•				•	
- check the operability of parking brakes	•					•				•	
check tightness of the braking system pipeline	•	•									
UNDERCARRIAGE											
- check and perform the toe-in, eliminate the steering axle wheel axial play	•			•						•	
- check the tire pressure in driving and driven wheels	•					•				•	
- adjust the GB switching mechanism	•									•	

Table 7.1 (continued)

Technical maintenance operations	Technical maintenance intervals										
	Before harvesting	Every day	After first operating hours: 50*	After first operating hours: 100*	After first operating hours: 500**	TM-1 (every 50 operating hours)	TM-2 (every 250 operating hours)	TM-3 (every 500 operating hours)	1000** operating hours	When required	After harvesting
MOTOR UNIT											
- check the operation and adjustments of engine	•										
- check the leak tightness of the fuel system; air-feeding system; exhaust system; cooling system; integrity of electric harnesses of engine control electronic system	•	•									
- clean or replace the main filtering element of the air filter	When an emergency signal is activated										
- replace the safety filtering element of the air filter	After three changes of the main filtering element. It is possible to change together with main filtering element, if necessary.										
- monitor the water separator for presence of sludge and water		•									
- drain water and sludge from the water separator										•	
- change the engine cooling system hoses	Every two years										
- check the engine oil level	•	•								•	
- change oil and filter in the engine							•				
- check the cooling fluid level	•	•									
- change the cooling fluid	Once in three years										
- check tightness of the fuel system pipeline	•	•									
- add fluid to the cooling system										•	
- replace the air-dryer cartridge	Every two years										
ELECTRIC EQUIPMENT											

Table 7.1 (continued)

Technical maintenance operations	Technical maintenance intervals										
	Before harvesting	Every day	After first operating hours: 50*	After first operating hours: 100*	After first operating hours: 500**	TM-1 (every 50 operating hours)	TM-2 (every 250 operating hours)	TM-3 (every 500 operating hours)	1000** operating hours	When required	After harvesting
- check the generator								●			
- charge the SB	Every three months										
- check the battery fluid level	●									●	
- check the integrity of junction blocks of electric equipment	●					●					
- clean the SB, lubricate its tips and terminals with any grease lubricant						●					
- check the fixture of power circuits of starter, generator, batteries, master switch	●	●									
- check the fixture of wire harness near moving and heated parts of the harvester	●	●									
- check the operability of contact detectors on the counter-cutting beam and their wiring		●								●	
SHREDDER											
- check the gaps between rotating parts of the harvester and its frame	●					●					
- check the belt gears tension	●	●				●					
REDUCTION GEARS											
Transfer gearbox											
- check the oil level	●	●								●	
- change oil				●				●			
- add oil										●	
Fan drive reduction gear											
- check the oil level	●									●	
- change oil				●				●			

Table 7.1 (continued)

Technical maintenance operations	Technical maintenance intervals										
	Before harvesting	Every day	After first operating hours			TM-1 (every 50 operating hours)	TM-2 (every 250 operating hours)	TM-3 (every 500 operating hours)	1000** operating hours	When required	After harvesting
			50*	100*	500**						
Track reduction gears											
- check the oil level	•									•	
- oil replacement from CIT kits				•				•			
- oil replacement from ZF kits					•				•		
Upper rollers reduction gear											
- check the oil level	•									•	
- change oil				•				•			
Feeder reduction gear											
- check the oil level	•									•	
- change oil				•				•			
GB											
- check the oil level	•									•	
- oil replacement from CIT kits				•				•			
- oil replacement from ZF kits					•				•		
FRICTION NODES LUBRICATION	According to the harvester lubrication table										
FEEDER											
- adjust the clearance between scraper and roller			•					•			
- clean the space between scraper support and smooth roller										•	
SHREDDER											
- check the drum knives condition and replace damaged drum knives, if necessary	•	•									
ROTATION SPEED MONITORING											
- adjust the rotation sensor	•									•	
CAB											

Table 7.1 (continued)

Technical maintenance operations	Technical maintenance intervals										
	Before harvesting	Every day	After first operating hours			TM-1 (every 50 operating hours)	TM-2 (every 250 operating hours)	TM-3 (every 500 operating hours)	1000** operating hours	When required	After harvesting
			50*	100*	500**						
- clean the cab air cleaner filter		•									
- replace the cab air cleaner filter										•	
- clean the windscreens	•										
CONDITIONING UNIT											
- clean the condenser		•									
- replace the drying filter										•	
PNEUMATIC UNIT											
- check system elements (receiving unit, pipelines) and replace if external damages are observed		•									
- check the receiving unit attachment to frame brackets						•					
- drain the condensate						•					
- check the leak tightness of the system, seal the threaded joints by means of sealant or fluoroplastic tape, if necessary	Once a year										
FIRE EXTINGUISHER											
- check the fire extinguisher readiness for operation	Every two years										
THREADED JOINTS											
- check and tighten the fixtures of external assembly units if necessary	•					•					
- check the wheel fastening nuts tightening	•	•									
- check engine fixation	•										
CLEANING											

Table 7.1 (continued)

Technical maintenance operations	Technical maintenance intervals											
	Before harvesting	Every day	After first operating hours			TM-1 (every 50 operating hours)	TM-2 (every 250 operating hours)	TM-3 (every 500 operating hours)	1000** operating hours	When required	After harvesting
			50*	100*	500**						
- clean the engine, air intake radiators unit, exhaust system (header, turbocharger, pipes, muffler) located in the vee of the engine block from herb residues deposition		•									
- clean the cab, cab air intake screen, protective housing (tops), harvester panels from herb residues deposition		•									
- clean the following reduction gears by means of compressed air: transfer gear, fan driver gear, feeder gear and brake gear		•									
- clean the slip connectors between wire harnesses of the harvester from dirt and plant residues by means of an air jet				•							

*Operations are performed together with TM-1
**Operations are performed together with TM-3

7.3 Threaded Joints Tightening Torques

Tightening torques for bolts and screws are given in Table 7.2.

Table 7.2

Grade -		Tightening torque in N·m for threaded joints*									
bolt	screw	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
4.6	4.8	6-8	10-20	30-40	50-65	65-80	120-145	160-200	230-290	320-400	400-480
8.8	-	8-10	20-25	40-50	65-80	80-120	145-180	200-250	290-360	400-500	480-600
10.9	-	13-15	32-35	62-68	107-118	169-187	260-285	360-395	500-560	690-760	670-960

7.4 Harvester Lubrication

During operation, harvester lubrication shall be performed in accordance with Table 7.3, Appendix J and lubrication charts.

Engine shall be lubricated in compliance with its operation manual.

Remove dirt from oilers prior to lubrication.

To uniformly distribute the lube, activate harvester operating units and keep them at idle speed for 2…10 min.

Lubrication points at charts are accumulated depending on lubrication periodicity. after 10 hours of operation (ESM), 50 hours (TM-1), 250 hours (TM-2), 500 hours (TM-3), 1000 hours.

Lubrication charts legend:

9 - Lubricants

① - Oils

Table 7.3. Lubrication table

Reference number at the lubrication chart	Name and designation of the assembly unit Lubrication point	Number of assembly units in the product, pcs.	POL		Weight (volume) of POL fueled to the harvester at filling or replacement (number of points), kg (l)	Frequency of change (refilling) of POL, h	Note
			Name and designation of POL grades*	Regulatory documentation			
1	2	3	4	5	6	7	8
Oils (liters)							
Shredder 1403.01.00.000, -01							
1	Reduction gear 1401.01.12.100A (of feeding unit) Reduction gear S8098000505	1	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-143-2014	22.000 (1)	First change after 100, subsequent changes after 500, but not less than once per season	-
2	Upper rollers reduction gear 1401.01.01.270 (of feeding unit)	1	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-143-2014	0.700 (1)	250, but not less often than once per season	-

Table 7.3 (continued)

1	2	3	4	5	6	7	8
3	Reduction gear 1403.05.09.640 (of fan drive) Reduction gear S2030100576	1	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-143-2014	0.800 (1)	First change after 100, subsequent changes after 500, but not less than once per season	-
Motor unit 1403.05.09.010							
4	Engine crankcase OM460LA 205376 QPRJ/011440	1	SHELL RIMULA ULTRA SAE 5W-30 Motor oil or Shell Rimula R6 ME 5W-30 Oil or All-seasons motor oil for diesel engines G-Profi GT 10W-40	STO 84035624-090-2012	39_{-5} (1)	Oil change after 250, but not less often than every two years	-
5	S8295121510 Reduction gear (transfer gear)	1	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-090-2012	8.000 (1) (for centralized drain)	First change after 100, subsequent changes after 500, but not less than once per season	-
Drive wheel axle 1401.02.11.010A (of CIT kit)							
Axle set 0264 350.0							
6	GB	1	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-090-2012	7.000 (1)	First change after 100, subsequent changes after 500, but not less than once per season	-

Table 7.3 (continued)

1	2	3	4	5	6	7	8
7	Track reduction gear	2	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-090-2012	12.000 (2)	First change after 100, subsequent changes after 500, but not less than once per season	-
Drive wheel axle 1401.02.12.010Б (of ZF kit)							
Axle set 2374.095.079							
8	GB	1	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-090-2012	8.000 (1)	First change after 100, subsequent changes after 500, but not less than once per season	-
9	Track reduction gear	2	Transmission oil ROSTSELMASH G-PROFI GRIP API GL-5 85W-90	STO 84035624-090-2012	13.000 (2)	First change after 100, subsequent changes after 500, but not less than once per season	-
Hydraulic equipment							
10	Hydraulic system (main, volumetric of steering wheel, of operating units control, volumetric of undercarriage drive) including hydraulic system tank		MGE-46V Rostselmash 12 Oil or ROSTSELMASH G-PROFI HYDRAULIC ULTRA PURE 12 Hydraulic oil	TU 38. 001347-00** STO 84035624-142-2014	90.000 including 50.000 tank	First change after 100, subsequent changes after 500, but not less than once per season	Oil purity shall be not less than grade 12 as per GOST 17216-2001

Table 7.3 (continued)

1	2	3	4	5	6	7	8
Greases (kg)							
Shredder 1403.01.00.100							
11	Tower 1401.01.20.000-01 Support pivot bearings	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.006 (2)	250, but not less than once per season	-
12	Spout swivel 1401.01.18.000A Worm gear pair, ball grooves	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.150 (1)	50	-
Feeding unit 1401.01.01.000							
13	Bushings for connection of lower rollers to feeder reduction gear	2	Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	0.012 (2)	50	-
14	Hubs of clutches for connection of lower rollers to feeder reduction gear	4	Shell Gadus S2 V220 AD 2 12*0.4K Lubricant		0.024 (4)	50	Base oil cinematic viscosity, at 40/100°C mm^2/s: 189/15.6 Dropping point, 180°C Penetration at 25°C, 0.1 mm: 265-295
15	Support H.027.01.080-02 (front counter-shaft left support)	1	Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	0.007 (1)	250, but not less than once per season	-

Table 7.3 (continued)

1	2	3	4	5	6	7	8
16	Support 1401.01.01.700 1401.01.01.700-01 Feeder torsion bar bearings	3 1	Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	0.024 (4)	50	-
17	Bearing assembly LKG 212 2F+H2312 Feeder counter-shaft left support	1	Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	0.040 (1)	250, but not less than once per season	-
18	Support 1401.01.01.950 Bearing LK 209 2F+H2309	3	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.021 (3)	250, but not less than once per season	-
Accelerator 1401.01.11.000A							
19	Bearing assembly LKS 212 2F+H2312 Accelerator rotor right support	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.008 (1)	50	-
20	Bearing support 1401.01.11.250 Accelerator rotor left support	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.008 (1)	50	-
Chassis 1403.02.00.000, - 01							
21	Bearings of steering wheels axle beam fix-ture		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.060 (2)	50	-
Shredding unit 1401.01.02.000B							
22	Threaded surface of counter-cutting beam spindle		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.006 (2)	50	-

Table 7.3 (continued)

1	2	3	4	5	6	7	8
23	Counter-cutting beam spindle bearings		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.012 (4)	50	-
24	Drum bearings		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	1.000 (2)	250, but not less than once per season	-
25	Tensioner 1401.01.06.020 Tensioner axis	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.016 (1)	250, but not less than once per season	-
26	Sharpening device 1401.01.02.030 Carriage cavity	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.010 (1)	50	-
Chassis 1403.02.00.000							
27	Drive wheel axle 1401.02.12.010B Connecting clutches of left and right semiaxes	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.012 (4)	50	-
28	Rod 1401.02.05.010 GB control mechanism rod hinge	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.003 (1)	250, but not less than once per season	-
1403.02.00.000-01							
29	Drive axle 1401.02.11.010A Connecting clutches of left and right semiaxes	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.006 (2)	50	-
30	Rod 1401.02.04.010 GB control mechanism rod hinge	1	Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.003 (1)	250, but not less than once per season	-

Table 7.3 (continued)

1	2	3	4	5	6	7	8
Drive steering axle unit 1401.02.02.500-02							
31	Steer pivot assemblies		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.028 (4)	50	-
32	Steering tie rod pivot bearings		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.014 (2)	50	-
Steering wheel axle 1401.02.02.010-01							
33	Wheel hub bearings		Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	2.080 (2)	250, but not less than once per season	-
34	Steer pivot assemblies		Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	0.300 (2)	250, but not less than once per season	-
35	Bearings of turn and steering rod hydraulic cylinders hinges		Grease Litol-24 (MLi 4/12-3)	GOST 21150-87	0.018 (6)	250, but not less than once per season	-
Corn cracker							
36	Cracker rollers bearings		Grease Litol-24 (MLi4/12-3)	GOST 21150-87	0.014 (4)	50	-

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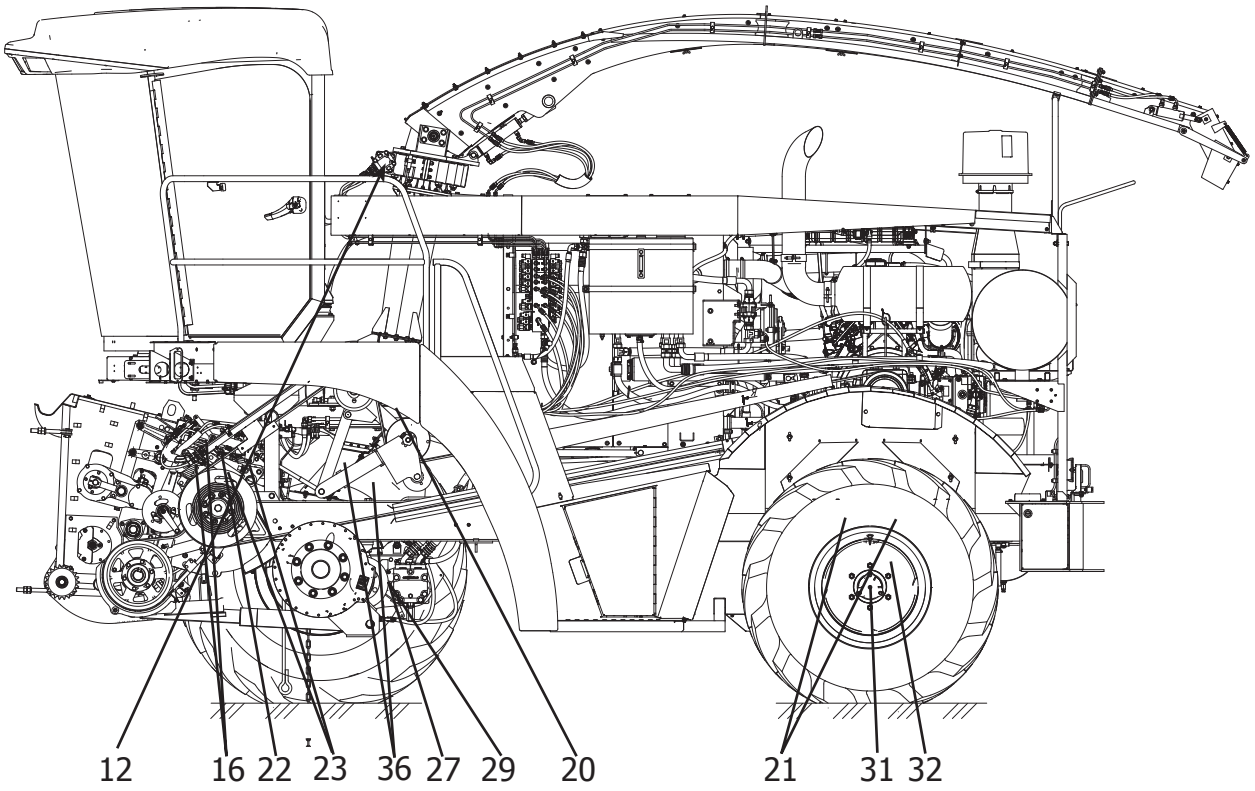
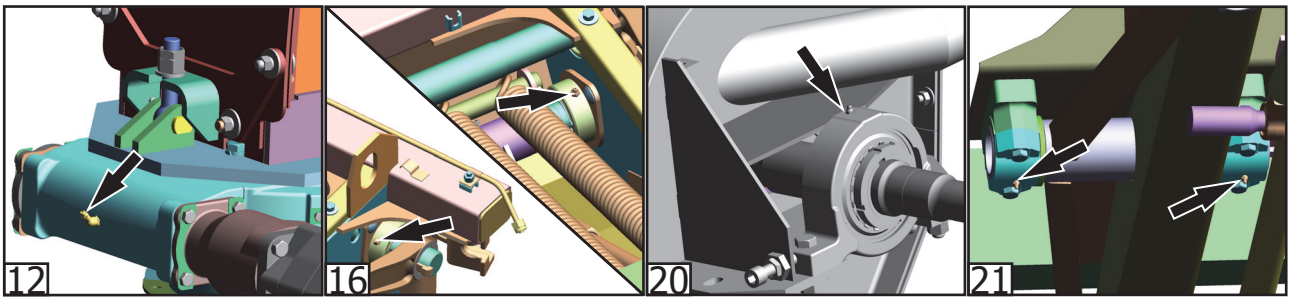
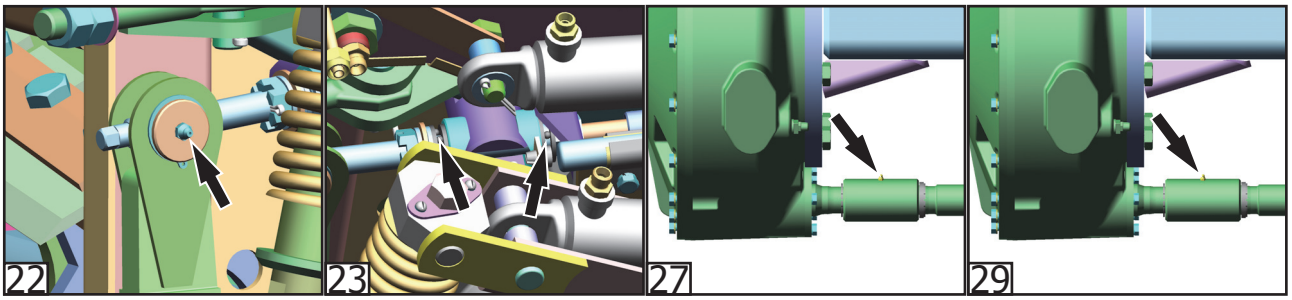
*It is strictly forbidden to mix POL of different grades

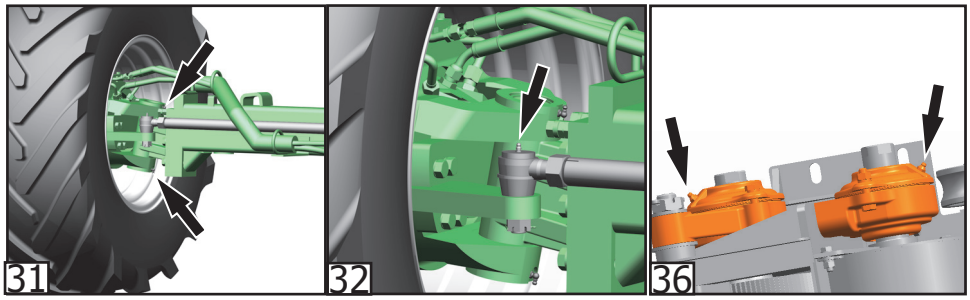
**In case of use of POL according to other regulatory documents, POL properties shall not be worse than those indicated for this POL grades.

Every 50 operating hours



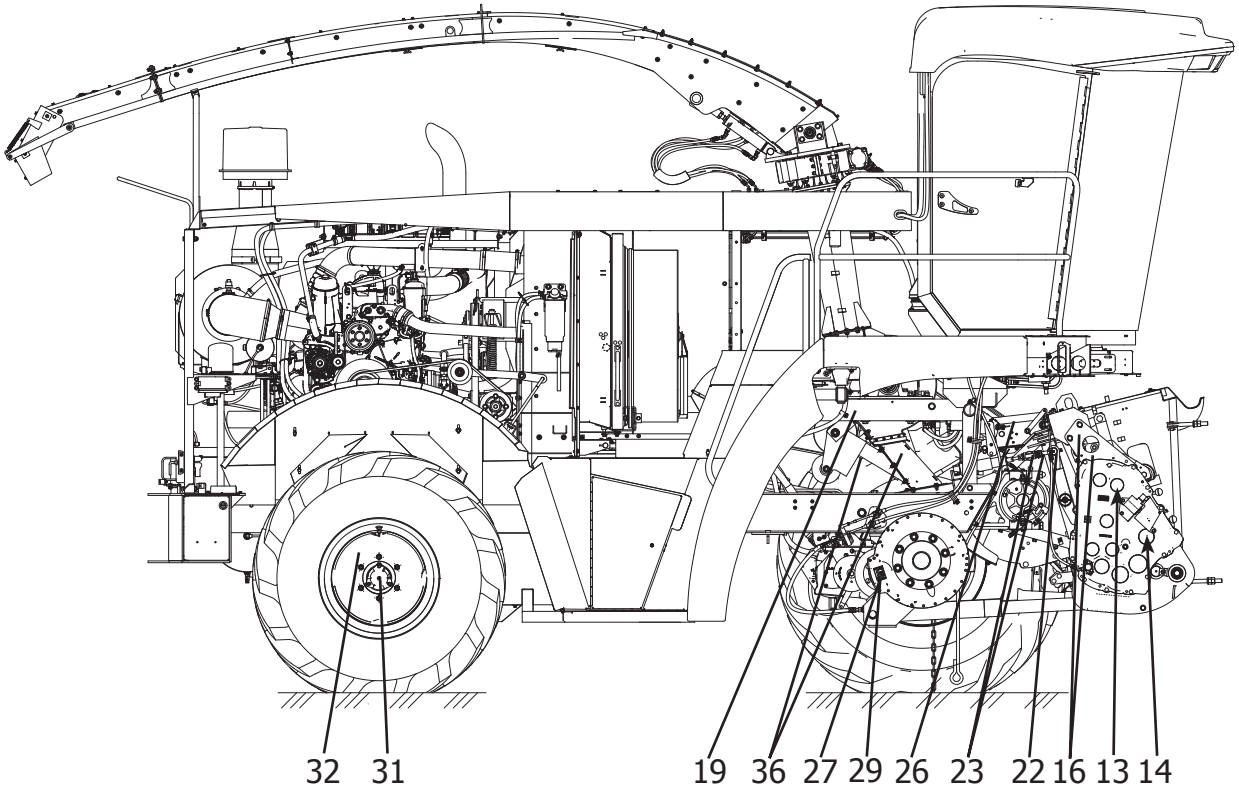


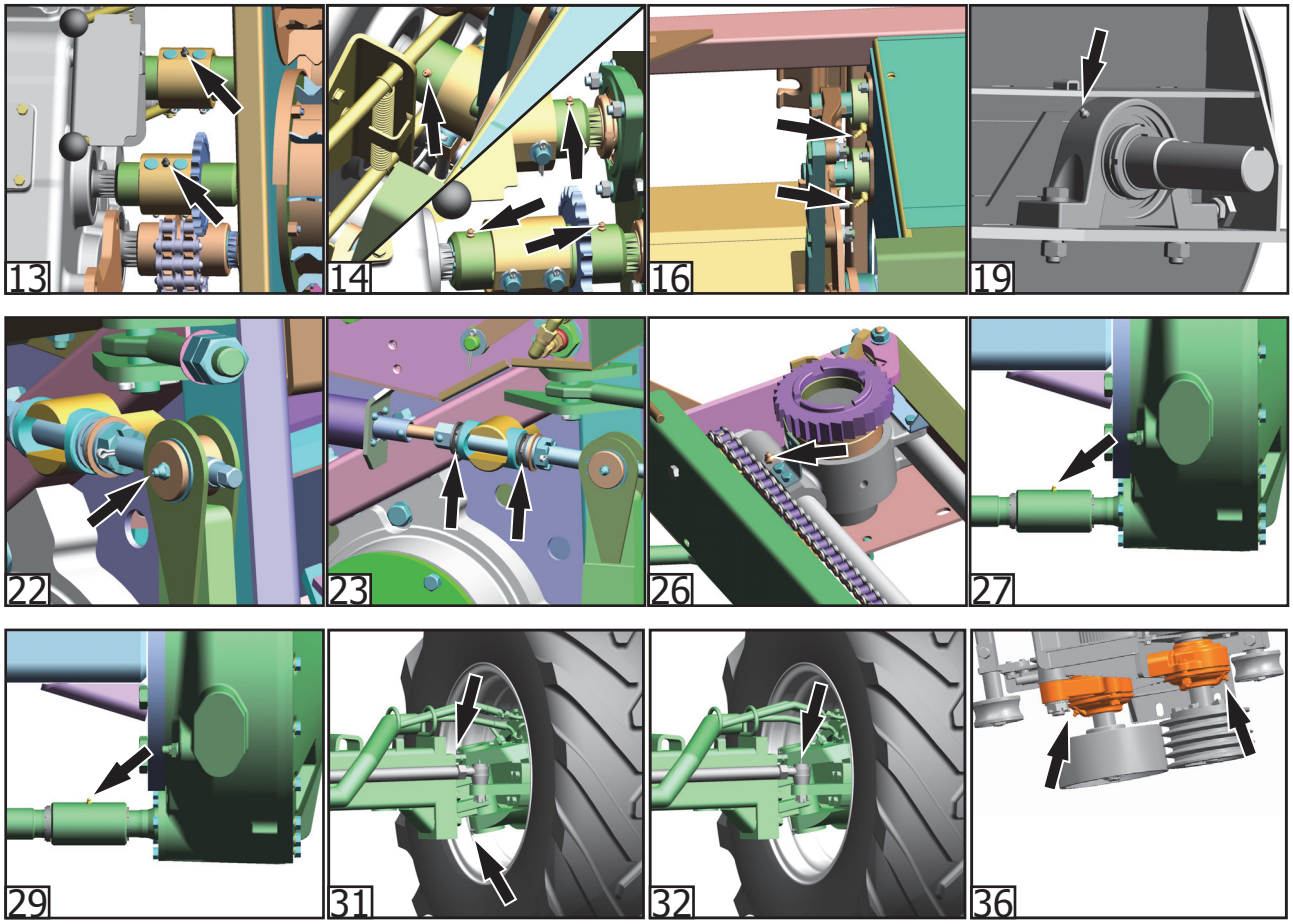




Lubrication chart No.1

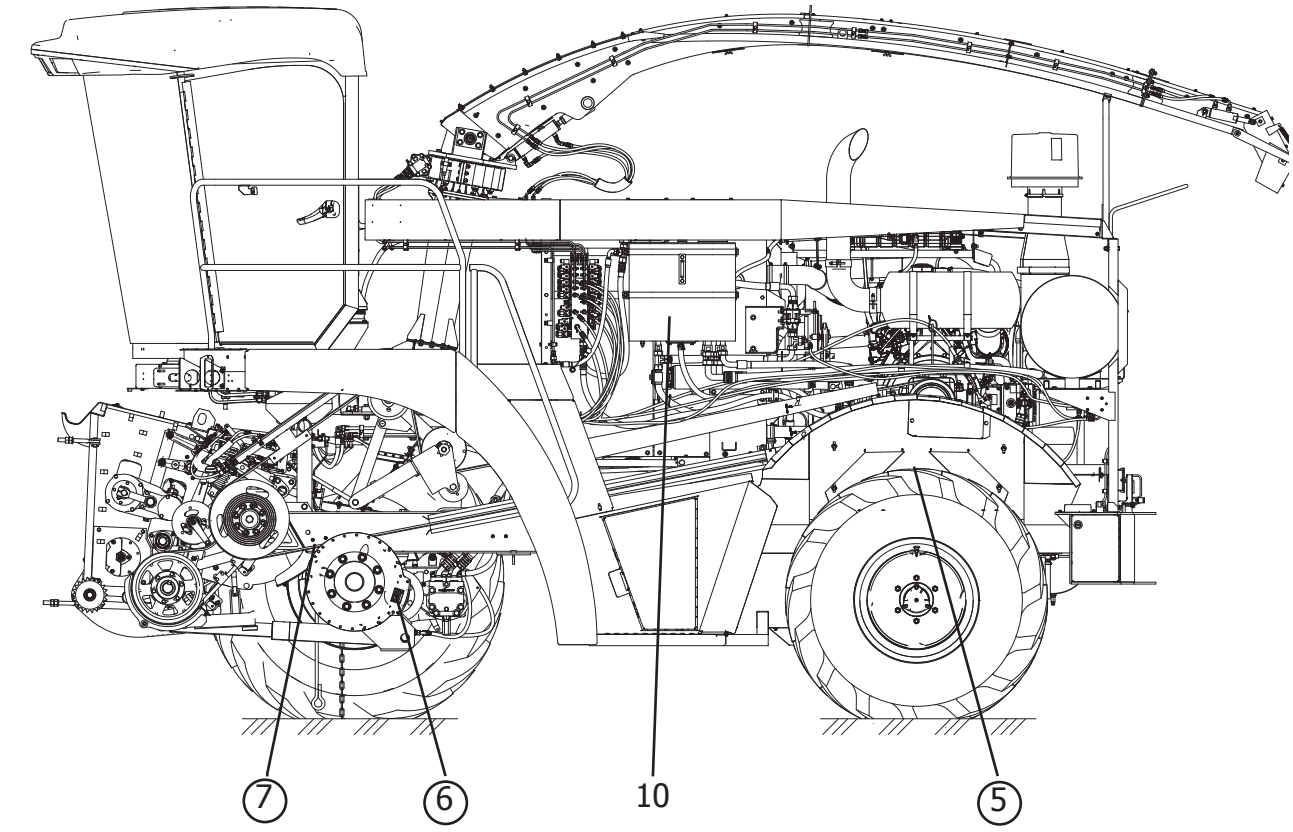
Every 50 operating hours

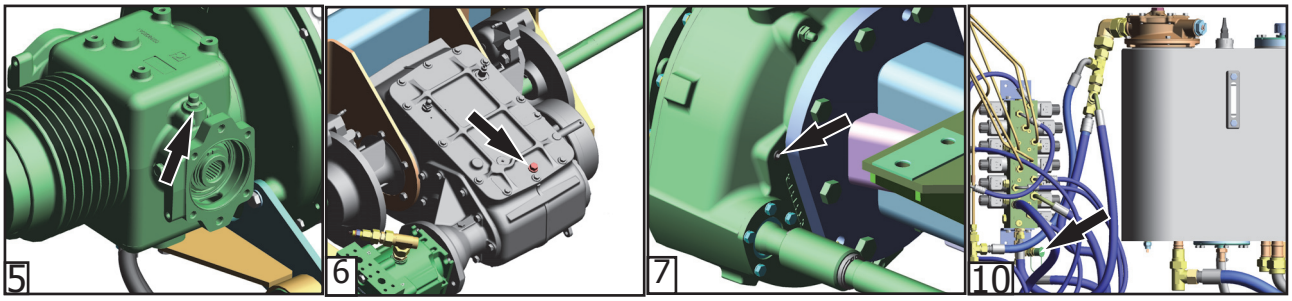




Lubrication chart No.2

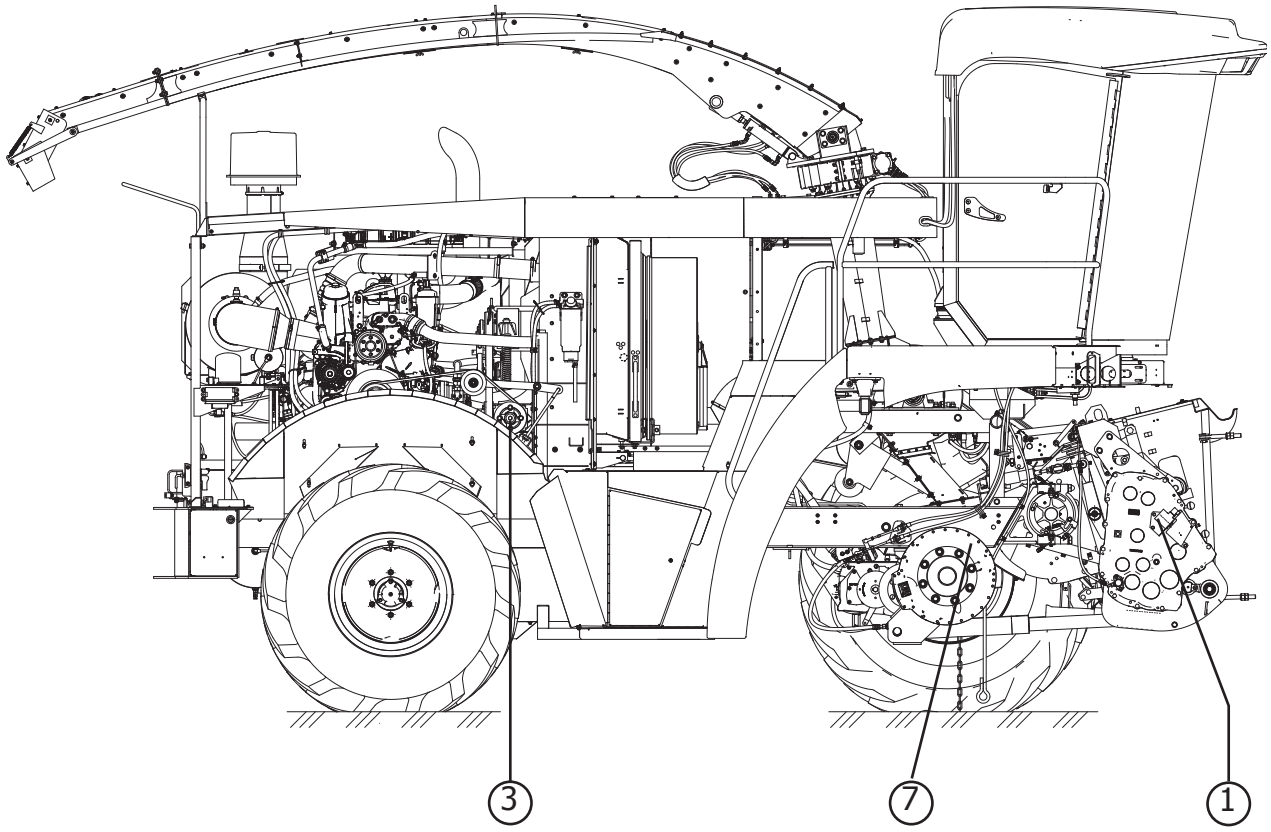
First 100 operating hours

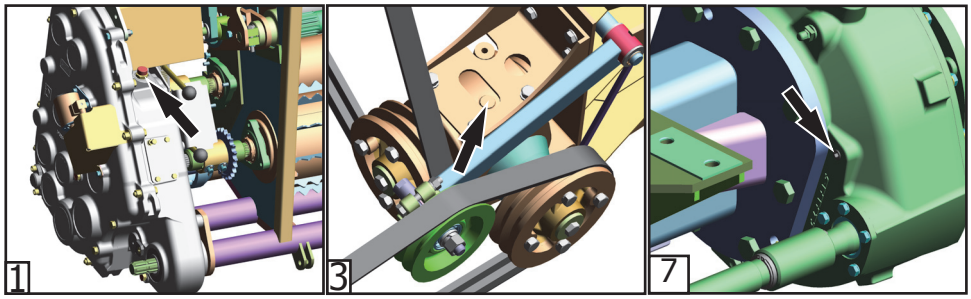




Lubrication chart No.3

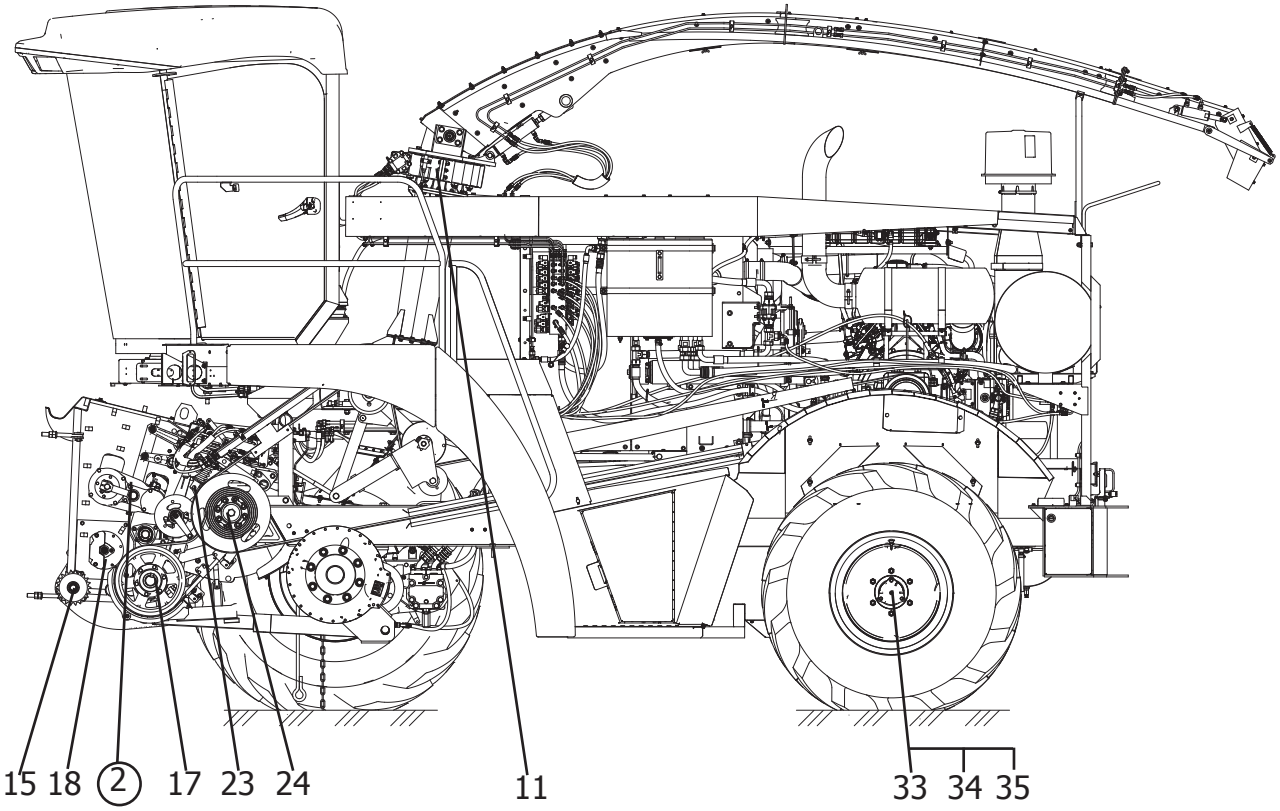
First 100 operating hours

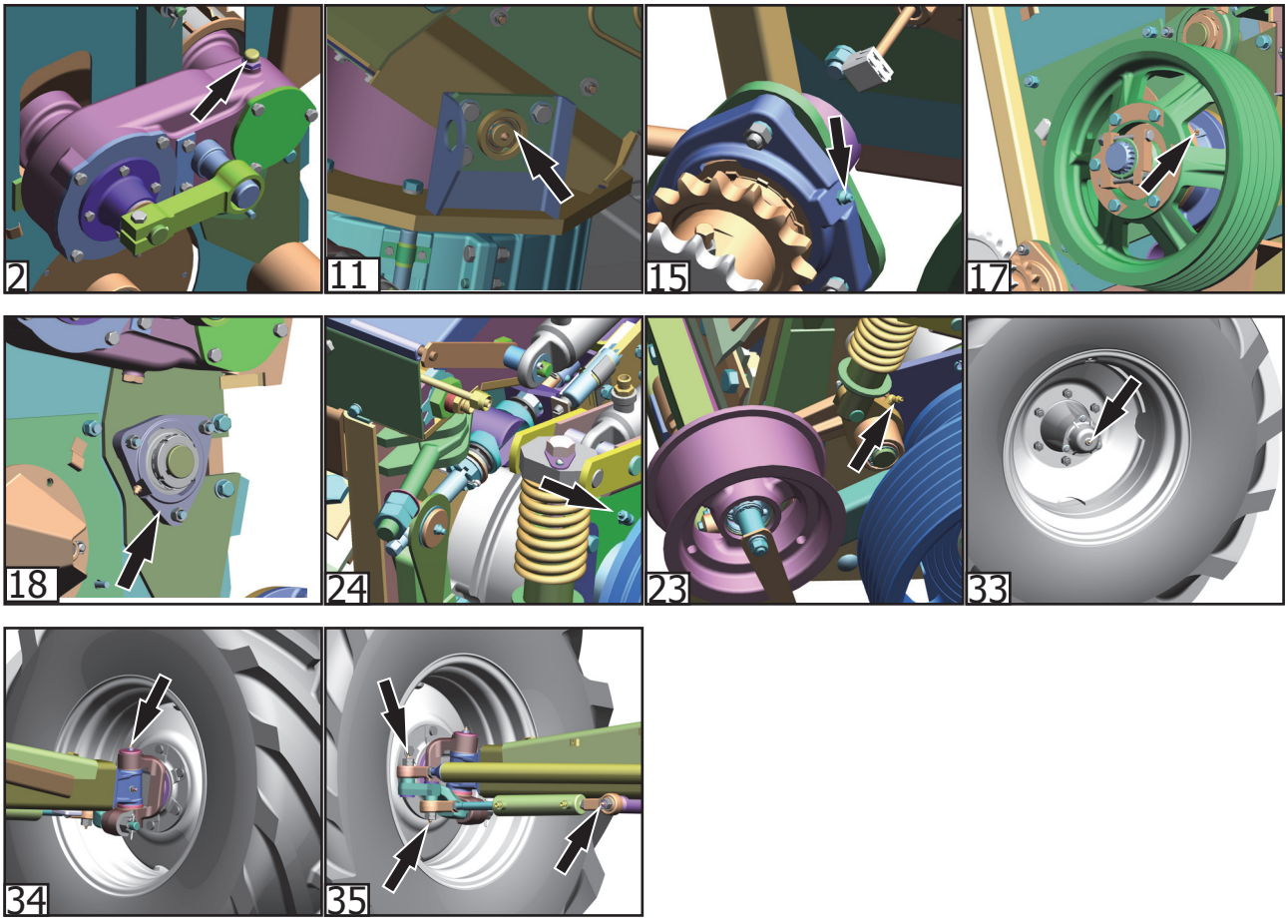




Lubrication chart No.4

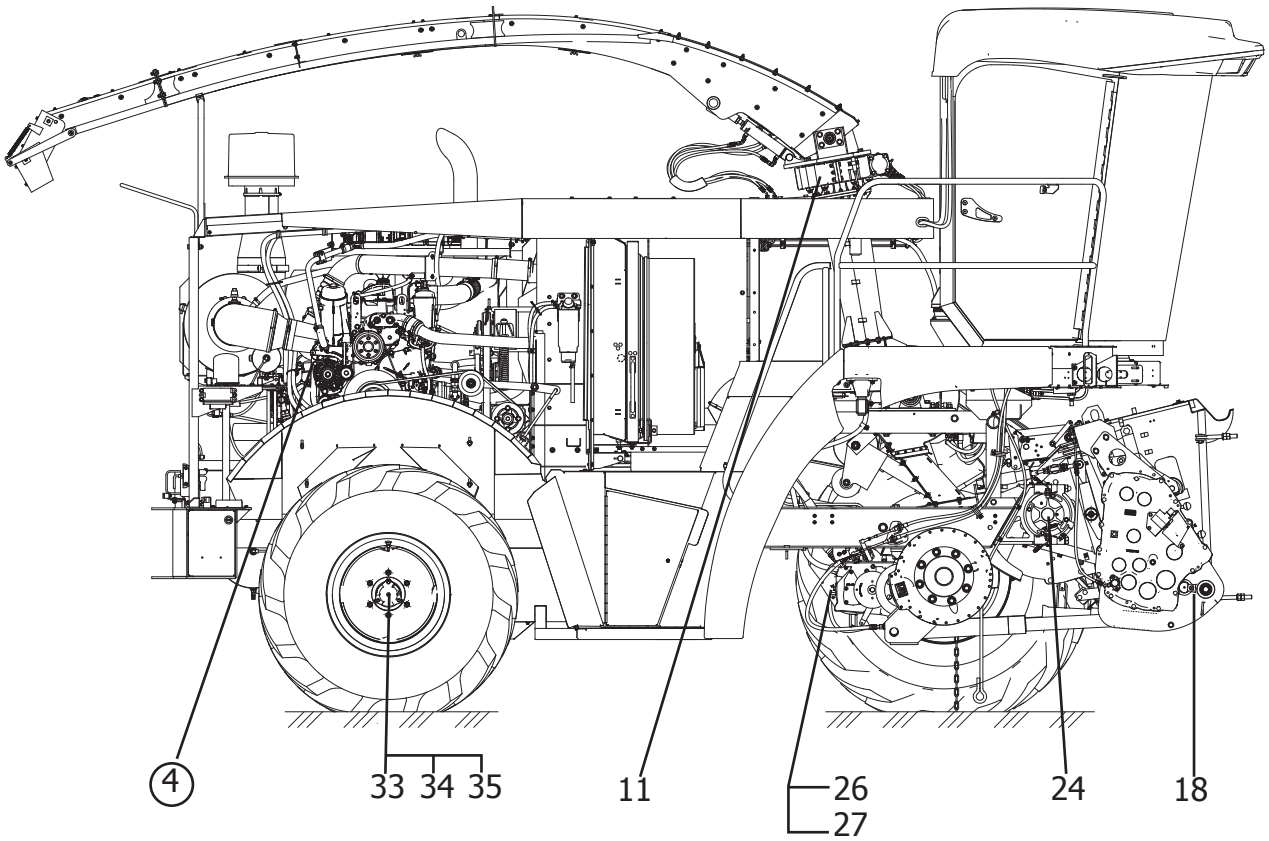
Every 250 operating hours

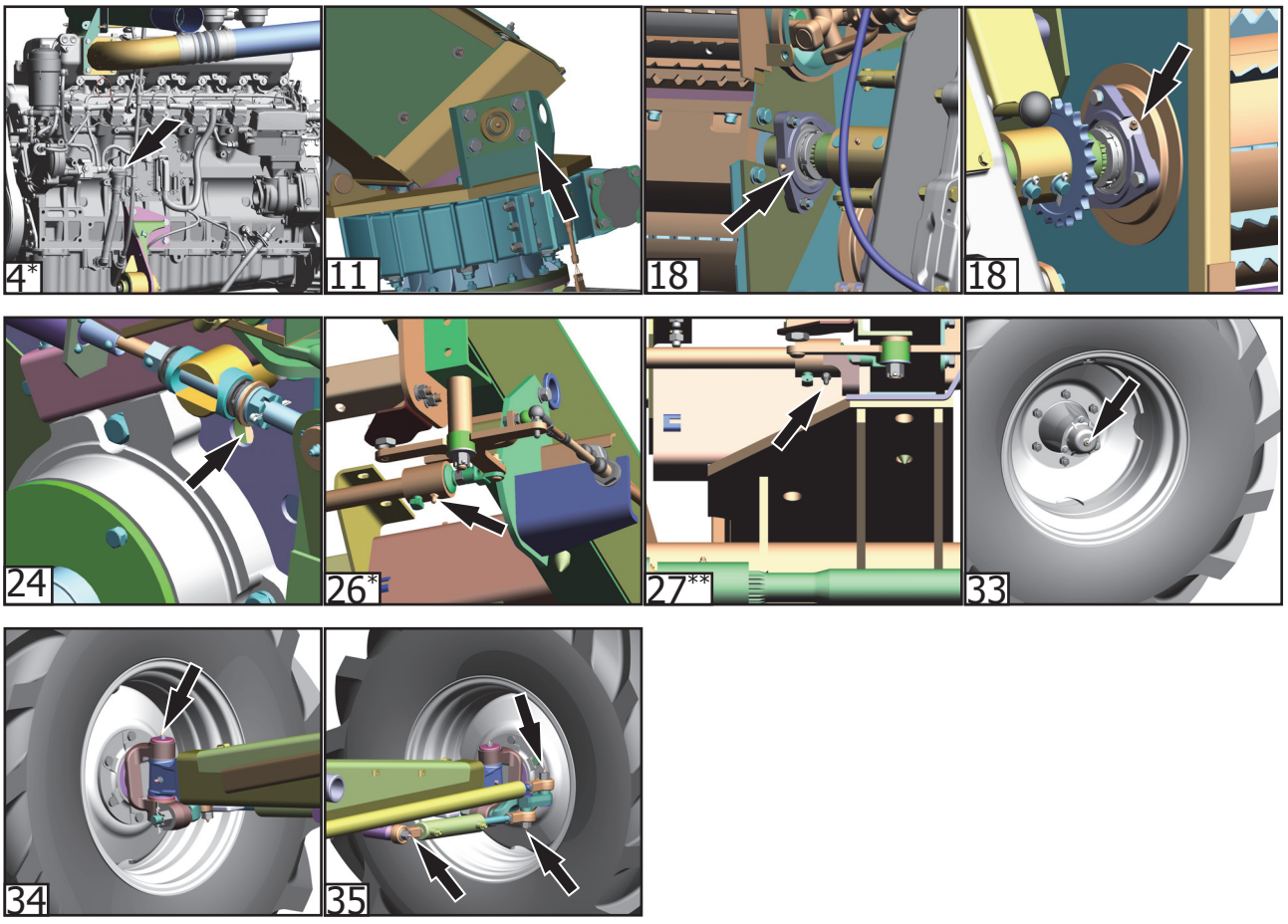




Lubrication chart No.5

Every 250 operating hours





Lubrication chart No.6

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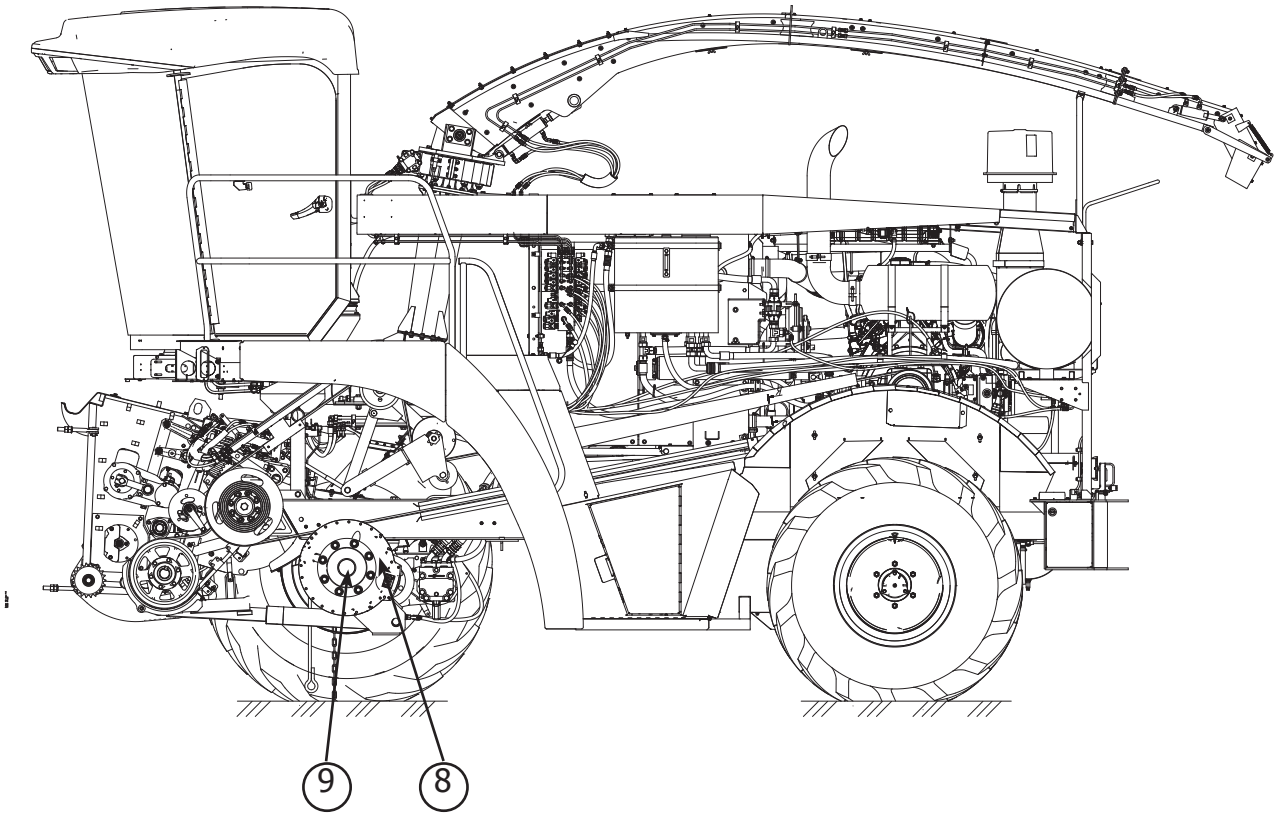
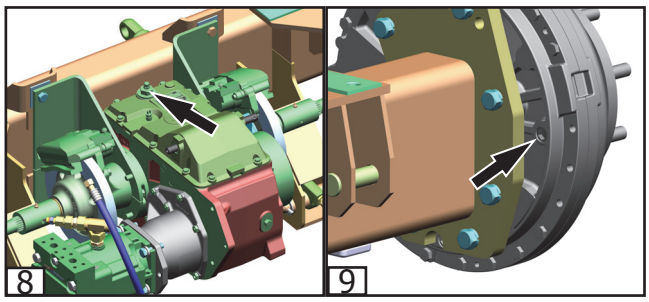
* DWA of CIT kit

** DWA ofZF kit

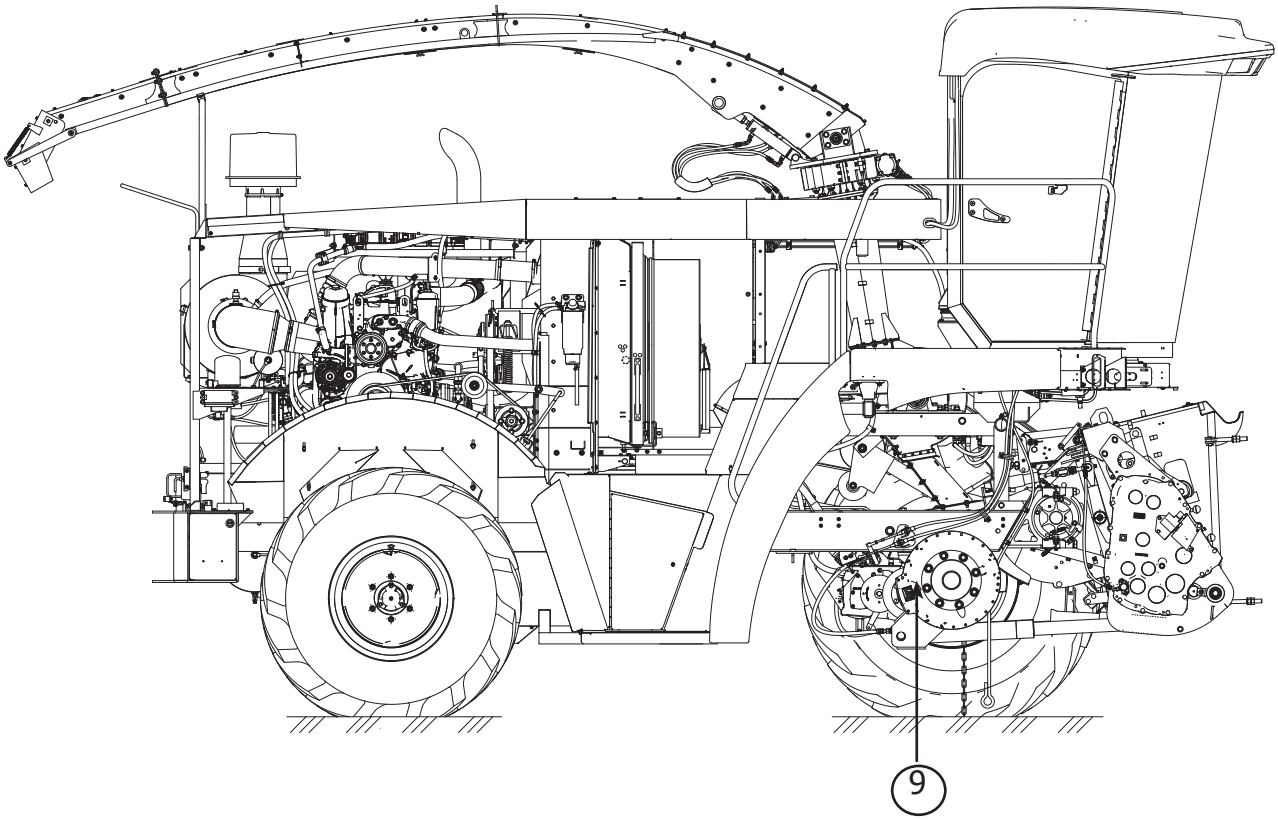
First 500 operating hours

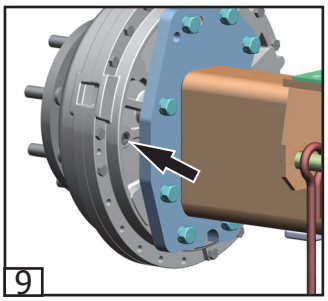




Lubrication chart No.7

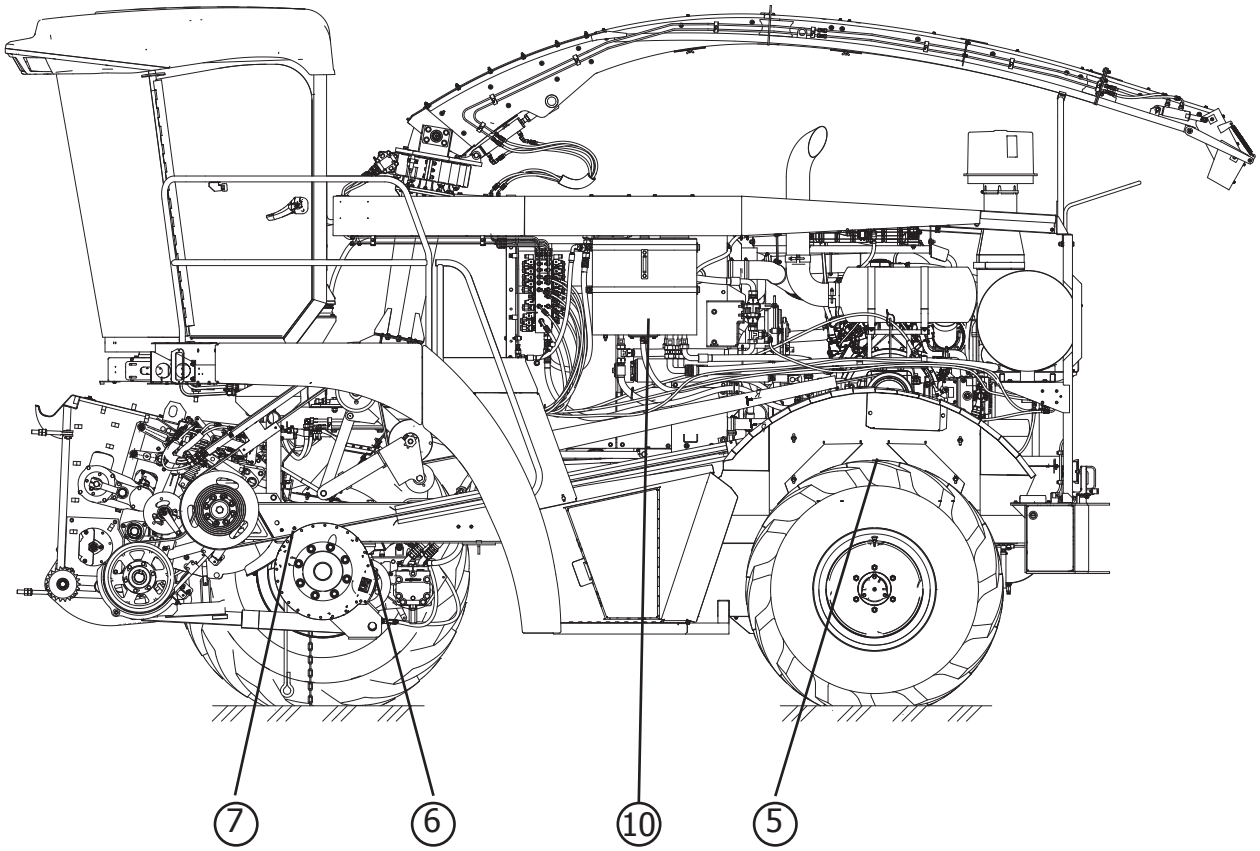
First 500 operating hours

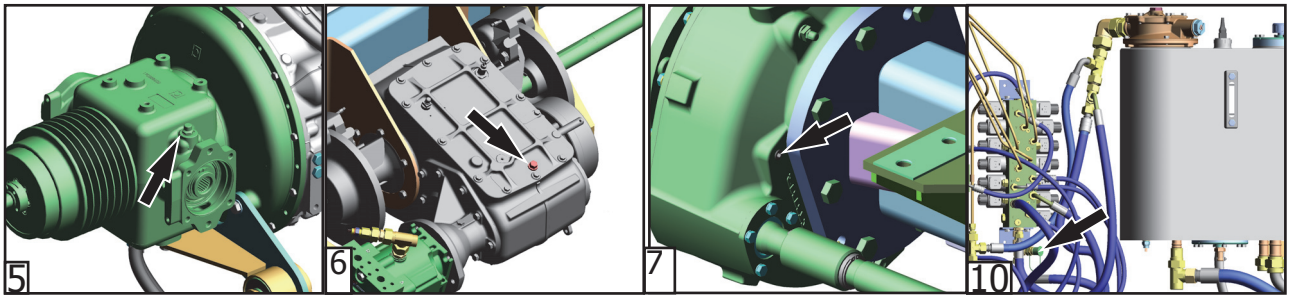




Lubrication chart No.8

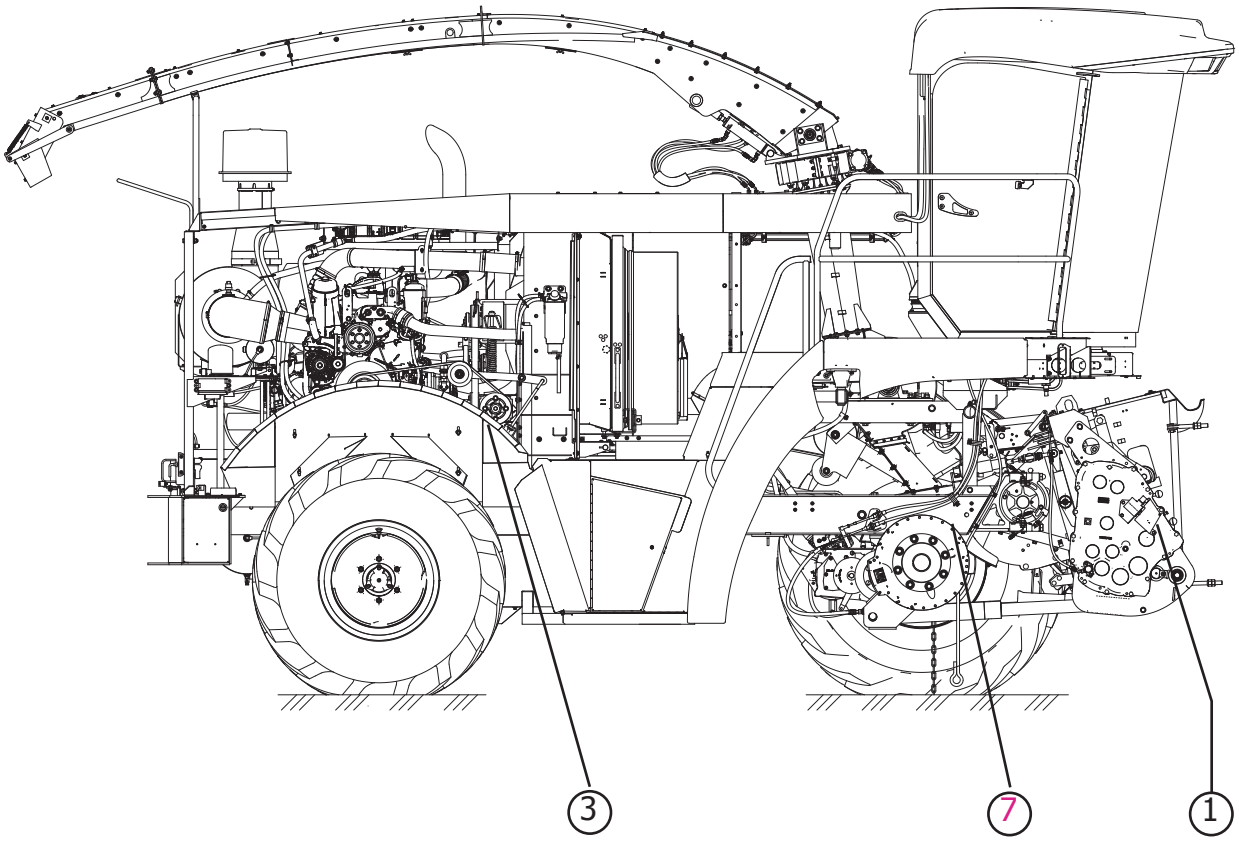
Every 500 operating hours

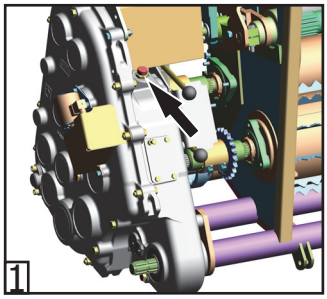


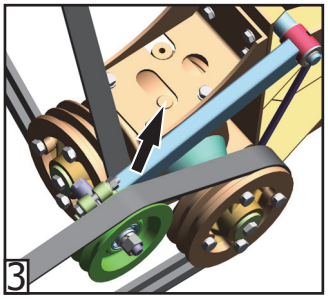


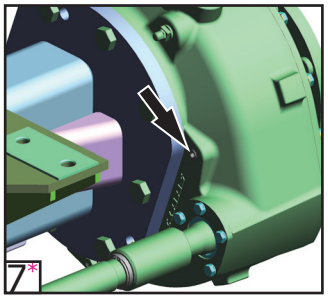
Lubrication chart No.9

Every 500 operating hours



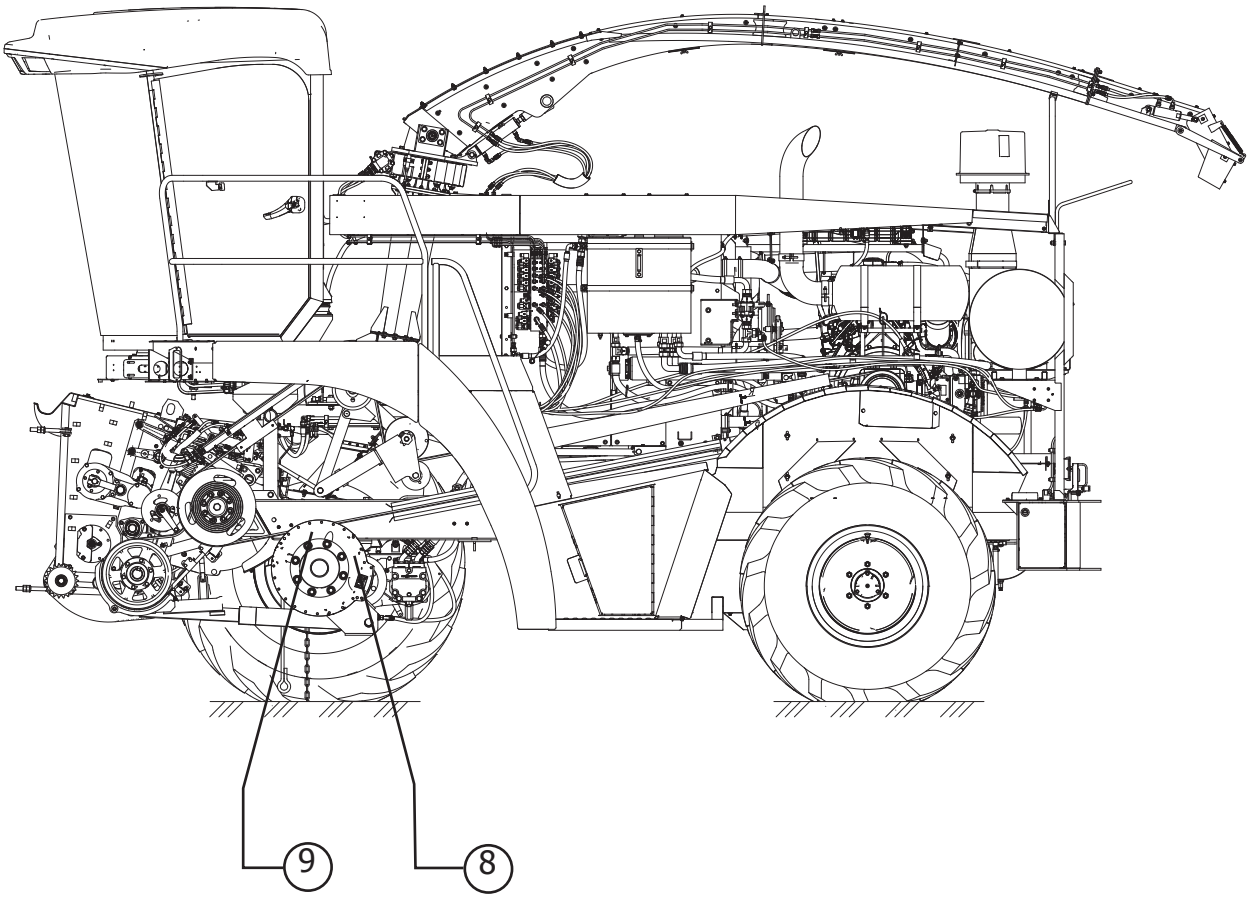


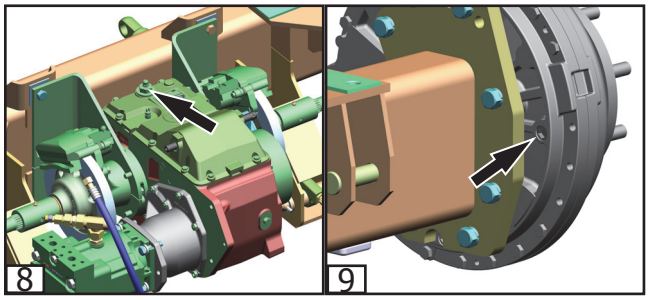




Lubrication chart No.10

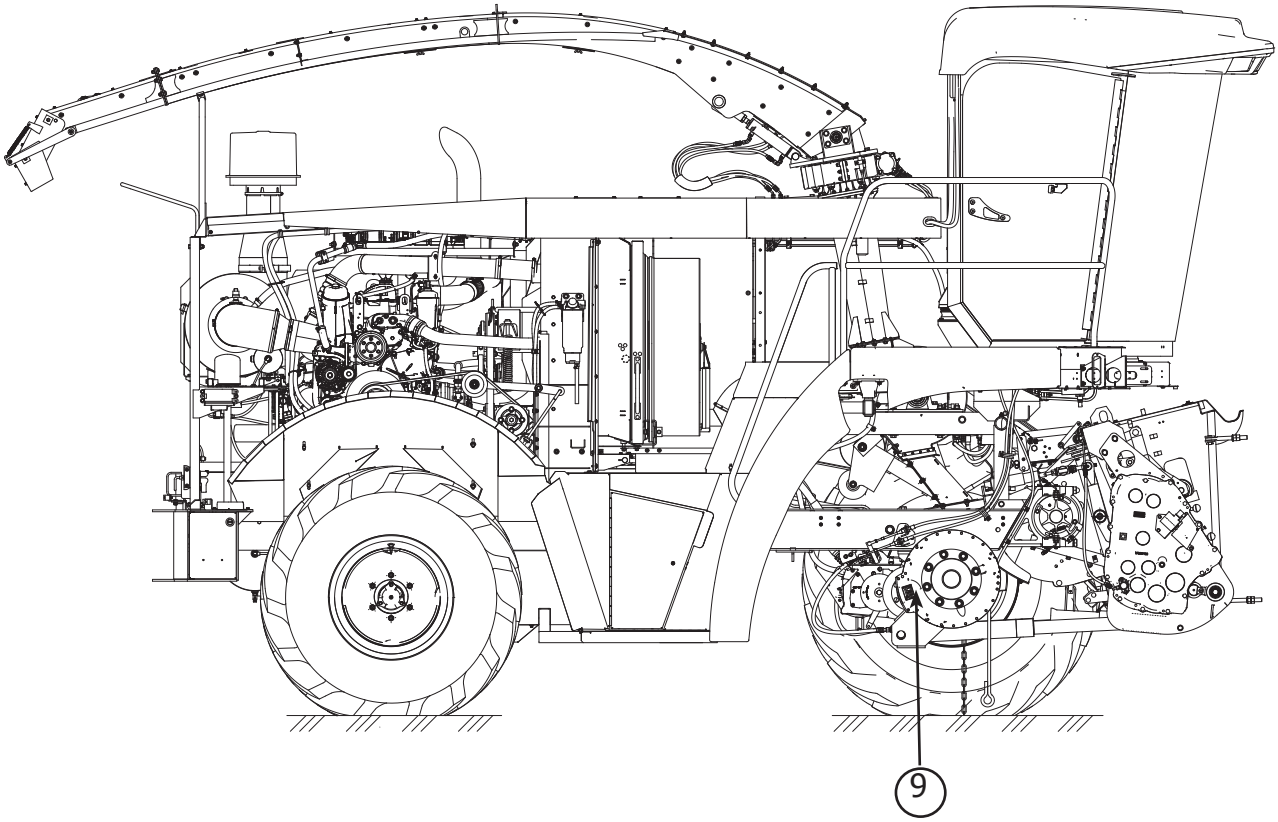
Every 1000 operating hours

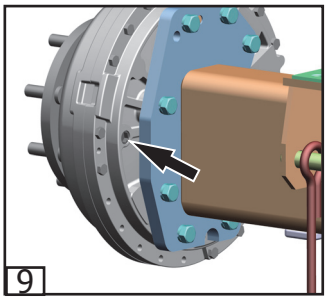




Lubrication chart No.11

Every 1000 operating hours





Lubrication chart No.12

7.5 Recommendations for Technical Maintenance Operations Prior to harvesting

7.5.1 Check of Oil Level in the Hydraulic Tank

Monitor the oil level in the hydraulic tank at feeder lifting hydraulic cylinder plunger fully retracted.

Oil level is monitored through inspection window 5 (Figure 6.21) located on the hydraulic tank.

7.5.2 Check of Hydraulic Brake Fluid Level

Hydraulic fluid level is monitored by means of actuation of the contact detector in the braking tank; in case if the harvester is not equipped with this sensor, the level shall be monitored visually.

Normal level of hydraulic fluid in feed tanks is the level not less than: 35-40 mm below the upper edge of the EDTSG 079.000-01 tank (if no sensor is installed) and 15-20 mm below the upper edge of the EDTSG 079.000-02 tank.

7.5.3 Operating Brakes Operability Check

Braking system operability check is carried out in two steps:

a) press interblocked brake pedals 3-5 times while the engine is running. Pedals shall be "springy" (not falling down to the floor) and their travel shall be no longer than 130 mm;

b) when moving not faster than 20 km/h, shift the HGD lever into its neutral position by pressing the interlocked pedals. The harvester shall move along a direct line until stop (allowed deviation from the direct line shall be not more than 0.5 m).

7.5.4 Parking Brake Operability Check

Prior to harvesting, every 50 hours of operation, as soon as pads become worn, but not less than once per year, parking brake operability shall be checked and adjusted if required (if the parking brake operates at sixth-seventh click).

Check of parking brake operability:

a) transfer lever 2 (Figure 6.44) in the cab in low position;

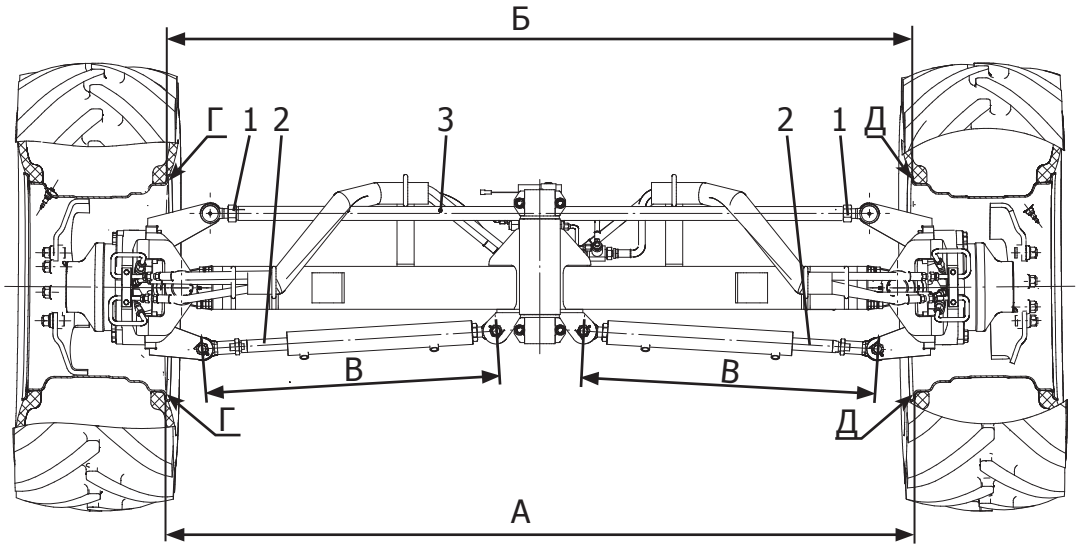
b) disconnect socket 4 from parking brake drive lever 5;

c) connect socket 4 to the subsequent slot, parking brake drive lever 5 shall rotate at the axis providing the selection of clearance appeared between pads and the drum.

d) in case of further wear transfer the socket to the next slot and repeat operations a) – c).

Check parking brake operation at turning of parking brake drive lever 3 at three-four clicks (fourth-fifth tooth of the sector).

Lever 2 (Figure 4.6) of the parking brake shall be set in the position when dog 3 (with its two teeth) is engaged with the fourth lower tooth of sector 7, the cable rod in the cab is completely sunk in the guide. Cables shall be adjusted by means



1 - nut; 2 - hydraulic cylinder rod; 3 - pull rod

Figure 7.1 – Drive SWA toe-in setting scheme

of cable attachment nuts 6.

7.5.5 SWA Wheels Toe-In Check and Performance

Drive steering wheel axle

Adjust the axle toe-in in the following way:

a) by turning wheels and moving rods 2, position the axle (Figure 7.1) to achieve the difference of C sizes of 2 mm or less;

b) adjust the toe-in: the difference between dimensions A and B measured at the wheel axle level between the same points D and E of the wheel rims shall be between 0 and 6 mm (A – B = 0..6 mm). Measurements shall be taken without any load applied on the wheels.

Permissible vertical displacement of measurement shall be ± 20 mm.

Adjustment is performed by rotating rod 3 with subsequent thread locking with nuts 1 with a torque from 149 to 176 N·m.

7.5.6 Check of Tire Pressure in Drive and Steering Wheels

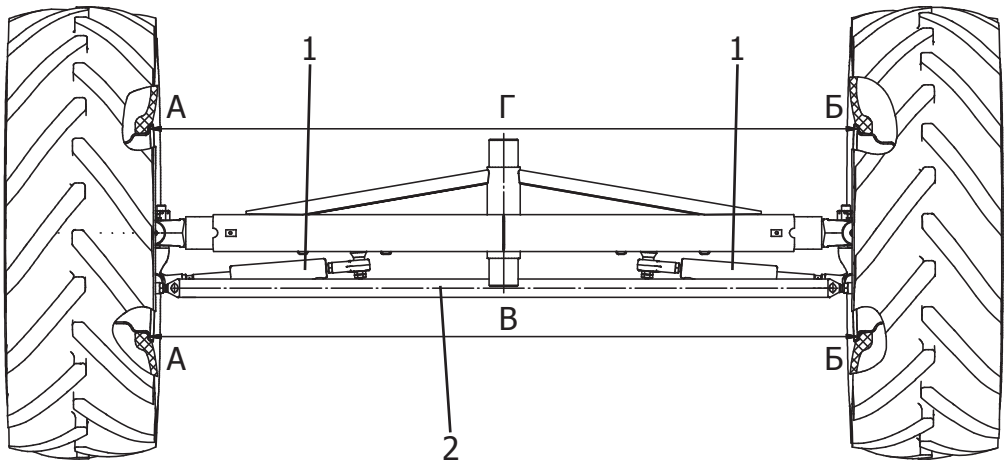
Check pressure in tires, make sure that there is no cuts, swellings, rim damages.

Always maintain proper pressure in tires (see Table 2.1). Never exceed the recommended pressure during tire pumping, use a chuck and a hose with sufficient length for you to stand beside the tire and not before or above it.

Driven steering wheel axle

The toe-in is set by means of steering tie rod 2 (Figure 7.2).

If the adjustment is correct, the difference between dimensions C and D measured at the steering wheel axle level between the same points A and B of the wheel rims shall be between 0 and 6 mm. Measurements shall be taken without any load applied on the wheels. Permissible measuring displacement shall be ±20 mm. Adjustment is performed by rotating steering tie rod 2 with subsequent thread locking at the ends. In order to prevent breaking of hinge centers of wheel steering hydraulic



1 - wheel steering hydraulic cylinders; 2 - steering tie rod

Figure 7.2 – Driven SWA toe-in setting scheme

cylinders 1 due to non-symmetrical installation, the hinges shall be screwed onto the threaded ends of hydraulic cylinders to at least 10 mm.

7.5.7 Check of Wheel Fastening Nuts Tightening

ATTENTION! TIGHTNESS OF WHEEL FASTENINGS SHALL BE CHECKED BEFORE STARTING MOTION. NEGLECTING THIS REQUIREMENT CAN CAUSE WHEEL SELF-DETACHMENT DURING OPERATION AND HARVESTER TUMBLING WITH SERIOUS INJURIES OF ITS OPERATOR AND SERIOUS HARVESTER DAMAGE.

If required, tighten the fixing nuts in a criss-cross manner to draw the wheel tightly and uniformly to its hub:

- with 500-550 N·m torque for drive wheels;

- with 500-550 N·m torque for steering wheels. Each time a wheel is replaced, check that contact surface between the disc and the hub was clean and that the fastening bolt threads were in perfect condition.

7.5.8 Check of Engine Operation and Adjustments

ATTENTION! BEFORE STARTING THE ENGINE, CHECK OIL AND COOLING FLUID LEVELS. ENSURE THE ABSENCE OF LEAKAGES, DAMAGED OR INSUFFICIENTLY TIGTENED PARTS, WORN OR DAMAGED BELTS, FUEL SMELL, ANY CHANGES OF ENGINE APPEARANCE.

Various possible faults and their solutions are described in the engine operation manual.

7.5.9 Check of Leak Tightness of Sleeves and Pipelines of Fuel, Hydraulic and Brake Systems

States of sleeves and pipelines of fuel, hydraulic and brake systems shall be checked before harvesting and during ESM.

Presence of leaks or contamination may signal about failures of fuel, hydraulic or brake systems.

Leak tightness check of braking system is carried out in three steps:

a) inspect the braking system visually from top to bottom, looking for leakages in all joints, wipe dry all places were

leakages possibly occurred;

b) press the interlocked brake pedals 5-10 times with force from 200 to 250 N;

c) inspect the braking system for presence of leakages once again.

If the leak tightness of some connections is damaged, tighten the pipeline nuts and fastening bolts of turning angles. Repeat the check starting from step (b).

In absence of leakages, the brake system is considered to be leak-tight.

Check if drops from other systems (hydraulics, engine cooling, heating, etc.) fall on any components of the braking system.

ATTENTION! IN CASE OF LEAKAGES IN MAIN CYLINDERS, PRESSURE CONTROLLER OR OPERATING CYLINDERS ON SUPPORTS, THEY SHALL BE REPLACED IN A SERVICE CENTER.

ATTENTION! IN ORDER TO PREVENT INJURIES BY PRESSURIZED WORKING FLUID, RELEASE PRESSURE BEFORE DISCONNECTION OF FUEL AND HYDRAULIC SYSTEMS PIPELINES. TIGHTEN ALL CONNECTIONS BEFORE PRESSURIZING THE SYSTEMS.

7.5.10 Check of Oil Level in Engine Crankcase

Monitor the oil level against the oil level gage dashes, not earlier than five minutes after the engine is stopped, provided that the harvester is installed on a flat surface. If the oil level is below the upper mark, add oil of the same grade up to the upper mark.

ATTENTION! IT IS NOT ALLOWED TO CHECK THE OIL LEVEL IN ENGINE, AS WELL AS TO OPEN THE LID OF THE COOLING SYSTEM EXPANSION TANK UNTIL THE ENGINE IS NOT STOPPED AND COOLED DOWN (COOLING FLUID TEMPERATURE DECREASES BELOW 50°C). NOT FOLLOWING THIS REGULATION MAY LEAD TO INJURY.

7.5.11 Check of Cooling Fluid Level

Harvester motor unit cooling system shall be filled with recommended cooling fluid. Cooling system fullness is checked according to the expansion tank volume level. After filling, activate the engine for a short time, check the cooling system fullness once again and add fluid if necessary.

Cooling fluid level in the expansion tank shall be between "min" and "max" marks.

7.5.12 Check of Battery Fluid Level

Battery fluid level shall be checked in accordance with SB operation manual.

CAUTION! USE ELECTRIC LIGHT WHILE CHECKING THE BATTERY FLUID LEVEL.

7.5.13 Check of Electric Equipment Junction Blocks Integrity

Perform visual inspection, pay special attention to:

- scuffs, marks of squeezing and other mechanical impacts on wires and cables;

- cracks of wire insulation and protec-

tive tubes, wire insulation breakages;

- broken wires;

- traces of mechanical impacts on electric equipment.

Inspection shall be carried out in all accessible places. During preparation for harvesting, it shall be also carried out along all cable routes and in all places where electric equipment is mounted except for the places where such inspection would require to remove the harvester assemblies.

7.5.14 Check of Power Circuits Fastening of Starter, Generator, SB, "ground" switcher

Check the secure fastening of wires to terminals of the starter, generator, SB, "ground" switcher.

7.5.15 Check of Wire Harness Fixture in Relation to Moving and Heated Parts of the Harvester

Check the fastening security of power cables near thresher and engine pulleys and near the heated parts of the harvester (manifold and engine exhaust system).

7.5.16 Check of Belt Gears Tension

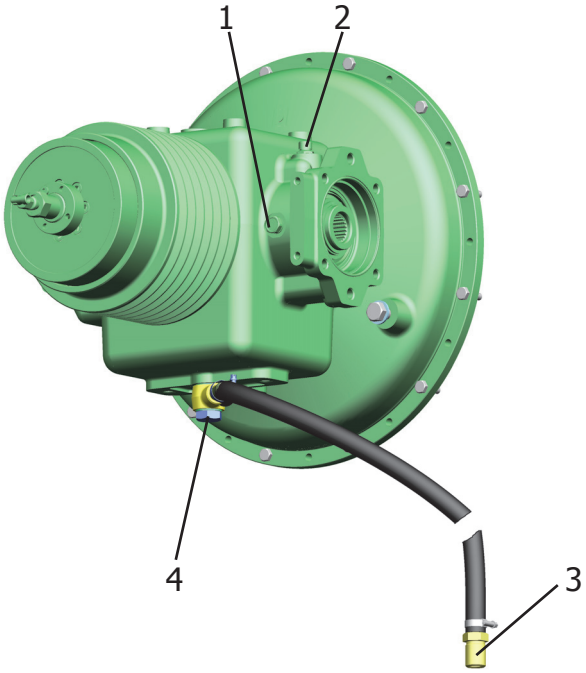
All V-belts shall be well tightened. If new belts are installed, check the tension in the first 2-3 hours of operation. Tighten if necessary.

Check of belt gears tension shall be performed in accordance with Table F.1 of Appendix F.

7.5.17 Check of Oil Level in the Transfer Gear

If the transfer gear was replaced, oil level in the gear shall be checked after trial running and prior to harvesting.

Oil level in the transfer gear shall be monitored every day of harvester operation based on the level in transparent oil level plug 1 (Figure 7.3).



1- transparent oil level plug; 2- breather; 3- drain valve; 4- magnet plug

Figure 7.3 – Transfer gear

7.5.18 Check of Oil Level in Track Reduction Gears

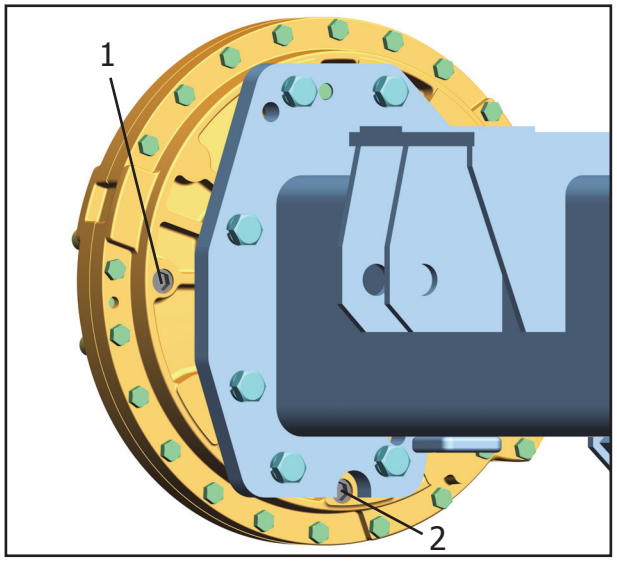
Oil level in GB and track reduction gears shall be:

- at the level of filling and monitoring plug hole 1 edge for ZF axle kit (Figure 7.4);

- at the level of monitoring plug hole 3 edge for CIT axle kit (Figure 7.5).

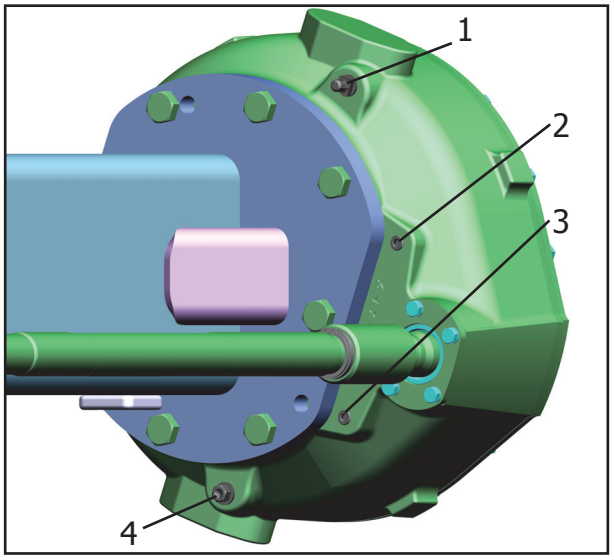
7.5.19 Check of Oil Level in the Upper Rollers Reduction Gear

Visually check the oil level in the upper rollers reduction gear up to the level of monitoring plug 2 (Figure 7.6) at hori-



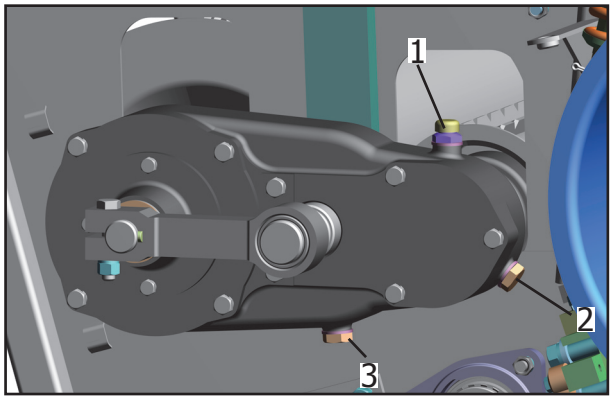
1- filling and monitoring plug; 2- oil drain plug

Figure 7.4 – ZF track reduction gear



1- breather; 2- filling plug; 3- monitoring plug; 4- drain magnet plug

Figure 7.5 – CIT track reduction gear



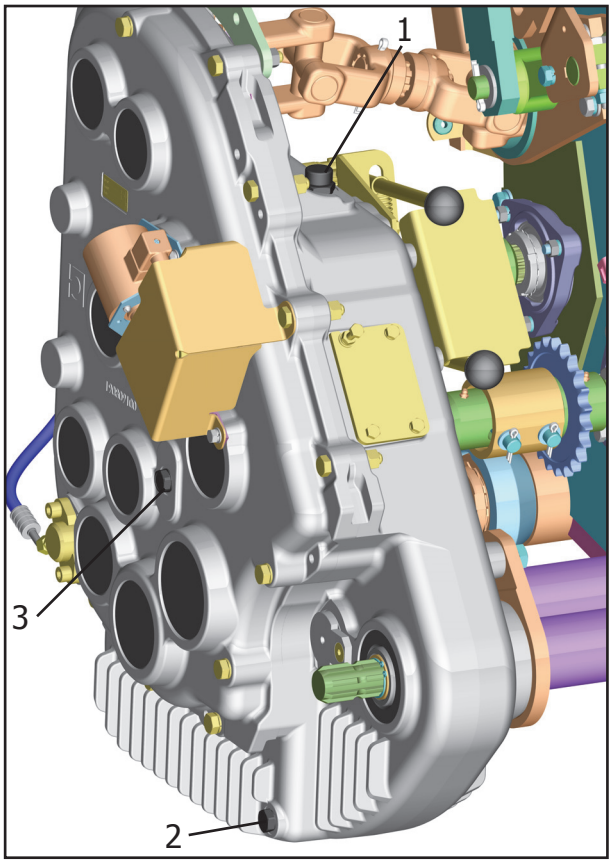
1- breather; 2- monitoring plug; 3- drain plug

Figure 7.6 – Feeder upper rollers reduction gear

zontal positioning of reduction gear axes.

7.5.20 Check of Oil Level in the Feeder Reduction Gear

Visually check the oil level in the feeder reduction gear up to the level of monitoring plug 3 (Figure 7.7).



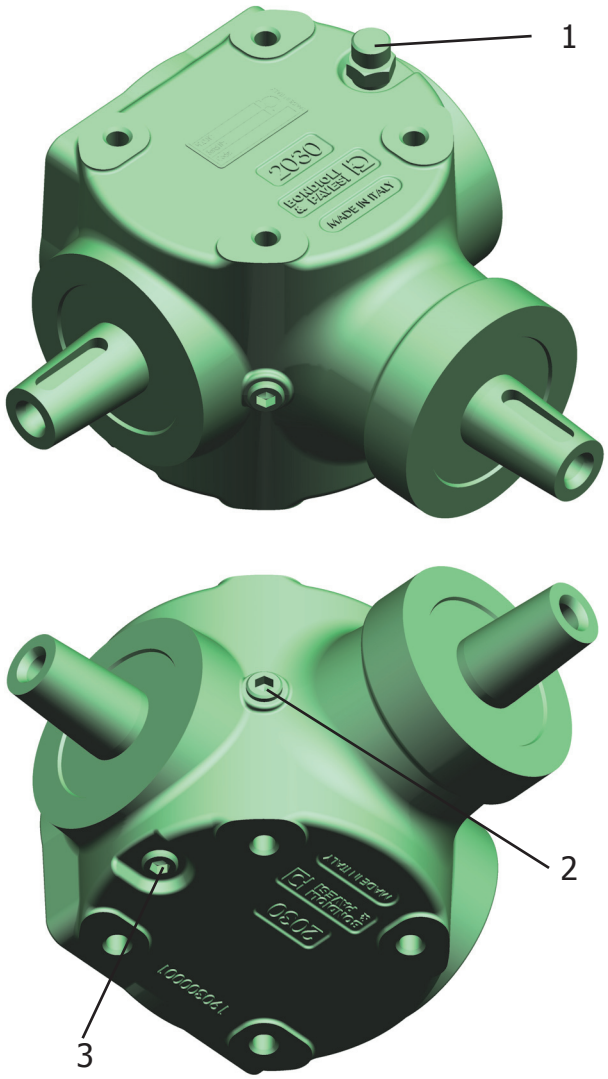
1- breather; 2- drain magnet plug; 3- monitoring plug

Figure 7.7 – Feeder reduction gear

7.5.21 Check of Oil Level in the Fan Drive Gear

Monitor the oil level by means of monitoring plug hole 2 (Figure 7.8).

If necessary, the fan drive reduction gear is filled during operation via breather hole 1.



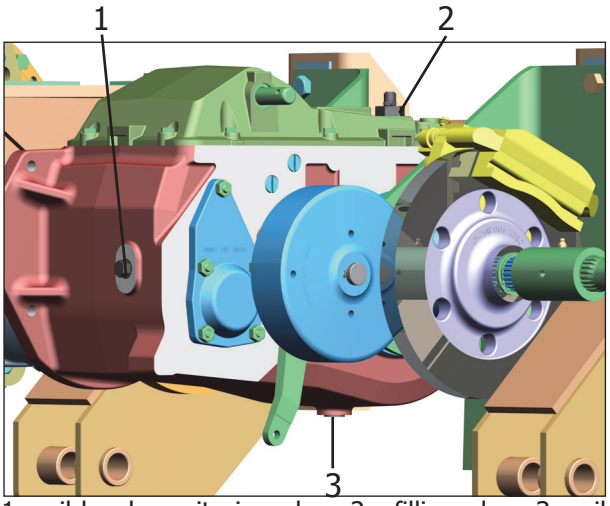
1- breather; 2- monitoring plug; 3- drain magnet plug

Figure 7.8 – Fan drive reduction gear

7.5.22 Check of Oil Level in the Gearbox

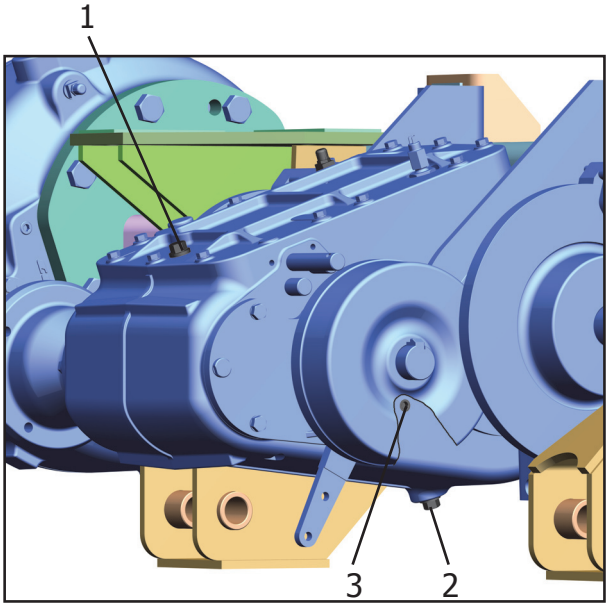
To check the oil level in ZF kit gearbox, remove oil monitoring plug 1 (Figure 7.9) and check the oil level along the lower edge of the hole. Add oil into GB if necessary.

To check the oil level in CIT kit gearbox, remove oil monitoring plug 3 (Figure 7.10) and check the oil level along the lower edge of the hole. Add oil into GB if necessary.



1 - oil level monitoring plug; 2 - filling plug; 3 - oil drain plug

Figure 7.9 – ZF axle kit GB



1 - filling plug; 2 - oil drain plug; 3 - oil level monitoring plug

Figure 7.10 – CIT axle kit GB

7.5.23 Check of Shredding Drum Knives State

Operation results in natural wear of knives; limiting wear is the size of shredding drum which does not allow adjustment of clearance between the counter-cutting beam and shredding drum knives. If the knives are damaged as a result of metal, stones, etc. ingress, they shall be replaced.

ATTENTION! ADJACENT (LOCATED OPPOSITE TO EACH OTHER) KNIVES ARE REPLACED IN PAIRS ACCORDING TO THE WEIGHT CATEGORY.

7.5.24 Adjustment of Shredding Drum Rotation Sensor and Feeder Upper Rear Roller Rotation Sensor

Check and if necessary adjust clearances between rotation sensors 1, 4 (Figure 7.11) and sprockets of drum shafts 2 and feeder reduction gear 3.

Clearance between sensors 1 and drum D shaft sprocket shall be between 2 and 4 mm.

Clearance between sensors 4 and feeder reduction gear C shaft sprocket shall be between 0.5 and 1.5 mm.

The clearance is set as follows:

- loosen the sensor fastening nuts;
- set the clearance by rotating the lower nut;
- tighten the nuts.

7.5.25 Check of External Assembly Units Fastening

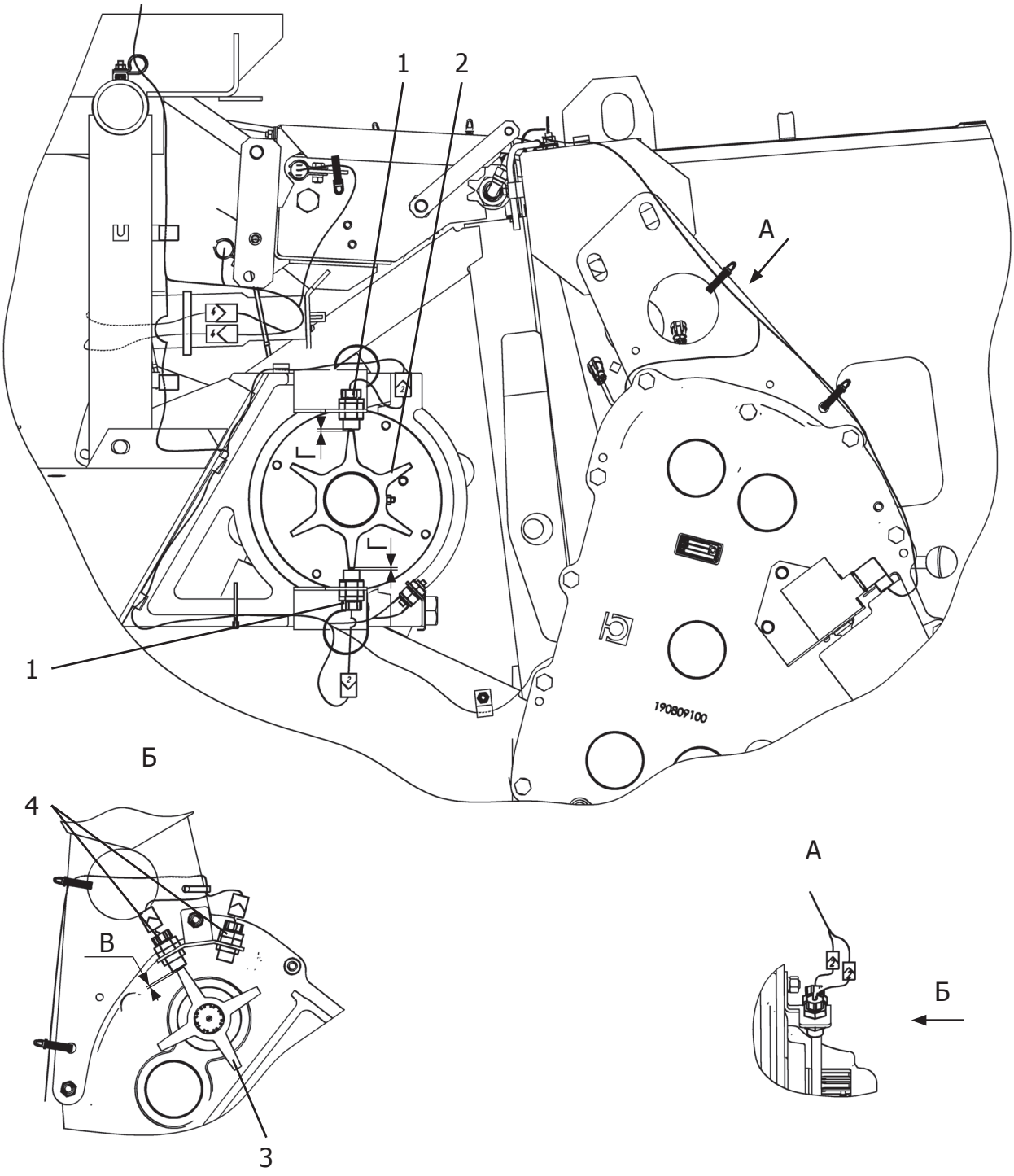
Check the fastening of the following external assembly units and tighten them if necessary in accordance with Table 7.2:

Check and tighten the fastening of the following external assembly units if necessary:

- track reduction gears to the axle beam and steering knuckle levers;
- steering rod hinges to steering knuckle levers;
- feeder reduction gear to the feeding unit;
- drive wheel axle to the frame;
- steering wheel axle to the frame;
- steering hydraulic cylinders hinges to the axle beam and wheel hubs;
- turning rod hinges to wheel hubs;
- accelerator to the frame;
- shredding unit to the frame;
- spout swivel to the transition chute;
- cab to supports;
- feeding unit to the shredding unit.

7.5.26 Check of Clearance between Harvester Rotating Parts and its Frame

Absence of grinding of harvester rotating parts (pulleys, drives, levers, sprockets, etc.) with the frame shall be regularly monitored. Surfaces friction spark may cause fire.



1, 4- sensor; 2- drum shaft sprocket; 3- feeder reduction gear shaft sprocket

Figure 7.11

7.5.27 Windscreen Cleaning

ATTENTION! PRIOR TO WINDSCREEN CLEANING, STOP THE ENGINE AND PULL OUT THE IGNITION KEY.

Windscreen shall be cleaned by means of a mop or rags with water or special detergent from the left and right entrance platform holding to the fencing.

7.6 Recommendations for Technical Maintenance Operations Every shift maintenance

7.6.1 Check of Oil Level in the Hydraulic Tank

See p. 7.5.1.

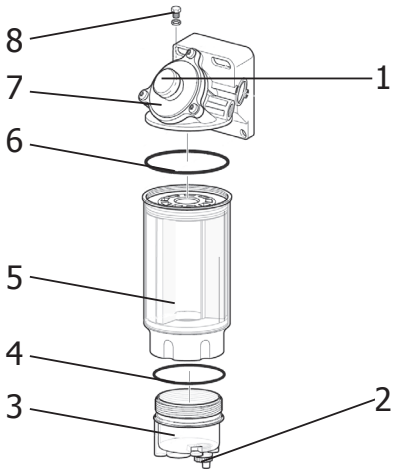
7.6.2 Check of Leak Tightness of Sleeves and Pipelines of Fuel, Hydraulic

and Brake Systems

See p. 7.5.9.

7.6.3 Water Separator Monitoring for Presence of Sludge and Water

Water in coarse fuel filter 2 (Figure 6.27) with a moisture separator shall be monitored every day by means of transparent water accumulation cartridge 3 (Figure 7.12) as well as at the necessity of filter sediment drain.



1- manual fuel feed pump; 2- water draining screw; 3- water accumulation cartridge; 4, 6- O-ring; 5- filtering element; 7- filter housing; 8- air release screw

Figure 7.12 – Coarse fuel filter

To drain water:

- unscrew water draining screw 2 at the bottom of water accumulation cartridge 3 and drain the collected water;
- tighten water draining screw 2.

7.6.4 Check of Oil Level in Engine Crankcase

See p. 7.5.10.

7.6.5 Check of Cooling Fluid Level

See p. 7.5.11.

7.6.6 Check of Power Circuits Fastening of Starter, Generator, SB, "ground" switcher

See p. 7.5.14.

7.6.7 Check of Wire Harness Fixture in Relation to Moving and Heated Parts of the Harvester

See p. 7.5.15.

7.6.8 Check of operability of contact detectors on the counter-cutting beam and their wiring

Check the connection of contact detectors installed on the left and on the right of the counter-cutting beam.

If wiring of contact detectors is damaged, faulty or absent, replace it.

The SAS has a special mode of checking contact detectors and their wiring operability.

This mode allows to verify whether the signals from left and right detector reach the SAS.

The necessity of such check (in addition to its performance during ESM) is determined by the operator. If you are sure that detectors are operable and their wiring is not damaged, the execution of this algorithm is not required.

For execution of contact detectors and their wiring operability check algorithm:

1) deactivate harvester engine;

2) activate the SAS by holding button 8 (Figure 4.23). "P.9" symbols appear at the digital display and the contact detectors signal level is checked and compared to the permissible range. If the signal level does not correspond to the permissible one, indicator 1 glows red and 90 failure code is indicated on the digital display, then the SAS goes off automatically. Causes of such fault are described in Table 4.3. If the signal level complies with the permissible range, harvester audio signal is generated automatically and P.9 indicators start to flash. Then the SAS shall switch to the standby mode and wait for signals from the

contact detectors, after that it is required to tap the counter-cutting beam left or right side slightly with a metal object for the contact detectors to generate signals similar to those of the shredder knives touching the counter-cutting beam. The SAS will actuate the harvester sound alarm in time with tapping,and the left "  " symbol on digital display 7 will glow permanently (instead of flashing) after signals are received from the left detector, the right "  " symbol will glow permanently after signals are received from the right contact detector. That means that contact detectors and their wiring are in operating condition and their signals are received by the SAS.

7.6.9 Check of Belt Gears Tension

See p. 7.5.16.

7.6.10 Check of Oil Level in the Transfer Gear

See p. 7.5.17.

7.6.11 Check of Shredding Drum Knives State

See p. 7.5.23.

7.6.12 Cleaning of Cab Air Cleaner Filter

To clean the filter:

- lift the cab roof screen;
- unfasten filter belts;
- remove the filter, blow it with air jet and reinstall.

ATTENTION! FILTER AND GASKET SHALL FIT TIGHT TO THE CAB FRAMEWORK. PASS THROUGH GAPS ARE NOT ALLOWED!

- fasten the filter with belts to the ceiling;
- put the cab roof screen down.

7.6.13 Condenser Cleaning

Clean the condenser from dust and crop residues by means of air jet with due regard to recommendations of conditioning unit OM.

7.6.14 Check of Pneumatic System Elements for External Damages and their Replacement

Parts of pneumatic system (air tank, pipe ducts, etc.) with external damages shall be replaced.

7.6.15 Check of Wheel Fastening Nuts Tightening

See p. 7.5.7.

7.6.16 Cleaning of all Harvester Assembly Units from Herbs Residues

The harvester shall be kept clean. Regularly clean it from dust, dirt, oil spillage, plant and other residues.

Harvester shall be cleaned from the top to the bottom.

Dirt, oil and herbs residues in engine compartment, at the engine and close to the moving parts could lead to fire. Wind direction, crop nature and its humidity affect the location and the amount of herbs residues.

Clean radiators unit, air intake, exhaust system in the vee of the engine block on a daily basis.

ATTENTION! RADIATORS UNIT SHALL BE CLEANED AND DEACTIVATED ENGINE ONLY!

Radiators unit, exhaust system in the vee of the engine block, transfer gear shall be periodically cleaned by means of air jet depending on the crop residue accumulation.

If the harvester is operated at extremely dry product and at high dust content, the above-mentioned places of dust accumulation shall be checked more often and cleaned if necessary.

In order to provide good access to the radiators unit for air jet cleaning, the air intake shall be free from two grips and opened by turning relatively to two hinges. This will also open the intermediate frame located between the air intake and water radiator.

Clean the cab from the accumulated herbs residues. Blow cab air intake screen with compressed air. Clean the protective housing (tops), harvester panels and roof. Clean upper area of driving wheel axle, gearbox, brakes and area around the steering wheels axle.

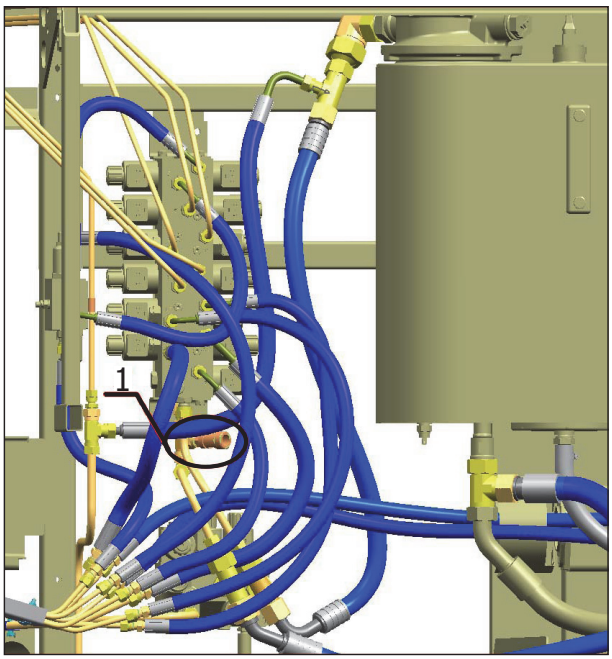
7.7 Recommendations for Technical Maintenance Operations Technical maintenance after first 100 operating hours

7.7.1 Hydraulic Oil Replacement

During hydraulic oil replacement, harvester feeder lifting hydraulic cylinders shall be folded in, i.e. their rods shall be retracted.

ATTENTION! HYDRAULIC TANK AND HYDRAULIC SYSTEM SHALL BE REFILLED ONLY WITH THE OIL GRADE APPLIED IN THE HYDRAULIC SYSTEM. IF APPLICATION OF ANOTHER OIL GRADE IS REQUIRED, HYDRAULIC SYSTEM OIL SHALL BE REPLACED COMPLETELY IN COMPLIANCE WITH THIS MANUAL. APPLICATION OF OILS WHICH ARE NOT INCLUDED INTO THE RECOMMENDED LIST IS NOT ALLOWED.

The hydraulic system shall be refilled only with clean, unused oil through filling half-clutch 1 of main system pressure measurement (Figure 7.13).



1- half-clutch

Figure 7.13 – Location of the half-clutch for harvester hydraulic system refilling and pressure measurement in the main hydraulic system

Thus the oil fills the hydraulic tank via distributor overflow valve and drain line, passing through the main system oil filter.

Oil level shall be monitored through inspection window 5 (Figure 7.14) located on the hydraulic tank.

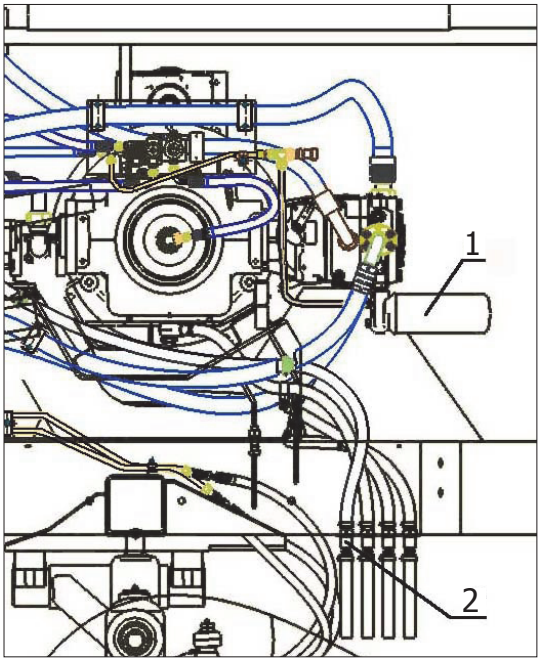
IT IS FORBIDDEN! TO OPERATE THE HARVESTER WITHOUT BREATHER 6 INSTALLED IN THE HYDRAULIC TANK.

Drain oil from the hydraulic tank through the draining sleeve and oil draining tap 2 (Figure 7.15).

Hydraulic oil shall be obligatorily drained from hydraulic motor 1 (Figure 7.16), removing half-clutch 3. After the oil is drained, reinstall half-clutch 3.

1-fastening screws of filter cover; 2-filter cover; 3-drain filter; 4-hydraulic tank; 5-inspection window; 6-breather

Figure7.14 – Hydraulic tank

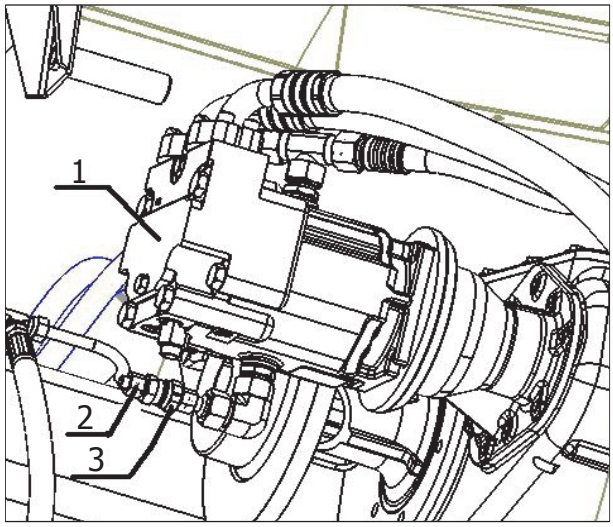


1- filter; 2- oil drain valve

Figure 7.15 – Pump

ATTENTION! DRAIN AND COLLECTED OPERATING FLUID SHALL BE APPROPRIATELY DISPOSED AND NEVER USED ONCE AGAIN!

Hydraulic system shall be filled in accordance with the following provisions:



1- hydraulic motor; 2- plug; 3- half-clutch

Figure 7.16 – Hydraulic motor

a) remove plug 2. Connect the charger to half-clutch 3 and fill the harvester with oil up to the half of inspection window 5 (Figure 7.14) located on hydraulic tank 4;

b) through half-clutch 1 (Figure 6.20) fill the hydraulic tank up to the upper mark of inspection window 5 (Figure 7.14) by means of charger and install plug 2 on the hydraulic motor (Figure 6.23);

c) when the hydraulic tank is filled up to the upper mark of inspection window 5 (Figure 7.14) rotate the engine crankshaft 3-4 times for 5...10 seconds by means of starter without starting the engine (fuel supply handle is in zero position);

d) check the operating fluid level in the hydraulic tank through inspection window 5 located on the tank and add operating fluid through half-clutch 1 (Figure 7.13), if necessary;

e) wait for approximately 5 minutes prior to repeated rotation of engine and

check the leak tightness of the hydraulic system;

f) start the engine and let it operate during 10...15 seconds in neutral gear without speeding up (idling low). Stop the engine;

g) wait for 5...6 minutes prior to start the engine once again. Check the leak tightness of the hydraulic system;

h) start the engine. Increase the crankshaft speed up to 1500 rpm in neutral gear. Go on with this speed over 5...10 seconds and shut off the engine;

i) check the operating fluid level in the hydraulic tank through inspection window 5 (Figure 7.14) and add operating fluid through half-clutch 1 (Figure 7.13) if necessary;

j) start the engine. Increase the crankshaft speed up to the nominal value in neutral gear, slowly turn the HGD control lever forward up to the stop, wait for 30-35 seconds, then turn back up to the stop and wait again for 30-35 seconds. No hydraulic consumers shall be on, GB switching shall be disabled. Stop the engine;

k) check the operating fluid level once again and add if necessary;

l) the harvester shall be left standing for approx. 30 minutes. Residual air can be removed from the hydraulic system to the hydraulic tank only when the engine is off. Now the HGD hydraulic system is filled with operating fluid and free from air;

m) check the operation of all hydraulic operating units in turn by activating and deactivating them for about 10 times;

n) check leak tightness of the hydraulic system;

o) check the operating fluid level in the hydraulic tank through inspection window 5 (Figure 7.14) located on the tank and add operating fluid through half-clutch 1 (Figure 7.13) if necessary;

The hydraulic system is ready for operation.

During hydraulic system filling and at its completion, the operating fluid level shall be at the upper mark of the inspection window provided that feeder lifting hydraulic cylinder rods are lowered.

7.7.2 Hydraulic Tank Filter Replacement

Filtering elements of hydraulic tank 4 (Figure 7.13) and of HGD filter 1 (Figure 7.14) shall be replaced with the following frequency:

a) first replacement — after 100 operating hours together with oil replacement;

b) second and further replacements — after 500 operating hours together with oil replacement, but at least once per season.

To replace the filtering element of drain filter 3 (Figure 7.13) of hydraulic tank 4, unscrew fastening screws of filter cover 1, remove filter cover 2 and pull up

the filtering element. Install a new filtering element in the reverse order.

ATTENTION! FILTERING ELEMENT SHALL BE INSTALLED SO AS TO LET THE GUIDING PIPE OF THE FILTER HOUSING ENTER THE FILTERING ELEMENT HOLE!

In case of early oil replacement, the filtering elements shall also be replaced.

7.7.3 Hydraulic Tank Breather Cleaning and Washing

Hydraulic tank breather shall be cleaned and washed together with replacement of the hydraulic tank filter.

7.7.4 Steering Wheel Hydraulic System Pumping

After oil replacement, as well as in case of lack of synchronous movement of the steering wheel and driven wheels, air shall be pumped away from the hydraulic system in the following way:

- Detach hydraulic cylinders housings from the steering wheel axle beam and turn the hydraulic cylinders so that their nipples look upward;

- release swivel nuts of high-pressure hoses for 1.5-2 turns from nipples of rod cavity of the left hydraulic cylinder and the piston cavity of the right hydraulic cylinder connected to it;

- at the minimum engine speed, rotate the steering wheel right up to the stop and keep it in the extreme position, the air will be removed through gaps created under the loosened swivel nuts. Hold the wheel as long as air bubbles are present in the exuding oil, then use a wrench to tighten the nuts until notable force input is felt, finish tightening by the wrench for 1/12 - 1/8 of a turn (at the angle of 30-45 degrees). In case of leakage after nut tightening, it is allowed to tighten the swivel nut for 2/4 turn more;

- release the swivel nuts of high-pressure hoses from nipples of not pumped cavities and remove air as described above;

- attach hydraulic cylinders housings to the steering wheel axle beam.

7.7.5 Wheels Toe-In Check and Performance

See p. 7.5.5.

7.7.6 Transfer Gear Oil Replacement

Oil replacement procedure:

- remove breather 2 (Figure 7.3) from the oil filling hole;

- drain the used oil through drain valve 3;

- remove and clean magnet plug 4, clean its mounting location as well;

- reinstall magnet plug 4 to its mounting location and tighten with a torque of 60-68 N·m;

- screw drain valve 3;

- fill the transfer gear with oil through the oil filling hole under breather 2 according to Table 7.3;

- reinstall the breather in place and tighten with a torque of 38-39 N·m;

- start the engine not earlier than in 5 minutes after filling completion;

- check the oil level and add oil into the transfer gear if necessary.

- during the first run, rotate the transfer gear at crankshaft rotation frequency ranging from 1000 to 1200 rpm for 2 minutes;

- check the oil level in 2 minutes after the engine stop.

IT IS FORBIDDEN! TO FILL THE TRANSFER GEAR WITH OIL ABOVE THE MONITORING PLUG LEVEL! EXCESSIVE OIL WILL BE SQUEEZED OUT THROUGH THE BREATHER OR THROUGH SEALING CAPS DURING OPERATION!

ATTENTION! DO NOT ALLOW OIL LEVEL FALL BELOW THE MINIMUM LEVEL!

In case of transfer gear replacement, fill the new transfer gear with oil as described above in this section.

Absence of lube oil leakage from the transfer gear shall be monitored every day.

7.7.7 Fan Drive Gear Oil Replacement

Oil replacement procedure:

- remove breather 1 (Figure 7.8);

- drain used oil by turning out drain magnet plug 3;

- clean drain magnet plug 3 and its installation hole;

- reinstall drain magnet plug 3 in place and tighten with a torque of 30 N·m;

- remove monitoring plug 2;

- fill the reduction gear with oil through the breather hole according to Table 7.3 Continue filling until the level of monitoring plug 2 hole is reached;

- reinstall monitoring plug 2 in place and tighten with a torque of 30 N·м;

- reinstall breather 1 in place and tighten with a torque of 30 N·m;

ATTENTION! IF VISUAL INSPECTION SHOWS STRONG CONTAMINATION, YOU SHOULD REPLACE OIL WITHOUT WAITING FOR THE TERMS SPECIFIED.

7.7.8 Oil Replacement in CIT Track Reduction Gears

Oil replacement procedure:

- remove filling plug 2 (Figure 7.5);

- drain used oil by turning out drain magnet plug 4;

- clean drain magnet plug 4 and its installation hole;

- reinstall drain magnet plug 4 in place and tighten with a torque of 40 N·m;

- remove monitoring plug 3;

- fill the reduction gear with oil through filling plug 2 hole according to Table 7.3. Continue filling until the level of monitoring plug 3 hole is reached;

- reinstall monitoring plug 3 in place and tighten with a torque of 40 N·м;

- reinstall filling plug 2 in place and tighten with a torque of 40 N·м.

7.7.9 Upper Rollers Reduction Gear Oil Replacement

Oil replacement procedure:

- remove breather 1 (Figure 7.6);

- drain used oil by turning out drain magnet plug 3;

- clean drain magnet plug 3 and its installation hole;

- reinstall drain magnet plug 3 in place and tighten with a torque of 30 N·m;

- remove monitoring plug 2;

- fill the reduction gear with oil through the breather hole according to Table 7.3 Continue filling until the level of monitoring plug 2 hole is reached;

- reinstall monitoring plug 2 in place and tighten with a torque of 30 N·м;

- reinstall breather 1 in place and tighten with a torque of 30 N·m;

7.7.10 Feeder Reduction Gear Oil Replacement

Oil replacement procedure:

- remove breather 1 (Figure 7.6);

- drain used oil through drain magnet plug 2;

- clean drain magnet plug 2 and its installation hole;

- reinstall drain magnet plug 2 in place and tighten with a torque of 40 N·m;

- remove monitoring plug 3;

- fill the reduction gear with oil through breather 1 hole according to Table 7.3. Continue filling until the level of monitoring plug 3 hole is reached;

- reinstall monitoring plug 3 in place and tighten with a torque of 40 N·м;

- reinstall breather 1 in place and tighten with a torque of 70 N·m;

Oil replacement shall be performed in accordance with Table 7.3.

ATTENTION! IF VISUAL INSPECTION SHOWS STRONG CONTAMINATION, YOU SHOULD REPLACE OIL WITHOUT WAITING FOR THE TERMS SPECIFIED.

7.7.11 Oil Replacement in CIT Axle Kit GB

Oil replacement procedure:

- drain used oil by unscrewing oil drain plug 2 (Figure 7.9);

- remove oil level monitoring plug 3;

- fill GB with oil through filling plug 1 hole. Continue filling until the level of monitoring hole is reached.

7.8 Recommendations for Technical Maintenance Operations Technical maintenance after first 500 operating hours

7.8.1 Oil Replacement in CIT Track Reduction Gears

Oil replacement procedure:

- remove filling and monitoring plug 1 (Figure 7.4);

- drain used oil by unscrewing oil drain plug 2;

- clean oil drain plug 2 and its hole;

- reinstall oil drain plug 2 in place and tighten with a torque of 50 N·m;

- fill the reduction gear with oil through filling and monitoring plug 1 hole according to Table 7.3;

- reinstall filling and monitoring plug 1 in place and tighten with a torque of 50 N·м;

7.8.2 Oil Replacement in ZF Axle Kit GB

Oil replacement procedure:

- drain used oil by unscrewing oil drain plug 3 (Figure 7.8);

- remove oil level monitoring plug 1;

- fill GB with oil through filling plug 2 hole. Continue filling until the level of monitoring hole is reached.

7.9 Recommendations for Technical Maintenance Operations Technical maintenance every 50 operating hours (TM-1)

7.9.1 Check of Hydraulic Brake Fluid Level

See p. 7.5.2.

7.9.2 Operating Brakes Operability Check

See p. 7.5.3.

7.9.3 Parking Brake Operability Check

See p. 7.5.4.

7.9.4 Check of Tire Pressure in Drive and Steering Wheels

See p. 7.5.6.

7.9.5 Check of Electric Equipment Junction Blocks Integrity

See p. 7.5.13

7.9.6 Cleaning of SB, Lubrication of Batteries Ends and Terminations

Cleaning of SB, lubrication of batteries ends and terminations is performed with any grease lubricant complying with SB OM requirements.

7.9.7 Adjustment of Shredding Drum Rotation Sensor and Feeder Upper Rear Roller Rotation Sensor

See p. 7.5.24.

7.9.8 Check of Belt Gears Tension

See p. 7.5.16.

7.9.9 Receiver Fastening Check

Check the receiver fastening to frame brackets and tighten the fasteners, if necessary.

7.9.10 Drain of Condensate from the Pneumatic Unit

Condensate shall be drained from the receiver by pressing condensate drain valve 2 (Figure 6.57) installed in the lower part of the receiver.

7.9.11 Check of External Assembly Units Fastening

See p. 7.5.25.

7.10 Recommendations for Technical Maintenance Operations Technical maintenance every 500 operating hours

7.10.1 Hydraulic Oil Replacement

See p. 7.7.1.

7.10.2 Hydraulic Tank Filter Replacement

See p. 7.7.2.

7.10.3 Hydraulic Tank Breather

Cleaning and Washing

See p. 7.7.3.

7.10.4 Steering Wheel Hydraulic System Pumping

See p. 7.7.4.

7.10.5 Generator Check

Keep an eye on  "Generator failure",  "Harness undervoltage" and  "Harness overvoltage" icons. Appearance of these icons on MTM display indicates generator malfunction.

7.10.6 Transfer Gear Oil Replacement

See p. 7.7.6.

7.10.7 Fan Drive Gear Oil Replacement

See p. 7.7.7.

7.10.8 Oil Replacement in CIT Track Reduction Gears

See p. 7.7.8.

7.10.9 Upper Rollers Reduction Gear Oil Replacement

See p. 7.7.9.

7.10.10 Feeder Reduction Gear Oil Replacement

See p. 7.7.10.

7.10.11 Oil Replacement in CIT Axle Kit GB

See p. 7.7.11.

7.11 Recommendations for Technical Maintenance Operations Technical maintenance every 1000 operating hours

7.11.1 Oil Replacement in ZF Track Reduction Gears

See p. 7.8.1.

7.11.2 Oil Replacement in ZF Axle Kit GB

See p. 7.8.2.

7.12 Recommendations for Technical Maintenance Operations Technical maintenance performed as required

7.12.1 Air-Dryer Cartridge Replacement

To replace the air-dryer removable cartridge:

- ventilate the air-dryer;
- unscrew the cartridge with a wrench and turn it out;
- clean the housing socket and air-dryer threaded nipple and inspect them for damage;
- lubricate the cartridge gasket and threaded nipple;
- screw the cartridge on the threaded nipple manually until the gap lands into the socket, and then screw it manually for a half of a turn with M torque of 15 N·m;
- check the leak tightness of the air-dryer. Tighten if necessary.

7.12.2 Engine Air-Feeding System Filter Maintenance

The air filter shall be cleaned depending on dust concentration in the air and tenuity sensor readings.

Air filter shall be replaced after tenuity sensor actuation.

Carefully remove old filtering elements. Thoroughly clean the internal part of the housing. Use clean wet cloth to clean the surface. Clean gasket surfaces.

Check the uniformity of surface cleaning not to leave any stains of dirt.

Check the new filtering element for damages. Press the new gasket to ensure its springing. Carefully insert the new filtering element. Ensure that the gasket has landed smoothly.

Check the internal cleanliness of the filter housing. Check the connection for absence of leaks and traits of wear.

Replace absent or damaged parts.

IT IS FORBIDDEN!

- to install a damaged filtering element;
- to tap the filter;
- to blow the filter under high pressure;
- to leave the air filter open;
- to apply non-recommended filters.

7.12.3 Cab Air Cleaner Filter Replacement

To replace the filter:

- lift the cab roof screen;
- unfasten the filter belts;
- remove the old filter and install a new one in the reverse order.

ATTENTION! FILTER AND GASKET SHALL FIT TIGHT TO THE CAB FRAMEWORK. PASS THROUGH GAPS ARE NOT ALLOWED!

- fasten the filter with belts to the ceiling;
- put the cab roof screen down.

7.12.4 Corn Cracker Cleaning and Preservation

Immediately after corn harvesting completion the corn cracker shall be removed, cleaned and preserved.

To clean the cracker rollers, protective enclosures 4 and 7 (Figure 6.39) shall be removed. Cracker rollers shall be thoroughly cleaned, including their grooves, and protected against corrosion by means of preservation grease.

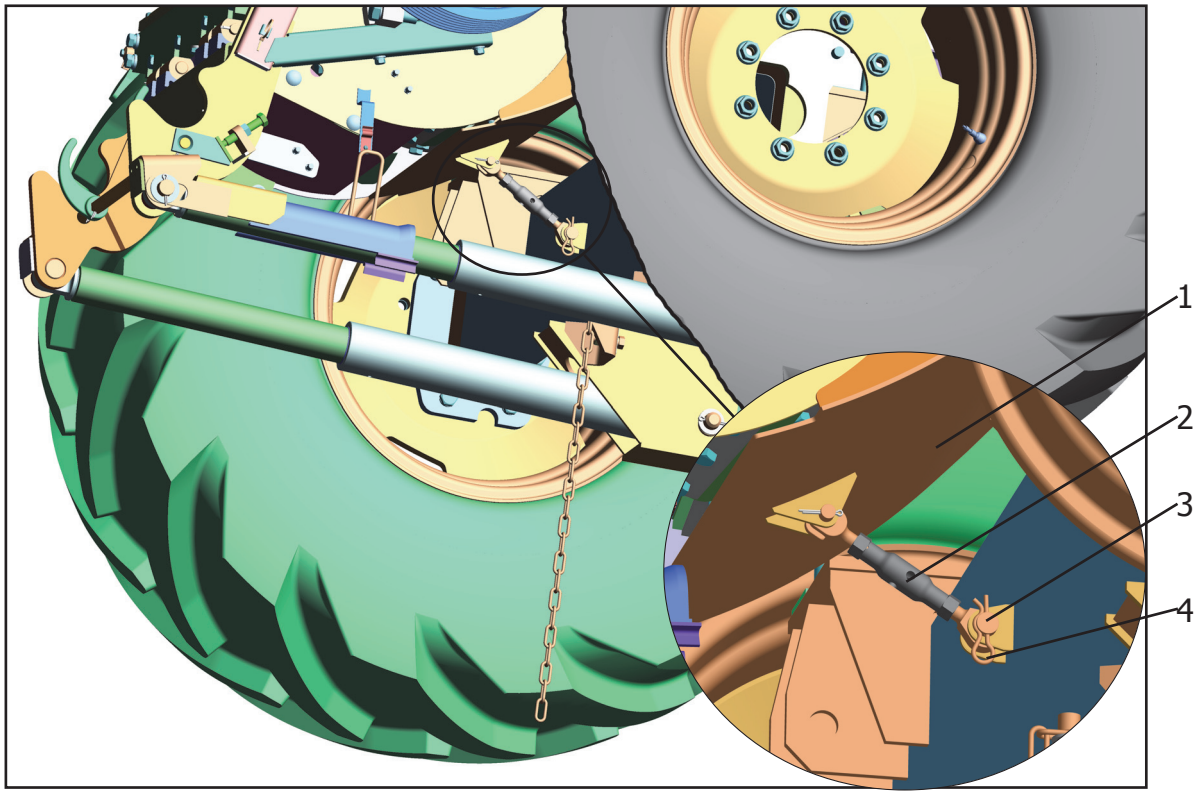
ATTENTION! THOROUGHLY GREASE ALL CORN CRACKER BEARINGS BEFORE AND AFTER CLEANING WITH WATER. IT IS IMPORTANT IN ORDER TO PREVENT INGRESS OF WATER AND DETERGENT INTO THE BEARINGS.

It is recommended to clean the corn cracker even in case it will not be operated for several days, as the rollers may otherwise become glued to each other.

7.12.5 Cleaning of Transport Channel in the Diffuser Operating Area

If the transport channel in diffuser 1 operating area (Figure 7.17) is clogged, it shall be cleaned. To do so, it is necessary to:

a) lift the feeder at the maximum possible height and install a safety stop on



1 -diffuser; 2 - rod; 3 - axis; 4 - cotter pin

Figure 7.17

the left feeder lifting hydraulic cylinder;

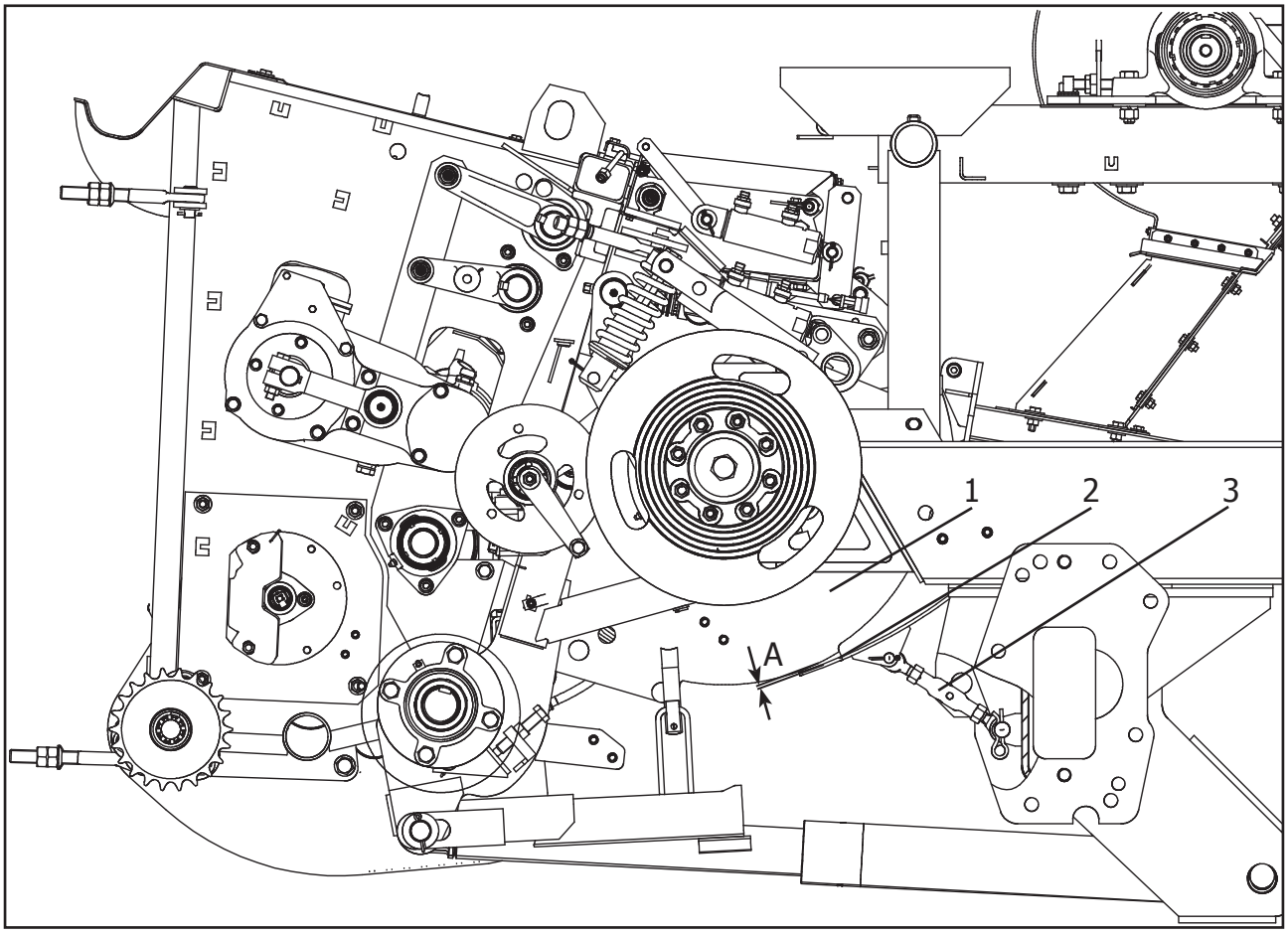
b) transfer ladders on both sides of the harvester cab to repair position, as shown in Figure 6.42;

c) remove cotter pin 4 and axis 3 of rod 2 fastening.

ATTENTION! WHEN THE AXIS IS REMOVED, DIFFUSER ROTATES DUE TO ITS OWN WEIGHT!

d) perform the cleaning.

After cleaning, install the diffuser in its operating position providing the A clearance of 5-7 mm between shredder side frames 1 (Figure 7.18) and diffuser bottom 2. A clearance is adjusted by rod 3 length adjustment.



1 - shredder side frame; 2 - diffuser bottom; 3 - rod

Figure 7.18 – Adjustment of clearance between shredder side frames and diffuser bottom

7.12.6 Diffuser Bottom Replacement

In case of through rubbing, the diffuser bottom shall be replaced. To do so:

a) perform operations a)-c) of Subsection 7.12.5;

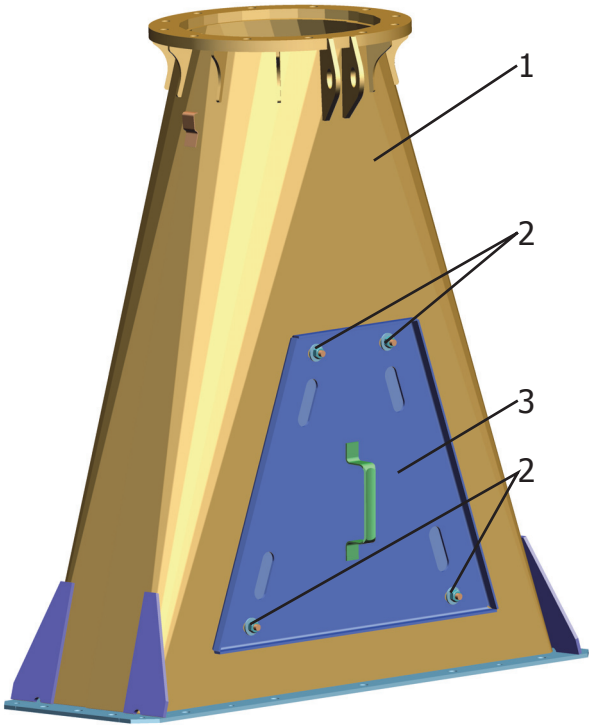
b) remove cotter pin 4 (Figure 7.19) and axis 5, remove rod 6.

c) remove cotter pins 2 and axes 1 from the left and from the right, remove diffuser bottom 3.

d) install the new diffuser bottom in reverse order and adjust the clearance between the shredder side frames and bottom in accordance with Subsection 7.12.5.

1, 5 - axis; 2, 4 - cotter pin; 3 - diffuser bottom; 6 - rod

Figure 7.19 – Diffuser bottom replacement



1 - transition chute; 2 - bolting; 3 - cover

Figure 7.20 – Transition chute

7.12.7 Cleaning of Transport Channel in the Transition Chute Operating Area

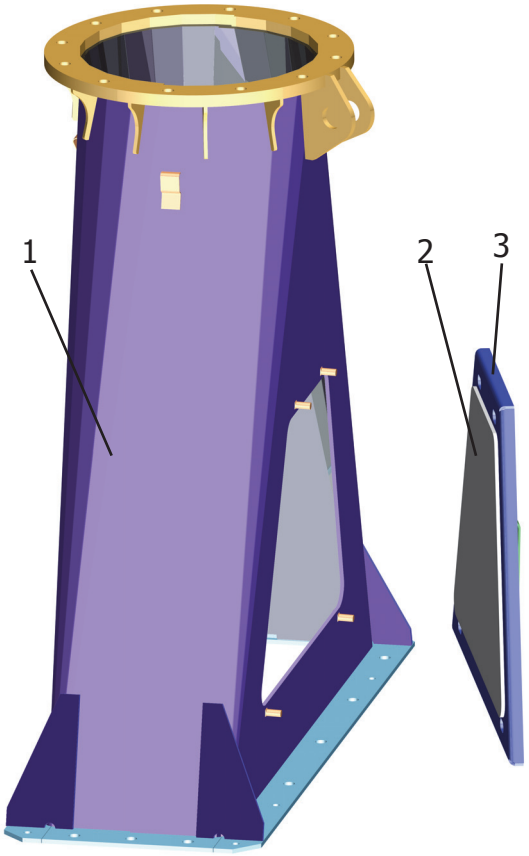
If the transport channel in transition chute 1 operating area (Figure 7.20) is clogged, it shall be cleaned. To do so, it is necessary to:

a) unscrew bolting 2 and remove cover 3.

b) perform the cleaning;

c) reinstall the cover in place and fasten with bolting 2.

CAUTION! PAD 2 (Figure 7.21) OF COVER 3 SHALL BE INSTALLED INTO TRANSITION CHUTE HOUSING 1 HOLE AT THE RIGHT ANGLE!



1 - transition chute housing; 2 - pad; 3 - cover

Figure 7.21

7.12.8 Cleaning of Transport Channel in the Tower Operating Area

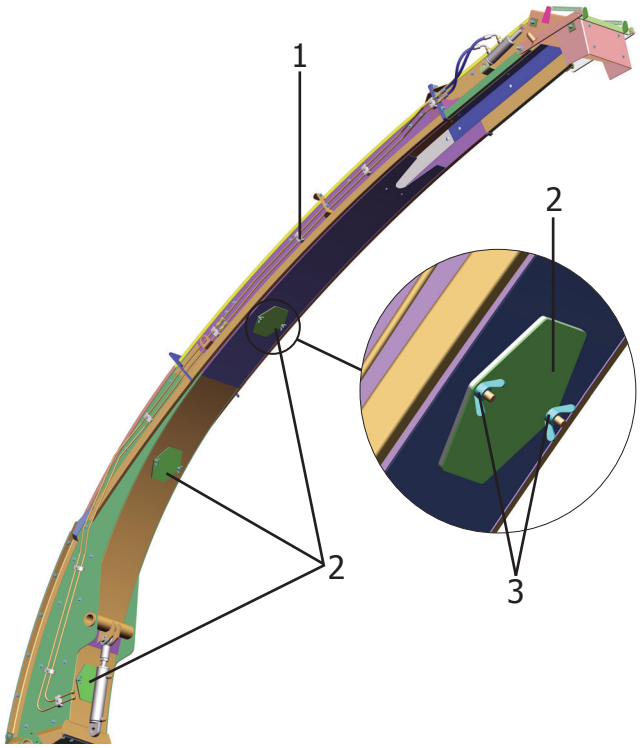
Covers are envisaged in tower structure to eliminate transport channel clogging in tower operating area 1 (Figure 7.22), as well as to monitor the changeable pads state.

In order to clean the transport channel:

a) unscrew butterfly nut 3 and remove sealed cover 2;

b) clean the transport channel;

c) reinstall sealed cover 2 in reverse order.



1 - tower; 2 - sealed cover;
3 - butterfly nut

Figure 7.22

8 HARVESTER STORAGE TERMS

8.1 General Provisions

Correct storage guarantees long service life of the harvester and maintaining of its performance.

Harvesters are stored in compliance with GOST 7751-2009.

Types of storage

- on a shift basis with operational pause up to 10 days;

- short-term from 10 days to 2 months

- long-term of over 2 months

Harvesters shall be stored in enclosed spaces or in the hangar. Harvesters storage in enclosed spaces can be justified from the point of view of economy: scope of works and material consumption at harvester putting in storage and taking from storage is reduced.

It is allowed to store harvesters on open equipped sites provided that mandatory procedures related to preservation, sealing and removal of parts which require warehouse storing have been performed.

Open sites for harvesters storage shall be located in non-flooded places and to be provided with draining ditches along the perimeter. Site surface shall be smooth and have a slope of 2° - 3° for water drain; it shall have solid and uniform or striped (asphalt, concrete or manufactured from local construction materials) surface capable to withstand the load from moving harvesters and stored harvesters.

After high wind, heavy rainfall or snowdrifts, the harvesters shall be checked and the detected defects shall be eliminated immediately.

Condition of harvesters during indoor storage shall be checked at least every two months, during outdoor or under shelter storage – each month.

Harvesters shall be put in shift and short-term storage directly after works completion, in long-term storage – no later than 10 days since works completion.

During harvesters storage, conditions shall be provided for convenient inspection and maintenance, as well as for fast taking out of storage in case of such necessity.

8.2 Harvester Preparation for Storage

CAUTION! For all types of storage:

1) close hoods, doors, hatches and guards;

2) switch off SB;

3) preserve non-painted metal surfaces of operating units (cutter bars, knives, conveyors, etc.), parts and mechanisms of gears, friction nodes, hydraulic cylinder rods, spline joints, chain gear sprockets, screw-type and threaded surfaces of parts and assembly units, as well as outer mating mechanically finished

surfaces. Prior to preservation, clean the harvester surfaces of mechanical contamination, degrease and dry;

4) set levers and pedals of control mechanism in position excluding inadvertent activation of harvester and parts thereof.

8.2.1 Harvester Washing and Cleaning

After operation the harvester shall be cleaned from dust, dirt, oil spillage, plant and other residues. Cleaning shall be performed at special sites where drain waters neutralization is provided.

Place the harvester on site, open protective guards and hatches, switch on the harvester and run at idle for 10-15 min to remove crop residues. Protect the components against unacceptable water ingress by protective shields made of waxed kraft paper or polyethylene foil. Blow the harvester with compressed air after cleaning and washing.

Electric equipment shall be cleaned, blown with air, terminals shall be covered with protective grease.

8.2.2 Preparation for Shift Storage

It is allowed to store the harvester on sites and locations of shift storage or directly in the place of operation.

The harvester is put in storage fully equipped without removal of major parts.

8.2.3 Preparation for Short-Term Storage

During preparation for short-term storage:

1) clean and wash the harvester as described in p. 8.2.1;

2) in case of low temperatures at harvester storage or over one month storage, remove storage batteries and place those at the warehouse;

3) tightly seal all holes, gaps, cavities with sealing plugs or glue tapes (feeding and unloading, inspection chambers, tanks and reducers filler caps, carburetor and fans throttles, breather holes, exhaust pipes, etc.) that could bring in atmospheric precipitations into inner parts of the harvester. To provide free exhaust from cooling and condensing systems, drain devices shall be left open.

8.2.4 Preparation for Long-Term Storage

During preparation for long-term storage operations described in p. 8.2.3 shall be performed.

In case of harvester long-term outdoor storage, the following parts shall be removed, prepared for storage and sent to the warehouse:

- electric equipment (lighting devices);
- chains;
- drive belts (after removal wash with warm water and soap, wipe dry, apply talc);
- rubber, polymeric and textile components;
- cutting devices blades;

- tools and devices.

If the harvester is stored indoors it is allowed to leave the parts (except for SB) in their places provided that they are preserved and sealed. Drive belts shall be cleaned from oil stains, tension shall be loosened.

Chains shall be removed and rinsed in washing fluid (kerosene, diesel fuel or gasoline). Chains that are suitable for operation shall be kept in diesel oil, heated from 80 to 90°C during 15-20 minutes, dried and reinstalled on the harvester in loosened state.

It is allowed to store unloaded tires (to reduce pressure in steering and drive wheel axles tires down to 70% of nominal) for harvesters installed on supports; tires shall not be exposed to direct sunlight. Tire surfaces are protected against cracking by coating them with AKS-3, AKS-4 aluminum paint, lime wash or other protective compositions, recommended by the "Rules of operation of tires for tractors and agricultural machinery".

The harvester shall be placed upon supporting blocks or backing blocks horizontally in order to exclude frames and other assemblies bending and provide wheels unloading. Leave a clearance of 80 - 100 mm between tires and support surface.

Clean the outer surfaces of hydraulic system sleeves and pipelines from oil, dry and apply talc. It is allowed to store sleeves and pipelines on the harvester. Their surfaces are additionally covered with light-protective composition or wrapped with paraffin paper as per GOST 9569-2006.

Replace filtering elements in the fuel supply system, if necessary.

Clean the cables and apply protective grease.

Springs of devices which regulate tension of conveyors, belt drives, belt and chain gears and other tension mechanisms and devices shall be unloaded and covered with protective grease or painted.

8.2.5 Preservation

Places where painting is damaged shall be cleaned, wiped, degreased and painted or covered with preservation grease.

Apply preservation grease on operating surfaces of sprockets, belt and chain drives, protruding parts of hydraulic cylinders shafts, gearbox shafts, axle, socket and lever of gear shift mechanism, spherical surfaces of hydraulic cylinders rods, turning axes of pulling devices levers, cutting bar knives, threaded surfaces of tension and other adjusting components, other operation devices which surfaces have worn during operation.

Preserve the component parts (engine, ground drive assemblies, undercarriage) by filling the internal cavities of operating and preservation greases and oils with subsequent rotation of mechanisms.

List of assemblies and required amount of compounds is provided in Table G.1 of Appendix G.

Multi-purpose operation and preservation oil shall be prepared by addition of AKOR-1 compound to operating oil grades. The compound is added based on 10 % of the total amount of operating and preservation oil. Preheated (from 60 to 70°C) compound is added to preheated (from 70 to 80°C) operating oil and stirred intensely until a uniform mixture is achieved. Mixture uniformity is determined by absence of black or dark-brown stains in the oil jet pouring from the mixer and by absence of residue or blobs on the vessel bottom or walls.

△ **IT IS FORBIDDEN!** TO POUR AKOR-1 COMPOUND IMMEDIATELY INTO THE ENGINE PALLET, HIGH-PRESSURE FUEL PUMP AND CONTROLLER, AS THE COMPOUND WILL REMAIN ON THE WALLS OF THE FILLER CAP OR CRANKCASE AND WILL NOT MIX WITH OIL, DUE TO ITS HIGH STICKINESS AND VISCOSITY.

For preservation of hydraulic system cavities start the engine. Run the harvester for 5 minutes, alternately turning on all operating units. At the completion of running, fill the hydraulic tank with oil up to the upper gage mark.

Add grease to bearing housings and lubricate the points in accordance with diagrams and lubrication table. Grease is not applied in cartridge type bearings.

Preserve the fuel tank and screw the neck and nipples plug tightly.

8.2.6 Sealing

If the harvester is stored outdoors:

- seal the oil tank filler cap and hydraulic tank breather;

- close hatches and guards;

- tightly seal all holes, gaps and cavities (feeding and unloading, inspection chambers, reducers filler caps, hydraulic tank breather, exhaust pipes. etc.), that could bring in atmospheric precipitations into inner parts of the harvester, with covers or sealing plugs;

- send tools, devices and spare parts to the warehouse.

8.3. Technical Maintenance during Storage

During a period of long-term storage, check the following when servicing:

1) condition of corrosion-resistant coatings (presence of protective lubricant, absence of corrosion or paint-loss);

2) tire pressure of drive and steering wheels;

3) condition and tight fit of the plugs;

4) condition of protective devices (integrity and proper fastening of cases, guards and covers).

In case of short-term storage, the engine shall be started and the following operations shall be carried out at minimum rpms:

1) run the harvester for 5 minutes, alternately turning on all operating units;

2) move hydraulic cylinders from one extremity to the other and then back again;

3) move the harvester by 1.5-2 m in order to test the gearbox and final drives and to shift the deformation area for drive and steering wheel tires;

4) perform 10-15 full rotations of the steering wheel in both directions, rotating it from one extremity to the other until hard stop;

5) check brakes performance by pressing brake pedals from 10 to 15 times;

6) check operation of the conditioning unit in compliance with conditioning unit operation manual.

8.4. Storage of Harvester Components

8.4.1. Tire Storage

Tires and inner tubes shall be stored in premises protecting against exposure to direct sunlight at a temperature ranging from plus 10 to plus 20 °C and relative air humidity from 50 to 80%. In some cases, unloaded tires can be stored on racks on the harvester, but shall be kept away from direct sunlight. Tires shall be mounted vertically onto wooden racks. They shall be periodically rotated to change support points. Tires shall not be stacked for storage.

Inner tubes shall be kept fully inflated and nested inside tires when in storage. They may also be stored separately by hanging them slightly inflated on painted wooden or metal hangers and semicircular shelf with a curvature radius of no less than 300 mm. The inner tubes shall be periodically rotated to avoid any creasing.

Tires and inner tubes shall be kept at a distance of at least 2 m from heating devices. They shall not be stored alongside chemicals (acids, alkali) or fuel.

8.4.2. Drive Belts Storage

Drive belts shall be stored in a dry, heated space with an air temperature from 0°C to 30°C and a relative humidity no greater than 85%, at least 1 m away from any heating devices.

Drive belts shall be stored uncoiled on racks, pallets, hangers or semicircular shelves. When in storage, drive belts shall be inspected periodically. They shall be disinfected if any areas of rot are found.

8.5. Maintenance during Removal from Storage

When removing from storage, the following maintenance steps shall be taken:

- mount and install tires;
- set the driving and steering wheel tires' air pressure as shown in Table 2.2;
- remove the harvester from its supports and tow to the maintenance area;
- remove any sealing devices (covers,

sealing plugs, casings, etc.), open protective guards, remove protective grease and dust;

- check the condition of corrugated conduits and wire insulation for each cable harness and correct any defects found;

- check all fuse links in CP fuse units and upper panel against the rating nameplate. Replace any links that have blown with serviceable ones of the appropriate rating;

- test buttons on the lever for HGD control and the harvester remote controls and replace any defective buttons;

- install storage batteriesinto the HARVESTER;

- install lighting devices and belts. Check the headlights and signal lights are intact before installation and replace any defective lights;

- install drive belts;

- adjust the tension of belt and chain drives;

- adjust safety couplings;

- check the level of fluid in the brake fluid reservoir and top up if necessary;

- drain fuel sediment from the fuel tank. Fill the fuel tank;

- test systems functioning and adjust harvester assembly units and machinery.

- remove any plugs, supports or tags used in preparing the harvester for long-term storage and return them to the warehouse.

9 POSSIBLE FAILURES AND METHODS OF THEIR ELIMINATION

Table 9.1. shows possible failures and methods of their elimination.

Table 9.1.

Fault, symptom	Elimination method
1	2
9.1 Feeder	
Feeder rollers do not rotate while the feeder drive is active (adapter drive shaft is rotating):	
- feeder reduction gear is off	Activate the gear
- stop mechanism dog did not disengage from the stop wheel (sound of safety clutch operation is heard)	Switch on feeder reverse to disengage the dog
- gear teeth destruction	Replace the reduction gear
- loss of axes of clutches connecting rollers with the reduction gear	Install the axes
Feeder rollers do not rotate while the feeder drive is active (adapter drive shaft is not rotating):	
- reverse switch clutch was not fully deactivated	Repeat reverse activation/deactivation until it switches off completely
- connecting clutch chain destruction at reduction gear drive	Replace the chain
Rollers stop while operating under load:	
- malfunction of safety clutch adjustment (sound of clutch operation is heard)	Replace the clutch (or reduction gear)
- feed mass clogging under the lower front roller while operating with rotary header	Install the bottom under the rollers from the rotary header kit
- feed mass clogging between scraper support and smooth roller	Clean the space between scraper support and smooth roller, adjust the clearance between scraper and roller
Adapter drive shaft does not rotate (rollers are rotating):	
- shaft drive spline joint is worn	Replace adapter drive shaft and reduction gear bushing
Feeder reverse does not operate:	
- no pressure in reverse activation pipeline	Check the operation of hydraulic distributor and cable connection
- reverse clutch is not fully activated	Repeat reverse activation
Oil leaks through sealing:	
- high pressure in reduction gear	Clean the breather
- cup seal damage	Replace damaged cup seals

Table 9.1. (continued)

1	2
9.2 Shredder	
Decrease of drum rotation while operating under load (engine speed is normal): - main drive belt tension loosening	 Tighten the belt
Counter-cutting beam delivery (clearance adjustment) mechanism does not operate: - roller between the electric mechanism and beam delivery mechanism screw is broken - no contact in electric connectors - electric mechanism is broken - control unit breakdown	 Replace the roller Restore the connection Replace the electric mechanism Replace the control unit
Sharpening device does not operate: - no pressure in the sharpening device control hydraulic system - no contact in electric connectors - control unit breakdown	 Check the operation of hydraulic distributor and cable connection Restore the connection Replace the control unit
9.3 Undercarriage	
GB gear does not activate	Switch off the parking brake Rotate the hydraulic motor shaft by means of the motion speed handle and try to activate the gear once again Eliminate the cause of gear switching handle thrust against cab components. Adjust the switching mechanism by changing switching unit 12 position (Figure 6.36, 6.37) in relation to its fastening bolts
Parking brake fails to restrain the harvester on slopes	Adjust the length of brake mechanic drive elements
Oil leaks through GB and track reduction gears sealing	Unscrew the breather and clean it from dirt Set the lubrication level up to the inspection hole Replace worn and damaged seals and gaskets Replace shafts with worn operating surfaces which come in contact with seals

Table 9.1. (continued)

1	2
Brake drive pedal "sinks"	Check and eliminate braking fluid leaks, if any Add braking fluid in braking system feed tanks and remove air from it (pump) Replace worn sealing rings of main and operating braking cylinders
Absence or low brake pedal travel, incomplete wheel release. Brakes are overheated	Check the absence of pads jamming on the caliper, if jammed, ease them up from the brake disc If the problem pertains, clean the compensation hole in the main braking cylinder. If the problem still pertains, replace the main cylinder
9.4 Main Drive Belt Gear	
Main drive belt loosening (can not be tightened with the rod): - tensioner spring is damaged	Replace the spring
9.5 Multifunctional Terminal Module	
MTM displays erroneous readings from rotation rate sensors, but does not indicate sensor circuit failure: a large clearance is set between rotation rate sensor and sprocket	Set the clearance of at least 3 mm.
MTM indicates circuit or sensor failure	Check the operability of the sensor of this channel. Replace the sensor, if required. Check the operability of sensor electric circuit, eliminate the failure
MTM displays erroneous readings of harvester motion speed	Check MTM settings in SETTINGS/EQUIPMENT menu for correctness of the setup drive wheel axle option
MTM does not display or indicate icons from contact detectors for quite a long time	Check the detectors state. Check the detectors operability. Check the operability of contact detectors electric circuits for short circuit to the harvester frame
MTM displays erroneous readings of fuel level in the tank	Check MTM settings in SETTINGS/EQUIPMENT menu for correctness of the setup level sensor type option. Check the operability of circuit and sensor
MTM indicates communication link malfunction	Check the operability of communication link and presence of power supply at the corresponding unit, eliminate the failure, if required
MTM displays erroneous readings of HGD oil temperature	Check MTM settings in SETTINGS/EQUIPMENT menu for correctness of the setup temperature sensor type option. Check the operability of circuit and sensor

Table 9.1. (continued)

1	2
9.6 Stone and Metal Detector and Feeder Rollers Stop System	
Ingress of metal or stones into the shredding drum: - metal sensor in the lower roller is installed incorrectly or impact sensors operation on the upper roller is corrupted	Visually inspect sensor installation points. Install the metal sensor at β angle in accordance with Figure 6.4
- large clearance between dog and stop wheel	Set clearance B in Figure 6.4 according to the recommendation of p.6.4.1.2
- feeder rollers stop solenoid does not operate	Check the electric wiring and solenoid. Repair or replace, if required
9.7 Electric Equipment	
Engine is not activated when the ignition key is turned to the second position	Check the position of GB lever (it shall be neutral), check the operability of GB neutral sensor
Do not switch on: - transport lights	Check: - fuse FU7.9 (at the forward control panel pillar on the right from the seat)
- operating lights	- fuses FU 9.3, 9.7, 9.8 (cab upper panel)
- left clearance lights	- fuse FU7.8 (at the forward control panel pillar on the right from the seat)
- right clearance lights	- fuse FU7.7 (at the forward control panel pillar on the right from the seat)
- left and right turns, audio signal	- fuse FU7.2 (at the forward control panel pillar on the right from the seat)
- wiper	- fuse FU9.2 (at the forward control panel pillar on the right from the seat)
- flashing beacon	- fuse FU9.4 (cab upper panel)
- stop signal	- fuse FU7.4 (at the forward control panel pillar on the right from the seat)
- audio signal failure	- fuse FU7.6
All electric hydraulics consumers do not operate	- fuse FU8.3 (at the forward control panel pillar on the right from the seat
9.8 Transport Channel	
Clogging of transport channel between shredder and accelerator:	Adjust the shredder bottom in accordance with p. 6.4.2.6 Clean the shredder in compliance with the requirements of subsection 7.12.5.
- operation at lifted adapter (transport channel is blocked)	Prior to lift the adapter at a turn, wait until the mass fed earlier is shredded

Table 9.1. (continued)

1	2
Clogging of transport channel after the accelerator	Adjust the accelerator rotor by providing a clearance between the rear wall and vanes of 7-10 mm Inspect the accelerator facing for through rubbing, replace with a spare one of SPTA, if required Clean the transition chute working space in compliance with the requirements of subsection 7.12.7. Clean the tower working space in compliance with the requirements of subsection 7.12.8
"Torn" mass at operation without the corn cracker	Inspect the accelerator facing for through rubbing, replace with a spare one of SPTA, if required
Mass stopping (clogging) in the tower during prewilted herbs pickup (lucerne, etc.)	Pour several meters of windrow (from 10 to 50 m) with water to wash the transport channel from sap deposits (resin)

APPENDIX A

(mandatory)

LIST OF KITS, TOOLS AND ACCESSORIES

Table A.1 - Tools and accessories kit

Designation	Description	Q-ty	Note
1	2	3	4
RSM-100.21.64.010	Oil blower	1	-
1401.62.00.010	Special wrench	1	-
101.01.00.430	Wrench	2	-
1401.01.06.680	Stop	1	-
RSM-100.62.00.010	Dipstick	1	-
1401.62.00.020	Ratchet wrench	1	-
34-13-7	Knife	1	-
RSM-10B.15.00.802	Allen key 27x32 or Allen key 27x32 IP-3901370 or Reversible Allen key 27x32 8M.158.325	1	-
RSM-10.15.00.806	Allen key 30x36	1	-
54-62385	Tommy bar	1	-
54-62398	Mandrel	1	-
	Cold chisel 2810-0187 Ts15. chr. GOST 7211-86	1	-
	Wrench 7811-0003 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0007 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0023 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0024 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0025 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0026 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0041 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0043 S 2 Ts15. chr. GOST 2839-80	1	-
	Wrench 7811-0464 S 2 Ts15. chr. GOST 2839-80	1	-
	Hammer 7850-0105 Ts15. chr. GOST 2310-77	1	-

Table A.1 (continued)

1	2	3	4
	Hammer 7850-0115 Ts15. chr. GOST 2310-77	1	-
	Screwdriver 7810-0308 3A 1 Ts15. chr. GOST 17199-88	1	-
	Combination pliers 7814-0407 Ts15. chr. GOST 17438-72	1	-
	Hydraulic jack D2-3913010 OST 37.001.278-80 or Self-contained hydraulic jack DA12 TU 4143-05-15159404-2004	1	-
	Wrench for DRK 6 tube removal	1	CAMOZZI PNEUMATIC LTD.
	Wrench for DRK 8 tube removal	1	CAMOZZI PNEUMATIC LTD.
	Wrench for DRK 10 tube removal	1	CAMOZZI PNEUMATIC LTD.
	Powder fire extinguisher OP-8(z)-ABCE-01-U2(Tr) TU 4854-004-03936201-05 or Powder fire extinguisher OP-8(z)-ABCE-02-U2(Tr) TU 4854-004-03936201-05	1	-
	Gun Sh1-3911010-A TU 37.001.424-82 code 45 9136 3001	1	-
Variable data for versions			
1403.62.00.000			
	Wrench 7812-0381 Ts15. chr GOST 11737-93	1	-
1403.62.00.000-01			
	Wrench 7812-0376 Ts15. chr GOST 11737-93	1	-

Table A.2 - Tower extension kit

Designation	Description	Q-ty	Note
1	2	3	4
1401.01.20.110	Extension	1	-
1401.01.20.473	Facing	1	-
1401.01.20.474	Facing	2	-
	Hex head bolt DIN 933-M10x35-8.8-zinc plated	7	-
	Bolt M8x16.46.019 GOST 7802-81 or Round head square neck bolt DIN 603 - M8x16-8.8-zinc plated	6	-
	Screw B.M6-6gx12.48.036 GOST 17475-80 or Counter-sunk head screw DIN 963-M6x12-4.8-zinc plated	7	-
	Hex nut DIN 934-M6-8-flZnyc(flZnncL)-480h	7	-
	Hex nut DIN 934-M8-8-flZnyc(flZnncL)-480h	6	-
	Hex nut DIN 934-M10-8-flZnyc(flZnncL)-480h	7	-
	Washer 6 WGR 1520 182	7	-
	Washer 8 WGR 1520 182	6	-
	Washer 10 WGR 1520 182	14	-
Auxiliary tower hydraulic equipment			
1401.09.29.710	Pipeline	1	-
1401.09.29.720	Pipeline	1	-
	Bolt AS M8x25-DIN 931/933-8.8-W3(1130021690)	2	Stauff
	Bushing LBBU-HUE 1/1D SP M8-U5/16 W3 (1130022886)	2	Stauff
	Clamp housing LBBU 108/08 SA M8-U5/16 (1130023498)	2	Stauff
	Facing LBBU-DP 1D M8-U5/16 W3 (1130022187)	2	Stauff
	Straight-through nipple G08LCFX	2	Parker

Table A.3 - Automated hitch set

Designation	Description	Q-ty	Note
	Bolt M16-6gx60.109.40x019 GOST 7798-70 or Hex head bolt DIN 931-M16x60-10.9-zink plated	4	-
	Hex nut ISO 7042-M16-10-zink plated	4	-
	Hitch RO841B4000C	1	-

Table A.4 - Pneumatic system auxiliaries kit

Designation	Description	Q-ty	Note
	Priming pistol AD-03M02	1	-
	Priming pistol RP8037-2M02	1	-
	Pipeline SC 108B10M01	1	-

Table A.5 - Spare parts kit for Kemper 445 corn reaper adapter

Designation	Description	Q-ty	Note
1	2	3	4
1401.01.01.860	Bottom	1	-
1401.01.01.478	Bracket	1	-
	Bolt M12-6gx75.88.35.019 GOST 7798-70 or Hex head bolt DIN 931-M12x75-8.8-zink plated	4	-
	Washer 12T 65G 019 GOST 6402-70	4	-
	Washer S 12.01.019 GOST 6958-78 or Washer DIN 9021-13-100HV-zinc plated	4	-

Table A.6 - Corn cracker kit

Designation	Description	Q-ty	Note
1	2	3	4
1401.01.05.010	Corn cracker drive	1	-
1401.01.05.020	Corn cracker	1	-
1401.01.05.030	Corn cracker installation	1	-
	Hex head bolt DIN 933-M12x30-8.8-flZnyc(flZnncL)-480h	4	-
	Hex nut DIN 934-M12-8-flZny-c(flZnncL)- 480h	4	-
	Washer 12 WGR 1520 182	8	-
	Forage harvester additional grain chopper ACLS kit RSM-1401 619-37666-6	1	-

APPENDIX B

(reference)

SPARE PARTS KIT

Table B.1 - Spare parts kit

Designation	Description	Q-ty	Note
1	2	3	4
1401.01.02.450	Bottom	1	-
1401.01.11.448	Facing	1	-
	Hex head bolt DIN 961-M16x-1,5x40-10.9-zinc plated	12	-
	Screw B.M8-6gx25.48.019 GOST 17475-80 or Counter-sunk head screw DIN 963 - M8x25-4.8- zinc plated	8	-
	Dehydrant cartridge 432 410 020 2	1	Wabco
	Grinding segment 11S 63X125 D 363.00.00 or Grinding brick BKr 63x1351.I.BKr.161.000	1	-
Cutter kit			
1401.01.02.630			
1401.01.02.610B	Cutter bunch	2	-
1401.01.02.610B-01	Cutter bunch	2	-
Or 1401.01.02.640			
1401.01.02.670	Cutter bunch	2	-
1401.01.02.670-01	Cutter bunch	2	-
Clamping bar kit			
1401.01.02.620A			
1401.01.02.443	Clamping bar	2	Pick-up
1401.01.02.443-01	Clamping bar	2	Pick-up
	Wire 2-0-4 GOST 3282-74		0.6 m
or 1401.01.02.620A-01			
1401.01.02.443A	Clamping bar	2	Pick-up
1401.01.02.443A-01	Clamping bar	2	Pick-up
	Wire 2-0-4 GOST 3282-74		0.6 m

Table B.1 (continued)

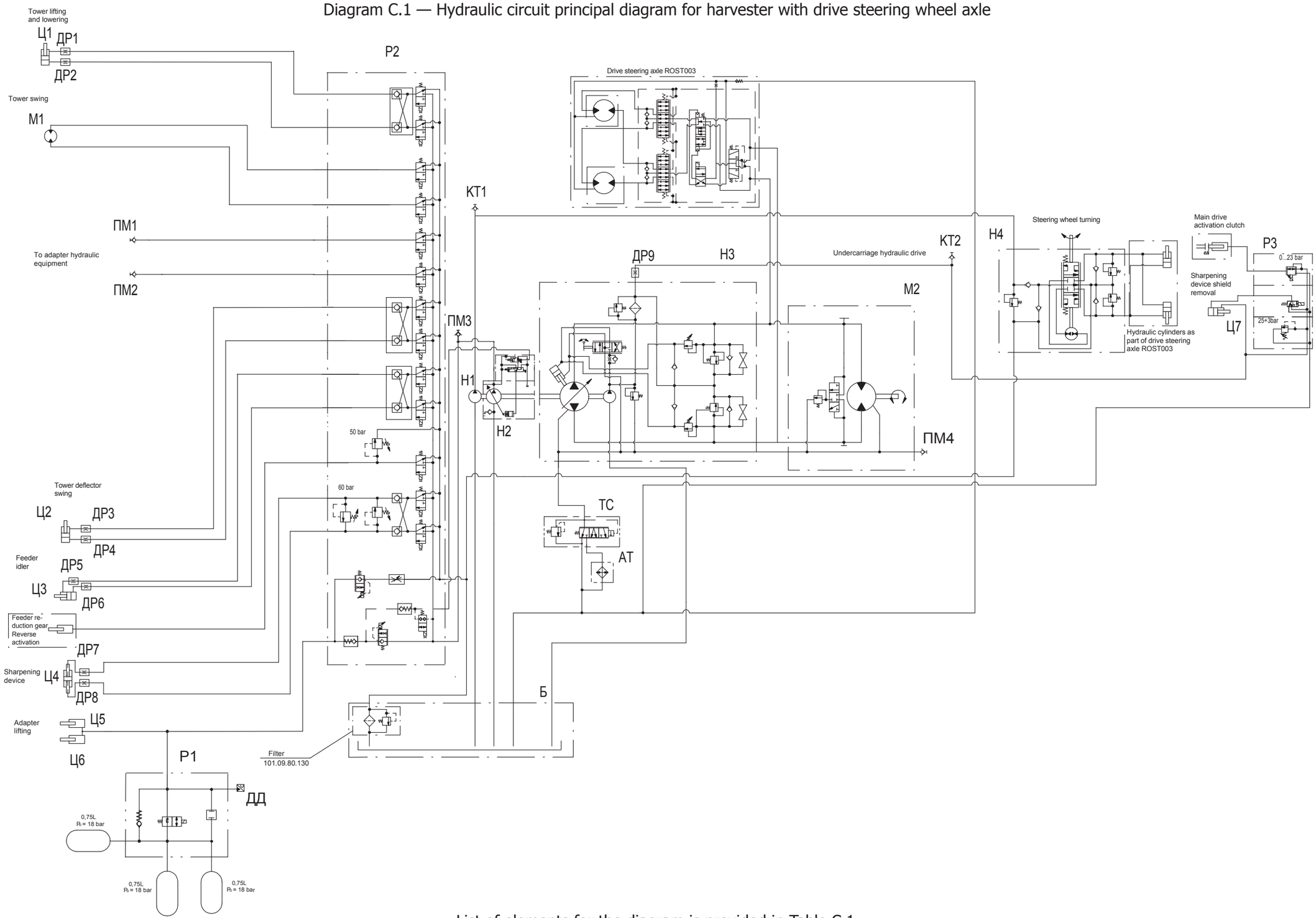
1	2	3	4
Electric equipment spare parts kit 1403.62.10.000			
	Position sensor DP-01M Yu-GISh.423149.001-01 Yu-GISh.420124.001 TU or Speed sensor DO14-1A P4MZ.850.023 TU	1	-
	Fuse 5 A 35.3722 (2110-3722105) TU 37.469.013-95 OKP code 45 7373 1523	4	-
	Fuse 15 A 353.3722 (2110-3722115) TU 37.469.013-95 OKP code 45 7373 1526	4	-
	Primary converter PrP-1A TU 17MO.082.021, configuration I	1	-
	Fuse MIDI Val 30A F1- 2063-0000 or Fuse 30A 06.02030	2	-
	Fuse MIDI Val 100A F1- 2071-0000 or Fuse 100A 06.02100	2	-
ACLS spare parts kit 536-34677-2			
223-12271-7	Straight nipple ST GE6-LL M10x1.0KCZG	2	-
223-12482-9	Straight-through nipple ST G 6-LL C	3	-
223-12533-9	Straight nipple ST GE6-LL M6x1.0KC	1	-
223-13021-3	Elbow nipple ST WE 6-LL M10x1.0KC ZG	3	-
226-12490-3	Cable tie SW TY 25M{ 186LGX4.8	20	-
432-23031-1	Clamping sleeve (for hose)	6	-
432-24162-1	Hose end	6	-
504-36033-3	Flexible hose, KF300 innerø4 sp. lube		3 m
Plank kit 1401.01.06.690			
1401.01.06.522	Plank	2	-
	Plastic clamp 4.8x290	2	-

APPENDIX C

(mandatory)

HYDRAULIC CIRCUIT PRINCIPAL DIAGRAMS

Diagram C.1 — Hydraulic circuit principal diagram for harvester with drive steering wheel axle



List of elements for the diagram is provided in Table C.1.

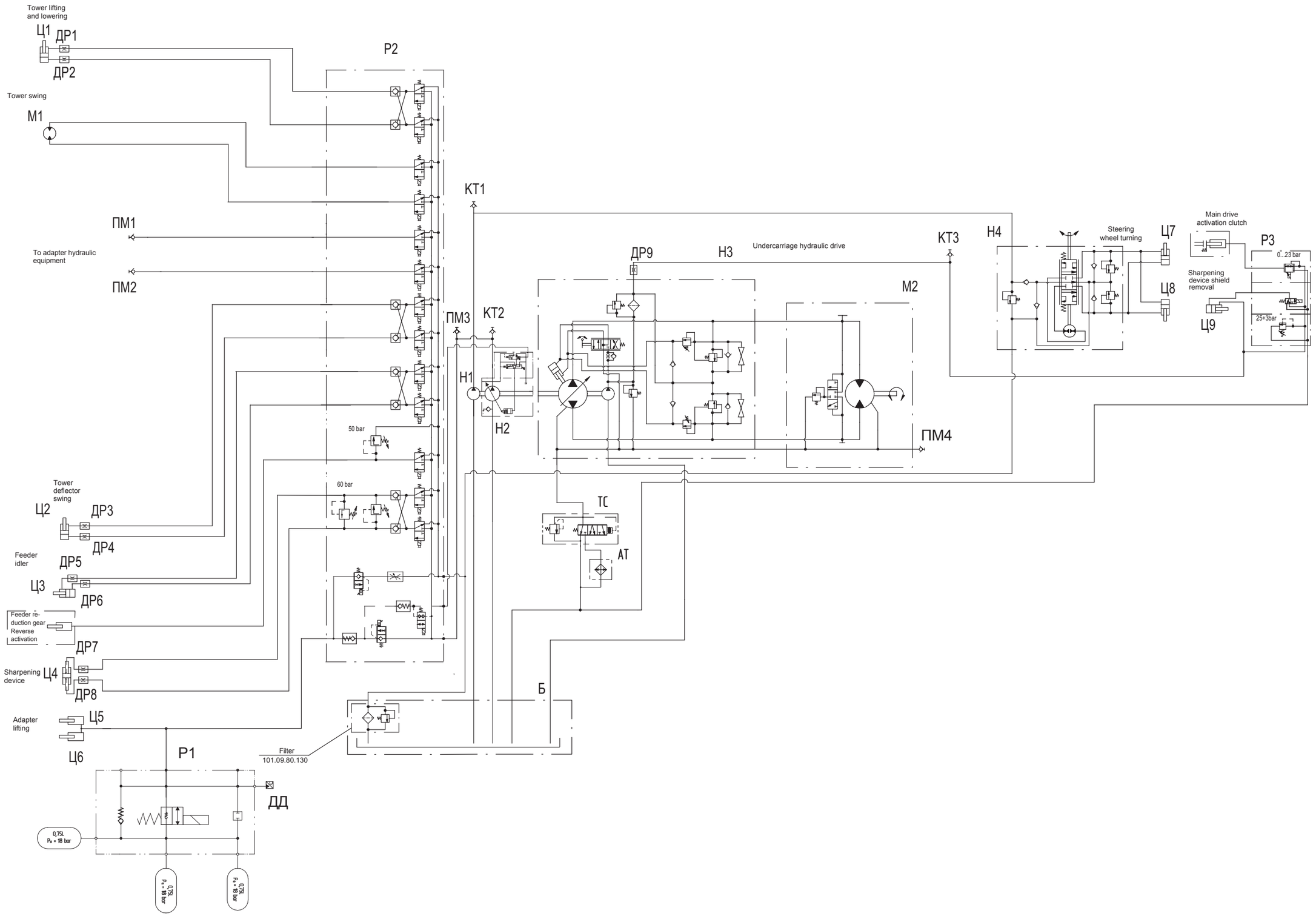
Table C.1 - List of elements for hydraulic circuit principal diagram for harvester with drive steering wheel axle

Designation	Description	Q-ty	Note
1	2	3	4
АТ	Oil cooler ТТРМ 1500.1013.100-03 or Oil cooler 01327 or Cooler 530К.08.000-10 ТУ 34 30-052-22593845-2009	1	Orenburgsky Radiator LLC, R&D Center Orlandi
Б	Hydraulic tank 101.09.80.110-01	1	50 l
ДД	Pressure sensor MBS1250-3413-C4FA08	1	Danfoss
ДР1...ДР6	Nipple 101.09.81.430	6	0.7 mm
ДР7, ДР8	Nipple 101.09.81.410-03	2	1.4 mm
ДР9	Reducing piece 181.09.02.690	1	2 mm
КТ1, КТ2	Test point VKA3/08LCF	2	Parker
М1	МГП125-01Р	1	Zavod Omskgid-roprivod LLC
М2	Hydraulic motor 90M100 NC0N8 N0C7 W00 NNN 0000F3	1	Danfoss
Н1	Gear pump SNP2NN/019RN-06SAP1F5F4NNNN/NNNNN (111.20.C53.00)	1	Danfoss
Н2	Pump LRR 030D LS 16 15 NN N 3 C2AR A6N PLB NNN NNN (83009438)	1	Danfoss
Н3	Pump 90R100 LW5 NN60 L3C7 EC5 GBA 424224 N345 (83018642)	1	Danfoss
Н4	Metering pump OSPD 70/230 ON (11113180)	1	Danfoss
ПМ1...ПМ3	Half-coupling 142.09.61.120	3	-
ПМ4	Half-coupling HP08-2-IGF06 or Half-coupling M ISO.A 38 BSP or Half-coupling 6605-6-6	1	HYDAC Ita Hydro Parker
Р1	Hydraulic accumulator unit 3985225	1	HYDAC
Р2	Hydraulic unit STB 2-031558 (400672974)	1	Bucher Hydraulics
Р3	Hydraulic unit STB 2-033987 (400673170)	1	Bucher Hydraulics
ТС	Thermostat TH-1000-16FO-23	1	Parker
Ц1	Hydraulic cylinder ЦХБ 050/030/0175/01.02.А (СНВ 50/30/175/0102А) (311117779)	1	HES PLC

Table C.1 (continued)

Designation	Description	Q-ty	Note
Ц2, Ц3	Hydraulic cylinder EDTSG 037.000-14R or Hydraulic cylinder ЦХБ 040/025/0063/01.01.А (СНВ 40/25/63/0101А)	3	Zavod Omsk-gidroprivod HES PLC
Ц4	Hydraulic cylinder EDTSG 117.000	1	Zavod Omskgid-roprivod LLC
Ц5, Ц6	Hydraulic cylinder TsPKh70x500-800	2	Djebel-96
Ц7	Hydraulic cylinder ЦХБ 040/025/0063/01.01.А (СНВ 40/22/63/0101А)	1	HES PLC

Diagram C.2 — Hydraulic circuit principal diagram for harvester with driven steering wheel axle



List of elements for the diagram is provided in Table C.2.

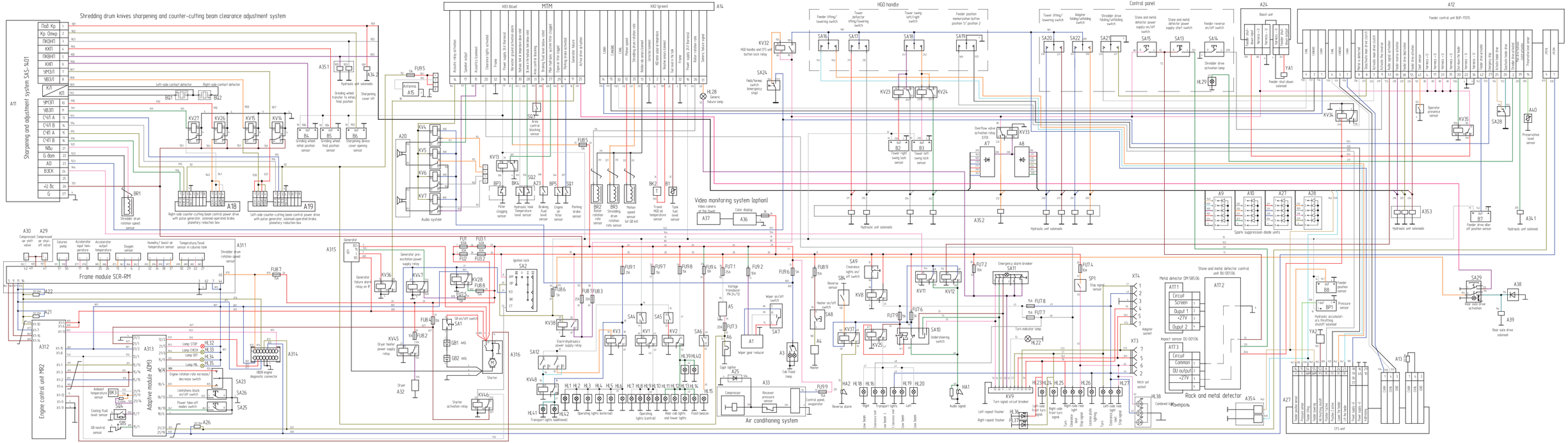
Table C.2 - List of elements for hydraulic circuit principal diagram for harvester with drive steering wheel axle

Designation	Description	Q-ty	Note
1	2	3	4
АТ	Oil cooler ТТРМ 1500.1013.100-03 or Oil cooler 01327 or Cooler 530К.08.000-10 ТУ 34 30-052-22593845-2009	1	Orenburgsky Radiator LLC, R&D Center Orlandi
Б	Hydraulic tank 101.09.80.110-01	1	50 l
ДД	Pressure sensor MBS1250-3413-C4FA08	1	Danfoss
ДР1...ДР6	Nipple 101.09.81.430	6	0.7 mm
ДР7, ДР8	Nipple 101.09.81.410-03	2	1.4 mm
ДР9	Reducing piece 181.09.02.690	1	2 mm
КТ1...КТ3	Test point VKA3/08LCF	3	Parker
М1	МГП125-01Р	1	Zavod Omsk-gidroprivod
М2	Hydraulic motor 90M100 NC0N8 N0C7 W00 NNN 0000F3	1	Danfoss
Н1	Pump PRN-026/8,0R107SLP1BBBAN-NC3C3NNNN/NNNAA (11112098)	1	Danfoss
Н2	Pump 90R100 LW5 NN60 L3C7 EC5 GBA 424224 N345 (83018642)	1	Danfoss
Н3	Metering pump OSPC 125 0N (11151093)	1	Danfoss
ПМ1...ПМ4	Half-coupling 142.09.61.120	4	-
Р1	Hydraulic accumulator unit 3985225	1	HYDAK
Р2	Hydraulic unit STB 2-031558 (400672974)	1	Bucher Hydraulics
Р3	Hydraulic unit STB 2-033987 (400673170)	1	Bucher Hydraulics
ТС	Thermostat TH-1000-16FO-23	1	Parker
Ц1	Hydraulic cylinder ЦХБ 050/030/0175/01.02.А (SNV 50/30/175/0102A) (311117779)	1	. HES PLC

Table C.2 (continued)

Designation	Description	Q-ty	Note
Ц2, Ц3	Hydraulic cylinder EDTSG 037.000-14R or Hydraulic cylinder ЦХБ 040/025/0063/01.01.А (СНВ 40/25/63/0101А)	2	Zavod Omsk-gidroprivod HES PLC
Ц4	Hydraulic cylinder EDTsG 117.000	1	Omskgidro-privod LLC
Ц5, Ц6	Hydraulic cylinder TsPKh70x500-800	2	Djebel-96
Ц7, Ц8	Hydraulic cylinder GTs 50.200.16.000А-02 TU 4785-001-07512714-2002 (ГЦ-01.000 TU) or Hydraulic cylinder ЦХБ 050/025/0200/02.01.А (СНВ 50/25/200/0201А)	2	. HES PLC
Ц9	Hydraulic cylinder ЦХБ 040/025/0063/01.01.А (СНВ 40/25/63/0101А)	1	. HES PLC

APPENDIX D
(mandatory)
PRINCIPAL ELECTRIC DIAGRAM



List of elements for principal electric diagram is provided in Table D.1.

Table D.1 - List of elements for electric principal diagram

Designation	Description	Q-ty	Note
A1	Gear reducer 52.3730 TU 37.459.078-86 OKP code 45 7375 3783	1	
A3	Flood lamp 2312.3714, OKP code 45 7372 3339, TU 37.458.064-90	1	
A4	Heater OT2.13.001MA TU 231156-83	1	
A5	Voltage transducer PN 24/12-120 TU FMIP.436437.002	1	
A6	Jumper PT10-01 (2106-3725010, item designation as per VAZ), TU 37.003.1108-82 OKP code 45 7373 1017	1	
A7, A8	Diode unit BD-2 14MO.390.367 TU	2	
A9, A10, A27, A28	Diode unit BD 5-1 TsNSK 431411.001 TU	4	
A11	Sharpening and adjustment system SZR-1401 YuGISh.426479.004	1	
A12	Feeder control unit BUP-1701C YuGISh.426449.014-05	1	
A13	Plug CAN-M YuGISh.685619.810	1	
A14	Multifunctional terminal module MTU-02 YuGISh.426471.098	1	
A15	Active automobile antenna Buran AV-16 FKShB.464328.050 GCh	1	
A17.1	Metal detector DM 585.07 TU U 31.6-21081867-010-2002	1	of the metal detector kit DMP2A-07 TU U 31.6-21081867-010-2002
A17.2	Control unit BU 001.07 TU U 31.6-21081867-010-2002	1	of the metal detector kit DMP2A-07 TU U 31.6-21081867-010-2002
A17.3	Impact sensor DU 001.07 TU U 31.6-21081867-010-2002	1	of the metal detector kit DMP2A-07 TU U 31.6-21081867-010-2002

Table D.1 (continued)

Designation	Description	Q-ty	Note
A18, A19	Motor speed reducer 96440.08567. GR63X25 24 VDC	2	
A20	Radio recorder U90AS10 FK-ShB.467292.020 GCh	1	
A21, A22, A26	Terminal resistance TS-120 TsNSK.434319.001 TU	3	
A23	Tank unit EDTsG 079.000-01 TU 4785-012-05785856-2002	1	
A24	Boost unit BF-01 TU 4573-229-23550134-2008	1	
A25	Diode unit BD2-1 TsNSK.431411.001 TU	1	
A27	Control unit SKRP-03 Yu-GISh.426471.099	1	
A29	Solenoid 3/2 472 070 639 0	1	
A30	Solenoid 3/2 472 176 316 0	1	
A31	Engine OM460LA 205376 QPRJ/011440	1	A31.1, A31.2, A31.3, A31.4, A31.5, A31.6
A32	Air dryer 432 410 007 0	1	
A33	Air conditioner Avgust-23BS-1701-01-U2 TU 4591-010-75166250-2005 or Air conditioner OTEM-KU-K3P5-RSM-1701-U2 TU 4591-001-72081725-2008	1	
A34	Hydraulic unit STB 2-033987 (400673170)	1	A34.1, A34.2
A35	Hydraulic unit STB 2-031558 (400672974)	1	A35.1, A35.2, A35.3, A35.4
A36	Color display MD3072B-V.K.L.	1	option
A38	Diode unit BD-2 14MO.390.367 TU	1	option
A37, A41	Video camera MC6090C-3	2	option
A39	Drive steering wheel axle ROST003	1	option
A40	Tank 2280219	1	option
B1	Fuel level indicator sensor V 26.3827 OST 37.003.002-85	1	
B2, B3, B4, B5, B6, B7	Position sensor DP-01M YuGISh.423149.001-01 Yu-GISh.420124.001TU	6	
B8	Elobau sensor 424A17A090B01	1	
BK2	Temperature sensor AV.21.0004	1	

Table D.1 (continued)

Designation	Description	Q-ty	Note
BK3	Ambient temperature sensor A 011 542 96 17	1	
BK4	Temperature annunciator sensor M111-07 TU 37.003.569-2007 OKP code 45 7382 5192	1	
BP1	Pressure sensor MBS1250-3413-C4FA08	1	
BP3	Signaling valve SV20-0.2-16- TU 23.2.1956-88	1	
BP5	Tenuity sensor X770316	1	
BR1, BR2, BR3	Primary converter PrP-1A 17MO.082.021 TU, configuration I	3	
BQ1, BQ2	Detonation sensor GT305 TU 95-95 ABKZh.402152.006TU	2	
FU1	Fuse 100A 06.02100 or Fuse MIDI Val 100A F1- 2071-0000	1 1	
FU2	Fuse 30A 06.02030 or Fuse MIDI Val 30A F1- 2063-0000	1 1	
FU3	Fuse unit 111.3722 TU 37.003.754-2007 OKP code 45 7373 1382	1	
FU7...FU9	Fuse unit 46.3722 TU 37.469.027-98 OKP code 45 7373 1605	3	
GB1, GB2	Battery 6ST-190AP ST TOO 40652818-026-2008 or Battery 6ST-190AL3, non-spillable, terminated under cone, ST TOO 39209526-001-2006 or Battery 6ST-190A3 (4), TU U 31.4-31950849-001-2004	2	
HA1	Audio signal ZVA 002.768-38	1	
HA2	Back-up alarm beeper 31.0045.0000	1	
HL1, HL2, HL5, HL6, HL11, HL12, HL13, HL14	Working lamp 1GA 996 361-171	8	
HL3, HL4, HL7, HL8, HL9, HL10	Working light headlamp 1GA 996 561-361	6	
HL15	Flashing beacon S24-75KRG TU 4573-001-22634188-2006	1	

Table D.1 (continued)

Designation	Description	Q-ty	Note
HL16, HL18, HL19, HL20	Head lamp 087101041 TU RB 600398030.004-2004	4	
HL22	Indicator lamp 24.3803-07 TU RB 300228919.037-2002	1	
HL23, HL24	Front turn indicator 26.3726 TU 4573-042-05808936-2005 OKP code 45 7374 3268	2	
HL25, HL27	Rear lamp FP132АБ-04 OKP code 45 7372 0485 TU 37.458.083-2002	2	
HL26	License plate light FP131AB-02 OKP code 45 7372 6134 TU 37.458.083-2002	1	
HL28	Indicator lamp 24.3803-137 TU RB 300228919.037-2002	1	
HL29, HL33...HL35	Indicator lamp 24.3803-31 TU RB 300228919.037-2002	4	
HL32	Indicator lamp 24.3803-46 TU RB 300228919.037-2002	1	
HL36, HL37	Side repeat flasher 2VM 011.788-001	2	
HL38	Combined light 2VA 980.720-017	1	
HL39, HL40	Operating light 1GA 007.506-777	2	
HL41, HL42	Working light headlamp 1GA 996 561-35	2	
KV1...KV8, KV11...KV15, KV23...KV28, KV32...KV38, KV45...KV48	Relay 753.3777 TU 37.469.093-2006 product code 45 7374 9033	30	
KV9	Turn indicator contact breaker RS 951A-U-KhL TU 37.453.056-82 (OKP code 45 7374 6556)	1	
SA1	SB Breaker COBO 13.003.000.01	1	
SA2	Starter and instrumentation breaker VK353 OKP code 45 7373 4489 TU 37.003.529-77	1	
SA3	Breaker VK343-01.01 TU 37.003.701-75	1	
SA4	Breaker VK343-01.52 TU 37.003.701-75	1	
SA5	Breaker VK343-01.61 TU 37.003.701-75	1	
SA6	Breaker VK343-01.70 TU 37.003.701-75	1	

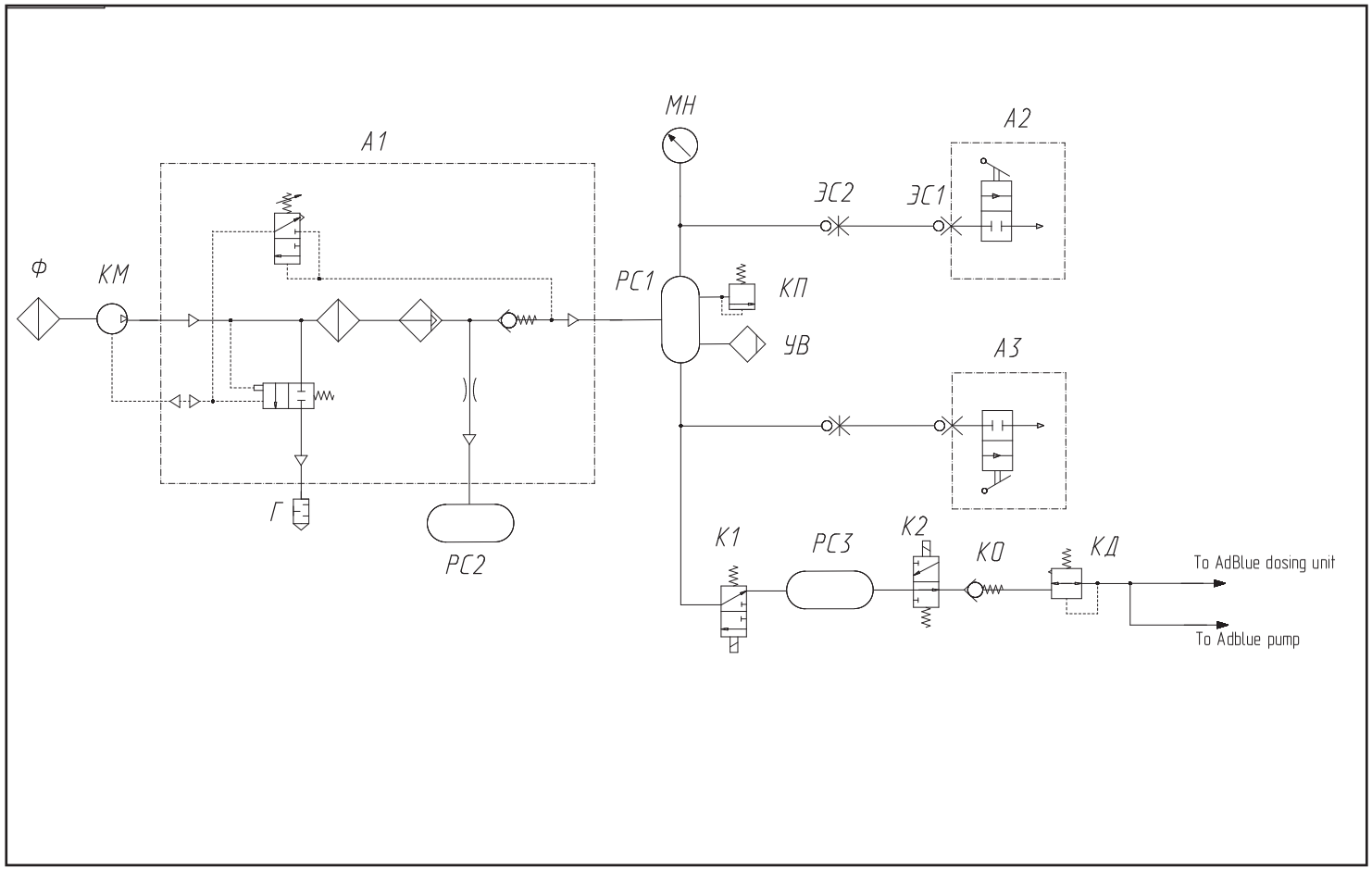
Table D.1 (continued)

Designation	Description	Q-ty	Note
SA7	Switch S147-01.09 TU 37.003.701-75	1	
SA8, SA25	Breaker 86.3710-02.00 TU 37.461.024-98	2	
SA9	Breaker 86.3710-02.74 TU 37.461.024-98	1	
SA10	Switch 6612.3709 TU 37.003.1336-87	1	
SA11	Emergency alarm breaker 249.3710-02 TU 37.469.022-97	1	
SA12	Switch P147-04.01 TU 37.003.701-75	1	
SA13, SA26, SA27	Breaker 86.3710-08.00 TU 37.461.024-98	3	
SA14	Breaker 86.3710-05.00 TU 37.461.024-98	1	
SA16, SA17, SA18, SA19, SA20, SA21, SA22, SA23	Switch 92.3709 TU 37.469.012-95 OKP code 45 7343 1424 (21093-3709613-01)	8	
SA24, SA28	Switch 23.0198.0000	2	
SA29	Switch 86.3710-10.00 TU 37.461.024-98	1	
SB4	Air flap indicator light breaker VK-409 (2101-3803130) TU 37.003.478-2004	1	
SB5	Breaker VK 418B-M (21213-3710180) YSh 3.602.923 TU OKP code 45 7363 0017	1	
SP1	"Stop" light hydraulic breaker VK12B TU 37.003.447-2007 OKP code 45 7374 1011 00	1	
SQ1, SQ3	Back run light breaker VK 415 TU 37.003.1213-84 OKP code 45 7373 4284	2	
SQ2	SensorDMUG-210TUTsNSK.423133.001	1	
SQ4	Cooling fluid level sensor A 970 545 01 24	1	
XT3, XT4	Socket SOVO 25.002.100.01	2	
YA1	Electromagnet EM 45-32 (EM 1-32) TU BY 300149331.037-2006	1	
YA2	Hydraulic accumulator unit 3985225	1	

APPENDIX E

(mandatory)

PRINCIPAL PNEUMATIC DIAGRAM



А1- air drier; А2, А3- pumping gun; Г- muffler; К1, К2- solenoid valve; КМ- compressor; КД- pressure limiting valve; КО- return valve; КП- safety valve; МН- manometer; РС1, РС2, РС3- receiver; УВ- condensate drain valve; Ф- ICE air filter; ЭС1, ЭС2- connecting element.

APPENDIX F

(mandatory)

BELT GEARS

Table F.1 - Gear parameters

Item designation (in Figures F.1, F.2, F.3)	Gear name	Belt, chain designation	Deflection in the middle of active run at effort of 60 N (6 kgs) for belts and 10 - 20 N (1 - 2 kgs) for chains, mm	Length of spring in tension mechanism, mm	Periodicity of gear tension check
1	2	3	4	5	6
Shredder 1403.00.00.000					
1	From engine shaft I to accelerator rotor II and shredding drum shaft III	RSM 6201384 Belt 6-HB 9000 La Ausf.23 Optibelt		367^{-5}	Every 50 operating hours
2	From shredding drum shaft III to feeder countershaft shaft IV	RSM 6201408 Belt 5-HB 2185 La Ausf.23 Optibelt		$136^{-1.6}$	At dismantling of activation mechanism
3	From engine shaft I to fan reduction gear shaft V	RSM 6201429 Belt 2-HB 2075 La Ausf.23 Optibelt		104^{-1}	Each 50 operating hours
4	From fan reduction gear shaft IV to radiator unit fan VII	RSM 6201430 Belt 2-HB 2462 La Ausf.23 Optibelt		394±3	Each 50 operating hours
5	From radiator unit fan VII to air intake drive VIII	RSM 6201411 Belt XPA 1807Ld Ausf.6AXP Optibelt	from 26 to 32 at 60 N effort		Every 50 operating hours
6	From air intake drive VIII to air intake drum IX	RSM 6201401 Belt A 13x3550Li Ausf. 05 Optibelt	from 15 to 16 At 25 N effort		Every 50 operating hours

Table F.1 (continued)

1	2	3	4	5	6
Corn cracker 1401.01.05.000					
7	From accelerator rotor II to rear cracker roller X and to front cracker roller XI	Belt RSM 620138 4-HB 2700 La Ausf.26 Optibelt	-	77^{-2}	Every 10 operating hours
8	From cracker reduction gear shaft XII to pipe with cables XIII	Chain PR-25.4-65 TU 23.2.05790417-014-01 86 links, including 1C (Chain 1401.01.05.890)	from 4 to 5	-	Every 50 operating hours

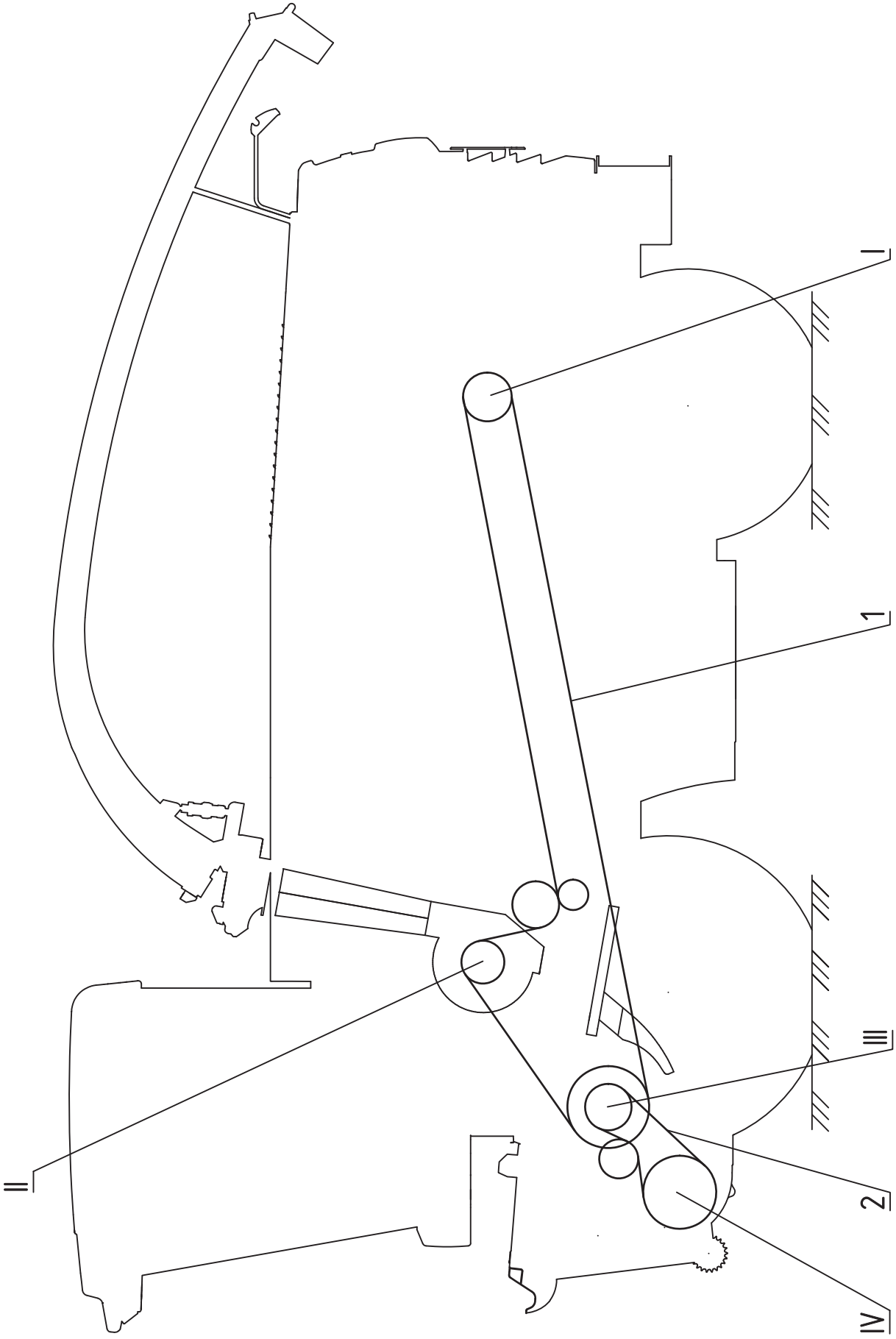


Figure F.1 – Gear diagram (left side)

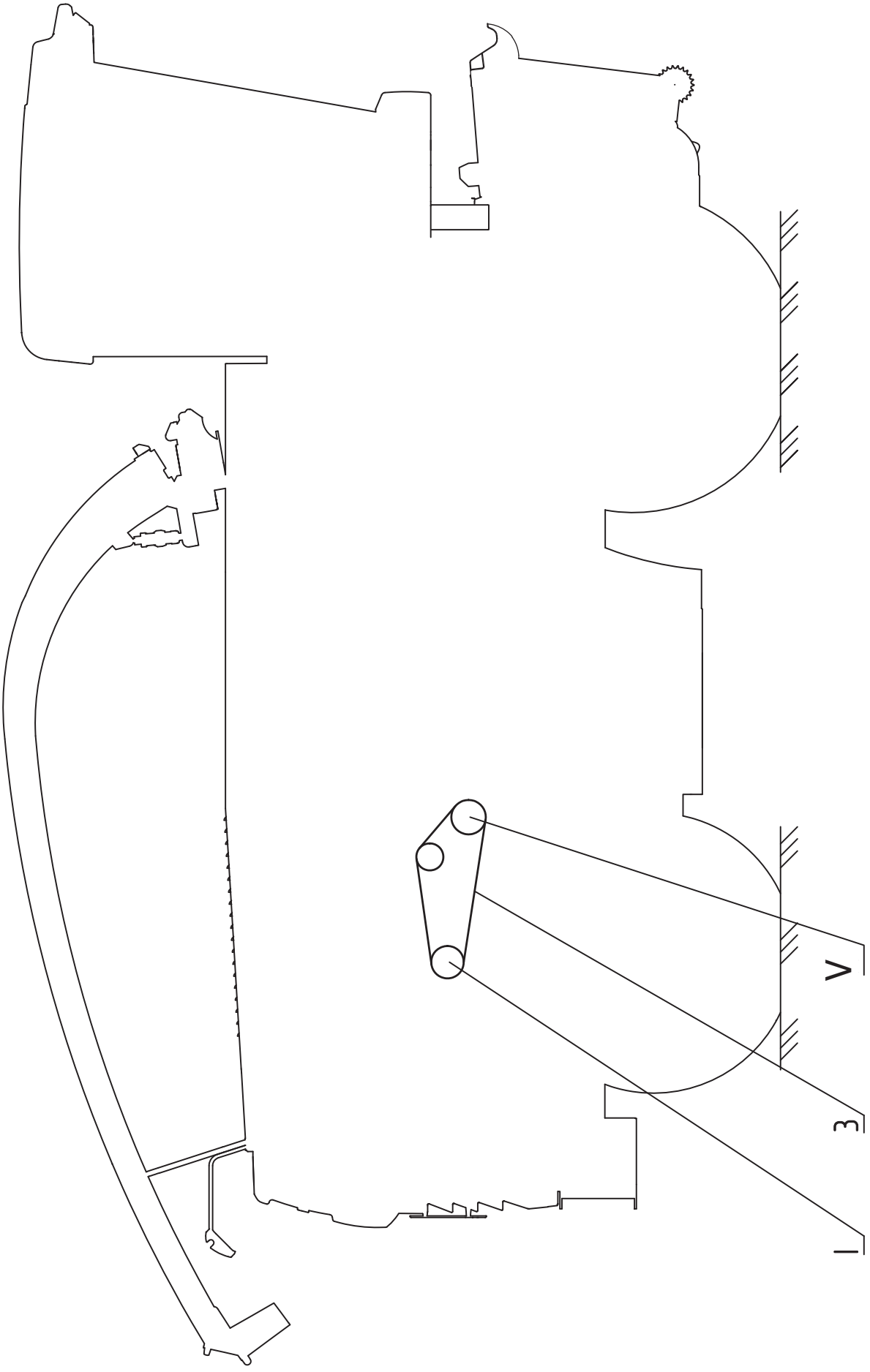


Figure F.2 – Gear diagram (right side)

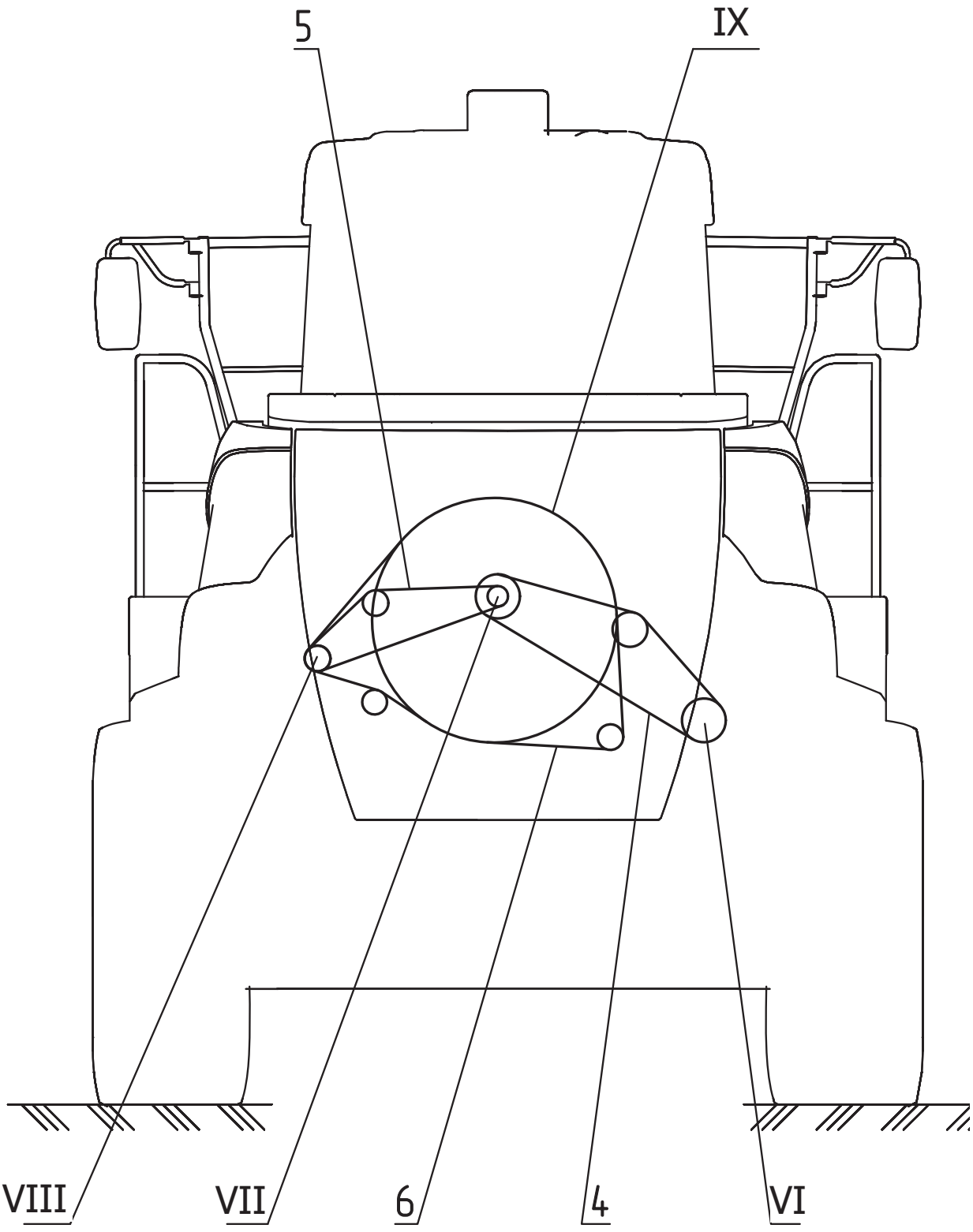


Figure F.3 – Gear diagram (rear view)

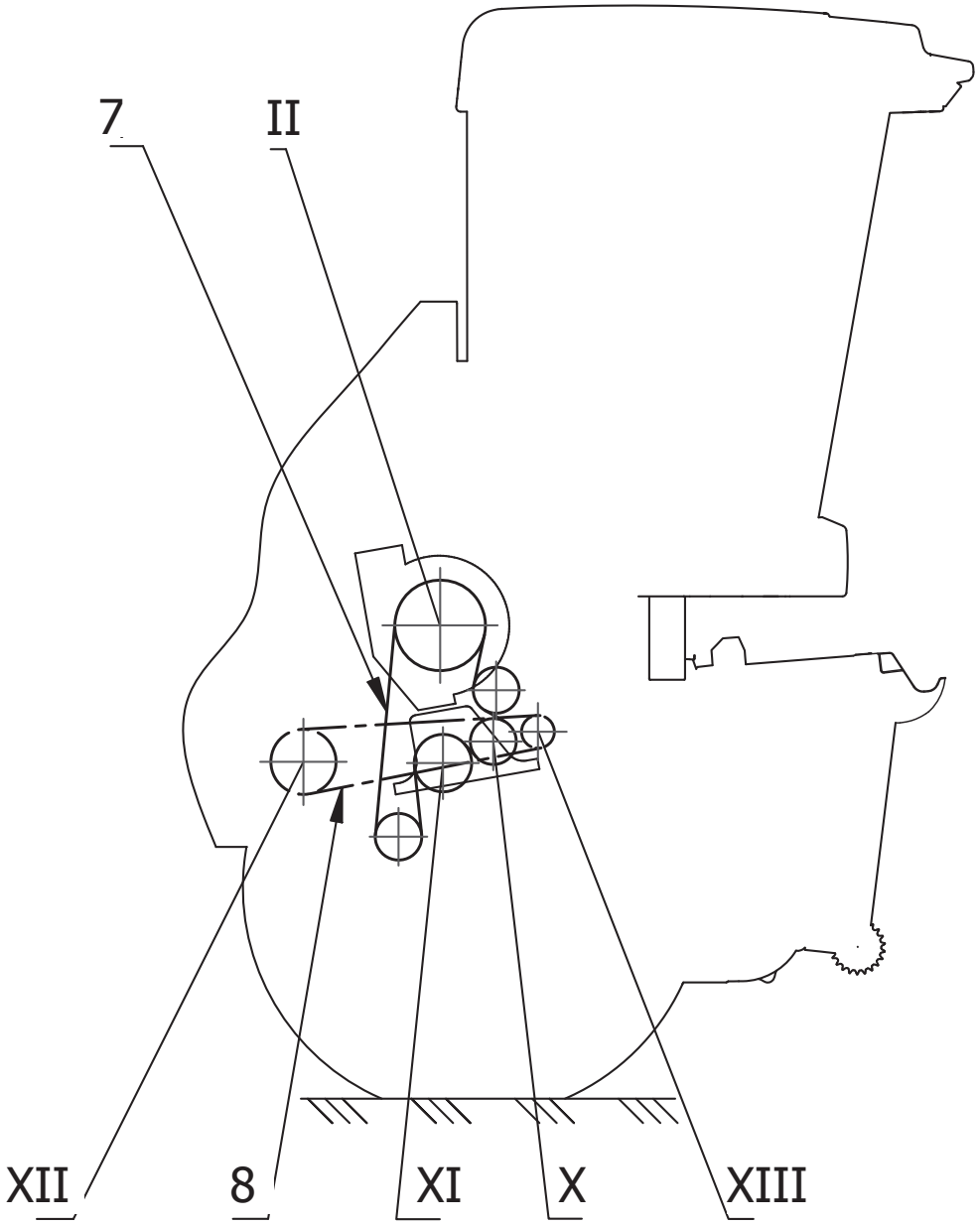


Figure F.4 – Gear diagram (of corn cracker)

APPENDIX G
(mandatory)
BEARING SUPPORTS OPERATION

Incorrect operation of bearing supports decreases their reliability.

One of indicators of bearing support efficient operation is absence of harsh noise and excessive heating.

Regardless of the ambient temperature, heating of bearings greased with Litol-24 GOST 21150-87 shall not exceed 100°C.

Main causes of bearings overheat and early failure is incorrect installation, contaminants that get into the bearing with grease during installation, maintenance or in case of sealing damage, as well as excessive or insufficient grease.

Some of the harvester assembly units contain ball bearings with bilateral sealings which are attached to the shaft by means of cone fastening bushings or eccentric retaining ring and have a retaining pin on external spherical surface which prevents rotation in the housing. During operation of such units, it is required to:

- unscrew the nut on the cone fastening bushing during bearing removal, align it with the end of the fastening bushing and punch the bushing out of the inner ring with a short, abrupt impact through the special mandrel. Light impacts may lead to bushing thread deformation. To avoid shaft disposal, place a thrust at the shaft end on the opposite support;

- in case of replacement of single-lubricated bearing with a retaining pin on the spherical outer ring, the bearing shall be positioned so that the pin got into the same slot it was in after shop assembly in order not to damage or shear the pin head;

- nut shall be installed on the fastening bushing with larger chamfer facing the retaining washer, the nibs of which shall not come in contact with sealing;

- tighten the nuts of fastening bushings or eccentric retaining ring only by means of a special torque wrench with torque in accordance with Table G.1.

Table G.1

Shaft journal diameter (inner diameter of fastening bushing), mm	30	40	50	80
Tightening torque, N·m	140-170	230-280	350-400	650-720

Exceeded tightening torques may cause bearing jamming even inner ring rupture; lower torques decrease the on-shaft fastening reliability.

Retaining washer nib shall be aligned with the nut slot by turning the nut in the direction of torque increase.

Fastening bushing nuts shall be tightened only after tightening of housing fastening. Failure to do so may cause additional axial loads in bearings and lead to heating.

The bearing is installed as follows: the eccentric retaining ring is slided on the eccentric shoulder of the inner ring and installed into the required position by rotating until it is fully retained. After that the counter-sunk shall be tightened. Bear in mind that the rotation angle depends on clearances between shaft, bearing inner ring and eccentric retaining ring.

Bearing is removed in reversed sequence.

It is not allowed to:

- transmit forces through balls to the shaft during bearing installation or into the housing during removal;

- tighten or loosen the nuts on the fastening bushings by means of punch or chisel as it may result in deformation of nut ends, thread and decrease of bearing on-shaft fastening reliability;

- bend the retaining washer vanes in direction to the bearing as they may come in contact with the separate panel or built-in sealing;

- deform the sealing as it results in lube leakage and built-in sealing falling out;

- wash the bearings with bilateral sealing in dissolvents or direct a water jet to the bearing during harvester wash as dissolvents and water can get into the bearing cavity.

The list of bearings is provided in Tables G.2, G.3, layout diagrams are given in Figures G.1, G.2, G.3.

Table G.2 - Harvester bearings list

Item number in Figure G.1	Name	Installation place	Number		
			of assembly units	per assembly unit	per harvester
1	2	3	4	5	6
1	Bearing ShSP30 TU 4649-020-05808824-2005	Steering wheel axle rod hinge	2	1	6
		Steering wheel axle hydraulic cylinders hinge	2	2	
2	Bearing ShSP40K TU 4649-020-05808824-2005	Feeder torsion bar hinge support	4	1	4
3	Bearing 207A GOST 8338-75	Gear wheel of feeder upper rollers reduction gear	1	2	3
		Feeder upper rollers reduction gear	1	1	
4	Bearing 209A GOST 8338-75	Feeder upper rollers reduction gear	1	2	2
5	Bearing 210AK GOST 8338-75	Feeder upper rollers reduction gear	1	1	1
6	Bearing 8104 GOST 7872-89	Shredder gear-motor spindle	2	2	4
7	Bearing 7610A GOST 27365-87	Steering wheel hubs	1	2	2
8	Bearing 7613A1 GOST 27365-87	Steering wheel hubs	1	2	2
9	Bearing 11316K GOST 28428-90	Shredding drum right support	1	1	1
10	Bearing 180204AC17 GOST 8882-75 or Bearing 180204AK10C17 GOST 8882-75	Radiator unit fan reduction gear idler	1	2	11
		Radiator unit fan idler	1	2	
		Air intake drive idler	1	2	
		Air intake drum bypass pulley	1	2	
		Air intake drum idler	1	2	
		Right support of lower front roller sensor	1	1	
11	Bearing 180205AC17 GOST 8882-75	Shredding drum and accelerator idler	1	2	2

Table G.2 (continued)

1	2	3	4	5	6
12	Bearing 180206AC17 GOST 8882-75	Feeder countershaft idler	1	2	2
13	Bearing 180207AC17 GOST 8882-75	Left support of lower front roller sensor	1	1	1
14	Bearing 180208C17 GOST 8882-75	Radiator unit fan flange	1	2	2
15	Bearing 180308C17 GOST 8882-75	Shredding drum and accelerator idler	1	2	2
16	Bearing 180310AC17 GOST 8882-75	Accelerator tensioner lever	1	1	1
17	Bearing 180508AC17 GOST 8882-75	Right support of upper rear roller	1	1	3
		Spout swivel worm shaft	1	2	
18	Bearing 180712AC27 non-standard	Accelerator tensioner lever	1	1	1
19	Bearing 353518H GOST 24696-81	Shredding drum left support	1	1	1
20	Bearing 680210A2HK7C17 TU VNIPP.016-03	Left support of front countershaft	1	1	2
		Right support of feeder countershaft	1	1	
21	Bearing 680314EHK7C17 TU VNIPP.016-03	Left support of accelerator rotor	1	1	1
22	Bearing 1180211AC17 non-standard	Right support of upper front roller	1	1	1
23	Bearing 1680208EK10T2C17 TU VNIPP.016-03 or 1680208EK7T2C17 TU VNIPP.016-03	Right support of upper front roller and left and right supports of lower rear roller	3	1	3
24	Bearing assembly LKG 212 2F+H2312 FKL	Left support of feeder countershaft	1	1	1
25	Bearing assembly LKS 212 2F+H2312 FKL	Right support of accelerator rotor	1	1	1
26	Bearing YEL 206-2F SKF	Air intake drive	1	2	2
27	Bearing YEL 206-2F SKF	Air intake drum	1	2	2

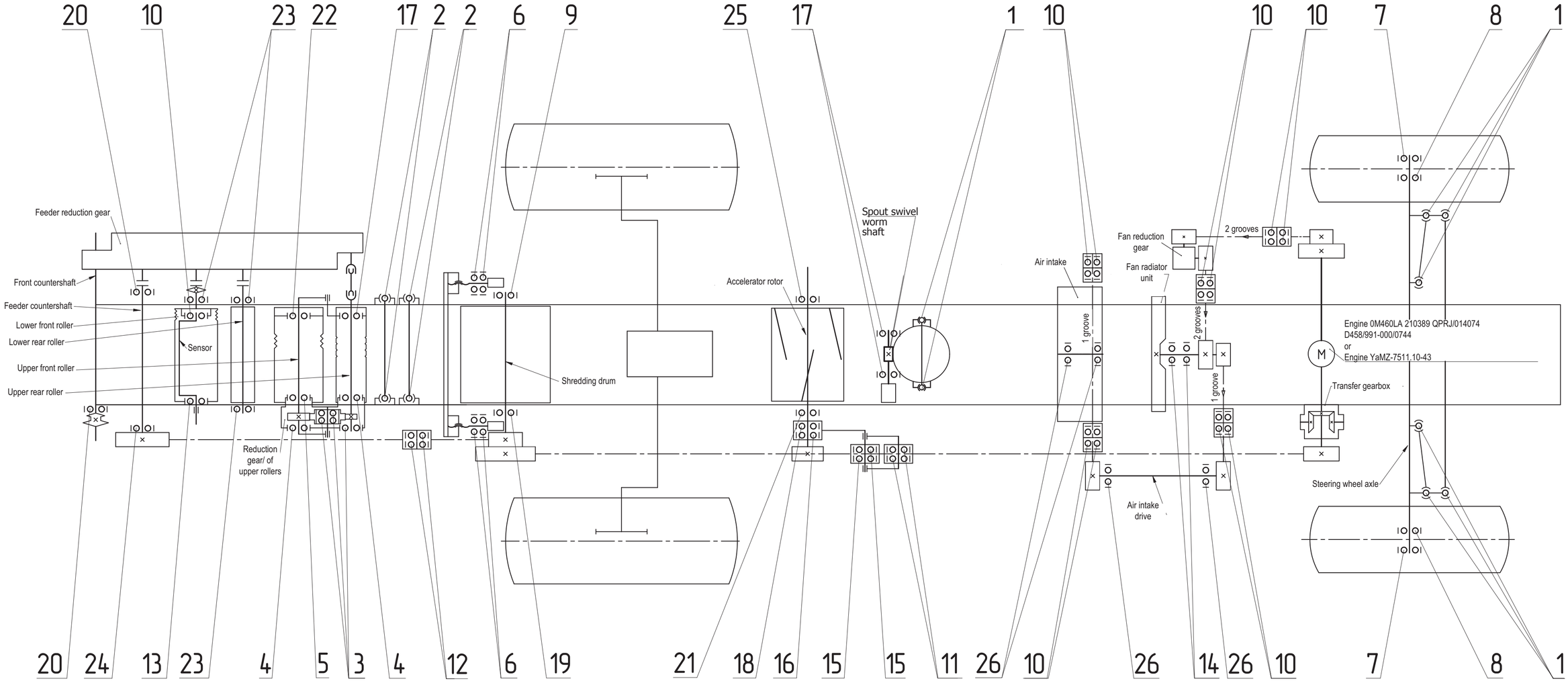


Figure G.1 – Harvester bearing diagram

Table G.3. - Harvester corn cracker bearings list

Item number in Figure G.2	Name	Installation place	Number		
			of assembly units	per assembly unit	per harvester
1	2	3	4	5	6
1	Bearing 21309-E1-K Schaeffler Group Industrial (INA, FAG) Bushing H309 Schaeffler Group Industrial (INA, FAG)	Left and right lever of corn cracker rear roller	2	1	4
		Left and right support of corn cracker front roller	2	1	
2	Bearing 46204 GOST 831-75	Corn cracker reduction gear worm shaft support	1	2	2
3	Bearing 180204AC17 GOST 8882-75	Wheels of front and rear corn cracker axes	4	1	4
4	Bearing 180205AC17 GOST 8882-75	Corn cracker drive idler	1	2	2
5	Bearing 180309C17 GOST 8882-75	Corn cracker bypass pulley	1	2	2

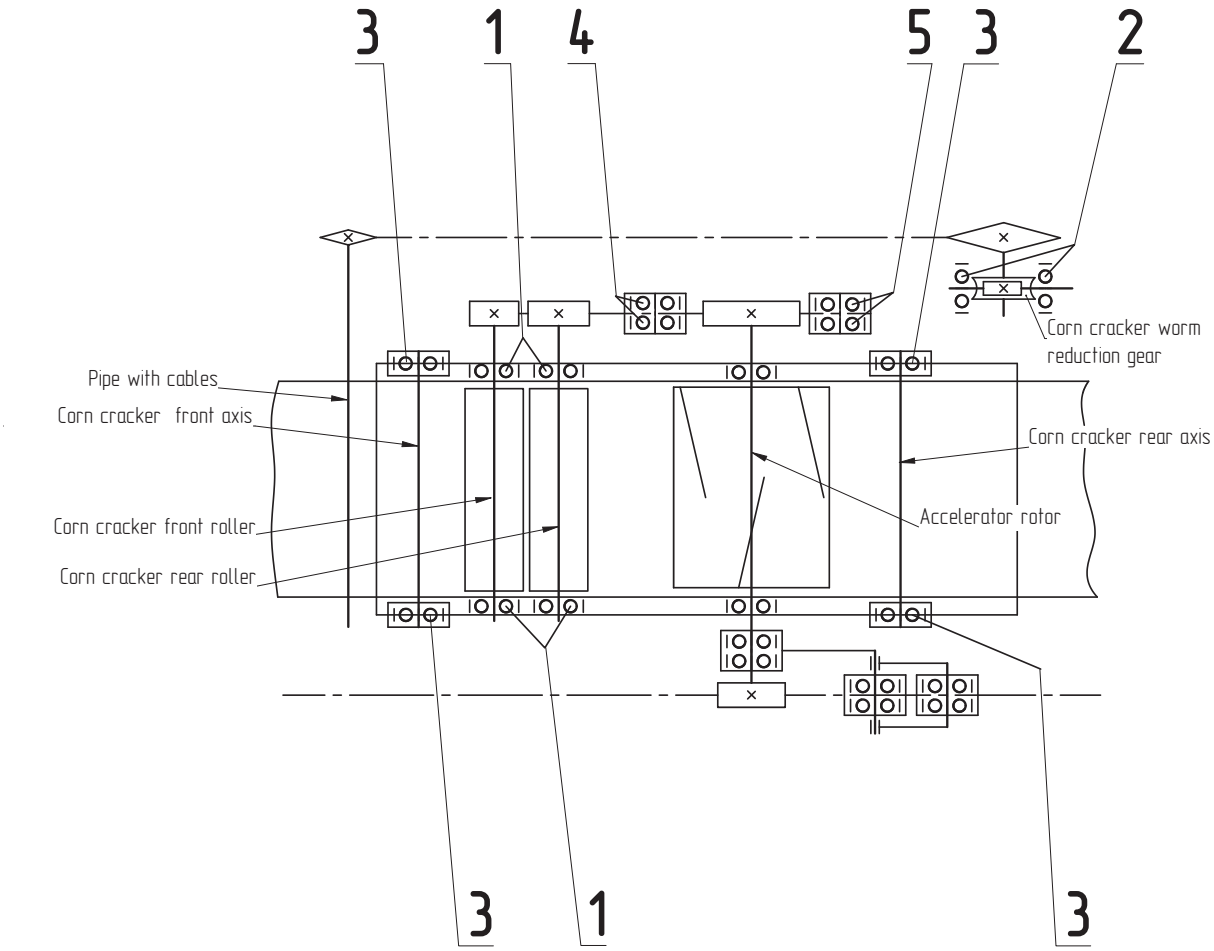


Figure G.2 - Harvester corn cracker bearing diagram

APPENDIX I

(mandatory)

VOLUMES OF REFUELING TANKS AND RECOMMENDED POL GRADES

Table I.1

Assembly unit name and index Lubrication point	Number of assembly units in the product, pcs.	POL		Weight (volume) of POL fueled to the harvester at filling or replacement, kg (l)	Periodicity of change (filling) of POL, hours	Note
		Name and designation of POL grades	Regulatory documents			
1	2	3	4	5	6	7
Fuels (liters)						
Installation of 1401.84.00.000 fuel tanks						
Fuel tank 1401.84.00.200 and 1401.84.00.300	1 1	EURO diesel fuel: Grade A: type I, type II, type III or or Grade B: type I, type II, type III or Grade D: type I, type II, type III		1000.00 (2) including 250 l at running	Refilling according to spending	Summer operation: filtering temperature max. 5°C Summer operation: filtering temperature max. 0°C Spring/autumn transition periods: filtering temperature max. −10 °C

Table I.1 (continued)

1	2	3	4	5	6	7
		or Grade F: type I, type II, type III or Class 0: type I, type II, type III or Class 1: type I, type II, type III				Spring/autumn transition periods: filtering temperature max. –20 °C Spring/autumn transition periods: filtering temperature max. –20 °C Winter operation: filtering temperature max. –26 °C
Special fluids						
Shredder 1403.01.00.000; -01						
Upper rollers reduction gear 1401.01.01.270 (of feeding unit)	1	AKOR-1 compound (5% to operational oil) or KP compound (5% to operational oil or operational oil in full volume)	GOST 15171-78 GOST 23639-79	0.035 l	Storage period without represervation is one year	
Pinion of the tower spout swivel, lever axis, deflector, operating surfaces of pulleys		K-17 preservation oil or Cannon grease (3T5/5-5)	GOST 10877-76 GOST 19537-83	1.100 kg	Storage period without represervation is one year	

Table I.1 (continued)

1	2	3	4	5	6	7
Braking system including tank unit EDTsG 079.000-01 TU 4785-012-05785856-2002	1	ROSDOT-4 brake fluid	TU 2451-004-36732629-99*	0.800 l	Every two years	Level of fluid shall be not less than 35-40 mm below the upper edge of the tank (if no transmitter is installed)
Braking system including tank unit EDTsG 079.000-02 TU 4785-012-05785856-2002	1	ROSDOT-4 brake fluid	TU 2451-004-36732629-99*	0.800 l	Every two years	Level of fluid not less than 15-20 mm below the upper edge of the tank
Motor unit OM460LA 205376 QPRJ/011440						
Cooling system		Antifreeze Glysantin® G05 Ready Mix	TU 2422-061-36732629-2005*	65.000 l	every three years	
Non-painted outer surfaces of the engine		Preservation oil or Cannon grease (3T5/5—5)	GOST 10877-76 GOST 19537-83	0.300 kg	Storage period without represervation is one year	
Neutralizing fluid lines 1403.05.17.200						
Tank included into OM460LA 205376 QPRJ/011440 engine	1	Calurea water solution AdBlue	DIN 70070-05	95.000 l	Refilling according to spending	
Steering wheel axle 1401.02.02.010-01						

Table I.1 (continued)

1	2	3	4	5	6	7
Protruding parts of hydraulic cylinders shafts, pivot joints		Preservation oil or Canon grease (3T5/5—5)	GOST 10877-76 GOST 19537-83	1.100 kg	Storage period without represervation is one year	
Installation of 1401.84.00.000 fuel tanks						
Inner surfaces of fuel system, fuel tank 1401.84.00.200 and fuel tank 1401.84.00.300	1	AKOR-1 compound (5% to diesel fuel) or KP compound (5% to diesel fuel or diesel fuel in full volume)	GOST 15171-78 GOST 23639-79	50.000 l	Storage period without represervation is one year	
Conditioning unit installation 1401.28.02.000-01						
Air conditioner Avgust-23BS-1701-01-U2 TU 4591-010-75166250-2005	1	Cooling agent R-134a		1.200 kg	Refilling as necessary	

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*In case of use of POL according to other regulatory documents, POL properties shall not be worse than those indicated for this POL grades.

For notes

SELF-PROPELLED FORAGE HARVESTER RSM-1403

Operation and
Maintenance Manual
RSM-1403 IE

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