



PRONAR Sp. z o.o.

17-210 NAREW, UL. MICKIEWICZA 101A, PODLASKIE VOIVODESHIP

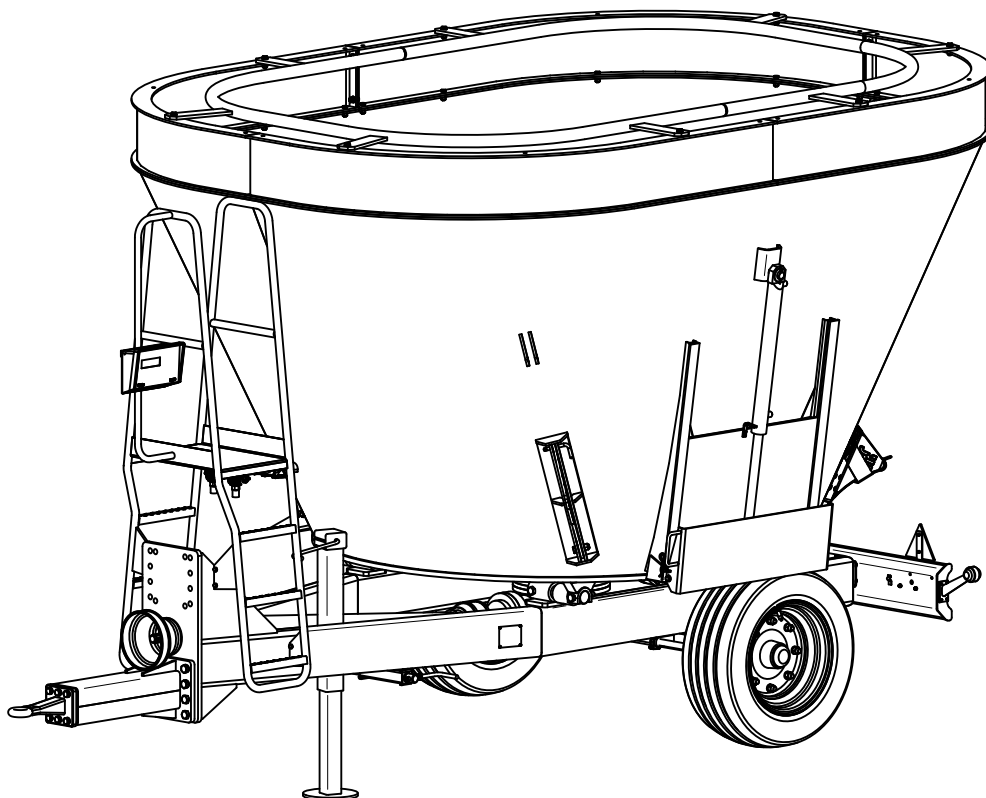
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www.pronar.pl

INSTRUCTIONS FOR USE AND SERVICING

FEED CAR VMP-10

T015



EDITION 2B-04-2008

NO. OF ISSUE 129N-0000000-UM



FEED CAR VMP-10

T015

IDENTIFICATION OF THE MACHINE

SYMBOL /TYPE: T015

KTM NUMBER: 0826-299-701-509

FACTORY NUMBER:

S	Z	B	V	M	1	0	X	X			X				
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INTRODUCTION

Information contained in the manual are up to date, the day they were prepared on. Due to improvements, some values and figures contained therein may not be same as actual state of the machine, that was supplied to the customer. The manufacturer reserves itself the right to introduce, in the manufactured machines, structural alterations facilitating servicing and improving quality of their operation, and not make changes in the manual nor in the catalogue. Comments and remarks on the structure and action of the machine please sent to the Manufacturer's address. This information will allow objective evaluation of the machine and will be helpful as guidelines in their further modernization. Information on essential structural alterations are delivered to the user by means of informative supplements (annexes) attached to the instruction.

The instruction for use and service constitutes the Basic equipment of the machine. Before starting exploitation the user must get acquainted with contents of this instruction and observe all recommendations contained therein. It will guarantee failure-free operation of the machine. The machine has been designed in accordance with binding standards, documents and currently binding legal provisions.

This instruction describes basic rules of proper and safe operation, servicing as well as maintenance of the feed car VMP 10. If information contained in the instruction appears not fully comprehensible it should be turned for help to the sales point in which the tractor has been purchased or to the Manufacturer.

Manufacturer's address:

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17-210 Narew

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Information, description of threats and precautions as well as recommendations and orders connected with safety of use, in contents of the instruction, are distinguished with the sign:



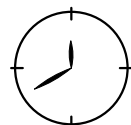
or preceded with the word „**ATTENTION**“. Non-compliance with recommendations described in the manual creates danger for life and health of operators or strangers.

Particularly important information and recommendations the observance of which is utterly necessary are distinguished in the text with this sign:



or preceded with the word „**CAUTION**“. Non-compliance with described recommendations is imminent damage of the machine due to improper service, adjustment or use.

In order to point out the necessity of performing periodic technical review of the machine, the content of particular paragraphs has been marked with the clock sign:



EC Declaration of Conformity

We, PRONAR Sp. z o.o, do hereby declare with full responsibility, that the machine:

MACHINE:	FEED CAR VMP-10
TYPE:	T015
FACTORY NO.:

the following declaration refers to, meets the requirements of the Directive 98/37/WE of the European Parliament and the Council and PN-EN 13019:2002 Standard approved by the Polish legislation by Regulation of the Minister of Economy on the day of December 20th, 2005, regarding principle requirements for machines and securing devices (Dz. U. Nr 259, poz. 2170). It complies with following standards conforming with aforementioned directive:

- PN-EN 703-2006 – Agricultural machinery – Loaders, mixers and/or feeders. Safety.
- PN-EN ISO 12100-1:2005 – Safety of machines. Basic definitions, general designing rules. Part 1: Basic nomenclature, methodology.
- PN-EN ISO 12100-2:2005 – Safety of machines. Basic definitions, general designing rules. Part 2: Engineering rules.
- PN-EN 1553:2002 – Agricultural machinery – Self-propelled, hooked-up, semi-hooked-up and hooked on agricultural machinery.

This EC Declaration of Conformity expires in case the machine is changed or reconstructed without prior written consent of the Manufacturer.

Narew, date: 11.04.2008



*Konrad Raczkowski
Financial-Economy
Assistant Director*

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CHAPTER

1

**GENERAL
INFORMATION**

IDENTIFICATION

APPROPRIATION

EQUIPMENT

WARRANTY TERMS

TRANSPORTATION

ENVIRONMENT HAZARD

WITHDRAWAL FROM USE

1.1 IDENTIFICATION

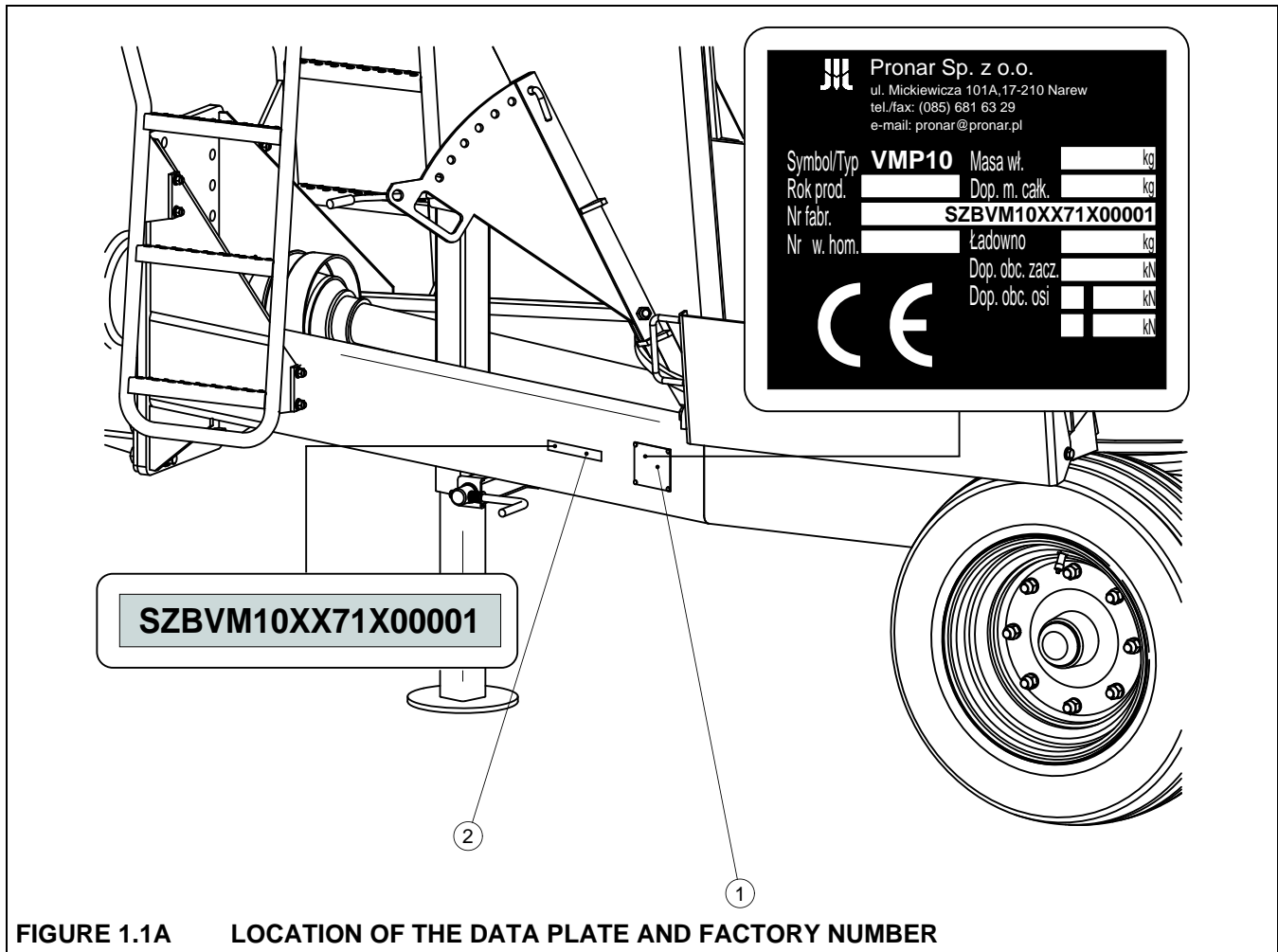


FIGURE 1.1A LOCATION OF THE DATA PLATE AND FACTORY NUMBER

(1) data plate, (2) factory number

The feed car VMP-10 is equipped with data plate mounted on the left longitudinal member of a bottom frame. Factory number is engraved on both the data plate and left longitudinal member of a frame on rectangular field painted in silver. When purchasing the feed car it is necessary to verify whether factory number engraved on the machine is same as written in the WARRANTY CARD, sale documentation as well as in INSTRUCTIONS FOR USE AND SERVICING.

Factory number of the carriageable axle as well as its type is punched on the data plate attached to the beam of carriageable axle.

1.2 APPROPRIATION

The feed car VMP-10 was designed especially for modern homesteads that are busy with stock breeding. The machine is designed for preparing animal feed in feeding systems of type TMR, PMR or similar. Components of feeding stuff are being dosed into the feed car tank, where are nicely fragmentized and mixed. Making substantial animal feed depends on many factors, thus it is recommended to select ingredients with due diligence and consult with food technician, who will be able to determine several formulas.

The feed car was designed to prepare feeding stuff comprising of all kinds of bulky feed (silage, straw, hay, vegetable meal) and compact feed, feeding stuff manufactured by food industry in a form of a powder or granulate, feeding stuff that improve milking capacity, vitamin or mineral.

Braking system as well as lighting and signalling system comply with road traffic rules.

Feed car is adapted to work with farm tractors equipped with external hydraulic system, 12V lighting system with 7-pin socket and upper hook-type coupling or bottom couplings of vertical carrying capacity of at least 12,7 kN. Depending on the equipment, the feed car may be equipped with rotator string with eye of 50 mm in diameter or regular string with eye of 40 mm in diameter. In order to provide proper cooperation of the aggregate, the minimum power demand of the tractor is 45 kW.



CAUTION

Accoupling feed car equipped with draught bar with rotatory string with upper hook-type coupling may be forbidden by the manufacturer of the tractor, thus before setting about accoupling both machines one must go through the operation manual of the tractor and strictly comply with recommendations contained therein.

Carriageable system (axes, wheels and tyres) meet requirements laid down for the feed car, which may be used with maximum allowable speed of 25 km/h. Performing those conditions is determined by proper operation and complying with instructions contained in this manual.

ATTENTION



The feed car must not be used contrary to its appropriation, in particular:

- for transporting people and animals
- for mixing and transporting toxic materials and combustibles
- for preparing food for people nor for storing food
- for smearing fluids, sand nor fibrous substances
- for transporting bulk cargo, single elements or any materials nor substances, that do not come within the appropriation of the feed car.

1.3 EQUIPMENT

The equipment of each feed car includes:

- *INSTRUCTIONS FOR USE AND SERVICING*
- *WEIGHT OPERATION MANUAL*
- *WARRANTY CARD*
- wiring system connecting cord

On the request of the customer, the Manufacturer may equip the feed car with additional elements, such as the following:

- plate distinguishing low-speed vehicles
- jointed-telescopic shaft along with the manual
- wedges for wheels

1.4 WARRRANTY TERMS

"PRONAR" Sp. z o.o. in Narew hereby warrants failure-free operation of the machine, when using in compliance with technical-operational terms described in the following instruction.

Troubles revealed during warrantee period are to be removed by the Warrantee service within 14 working days from the day of taking the machine for repair by the warrantee service, unless otherwise agreed.

The warranty does not hold parts neither sub-assemblies of machines, that undergo wear and tear before expiring the warranty period, e.g.: exploitatively worn tyre, cutting blades and brake lining, mechanical damages, damages resulting from improper usage, adjustment and maintenance.

Detailed warranty terms are included in warranty card attached to each newly purchased machine



CAUTION

You must request from the seller to fill in the Guarantee Card and claim coupons. Lack of e.g. date of sale or the seal of the selling point expose the user to non-recognition of possible claims.

1.5 TRANSPORTATION

The feed car is prepared for sale as one assembly and does not need to be packed. The only elements that need to be packed are the technical documentation, the wiring system cord and elements of additional equipment.

Delivery of the feed car to end user is performed by means of motor transport or by means of independent transport mean, after having the feed car accoupled with tractor.



CAUTION

In case of independent transport, the tractor operator should get familiarized with the content of this Instructions for Use and Servicing and observe the rules contained therein. In case of motor transport, the feed car is mounted on the platform of the transport mean, in compliance with the safety rules during transport. The driver, when transporting the machine, should exercise special care. It results from the fact of moving the center of mass of the transport unit with the machine, upwards.

When loading and unloading the feed car one must comply with general work safety instructions regarding reloading procedures. Individuals handling with reloading equipment must have appropriate qualifications for taking advantage of those machines.

The feed car ought to be securely fastened on the platform of appropriate transport mean with use of belts or chains equipped with belt stretcher system. Fastening elements must have current safety certificate. One must put wedges or other elements devoid of sharp

edges under wheels, which will protect the machine against spontaneous rolling by. Wedges must be fastened to the platform of transport mean. When performing reloading works one must mind not to damage elements that make up the equipment of the feed car and its varnish coating.

1.6 ENVIRONMENT HAZARD

Leakage of hydraulic oil or else gear oil, make up direct threat for natural environment. When performing maintenance and repair works with a bad risk of oil leakage, it is necessary to perform those works in rooms with oil-proof floor. Oil that got out of hydraulic or lubricating systems must be collected and neutralized immediately.

1.7 WITHDRAWAL FROM USE

In case the user makes a decision on withdrawal of the machine from use, the complete feed car must be delivered to the scrap materials deposit, appointed by the Starost. Dismounted parts that are left after repairing the machine must be delivered to the recycle stock. Oil from hydraulic and lubricating systems must be delivered to proper plant that is busy with utilization of such kind of wastes.

CHAPTER

2

OPERATION SAFETY

GENERAL SAFETY RULES

RULES OF DRIVING ON PUBLIC ROADS

RESIDUAL RISK DESCRIPTION

INFORMATION-WARNING LABELS

2.1 GENERAL SAFETY RULES

- Before starting exploitation of the machine, the user should get acquainted thoroughly with the contents of this instruction as well as other instructions enclosed to the feed car equipment (instructions for use of the scales and jointed-telescopic shaft). When operating the machine you must observe all provisions contained therein.
- If information contained in the instruction appears not fully comprehensible it should be turned for help to the seller that manages the Authorized Technical Service on behalf of the Manufacturer or directly to the Manufacturer.
- Careless and improper use and service of the feed car and non-observance of recommendations contained in the following manual, create health hazard.
- Non-observance of rules of safe-operation creates health hazard for operators as well as for strangers.
- It is warned that there is a possibility of occurrence of residual risk with relation to hazards that is why observing rules of safe-operation should be the basic rule for using the feed car.
- It is forbidden to use the machine by operators that are unauthorized for driving farm tractors, including children, people in drink or being by the action of drugs or other kinds of stupefacient.
- It is forbidden to use the machine inconsistently with its appropriation. Every person, who uses the machine contrary to its appropriation, takes upon oneself all consequences arising from its usage. All activities that were not described in this manual are considered to be an inappropriate usage.
- Any modifications of the feed car release the PRONAR Narew company from responsibility for damages or harms, that arose thereby.
- You must check technical condition of the feed car before every use. You must check the condition of hook-type coupling, carriageable system, braking system and signalling system, in particular.
- Getting upon the machine is allowed only when it is completely immobilized and the engine is disabled. When the machine is working it is allowed to get upon the platform, in order to check mixing and milling process, exercising caution.

- Feed car detached from the tractor must be braked. In case the machine stands on the slope, you must additionally secure it against rolling down by putting wedges or other elements devoid of sharp edges, under wheels.
- It is forbidden to carry people or animals on the machine.
- Before setting about accoupling feed car to the farm tractor you must check technical condition of the hook-type coupling of both the tractor and the feed car, driving shaft and couplers of the hydraulic system and wiring system.
- It is forbidden to accouple the feed car with tractor, in case hydraulic oils in both machines are of different type.
- When accoupling feed car with tractor you must use the lower or the upper hook-type coupling of the tractor. You must check its performance and condition of safety device.
- You must exercise special care when accoupling the machine.
- Nobody must stay between feed car ant tractor when accoupling those machines.
- Verify the coupling performance and verify the condition of safety device.
- Hydraulic system works under high pressure.
- You must verify technical condition of couplings of hydraulic as well as pneumatic piping, on a regular basis.
- In case of failure of hydraulic or pneumatic system, the machine must be disabled until mending the failure.
- When connecting hydraulic pipes to the tractor it must be observed that hydraulic system of tractor as well as feed car were not pressurized.
- It is necessary to check the condition of hydraulic system of the machine frequently, no oil leaks allowed.
- In case of hydraulic or pneumatic system failure, the feed car must be excluded from operation until having the problem solved.
- Before setting about repairing, one must reduce oil or air pressure in hydraulic or pneumatic system, as appropriate.
- In case of injury caused by intense hydraulic oil stream, it is necessary to consult the physician. Hydraulic oil may penetrate your skin and cause infection.

- Always use oil approved by the manufacturer. Never mix two kinds of oil.
- After having oil changed, you must utilize old oil.
- When working with tyres it is necessary to protect the machine against rolling by, putting wedges under wheels.
- Repair works regarding wheels or tyres must be performed by professionally trained and authorised individuals. Those actions must be taken with use of purpose-made tools.
- After having the wheel mounted, one must check that all nuts are properly tightened. Control must be exercised after first use, after first performance with load and then after 6 months.
- Control tyre pressure on regular basis.
- In case of discovering any imperfections regarding operation of the machine or any damage, you must exclude it from operation until having all problems solved.
- When taking repair actions you must wear appropriate, well-fitting protective clothing, gloves and purpose-made tools.
- Service-repair action must be taken when complying with general work safety rules. In case of injury rinse and disinfect the wound immediately. In case of severe injury, it is necessary to consult the physician.
- Repair, maintenance and cleaning works may be performed only with engine powered off and ignition key taken out.
- Verify condition of all screw joints.
- Before setting about any welding or electrical works, it is necessary to deenergize the feed car.
- Within warranty period all repair works may be performed only by warranty service authorized by the manufacturer.
- In case of necessity of replacement of particular elements, one must use original spare parts or approved by the manufacturer only. Non-observance of this rule may create danger for life and health of operators as well as strangers and contribute to machine damage.

- Before setting about welding works it is necessary to clean varnish coating. Vapours of burning paint are dangerous for human and animals. Welding action may only be taken in well-lighted and air-conditioned hall.
- Verify technical condition of protective elements as well its fastening.
- When performing welding works one must pay special attention to inflammable or liquefiable elements (elements of pneumatic system. Wiring system, hydraulic system and elements made of plastic). If there is imminent danger of ignition or impairment of those elements it is necessary to dismantle them before taking any welding action.
- In case of works that require lifting the feed car, one must use purpose-made, certified hydraulic or mechanical crane. When having the machine lifted it is necessary to apply additional firm and reliable supports. It is forbidden to perform any works having the machine lifted with use of jack only.
- It is forbidden to support the machine with use of fragile elements (like bricks, air-bricks, concrete blocks).
- After finishing works connected with lubrication, remove the excess grease or oil.
- It is necessary to keep the feed car, tank and worm in particular, clean.
- Procedure of adjusting cutting blades may only be performed when worm is not rotating.
- Before entering the tank you must secure tractor against strangers, disconnect telescopic-joint shaft, open shutters and disconnect pipes of hydraulic system.
- When entering the tank one must exercise special care.
- Entering the tank is possible with use of two ladders, it is forbidden to use platform or chute window.
- Entering the tank is allowed only when the machine is immobilized.
- Cutting blades are very sharp, thus it is necessary to exercise special care when mounting, dismantling or adjusting blades.
- At the end of work it is necessary to clean the feed car from feed leftovers.

- Using feed car in several holdings creates danger of expansion of microorganism in the environment. This threat may be significantly reduced by deep cleaning of the machine.
- In case the machine was used for mixing contaminated feeding stuff, it is necessary to disinfect it in compliance with regulations of local sanitary authorities.
- The machine must be deep cleaned in case it has not been used for more than three days.
- Expansion of bacteria is a normal phenomenon and is more intense when using foodstuffs for production feed mixture. Keeping the machine clean is a necessary condition for keeping animals in good health.
- Before setting about working with the machine, it is necessary to become familiar with propeller shaft operating manual provided by the manufacturer and comply with instructions contained therein.
- The feed car may only be accoupled with tractor with use of purpose-made telescopic-joint shaft, recommended by the manufacturer.
- Propeller shaft must be equipped with protecting covers. It is forbidden to use propeller shaft with damaged covers or without covers.
- After having the shaft installed, one must make sure that it is properly and safely connected to tractor and feed car.
- Before each start-up it is necessary to make sure that all covers are in full order and properly mounted. Damaged or deficient subassemblies must be replaced immediately.
- It is forbidden to wear loose cloths, loose belts or anything what could wriggle in rotating shaft. Contact with rotating propeller shaft may end with serious injury.
- Before disconnecting propeller shaft, one must power off tractor's engine and take ignition keys out.
- In case of working in conditions of limited visibility, telescopic-joint shaft as well the area around it, ought to be floodlighted by operating head-light of tractor.
- Shaft ought to be transported in horizontal position in order not to damage covers and other protective elements.

- When using shaft and feed car, it is necessary to mind not to exceed rotational speed of power take-off shaft of 540 rpm. It is forbidden to overload shaft and feed car and impetuous clutching in. Before actuating telescopic-joint shaft, one must make sure that the sense of rotation of power take-off shaft is correct.
- It is forbidden to walk above or under shaft as well as stand on it when the feed car is on-the-job and under stopover.
- Telescopic joint shaft has markings on its casing that indicate which end of the shaft must be connected to tractor.
- Never use damaged telescopic-joint shaft, because it may be dangerous. Damaged shaft must be repaired or replaced.
- Disconnect shaft drive each time when there is no need to propel the machine or else, when tractor and feed car are placed in adverse angular position.
- Chain that protect shaft covers against rotating when shaft is in operation must be attached to fixed structural member of the feed car.
- It is forbidden to use securing chains for supporting shaft during stoppage or transportation of the feed car.

2.2 RULES OF DRIVING ON PUBLIC ROADS

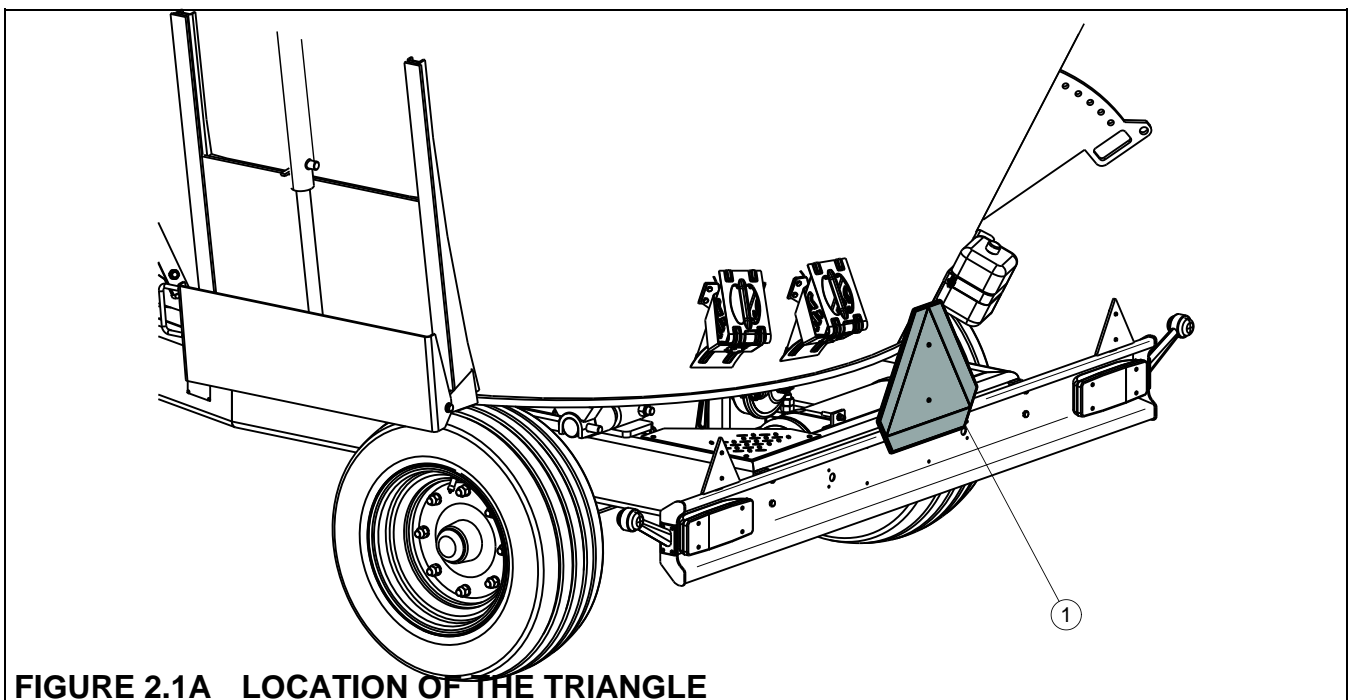


FIGURE 2.1A LOCATION OF THE TRIANGLE

(1) triangle distinguishing low-speed vehicles

- Driving on public roads you must observe the road traffic rules.
- Exceeding maximum authorized payload of the feed car may cause its breakage and also create imminent danger on the road.
- One must mount three-cornered board that distinguish low-speed vehicle on lighting beam, in case the machine is the last one in aggregate – figure (2.1A).
- You must not exceed top constructional speed of 25 km/h. You must adjust the speed to actual conditions on the road.
- It is forbidden to leave the machine unsecured. Securing the machine consists in braking it with parking brake or else putting wedges under wheels.
- When driving on public roads, the feed car must be equipped with certified warning reflective triangle.

2.3 RESIDUAL RISK DESCRIPTION

The Pronar Sp. z o. o. in Narew exercised all necessary care so to eliminate the risk of unfortunate accident. However there exists some particular residual risk, that can bring to fatality, and which is particularly connected with activities described below:

- using feed machine for other purposes than described in the following manual,
- staying between the tractor and the feed car while the engine is working and when accoupling both machines,
- operating the feed car by individual in drink or being under influence of any kind of stupefacient,
- operating the machine by unauthorized people,
- being on the machine when it is working,
- cleaning, maintaining and technical reviewing of the feed machine.

Residual risk can be reduced to minimum, when complying with the following recommendations:

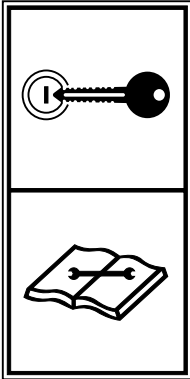
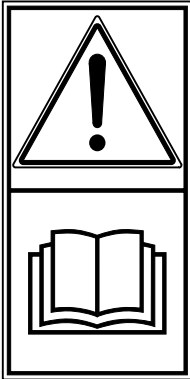
- careful and unhurriedly operation,
- reasonable application of notes contained in the *INSTRUCTIONS FOR USE AND SERVICING*,

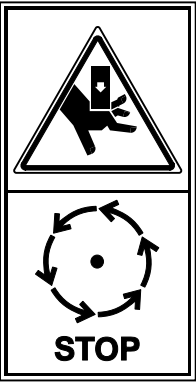

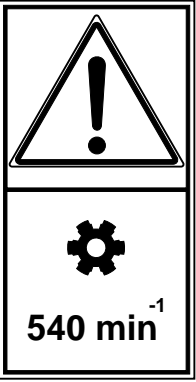
- keeping safe distance from illicit and dangerous places,
- no staying on the machine during its operation,
- taking repair and maintenance actions only by trained professionals,
- using protective clothing,
- securing the machine against unauthorized entry, especially against children.


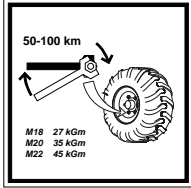


2.4 INFORMATION-WARNING LABELS

The VMP-10 feed car of Pronar is marked with information-warning signs in the form of labels, named in the table (2.1). Arrangement of symbols was shown on the figure (2.2A). The user is obliged to take care of legibility of markings and warning symbols during all period of using the machine and if need be to replace them with new ones. Labels with signs and symbols are purchasable at the Manufacturer or place where the machine was purchased. New assemblies after being replaced must be labeled.

TABLE 2.1 INFORMATION-WARNING LABELS

ITEM	SYMBOL	DESCRIPTION
1		<p>Before setting about service or repair works, turn off the engine and take the ignition key out of the ignition</p>
2		<p>Become familiar with content of this instruction</p>

ITEM	SYMBOL	DESCRIPTION
3	 <p>The symbol consists of two rectangular boxes stacked vertically. The top box contains a triangular warning sign with a hand being crushed by a finger. The bottom box contains a circular arrow symbol with the word 'STOP' written below it.</p>	<p>Threat of crashing fingers or hands. Do not touch any elements of the machine before having all units immobilized.</p>
4	 <p>The symbol consists of two rectangular boxes stacked vertically. The top box contains a triangular warning sign with a person climbing a ladder. The bottom box contains the word 'STOP' above a right-pointing arrow, and below that, a key with a '1' in a circle next to it.</p>	<p>Before climbing onto the ladder or getting into charge compartment, shut off the engine and take the ignition key out of the ignition. Secure tractor against not qualified individuals.</p>
5	 <p>The symbol consists of two rectangular boxes stacked vertically. The top box contains a triangular warning sign with an exclamation mark. The bottom box contains a gear icon and the text '540 min⁻¹'.</p>	<p>Maximum allowed rotational speed of the power take-off shaft is 540 rpm.</p>
6	<p>VMP-10 PRONAR</p>	<p>Machine type</p>
7	<p>5 4 3 2 1 0</p>	<p>Servomotor label</p>
8	<p>800kPa</p>	<p>Tyre pressure</p>

ITEM	SYMBOL	DESCRIPTION
9		Lubricate in accordance with recommendations contained in the Instructions for use and servicing
10		Check condition of screw joints of carriageable axes
11		Maximum speed of the machine is 25 km/h ★
12		Do not approach rotating elements, do not take covers off when the engine is working

★ - was not shown on figure 2.2A, this label is placed on the rear wall of the tank

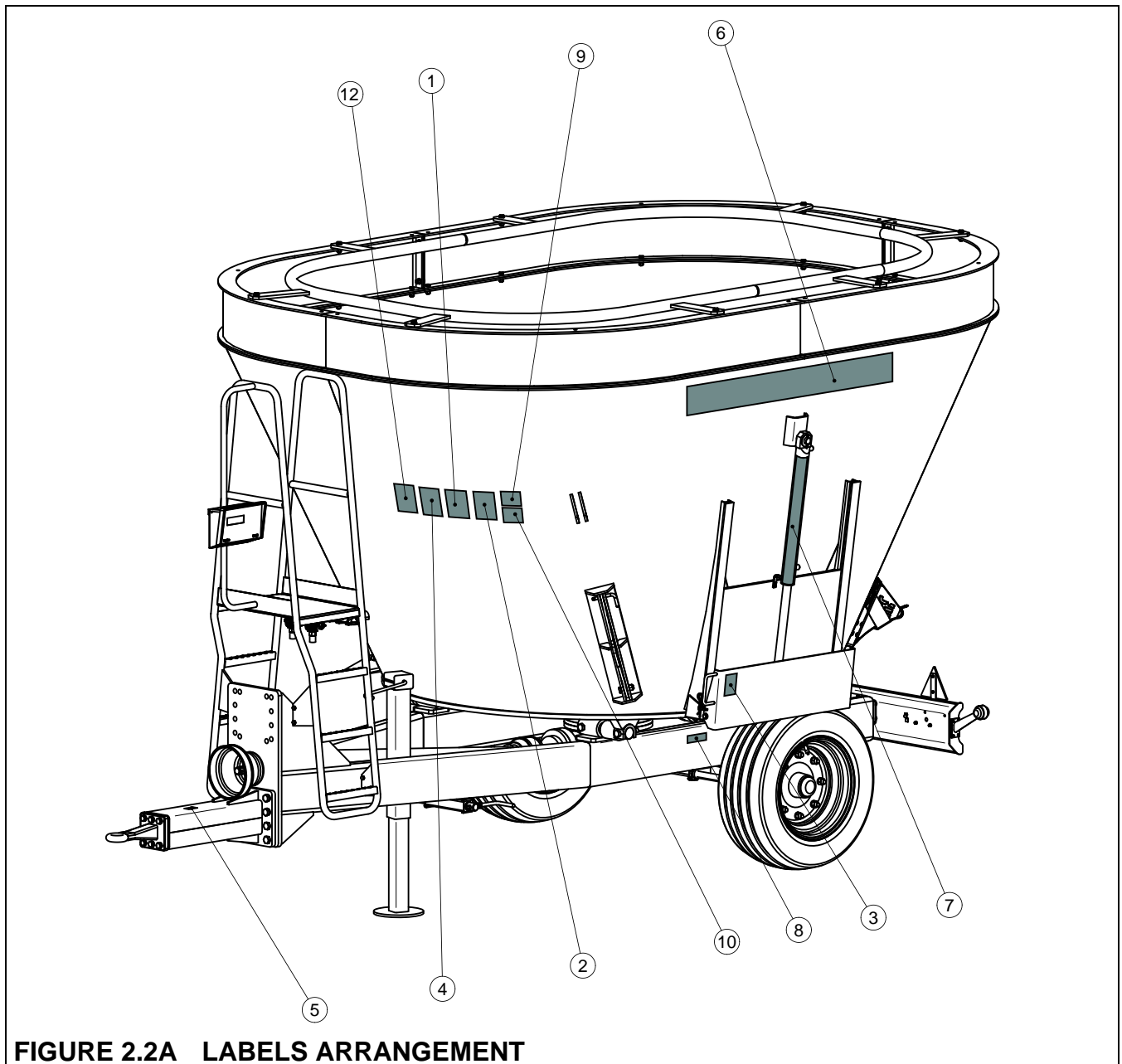


FIGURE 2.2A LABELS ARRANGEMENT

Markings comply with table 2.1 „Information-warning labels”

CHAPTER

3

STRUCTURE AND PERFORMANCE

TECHNICAL SPECIFICATION

CHASSIS

TANK

MAIN BRAKE

PARKING BRAKE

WORM DRIVE

GEAR LUBRICATION SYSTEM

HYDRAULIC SYSTEM OF SHUTTERS

WIRING SYSTEM

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 GENERAL TECHNICAL DATA OF THE FEED CAR VMP-10

ITEM	UNIT	VALUE
Tank capacity with added top wall	m ³	10
Own weight	kg	3 700
Load capacity	kg	4 000
Total weight	kg	7 700
Total length	mm	4 860
Total width	mm	2 550
Total height	mm	2 700
Tank dimensions:		
- length (top/bottom)	mm	1 960/3 470
- width (top/bottom)	mm	2 000/2 440
- height without added top wall	mm	1 590
- added top wall height	mm	250
Tank casing thickness	mm	8
Added top wall thickness	mm	8
Tank bottom thickness	mm	20
Power take-off shaft driving gear	rpm	540
Power demand	kW	45
Number of revolutions of the worm	rpm	25
Tyre		30x11.5-14.5 20PR
Tyre pressure	kPa	800
Maximum constructional speed	km/h	25
Wiring system voltage	V	12
Allowable vertical load of draught bar	kN	12.7
Hydraulic oil demand:		
- hydraulic system of shutters	l	18
- hydraulic braking system	l	3
Clutch overload point	Nm	2400
Gear lubrication system capacity	l	16
Worm rotational speed at power take off speed of 540 rpm	rpm	25

3.2 CHASSIS

The chassis of the feed car is built of assemblies marked in the Figure (3.1A). Bottom frame (1) is a welded element made of steel sections. The basic bearing elements are two frame side members. In the middle of the element there are seats for attaching scales. The lighting beam is attached to the closing profile located in the rear of the rear frame, and in front of the lower frame, there are the draught bar (5) along with string (6), platform (8) and support (7). Seats and clamps designed for fastening connectors of hydraulic and pneumatic piping when the machine is in a halt state are screwed to the platform.

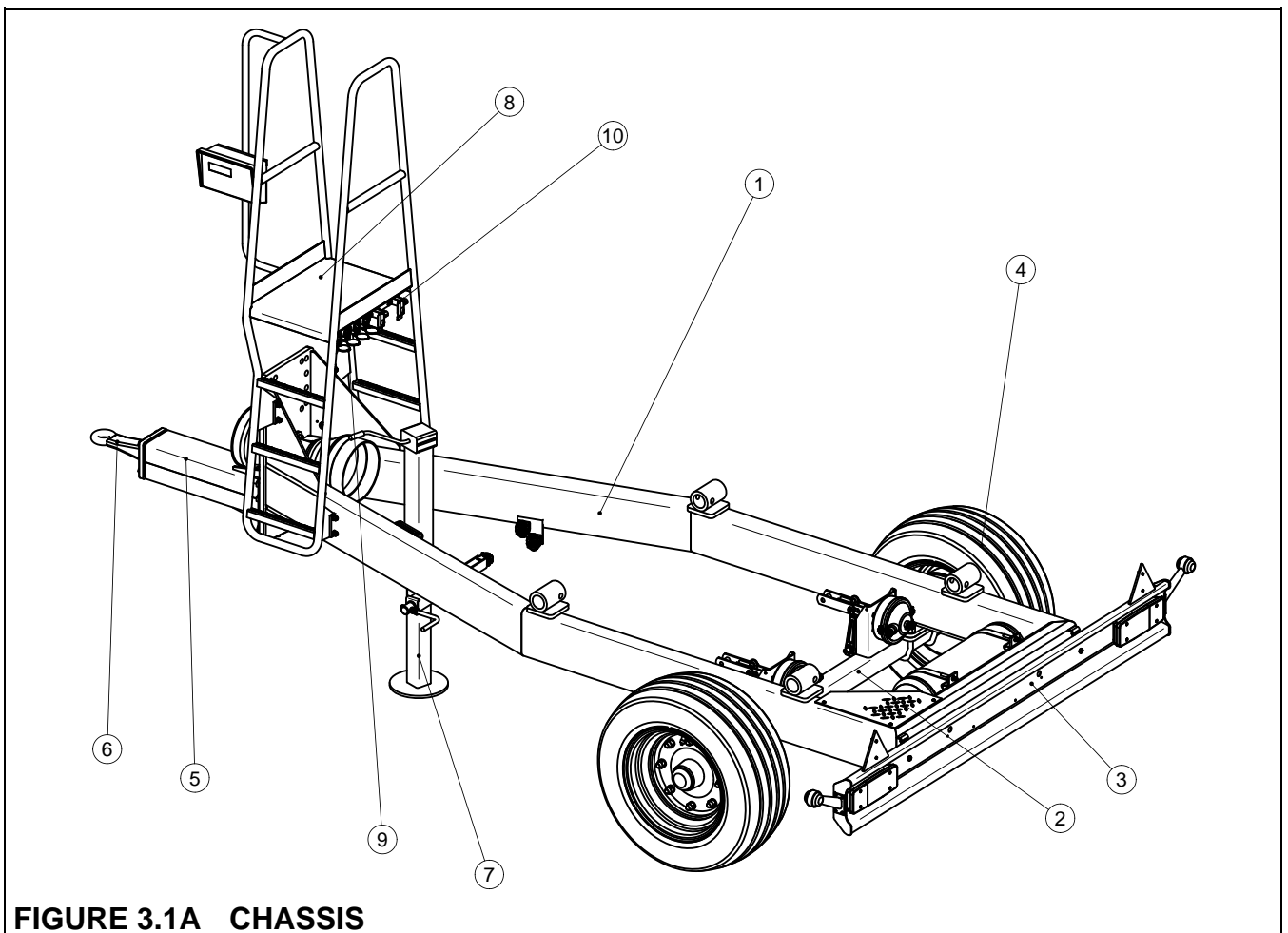


FIGURE 3.1A CHASSIS

(1) bottom frame, (2) carriageable axle, (3) lighting beam, (4) wheel, (5) draught bar, (6) string, (7) support, (8) platform, (9) seats for hydraulic connectors, (10) pneumatic pipes clamps

In the rear of the bottom frame there is a carriageable axle (2) that was made of square rod ended with pins. On pins, on cone bearing, there are wheel hubs. Wheel hubs are equipped

with shoe brakes actuated by mechanical cam expanders. Actuating elements for brakes are pneumatic or hydraulic servomotors, depending on equipment of the feed car.

3.3 TANK

The structure of the feed car's tank was shown on the figure (3.2A). In side walls of the tank there are chute windows that are opened with use of two shutters (5). Shutters are controlled self-reliantly. Under chute windows there are chutes (6) that are designed for distributing feeding stuff. In the rear of the tank there are wedges (8) and oil tank of the planetary gear (9) lubricating system. Reduction gear is screwed from the bottom of the tank floor and on its pin there is worm (3).

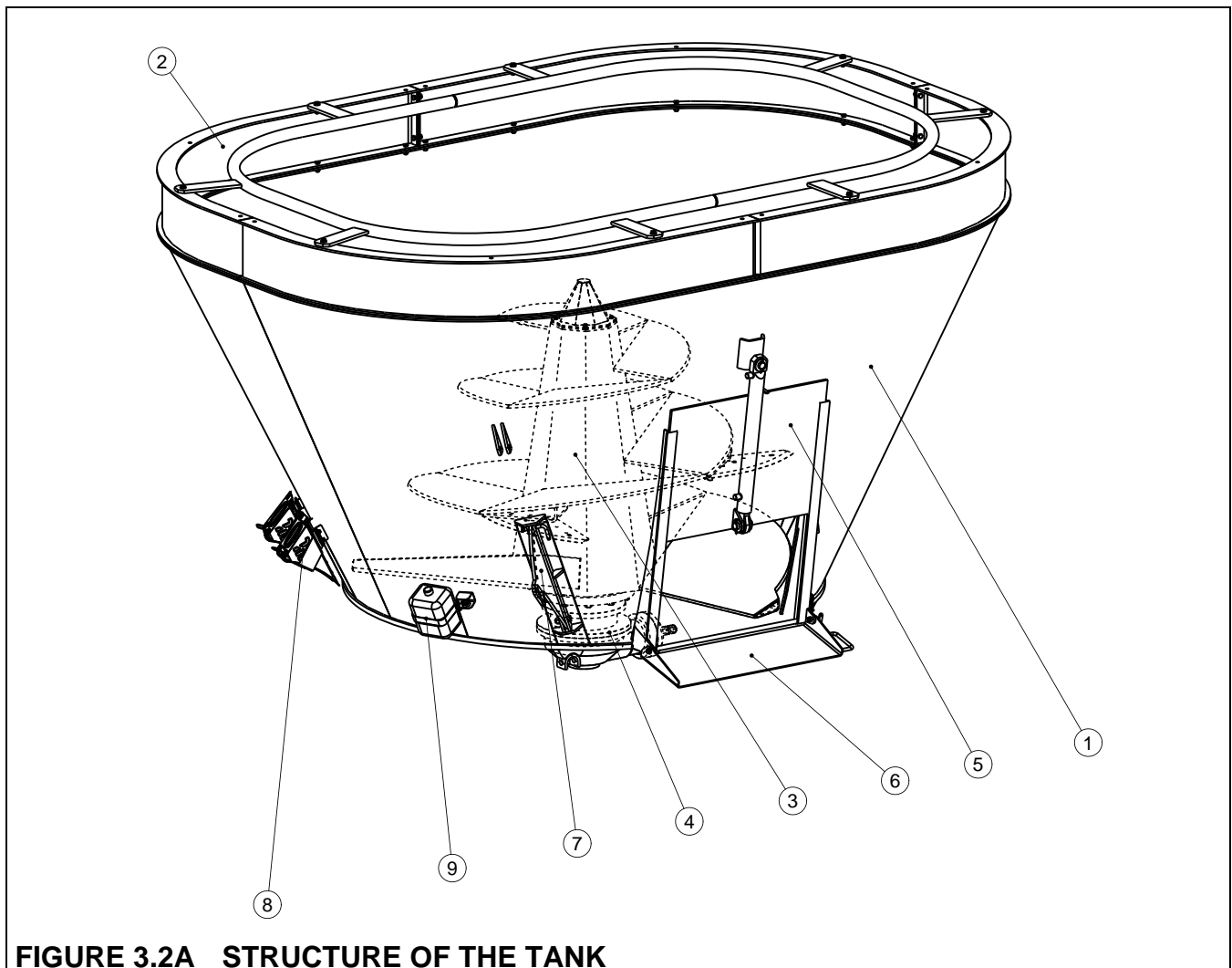


FIGURE 3.2A STRUCTURE OF THE TANK

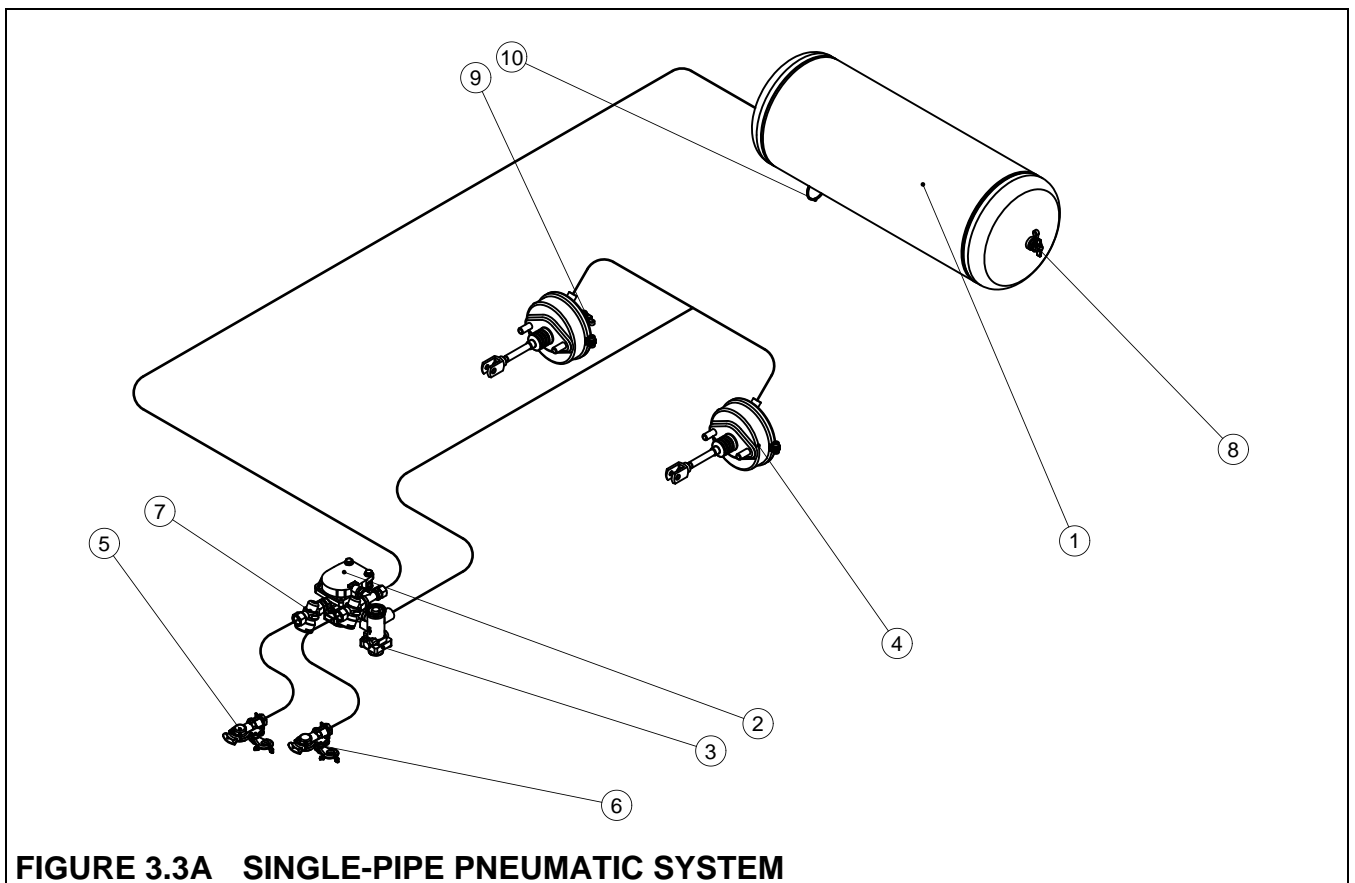
(1) tank, (2) tank added top wall, (3) worm, (4) planetary reduction gear, (5) shutter, (6) chute, (7) milling blade, (8) wedges, (9) lubricating oil tank

Added top wall (2) is screwed to the edge of tank. Two milling blades were installed in tank walls. Full assembly of tank rests upon weight stress tensor, which in turn are attached to bottom frame of the feed car.

3.4 MAIN BRAKE

The feed car VMP-10 was equipped in one of three types of main braking system:

- Two-pipe pneumatic system - figure (3.3A),
- Single-pipe pneumatic system - figure (3.4A),
- Hydraulic braking system - figure (3.5A).



(1) air tank, (2) control valve, (3) braking force controller, (4) pneumatic servomotor, (5) pipe joint (red), (6) pipe joint (yellow), (7) air filter, (8) control joint of air tank, (9) control joint of pneumatic servomotor, (10) drain hole

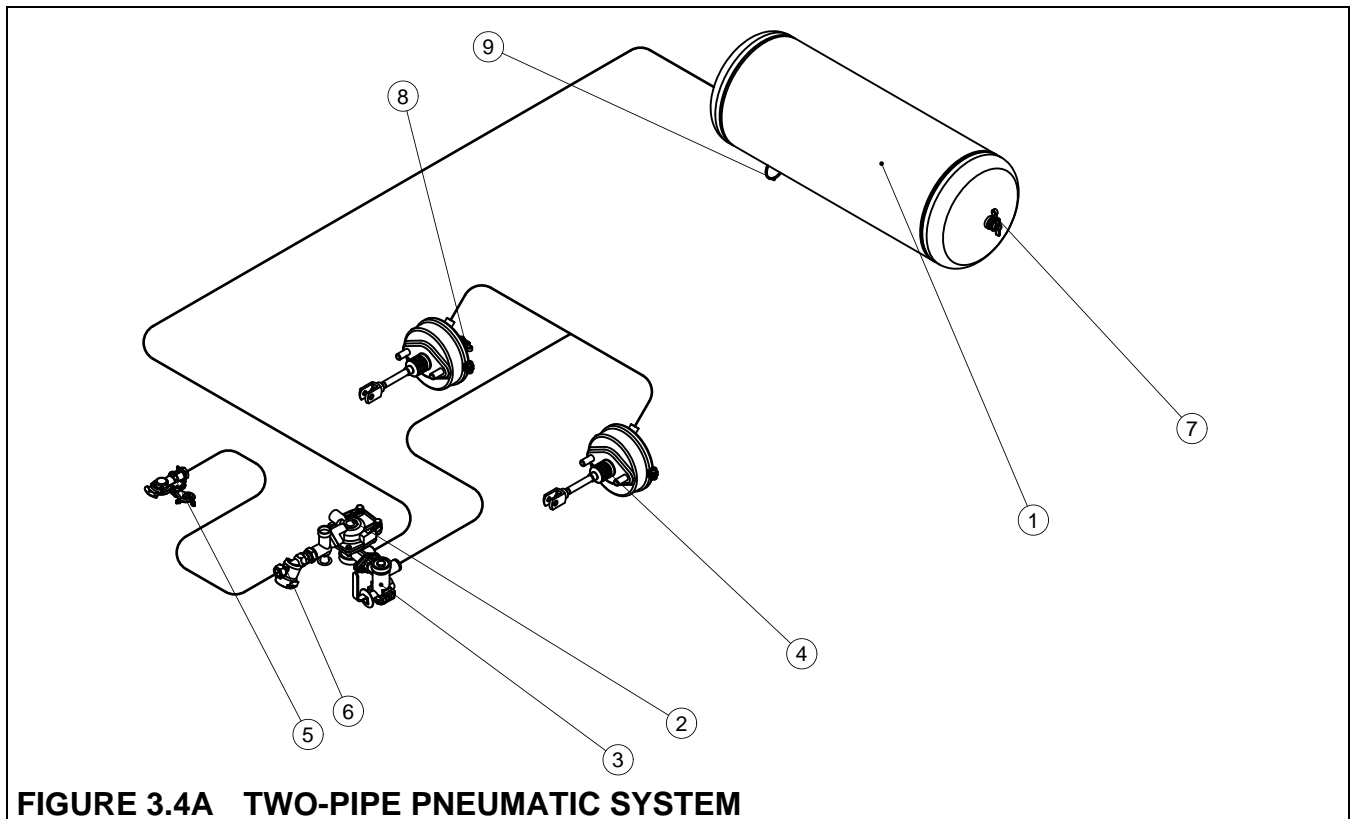


FIGURE 3.4A TWO-PIPE PNEUMATIC SYSTEM

(1) air tank, (2) control valve, (3) braking force controller, (4) pneumatic servomotor, (5) pipe joint, (6) air filter, (7) control valve of air tank, (8) control valve of pneumatic servomotor, (9) drain hole

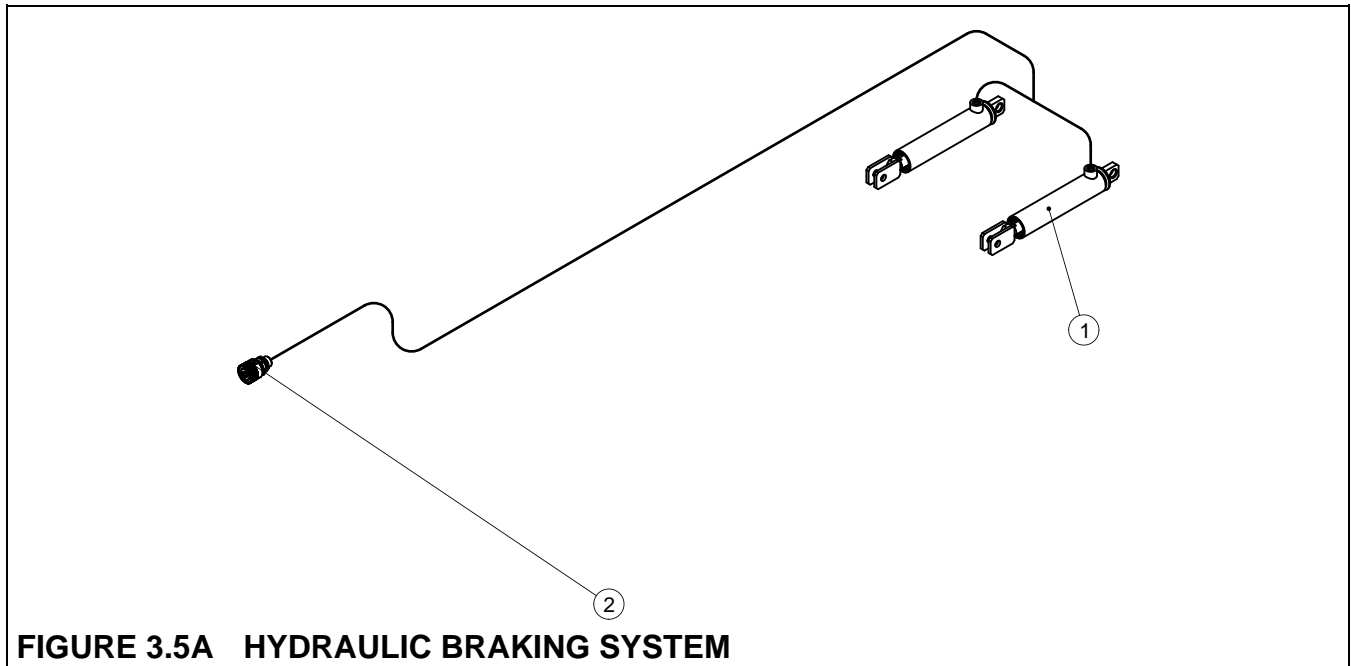


FIGURE 3.5A HYDRAULIC BRAKING SYSTEM

(1) hydraulic braking servomotor, (2) quick-coupler

Main brake is activated from operator's working place by pedalling tractor brake pedal. Task of control valve (2) used in pneumatic systems – figure (3.3A) and (3.4A) is actuating brakes of the feed car along with actuating tractor brake. Furthermore, in case of incidental disconnection of a pipe located between car and tractor, control valve automatically actuates brake of the machine. Applied valve was equipped in brake releasing system that is used when the feed car is disconnected from tractor. After having air pipe connected to tractor, releasing device spontaneously switches into position enabling normal operation of brakes.

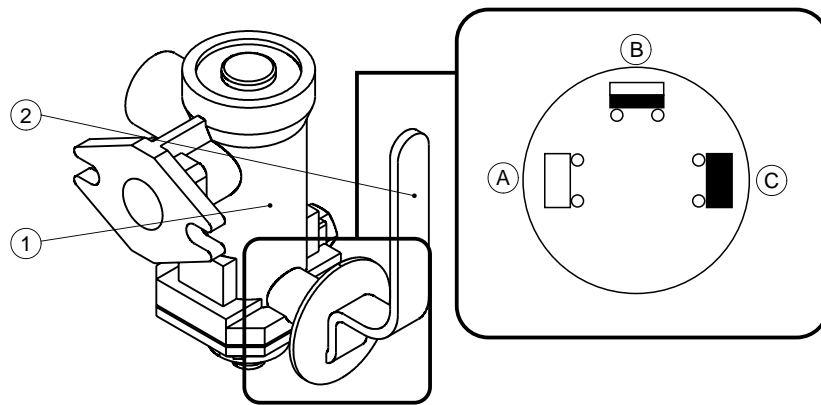


FIGURE 3.6A THREE-POSITION BRAKING FORCE REGULATOR

(1) three-position braking force regulator, (2) steering lever, (A), (B), (C) working positions of controller

Three-position braking force controller – figure (3.6A), used in pneumatic systems adjusts braking force depending on its setting. Switching on appropriate working mode is made manually by machine operator before start-up with use of lever (2). There are three working modes available: A – “No load”, B – “Half load”, C – “Full load”.

3.5 PARKING BRAKE

Parking brake was designed for immobilizing the feed car while being in halt state. Structure of parking brake system was shown on figure (3.7A). Crank mechanism (1) of brake is welded to left longitudinal member of a bottom frame. Steel brake cable (2) is attached to levers of expander of carriageable axle with crank mechanism by means of hand brake pulling off mechanism (3). Stretching cord causes swinging expander levers, that by half-opening brake shoes, immobilize the feed car.

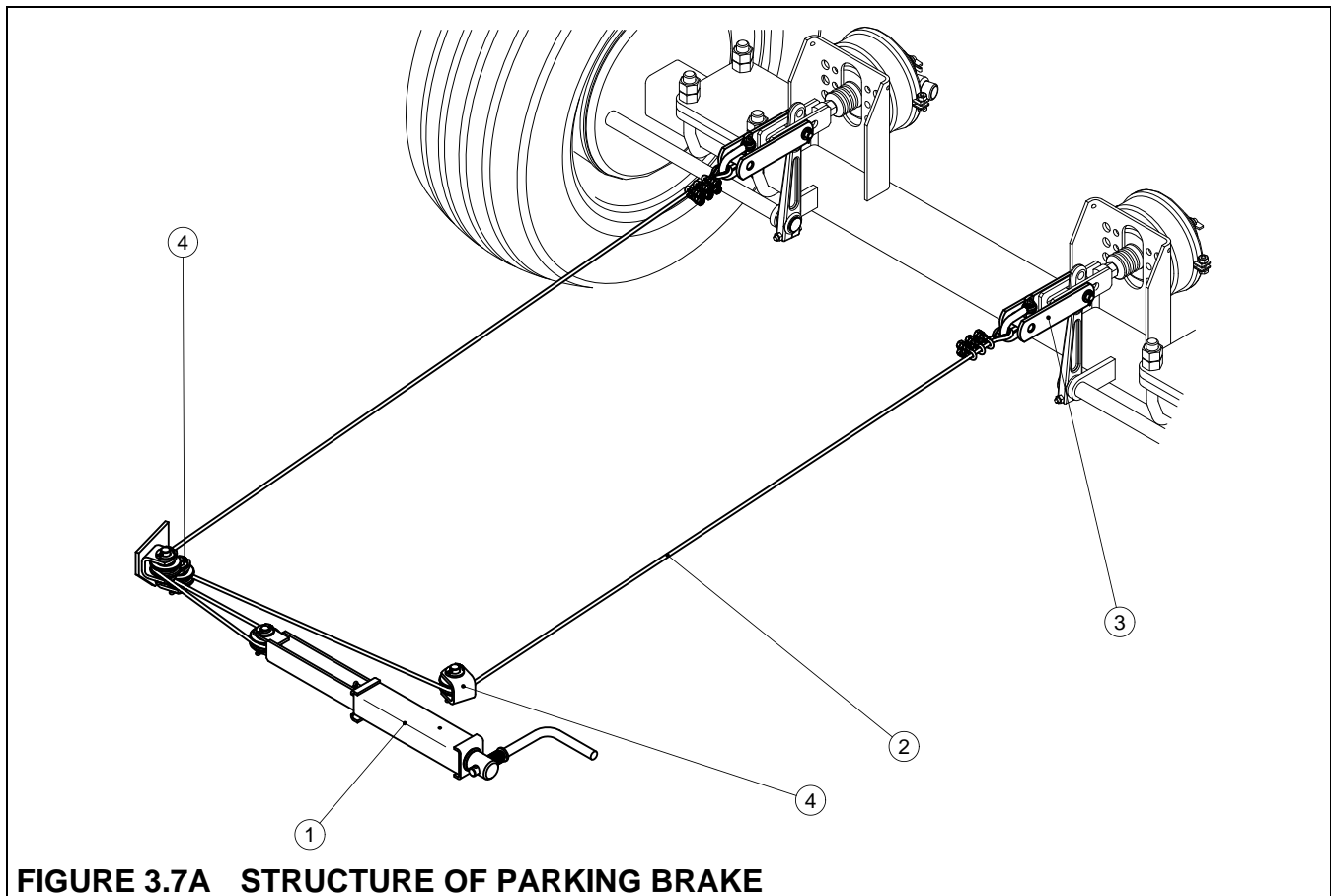


FIGURE 3.7A STRUCTURE OF PARKING BRAKE

(1) brake crank mechanism, (2) cable, (3) brake pulling off mechanism, (4) guide rolls

3.6 WORM DRIVE

Worm driving force is transmitted from tractor by means of telescopic-joint shaft (1) that connects feed car with tractor, telescopic-joint shaft (2) with built in overload friction clutch for planetary reduction gear (3). Worm (4) rests on back-end shaft. Feed car is designed to work with power take-off rotational speed not bigger than 540 rpm. Two adjustable cutting blades are attached to worm disk. Worm rotates clockwise (when looking at the feed car from above).

Components of feeding stuff are administered to the tank from above. Worm drive is turned on at that time. Foodstuff drop down and are collected by worm by surface (A) and moved up. Then, when running along walls, fall off again. At that time foodstuff is milled with use of cutting blades (6) installed on the worm and milling blades (7) installed on walls of the tank. Figure (3.8A) shows worm driving gear, circulation of foodstuff during mixing and milling process – arrows (B) as well as sense of rotation of the worm (C).

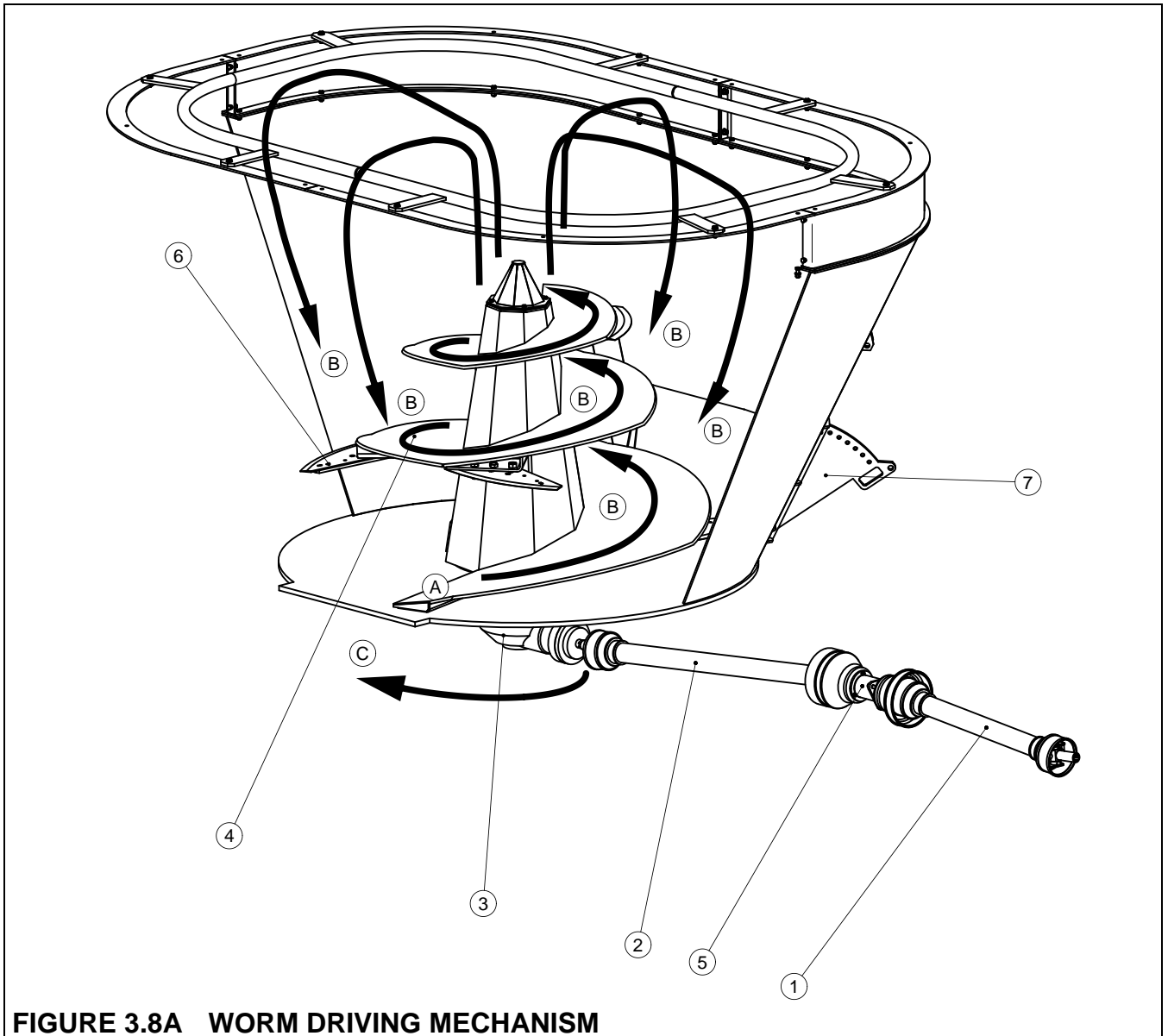


FIGURE 3.8A WORM DRIVING MECHANISM

(1) telescopic-joint shaft, (2) telescopic-joint with overload clutch, (3) planetary gear, (4) worm, (5) connector, (6) cutting blades, (7) milling blades, (A) landing net edge, (B) direction of foodstuff circulation in the tank, (C) sense of rotation of worm

3.7 GEAR LUBRICATION SYSTEM

Gear lubrication system was shown on figure (3.9A). Gear oil tank (1) is located in the rear of the tank, which in turn is located above the highest point of the gear. There is a pipe led out of the tank, which is connected with the gear. It supplies oil in case of any leakages.

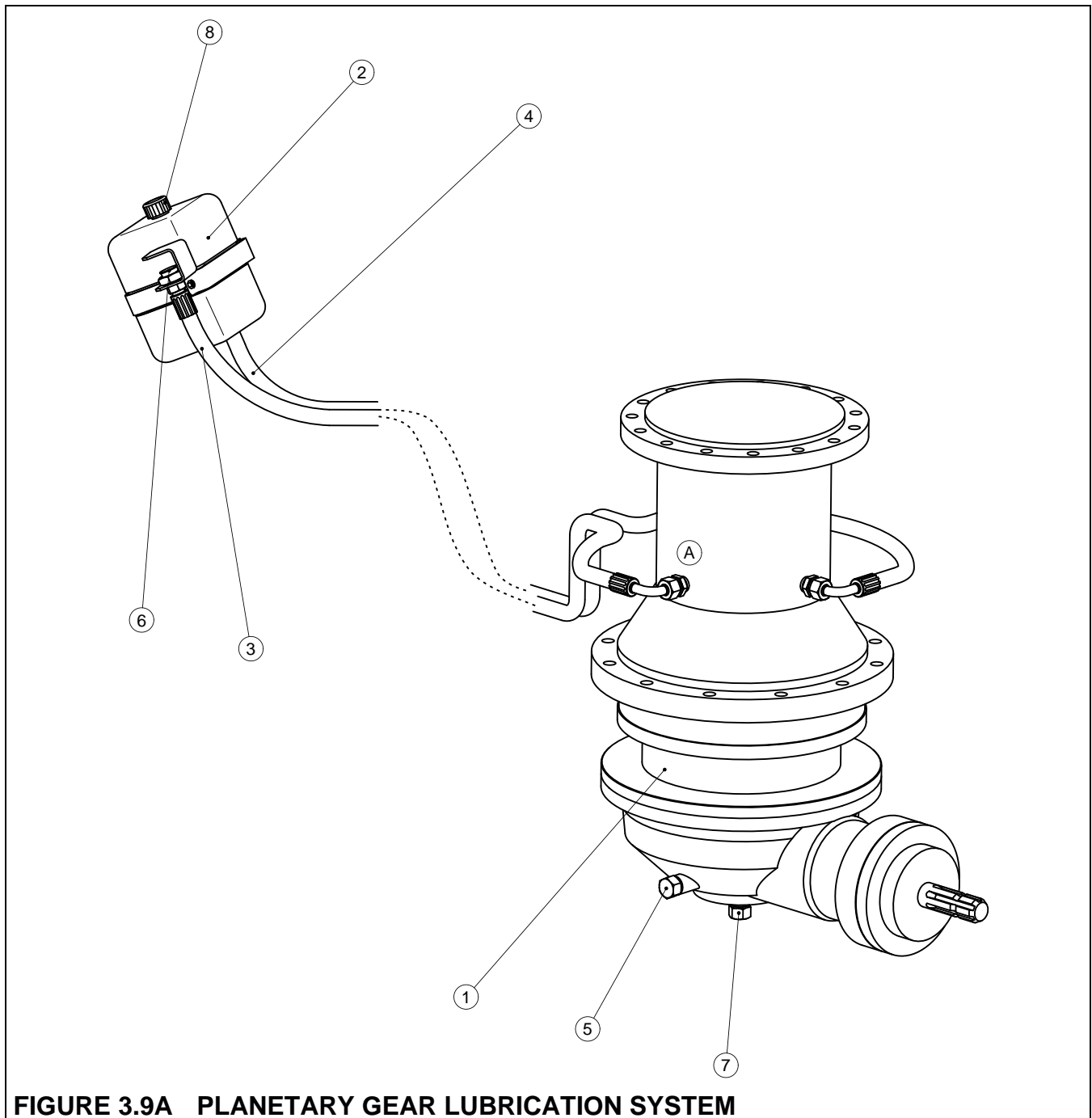


FIGURE 3.9A PLANETARY GEAR LUBRICATION SYSTEM

(1) planetary gear, (2) oil tank, (3) vent pipe, (4) supply pipe, (5) plug, (6) vent plug, (7) drain plug, (8) oil inlet nut, (A) overflow hole

Capacity of gear lubrication system is approx. 16 litres.

3.8 HYDRAULIC SYSTEM OF SHUTTERS

Feed car is equipped with two shutters designed for administering prepared food to animals. They are located on both sides of the tank and are actuated by hydraulic servomotors.

Supply of the system is being done from external hydraulic system of tractor. Shutters are controlled independently one on another. Applied solution allows administer animal food on both sides of the feed car at the same time. Administering speed depends on rotational speed of the worm. Draft view on arrangement of elements of the system from right side of the feed car was shown on figure (3.10A).

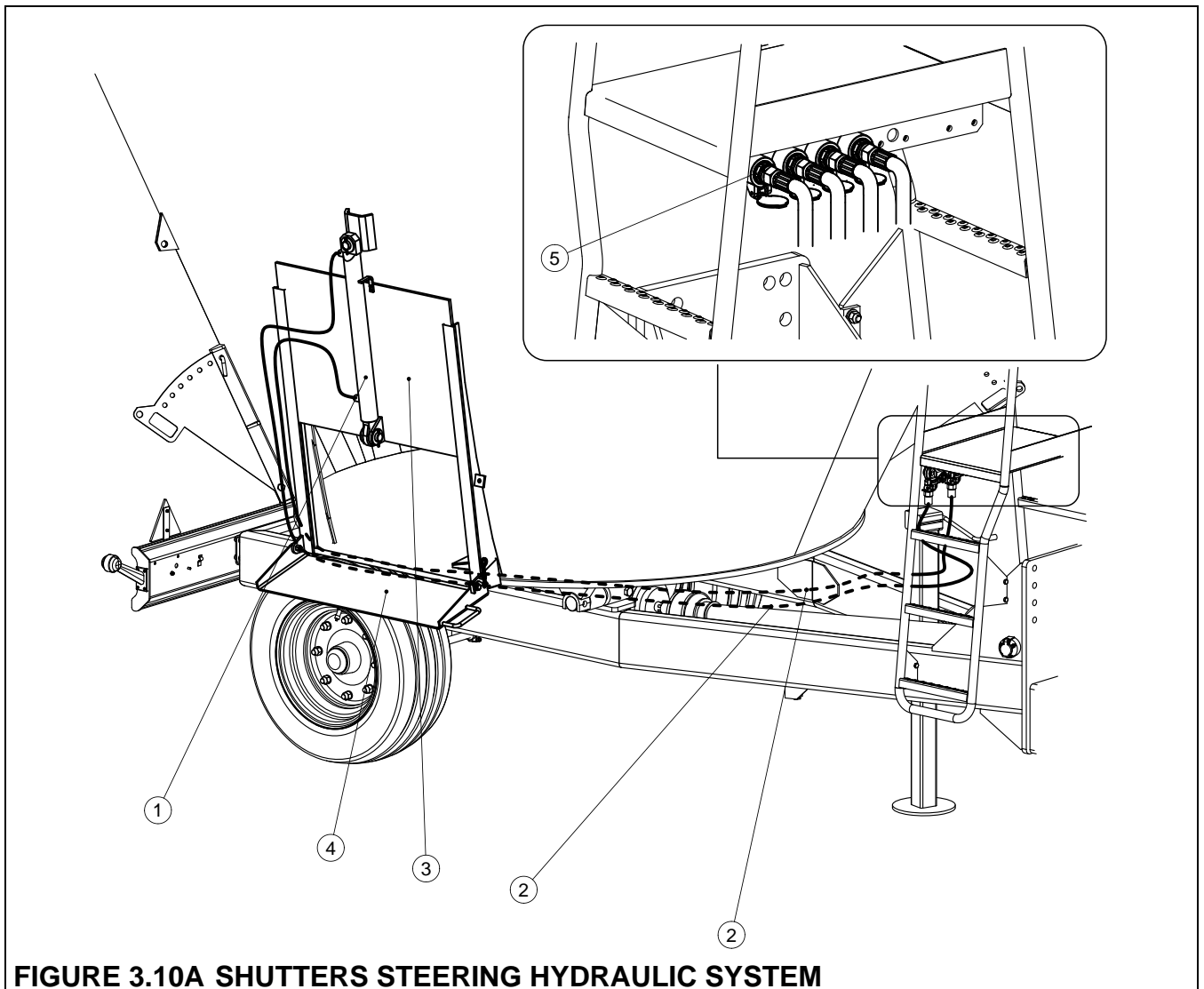


FIGURE 3.10A SHUTTERS STEERING HYDRAULIC SYSTEM

(1) hydraulic servomotor, (2) pipes, (3) shutter, (4) chute, (5) seats and connectors of hydraulic piping

3.9 WIRING SYSTEM

Wiring system of the feed car is adapted for current supply of nominal voltage of 12V. Performing connections between wiring system of the feed car and tractor ought to take place with use of purpose-made connecting cord, which is supplied with the machine. Contour lights (3) and (4) as well as complex lights (1) and (2) are installed on rear lighting

beam. Connecting socket (7) is located in front of the feed car and is screwed to the right knee brace of the draught bar front plate.

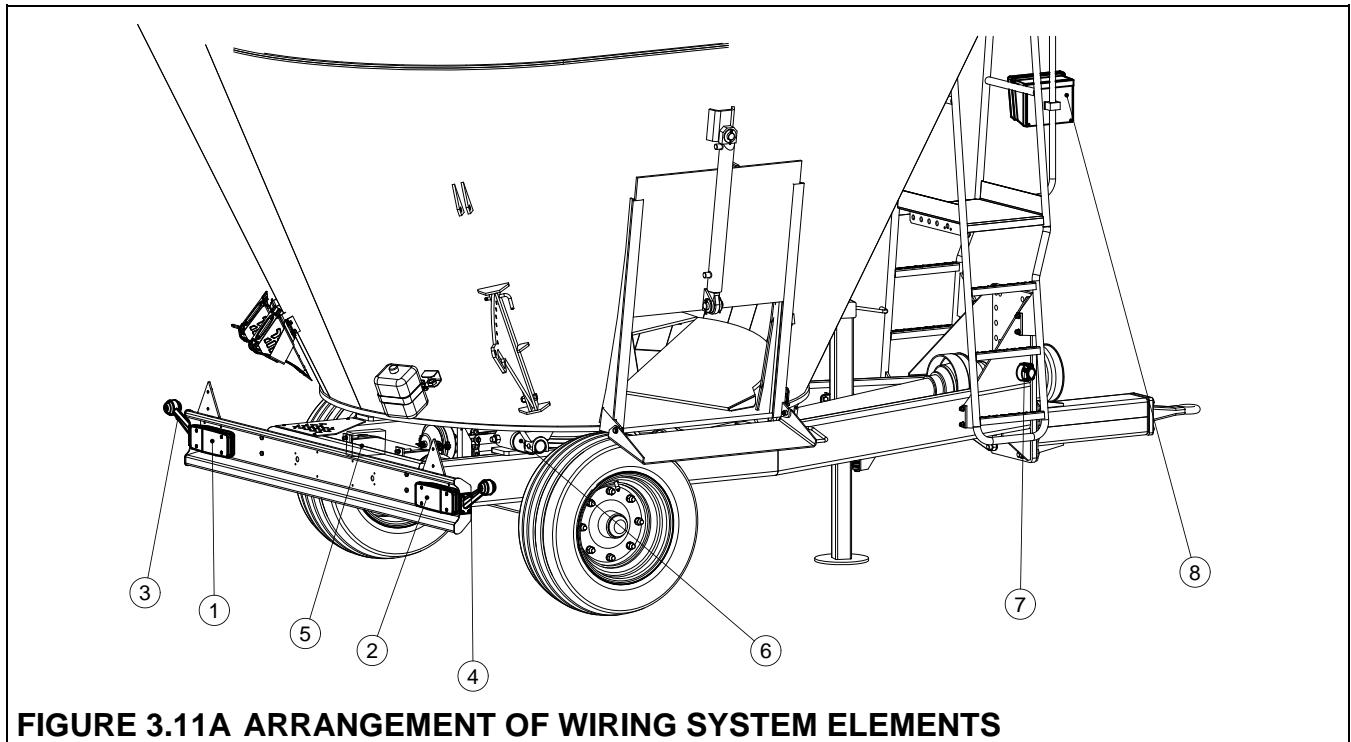


FIGURE 3.11A ARRANGEMENT OF WIRING SYSTEM ELEMENTS

(1) left rear complex lamp, (2) right rear complex lamp, (3) left contour lamp, (4) right contour lamp, (5) junction box, (6) load cell, (7) connecting socket, (8) display

Tank of the feeder car rests upon bottom frame and is fixed by means of four load cells (6). Cells, junction box (5) as well as display (8) make up measuring system of load factor of the feed car. Feeding stuff is being prepared as a mixture of many compounds, which dosing is facilitated by aforementioned system. Supply of lighting system and load measuring system can be switched on only after having parking lights or passing lights of tractor switched on. Wiring system schematic diagram was shown on figure (3.12A).

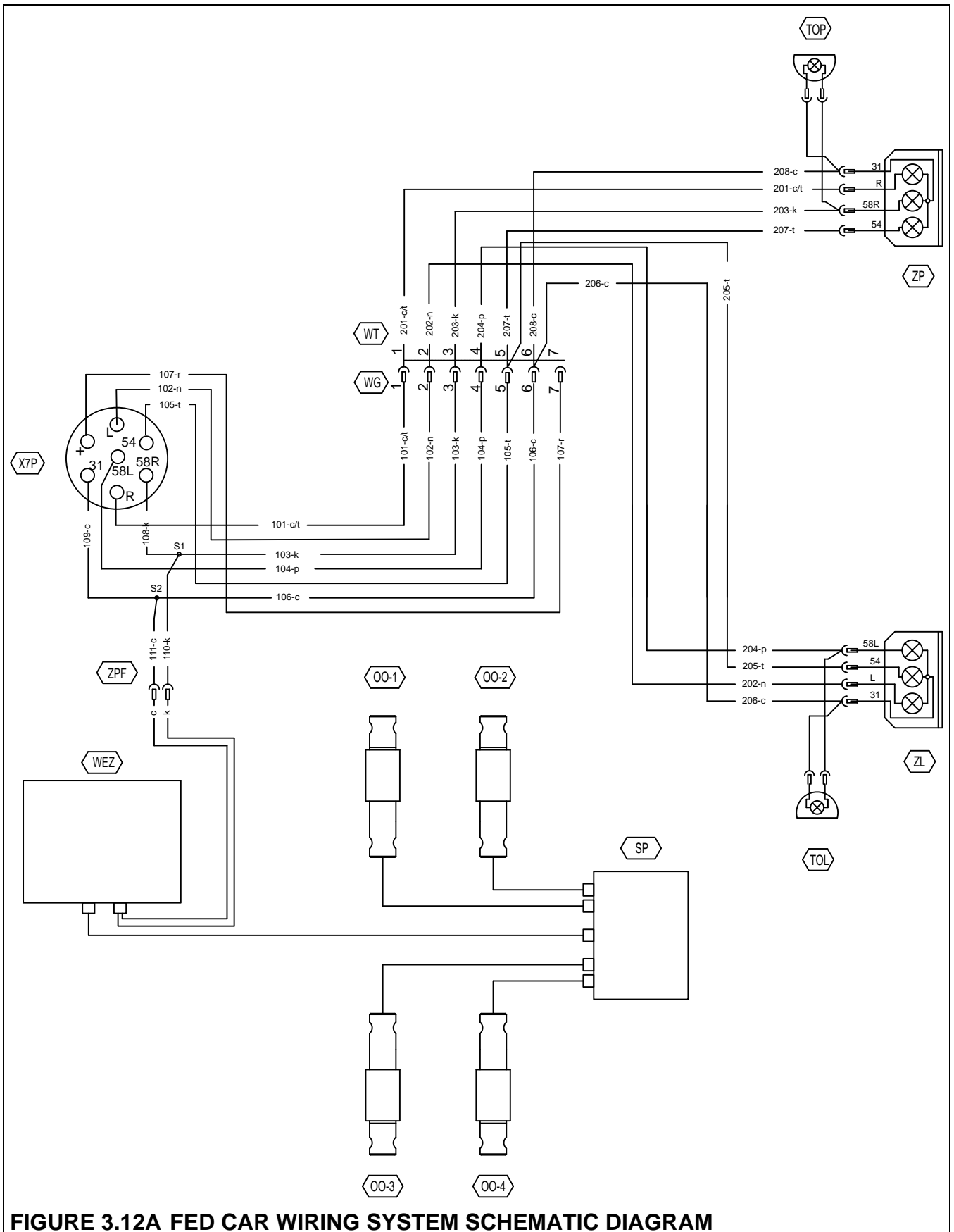


FIGURE 3.12A FED CAR WIRING SYSTEM SCHEMATIC DIAGRAM

(ZP), (ZL) rear complex lamp, (TOP), (TOL) contour lamp, (X7P) socket, (WEZ) display, (SP) junction box, (00-1)... (00-4) load cells

CHAPTER

4

OPERATION RULES

PREPARATION BEFORE INITIAL START-UP

PREPARATION FOR NORMAL WORKING MODE

ACCOUPLING WITH TRACTOR

FILLING UP THE TANK AND PRODUCING FEEDING STUFF

COMPOUND FEED ANALYSIS

FEEDING ANIMALS

CLEANING

DISCONNECTING FROM TRACTOR

TYRES – INSTRUCTIONS FOR USE

4.1 PREPARATION BEFORE INITIAL START-UP

The feed car has been delivered to end user as a full assembly and does not need taking additional assembling actions. Manufacturer assures that the car is in full order and that was verified according to control procedures and admitted to be used. However it does not exempt the user from liability of checking the machine state before purchase and initial start-up.

Before setting about connecting tractor, the feed car operator must perform technical review of the machine and adjust it to his own needs. In order to do so, one must:

- get the feel of the content of the following manual, operating manual of the telescopic-joint shaft and display operating manual and comply with all instructions contained therein,
- immobilize the feed car with use of parking brake,
- verify technical condition of all protective covers as well validate its installation,
- verify condition of varnish coating, possible corrosion or mechanical damages (indent, perforation, bend or breakage of details),
- verify technical condition of telescopic-joint shafts, technical conditions its covers and its subassemblies,
- by turning worm clockwise, verify whether the movement is smooth, with no jams and that it does not raise doubts regarding its future performance,
- verify technical condition and validate installation of cutting blades on the worm and milling blades installed inside the tank,
- verify tyre pressure and check whether all screws are screwed tight,
- adjust height and location of display,
- adjust height of draught bar of feed car and hook type coupling of tractor,
- verify lubricant level in the gear,
- check whether there are no any objects nor living being inside the tank.

After having all aforementioned checks done and the feed car is in full order and ready to work, one may proceed with accoupling the feed car to tractor (see item 4.3). After having

braking system pipes (hydraulic and pneumatic) as well as hydraulic pipes of shutters steering system connected, one ought to verify whether all systems work properly and check whether there are no leakages in servomotors. At the end, one ought to actuate power take-off shaft in tractor and confirm that the machine works properly. The tank must be empty at that time.



ATTENTION

Before each start-up it is necessary to check whether there are no objects, nor living beings inside the tank.

This action must be taken by two individuals, because operator of tractor must stay in the cabin. If there are no abnormal sounds coming out of the tank and gear operation as well as worm and telescopic-joint shaft operation is unquestionable, one may set to work. In case of any abnormalities in operation, turn off power take-off in tractor immediately and find damaged part. If there is no possibility to fix that imperfection or its fixing will result in loss of warranty, it is necessary to contact with the seller or directly with the manufacturer of the machine.



CAUTION

Non-observance of recommendations contained in this manual or improper start-up of the feed car may be the cause of machine failure.

Technical condition of the machine before setting to work must not raise any doubts.

4.2 PREPARATION FOR NORMAL WORKING MODE

When preparing the car for normal operation, one must check:

- condition of wheels and tyre pressure,
- whether wheel screws and draught bar screws are screwed tight,
- condition of other screw joints,
- lighting and signalling system performance,
- braking system performance,

- performance of hydraulic system of shutters,
- oil level in planetary gear lubrication system,
- technical condition of telescopic-joint shaft, covers and securing chains,
- lubricate elements according to instructions described in chapter „Lubrication points” in compliance with service schedule.



CAUTION

It is forbidden to use nonoperational feed car.

Pipes of braking pneumatic system are equipped with terminals, which protective plugs are made of dyed plastic. Colours of those terminals correspond with plug-in sockets in tractor (yellow, red or black). Pin of the pipe supplying hydraulic brakes ought to be connected to brakes hydraulic socket in tractor.

In case of connecting pipes controlling servomotors responsible for lifting / lowering shutters, one must exercise special care not to be mistaken and connect proper pairs of pipes.



CAUTION

Before setting any connections in the system, it is necessary to familiarize with the content of technical manual of tractor and comply with recommendations contained therein.

4.3 ACCOUPLING WITH TRACTOR

Before setting to accouple feed car with tractor, one must make sure whether it is immobilized by means of parking brake. The machine may be aggregated only with tractors equipped with lower or upper hook-type couplings that transfer vertical load of at least 12,7kN (1270kg).



ATTENTION

When accoupling both machine no one must stand between feed car and tractor.

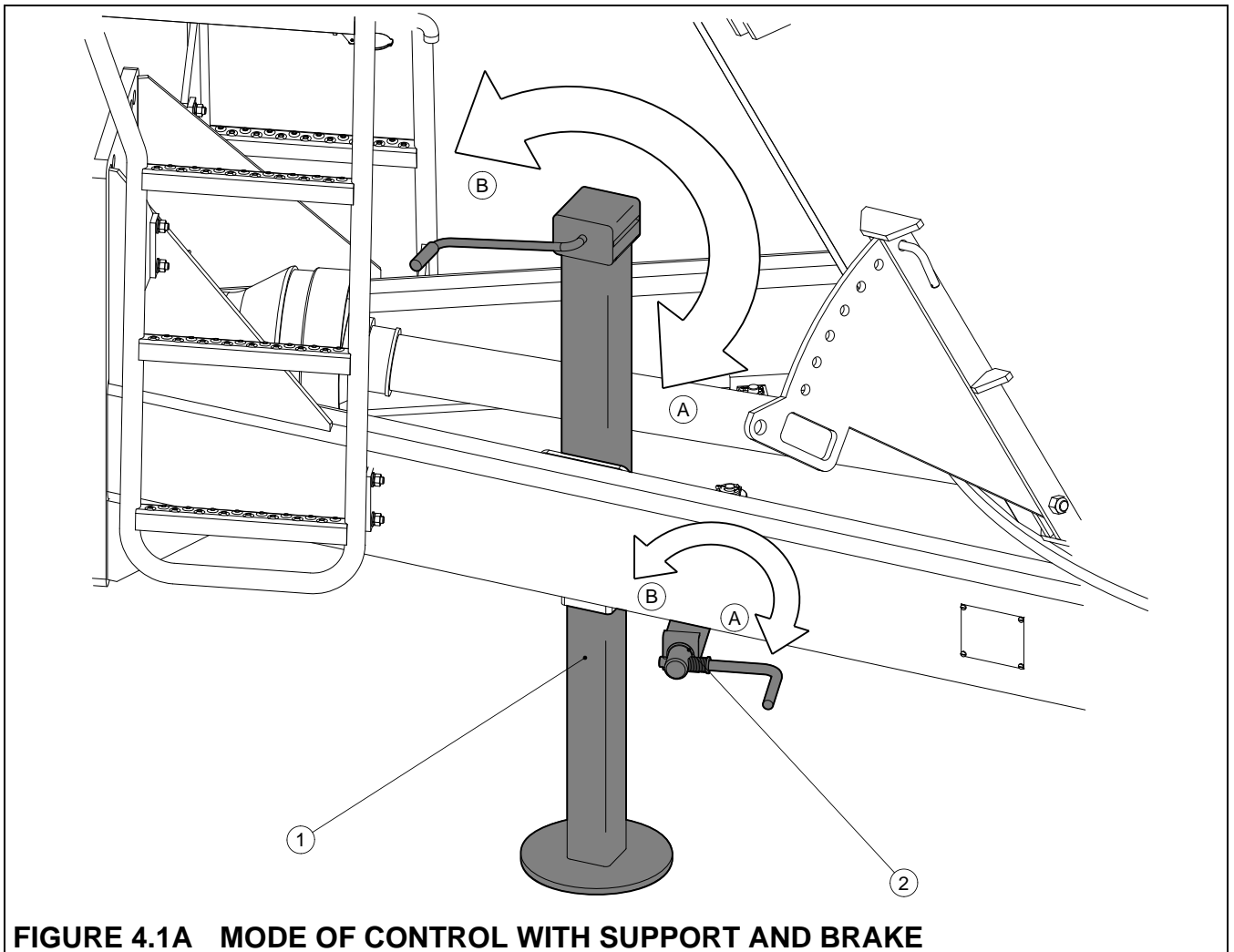


FIGURE 4.1A MODE OF CONTROL WITH SUPPORT AND BRAKE

(1) support, (2) parking brake mechanism

In order to accouple the feed car with tractor, one must take following actions:

- set the draught bar eye on proper height by turning with crank of the support (1) in (A) direction if the draught bar string needs to be lifted or in (B) direction if the draught bar string needs to be lowered - figure (4.1A)
- by drawing back tractor connect draught bar eye with proper hook-type coupling of tractor and verify its securing elements,
- lift the support up,
- connect wiring system cables, braking system pipes and shutter control system pipes,
- connect telescopic-joint shaft with tractor,

- release hand parking brake by turning the crank of parking brake mechanism (2) in direction (B)

CAUTION



It is forbidden to drive on public roads with nonoperational braking system, lighting system or signalling system.

When taking a turn, connecting pipes must be loose and must not let in moving elements of the feed car and tractor.

During operation and journey of the feed car, the support must stay lifted.

4.4 FILLING UP THE TANK AND PRODUCING FEEDING STUFF

When loading the tank it is recommended to use mechanical devices: loader, bale catcher, forks, etc. In case of manual loading, one ought to use platforms or other podiums. For safety and labour ergonomics, height of loading standpoints in case of manual loading, ought to be shorter from added top wall edge of at least 1.4 m.

CAUTION



When operating power take-off shaft, it is necessary to exercise special care and comply with instructions contained in tractor operation manual and feed car book of instructions.

When taking advantage of the feed car, one must mind the cutting blades to be always sharp. Using high rotational speeds of the worm is uneconomical. Taking those remarks into account will reduce time necessary for milling the foodstuff and allow save fuel and prolongs life-time of the machine.

Before setting about loading, one must accouple the feed car with tractor and place them on level and stable ground. Both machines must be braked with parking brake. Power on the engine and power take-off shaft with speed not more that 200 – 300 rpm, switch parking lights of tractor on and turn feed car weight on. Make sure that both shutters are closed. Handling with weight and display was described in separate book of instructions.

Making bulk animal feed depend on many factors, thus it is recommended to select ingredients with due diligence and with advice of food advisor, who will be able to determine several feeding formulas. It is necessary to remember that degree of fragmentation of

foodstuffs depends not only on worm speed but also on position of cutting blades and its wear as well as on time of mixing and milling.

ATTENTION



It is strictly forbidden to stand on the platform or in close vicinity of the tank during loading procedure. Staying on the platform is allowed only when a bulk of foodstuff is initially crushed and mixed.

Taking a place over the upper edge of added top wall when power take-off shaft is in operation is strictly forbidden.

When loading the draught bar may raise slightly due to temporary load. For that reason it is essential to connect and secure the string properly.

If there is a necessity to stand on the platform when the worm is in operation, one must mind the dust coming out of the tank and protect one's eyes.

During worm operation – during milling and mixing procedure, it is forbidden to dip into the tank using hands or other objects.

In the first place one should administer foodstuffs that require fine milling (hay, straw, fresh grass). It is necessary to use weight when loading bulks of foodstuffs. Hay and straw may rotate along with the worm, thus it is essential to adjust milling blades so that the mixing and cutting process was running through properly. Another component may be administered when the first bulk is properly mixed and milled.



CAUTION

Milling blades adjusting procedure may only be performed with the worm drive powered off.

Next, one ought to administer heavier components, such as silage and hay, potatoes, beet pulp, mangold, etc. Milling and mixing process ought to run until obtaining homogenous animal feed.

The last stage consists in adding the lightest components, of low graininess or liquid components (cereals, flour, foodstuffs, water, etc.).

CAUTION

When adding following components of animal feed, one must pay special attention not to allow foreign matter to fall into the tank.

It is forbidden to exceed maximum speed of power take-off shaft that is 540 rpm.



Before setting about loading the machine, one scrub all components packed in round or square bales from strings, foil, net or other packing material.

It is forbidden to exceed maximum allowable load capacity of the feed car. In case of installing additional added top walls that do not make the standard equipment, it is forbidden to prepare volume of animal feed exceeding 10m³.

Some components that are used for preparing feed bulk may grow larger with contact with water – for example pressed beet pulp. For that reason one must pay attention not to exceed maximum allowable tank capacity when preparing animal feed.

Milling and mixing process may be started at rotational speed of power take-off shaft not bigger than 200 – 300 rpm. This restriction mainly applies to mixing light and dry food components, such as hay or straw. It is allowed to speed up when foodstuffs are initially cut and mixed. One must remember that maximum power take-off shaft speed must not exceed 540 rpm. Foreign matter that fall into the tank will shorten life-time of cutting blades and milling blades and they may also be the reason of morbidity rate increase. Adding all food components as one bulk may obstruct or disenable preparing good animal feed and contribute to overloading of worm driving unit.

4.5 COMPOUND FEED ANALYSIS

Appropriate degree of mixing and milling of foodstuffs ought to be verified each time when adding following food compound. Operator of the feed car should take several samples of the feed and visually determine level of homogeneity. If following samples are similar one to another it means that the animal feed is being properly milled and mixed. Otherwise it is necessary to continue milling and mixing before adding following feed bulk. Preparation process may be controlled when standing on the podium but provided that special care has been exercised when climbing on / down the podium.

If the feeding formula has been worked out, it is recommended to take notes for the first couple of weeks of using the feed car. The notes should include the amount of particular food component, time needed for its milling and mixing and approximate degree of humidity.

Comparative analysis of prepared animal feed with notes taken during its preparation will allow produce good quality animal feed of proper consistency and degree of mixing.



WARNING

Preparation process may be controlled while standing on the podium but provided that special care has been exercised when climbing on / down the podium.

Taking samples for qualitative analysis of the bulk ought to be performed with worm drive powered off.

4.6 FEEDING ANIMALS

Feeding animals ought to begin right after animal feed preparation. The feed car is equipped with two shutters located on both sides of the tank, which enable administering feed both on the right and on the left side of the machine. In order to administer feed, one ought to take out the cotter pin that secure chute (3) – figure (4.2A), bend back the chute (2) located on intended feeding side and open the shutter (1) with use of hydraulic servomotor.

When administering animal feed, one ought to actuate propeller shaft. Circulation of animal feed inside the tank causes pouring it out on one of the chute plate and then the feed falls down on feeder. As soon as feeding on one side of the car is finished, one ought to close the shutter and put down the chute and then bend back the chute and open the shutter on the other side of the tank. As soon as feeding is finished, some animal feed may cover the worm. In order to prevent this it is necessary to speed up the power take-off shaft up to 540 rpm and empty the tank.

Feed administering speed mostly depends on rotational speed of the worm and shutter opening height. Size of chute window is marked with number (2), which while opening the shutter will change its location vs. information label (1) that is stuck to immovable part of the servomotor. The label is marked with figures from 0 to 5, whereat 0 says that shutter is closed and 5 shows maximum opening of chute window.

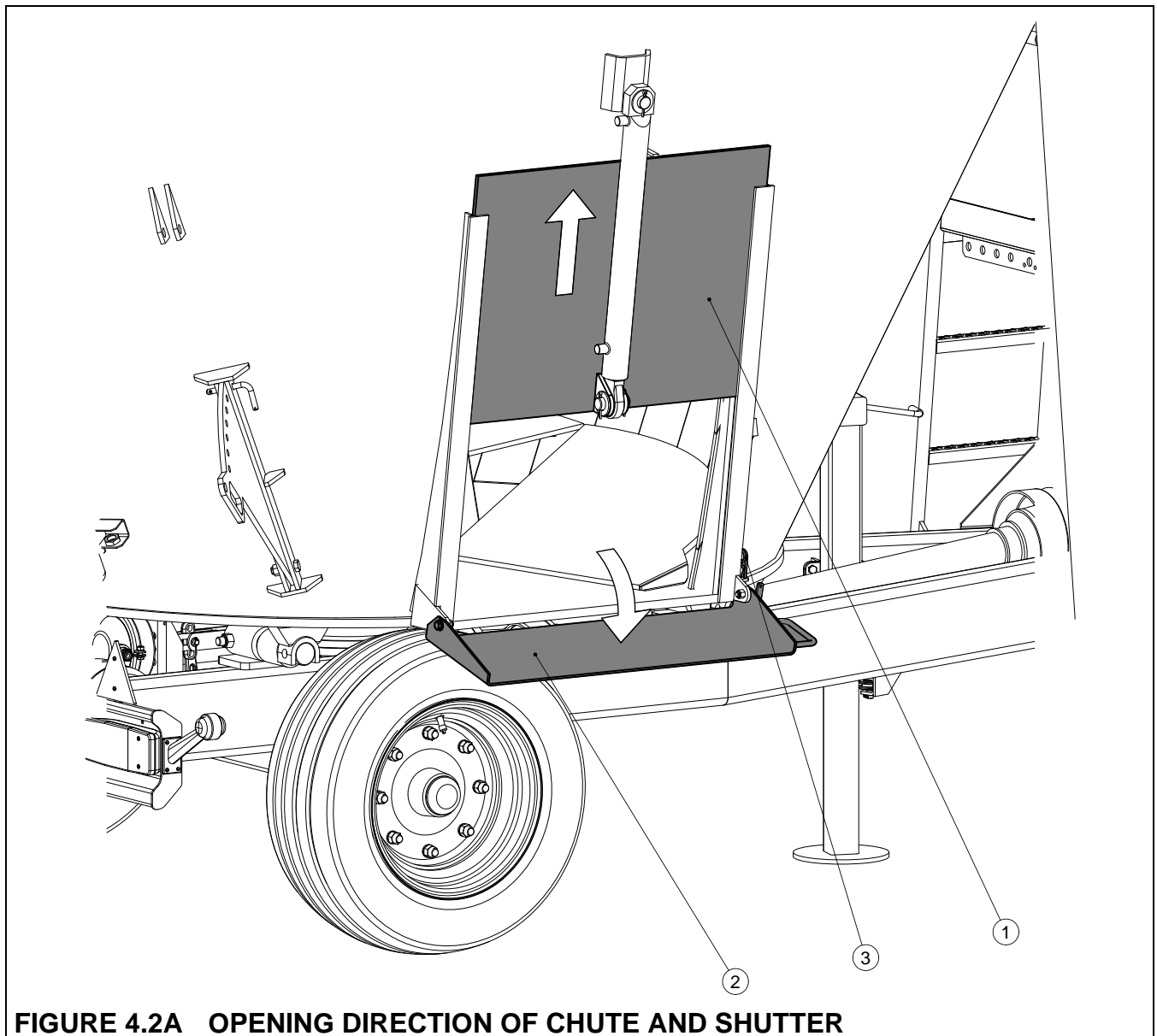


FIGURE 4.2A OPENING DIRECTION OF CHUTE AND SHUTTER

(1) left shutter, (2) left chute, (3) cotter pin

Parameters of the worm drive unit are selected so that at rotational speed of 540 rpm the power demand was the lowest possible and still animal feed is mixed properly. Those parameters allow empty the tank in the end phase of feeding. Despite of the aforementioned some amount of animal feed may remain inside the tank on the worm. Those leftovers must be removed by hands.

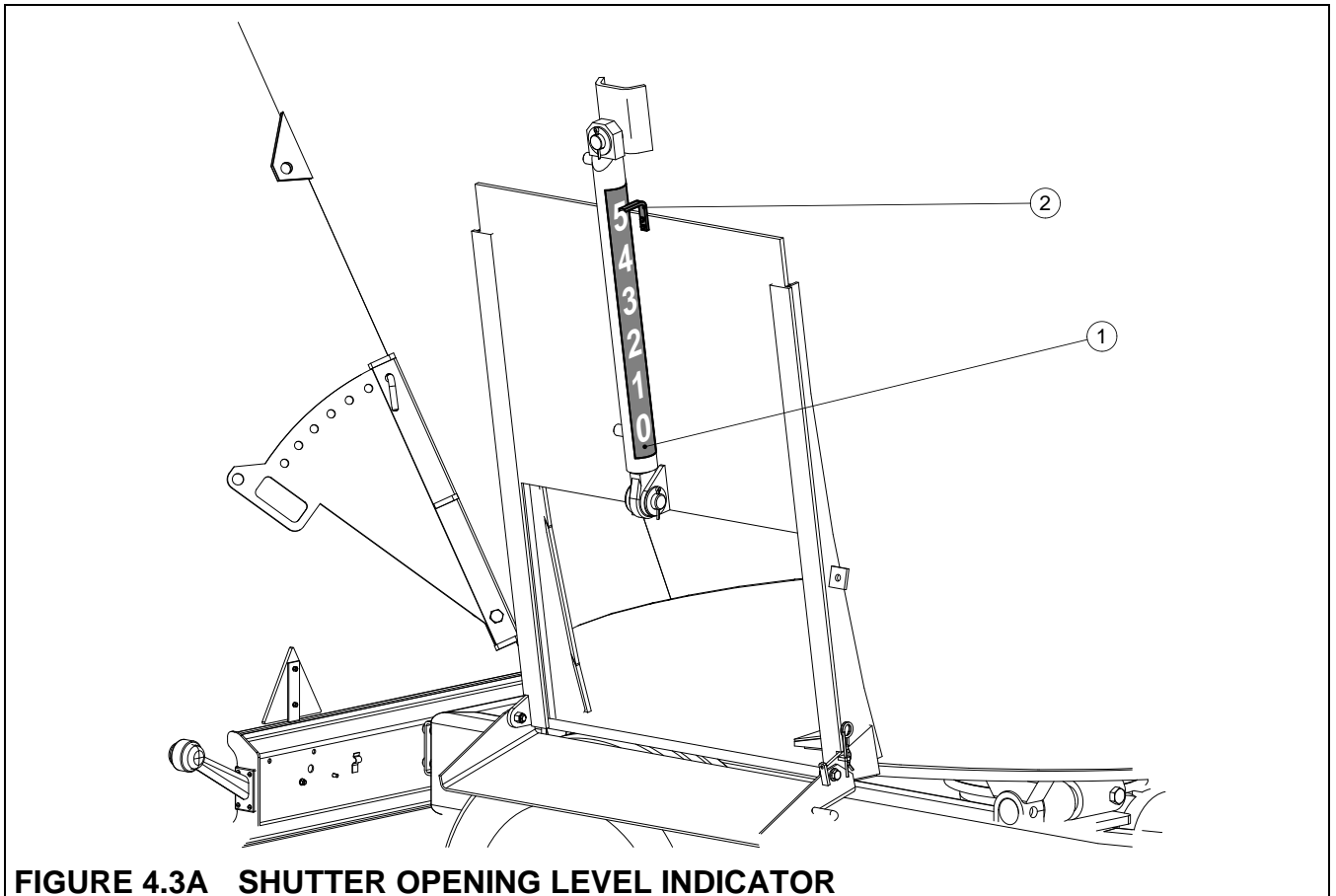


FIGURE 4.3A SHUTTER OPENING LEVEL INDICATOR

(1) information label, (2) shutter opening level

4.7 CLEANING

As soon as feeding is finished, it is necessary to clean the feed car from all feedstuff leftovers. It is recommended to use pressure washer. In order to do so, one ought to:

- bend chutes back and open shutters on both sides of the feed car,
- stop the engine of tractor and take ignition keys out,
- immobilize feed car and tractor by means of parking brake,
- secure tractor against strangers,
- clean the feed car with strong jet of water and leave it until it dries.

During winter season, drying the feed car ought to take place in a room where temperature is higher than 0 C. Frozen water may damage varnish coating or elements of the machine. Non-observance of recommendations regarding cleaning of the feed car creates real danger of micro-organisms growth that may cause diseases.



CAUTION

The machine must be cleaned in case it has not been used for the period of more than three days.

After each use, one must clean the machine from feed leftovers.

4.8 DISCONNECTING FROM TRACTOR

In order to disconnect the feed car from the tractor, you must take following actions:

- after having the tractor stopped, brake the feed car by pulling parking brake,
- with use the support position the machine on the ground on proper height,
- disconnect electrical cables, hydraulic and pneumatic piping from the tractor and secure its terminals against getting dirty,
- disconnect telescopic-joint shaft,
- disconnect the string of draught bar of the feed car from hook-type coupling of the tractor and drive away with the tractor.

4.9 TYRES – INSTRUCTIONS FOR USE

- Before setting about installation and disassembling tyres, you must secure the machine against spontaneous dislocation by putting wedges or other elements devoid of sharp edges under wheels. Wheel disassembling procedure may only be taken with the feed car unloaded.
- Repair works or replacement of tyres must be performed by well-trained technician and with use of proper tools.
- Check whether nuts are screwed tight after performing each wheel assembly procedure. Verification ought to take place every time after initial start-up, after first performance with load and then every 6 months. After each wheel disassembly procedure one must verify whether nuts are screwed tight.
- Control and keep correct tyre pressure on regular basis, according to instructions contained in the manual (especially after long idle hours)

- Tyre pressure should be also verified after heavy duty. It must be taken care of the fact that the temperature increase in tyres may result with pressure increase, even up to 1 bar. At each rise of temperature or pressure, you should decelerate and reduce burden.
- Never reduce pressure by deaeration, if it was caused by temperature rise.
- In order to avoid being fouled, valves ought to be secured with use of special nuts.
- Never exceed maximum speed of feed car.
- Each day of operation must be followed by at least one hour standstill at noon.
- Remember to stop the car for 30 minutes to let tyres to be cooled down after having driven 75 km or 150 minutes of operation, whichever come first.
- You must avoid holes, sudden and violent manoeuvres and great speed when turning.

CHAPTER

5

SERVICING INSTRUCTIONS

INSPECTING AND ADJUSTING WHEEL BEARINGS

ADJUSTING MAIN BRAKE

ADJUSTING PARKING BRAKE

PNEUMATIC SYSTEM OPERATION

HYDRAULIC SYSTEM OPERATION

LUBRICATION

REDUCTION GEAR HANDLING RULES

ADJUSTING DRAUGHT BAR TO TRACTOR'S HOOK-TYPE COUPLING

ADJUSTING MILLING BLADES

ENTERING THE TANK

CUTTING BLADES DISASSEMBLY

ADJUSTING CUTTING BLADES POSITION

SHARPENING CUTTING BLADES

STORAGE

SCREWING FORCE OF SCREW JOINTS

5.1 INSPECTING AND ADJUSTING WHEEL BEARINGS

In newly purchased feed car, after one month of operation and in case of further performance – after 6 months of operation, one ought to verify and, if need be, adjust wheels bearing slackness. Worn or damaged bearings need to be replaced. When replacing bearings it is necessary to replace sealing rings that are located in hub of carriageable axle.

Accouple the feed car with tractor, put wedges under wheels and lift one wheel at a time by means of purpose-made jack. The feed car must not be loaded. When checking bearings you must not have telescopic-joint shaft connected. Jack ought to be placed under carriageable axle between bow screws that fasten axle to frame. It is necessary to be sure that the feed car will not roll by when checking bearings. By turning the wheel in both directions verify whether movement is smooth and there is no excessive opposal. Set the wheel into very fast motion and check whether there are no abnormal sounds coming out of bearing. Hold this wheel with both hands and try to feel slackness, this may also be verified by putting lever under wheel and resting it in on the ground. In case you can actually feel slackness, perform adjusting procedure. Abnormal sounds coming out from the bearing may be the symptom of its excessive wear, contamination or damage. In such case, one ought to replace bearing along with sealing wheels.

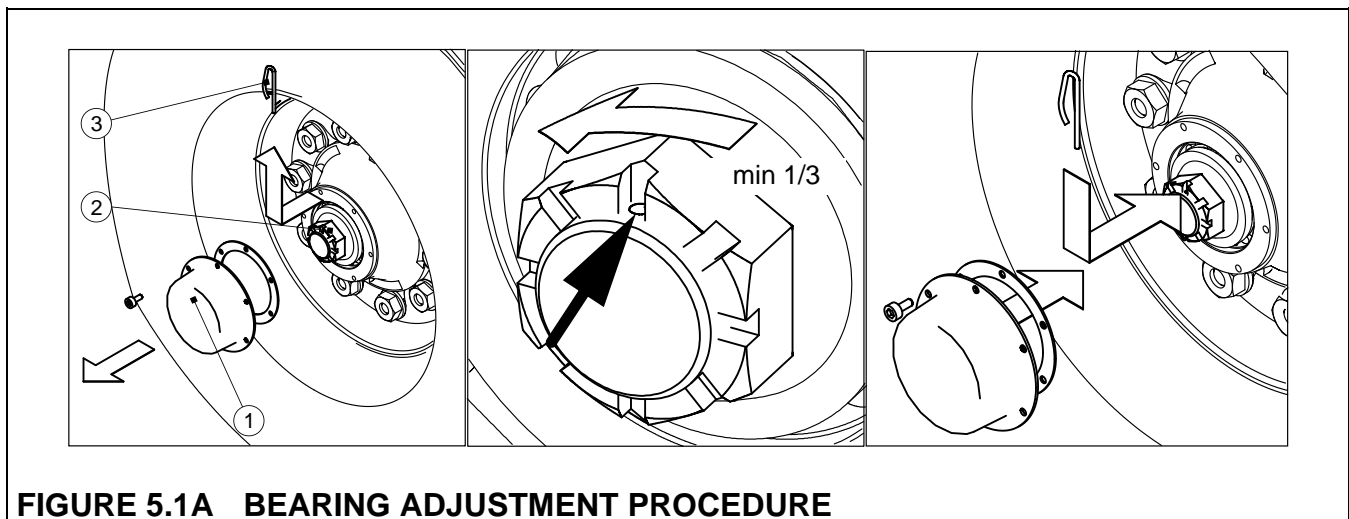


FIGURE 5.1A BEARING ADJUSTMENT PROCEDURE

(1) hub cover, (2) castellated nut, (3) cotter pin

Bearings adjustment procedure ought to be performed according to following guidelines:

- dismantle hub cover (1),
- take cotter pin out (3) which secures castellated nut (2),

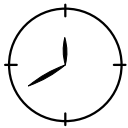
- when turning the wheel screw castellated nut tight until wheel stops,
- unscrew nut (of at least 1/3 turn) till the closest nut groove align with hole in carriageable axle pin,
- secure castellated nut with use of cotter pin and install hub cover.

Wheel ought to move smoothly, without jams and perceptible opposal that do not result from rubbing shoes on brake drum.

TABLE 5.1 REQUIREMENTS REGARDING THE JACK

LIFTING CAPACITY	2 000 kg
HEIGHT OF COMPACTED JACK	280 mm

Replacement of bearings, lubrication as well as works connected with braking system and carriageable axes must be performed my qualified technicians.



Checking bearing slackness and technical condition of bearings of carriageable axle must be done after first month of operation and then every 6 months of further performance.

5.2 MAIN BRAKE ADJUSTMENT

Brakes need to be adjusted if:

- in consequence of abrasive wear of brake lining, the excessive slackness occurs between lining and brake drum. In such case braking efficiency is reduced,
- brakes of both wheels operate unequally and unevenly.

When having properly adjusted brakes, braking of both wheels must happen at the same time. Adjusting brakes consists in changing position of expander's arm (1) with relation to expander's roll (2). In order to do so, one ought to take off the snap ring and washer (3), dismantle expander's lever and position it in the right direction, i.e.:

- backward – if brake is retarded (A)
- forward – if braking happens to early (B)

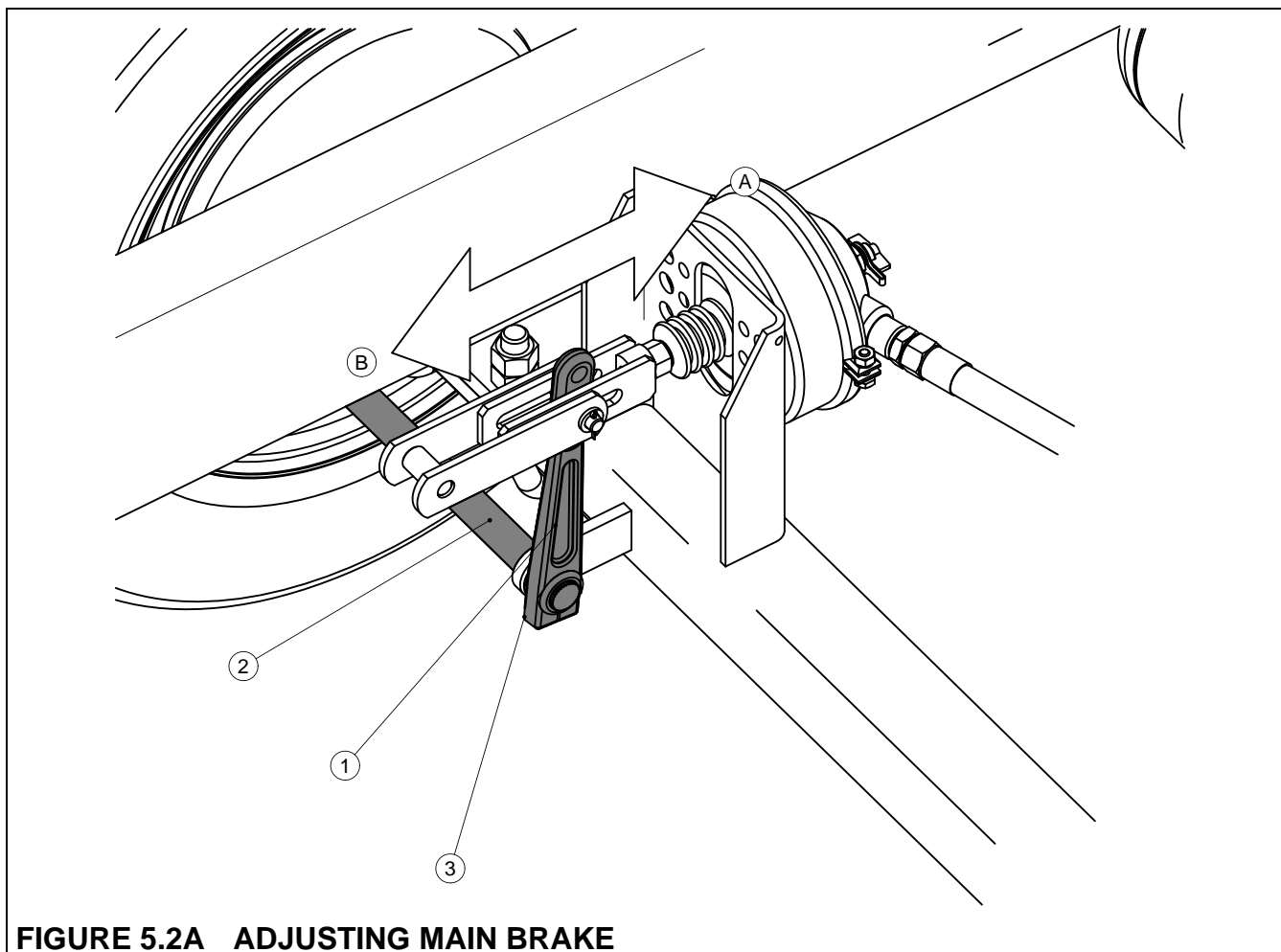



FIGURE 5.2A ADJUSTING MAIN BRAKE

(1) Expander's roll, (2) expander's arm, (3) snap ring + washer

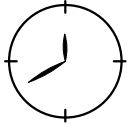
TABLE 5.2 MAIN BRAKE BRAKE FORCE

MAIN BRAKE BRAKE FORCE	UNIT
23.5	kN

Adjustment ought to be performed separately for each wheel. After having braked properly adjusted, at full pullback, the expander's arms ought to form 90 C angle with pneumatic servomotor piston rod. At properly adjusted brakes, the main brake brake force ought to reach values not lesser than denoted in table 5.2.

	<p>CAUTION</p> <p>Brake force of a whole feed car is a sum of brake forces of all wheels together.</p>
---	---

The difference in brake force of left and right wheel must not be bigger than 30%, considering that 100% makes up the bigger force.



Main brake check procedure and, if need be, adjustment procedure, must be performed once a year.

5.3 PARKING BRAKE ADJUSTMENT

Adjustment of parking brake must be performed in following cases:

- extensure of parking brake cable,
- letdown of parking brake cable clamps,
- after adjusting main brake,
- after taking any repair action in main brake system,
- after taking any repair action in parking brake system.

Before setting about adjusting parking brake, it is necessary to make sure that main brake works properly. The length of brake cable should be set so that with operating brake and parking brake totally released, the cable was loose and hang down approx. 1 – 2 cm. With properly adjusted brakes, the brake force of the parking brake should not be lower than specified below in the table 5.3.

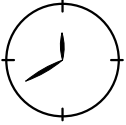
TABLE 5.3 PARKING BRAKE BRAKE FORCE

PARKING BRAKE BRAKE FORCE	UNIT
14	kN



CAUTION

Brake force of the feed car is a sum of brake force of all wheels.



Parking brake check procedure and, if need be, adjustment procedure, must be performed once a year.

5.4 PNEUMATIC SYSTEM OPERATION

One of main servicing activities is verification of pneumatic system tightness and all joints in particular. Tightness of the system ought to be checked at nominal pressure of approximately 600 kPa (6,0 kg/cm²).

If pipes, washers and other elements of the system are damaged, then compressed air will go through those leaks producing characteristic fizz or else at small leaks in a form of air bubbles. Small leakages can be detected by covering elements in question with washing up liquid or other foamy agent that will not react with elements of the system. In that case one ought to replace damaged pipes and washers. If the reason of lack of tightness is air outflow of servomotor, control valve body or brake force controller, you must not try to fix them, they need to be replaced.

It is necessary to remove condensate water from the tank on regular basis. In order to do so, one must put out the drain valve stem (2) placed on the bottom of the tank. Compressed air in the tank will make the water escape. After releasing stem, the valve ought to close the flow automatically. Once a year, before winter season, it is necessary to dismantle drain valve and remove all dirt. Copper washer ought to be replaced then.

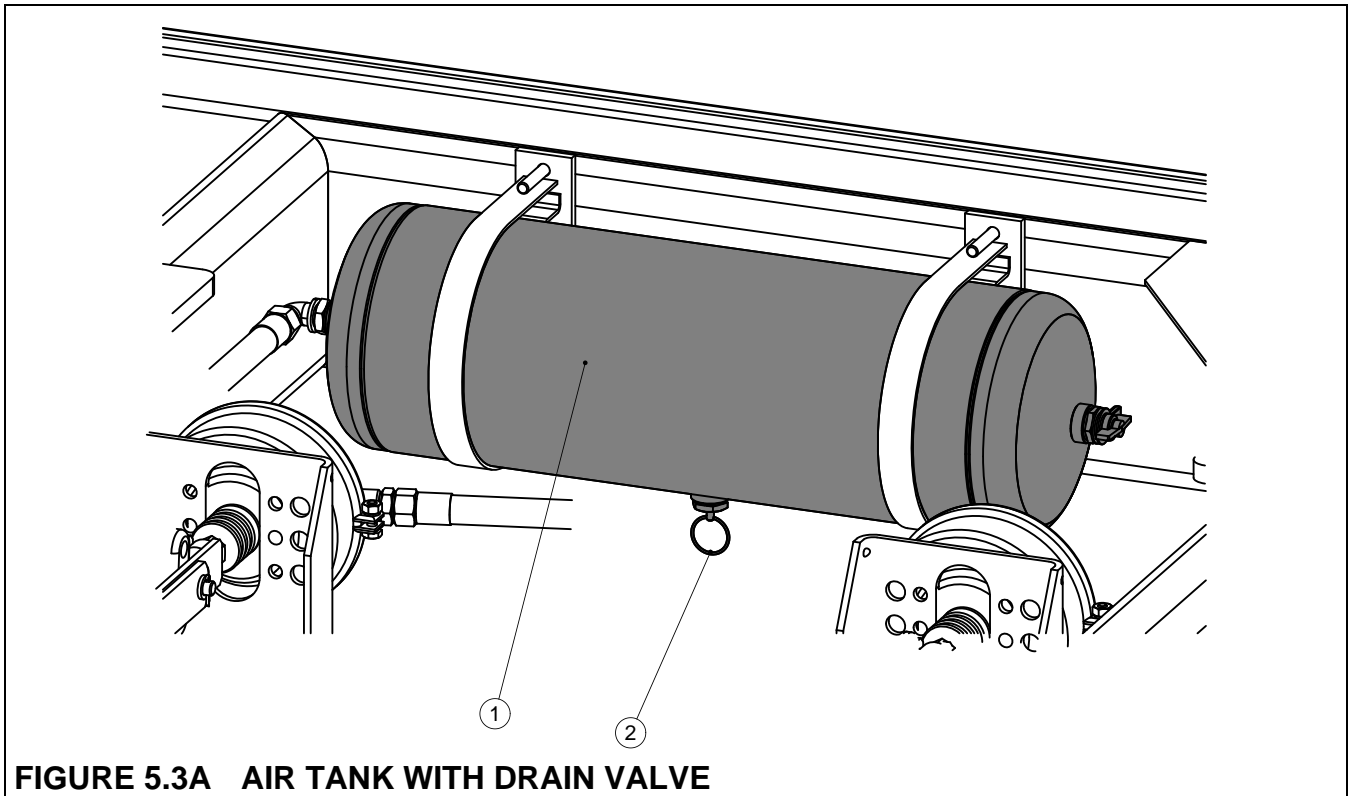
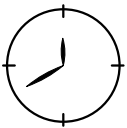


FIGURE 5.3A AIR TANK WITH DRAIN VALVE

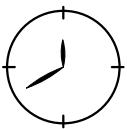
(1) air tank, (2) drain valve



Before winter season it is necessary to dismantle drain valve and clean it thoroughly. Verification of tightness as well as detailed inspection of pneumatic brake system must be performed at least once a year and after all repair works regarding this system.

5.5 HYDRAULIC SYSTEM OPERATION

It is essential to follow the rule that oil in hydraulic system of the feed car and oil in hydraulic system of tractor were of same type. It is unacceptable to use different types of oils. In newly purchased feed car, the system was filled up with HL32 hydraulic oil.



Hydraulic pipes must be replaced after 4 years of operation. Precise verification of tightness and technical condition of hydraulic system of shutters as well as brakes hydraulic system ought to be performed at least once a year.

Hydraulic system of the feed car must be fully tight. Verification of tightness consists in connecting the machine with tractor and repeated actuation of hydraulic brakes by pressing brake pedal in operator's cabin and actuating hydraulic cylinders of shutters. Hydraulic

cylinders must be kept in a position of maximum extraction for the period of 30 seconds. In case of finding oil leakage on hydraulic pipe joints, one ought to screw the joint tight. If this operation is not solving the problem, you must replace the pipe or elements of pipe joint. Each damage of mechanical type cause that subassembly must be replaced. In case of finding damaged servomotors, one must replace them.

TABLE 5.4 HL32 HYDRAULIC OIL SPECIFICATION

ITEM	NAME	VALUE
1	Viscosity rating according to ISO 3448VG	32
2	Kinematic viscosity in 40 ⁰ C	28.8 – 35.2 mm ² /s
3	Quality rating according to ISO 6743/99	HL
4	Quality rating according to DIN 51502	HL

CAUTION



Using the feed car with leaky hydraulic system is strictly forbidden.
 Condition of hydraulic system must be checked up to date during operating the feed car.
 Hydraulic system in operation is under high pressure.
 Control technical conditions of hydraulic pipes and pipe joints on regular basis.
 Use hydraulic oil recommended by the manufacturer. Never mix two kinds of oil.

In case replacing hydraulic oil with new one but of other kind, it is necessary to familiarize with recommendation of oil manufacturer. If manufacturer recommends rinsing the system with use of special liquid, you must follow those instructions. It is important to remember to use agents that will not have any negative effect on elements of hydraulic system.

5.6 LUBRICATION

The feed car ought to be lubricated in placed marked on figure (5.4A) and specified in the table (5.5).

TABLE 5.5 LUBRICATION POINTS

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF LUBRICANT	FREQUENCY OF LUBRICATION
1	Wheel bearings	2	solid	24 months
2	Gear spline shaft	1	solid	30 working hours
3	Power take-off shaft connector spline shaft	2	solid	30 working hours
4	Hand brake mechanism	1	solid	6 months
5	Chute window guides	4	biodegradable oil	3 months
6	Eyes of servomotors for opening shutters	4	solid	6 months
7	Rotary spring	1	solid	3 months
8	Pins of fork	2	solid	6 months
9	Pins of brake servomotor	2	solid	6 months
10	Pins of guide wheels	4	solid	6 months

CAUTION: Description of the „ITEM” column of the table (5.5) corresponds with numbering on the figure (5.4A)

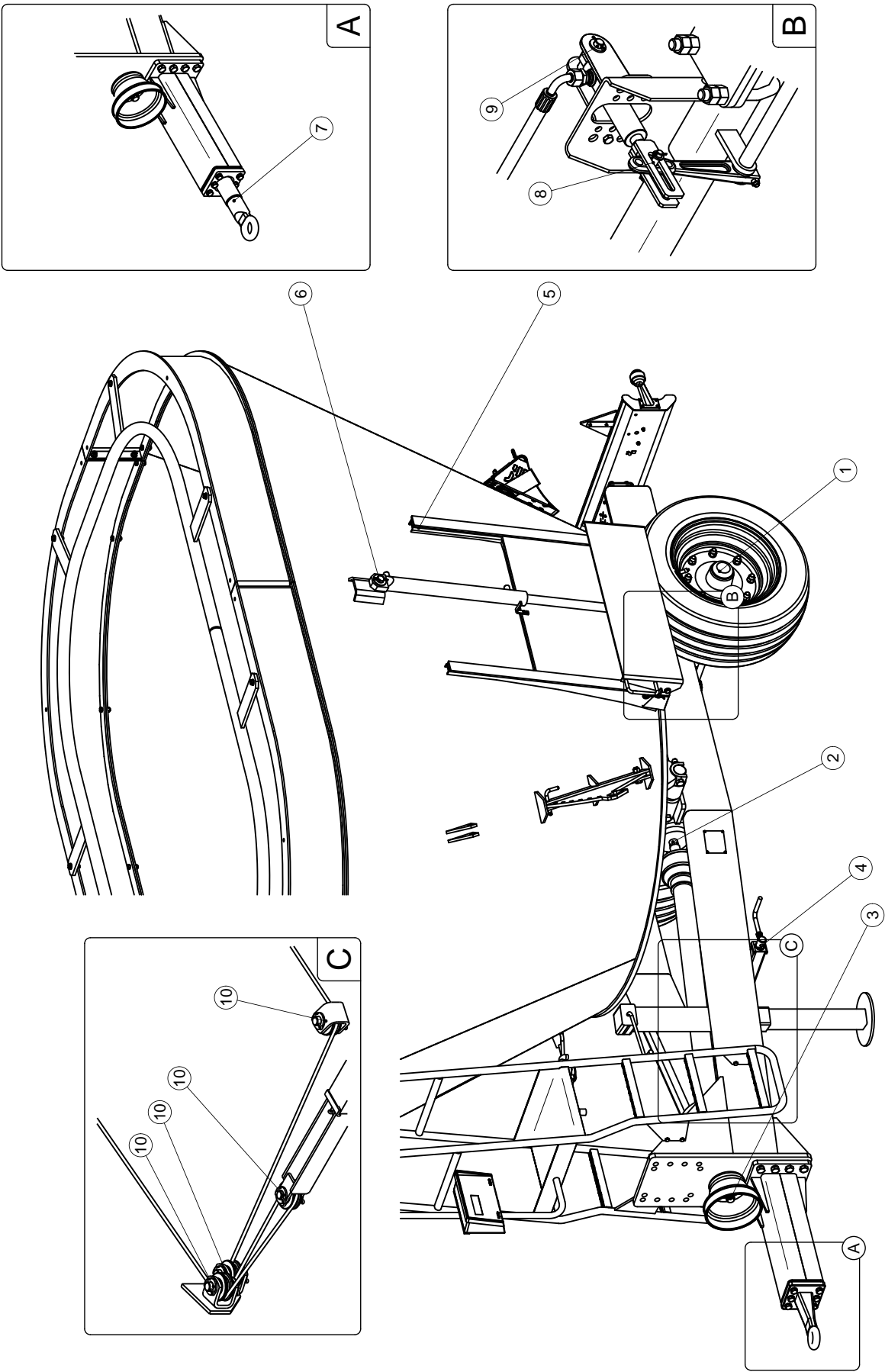
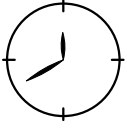


FIGURE 5.4A LUBRICATION POINTS OF THE FEED CAR

After having the feed car lubricated according to recommendations, remove excessive amount of lubricant. Replacing grease in hub bearings of wheels ought to be done in authorised service.



When taking advantage of the feed car, the user is obliged to follow instructions contained in lubrication manual according to specified schedule. Excess of lubricant or grease will make the dirt particles rest on places that require to be lubricated, thus it is necessary to keep each element of the machine clean.

5.7 REDUCTION GEAR HANDLING RULES

Handling with reduction gear consists in general verification, replacement or adding by pouring gear oil loss. In case the reduction gear has been damaged, one ought to contact with authorised service in order to refit the element in question.

After first 100 hours of driving, one must change oil in the system. Following procedures of changing oil ought to be performed after each 2 000 hours of performance or else once a year.



CAUTION

If the volume of poured gear oil to operational level (after having 100 hours worked) is bigger than 1.5 litres, this is a symptom that oil leaks out of the gear. Contact with authorised service in order to refit the element.

In order to replace oil in reduction gear, take following actions:

- unscrew plug of vent pipe (6) and plug of oil tank (1),
- unscrew drain plug (7),
- drain oil into an oil-proof container, the oil container should hold approximately 20 litres of oil,
- if oil manufacturer recommends to rins the system with special agent, you must take this action in compliance with manufacturer's requirements,
- screw drain plug tight (7),
- unscrew plug (5),

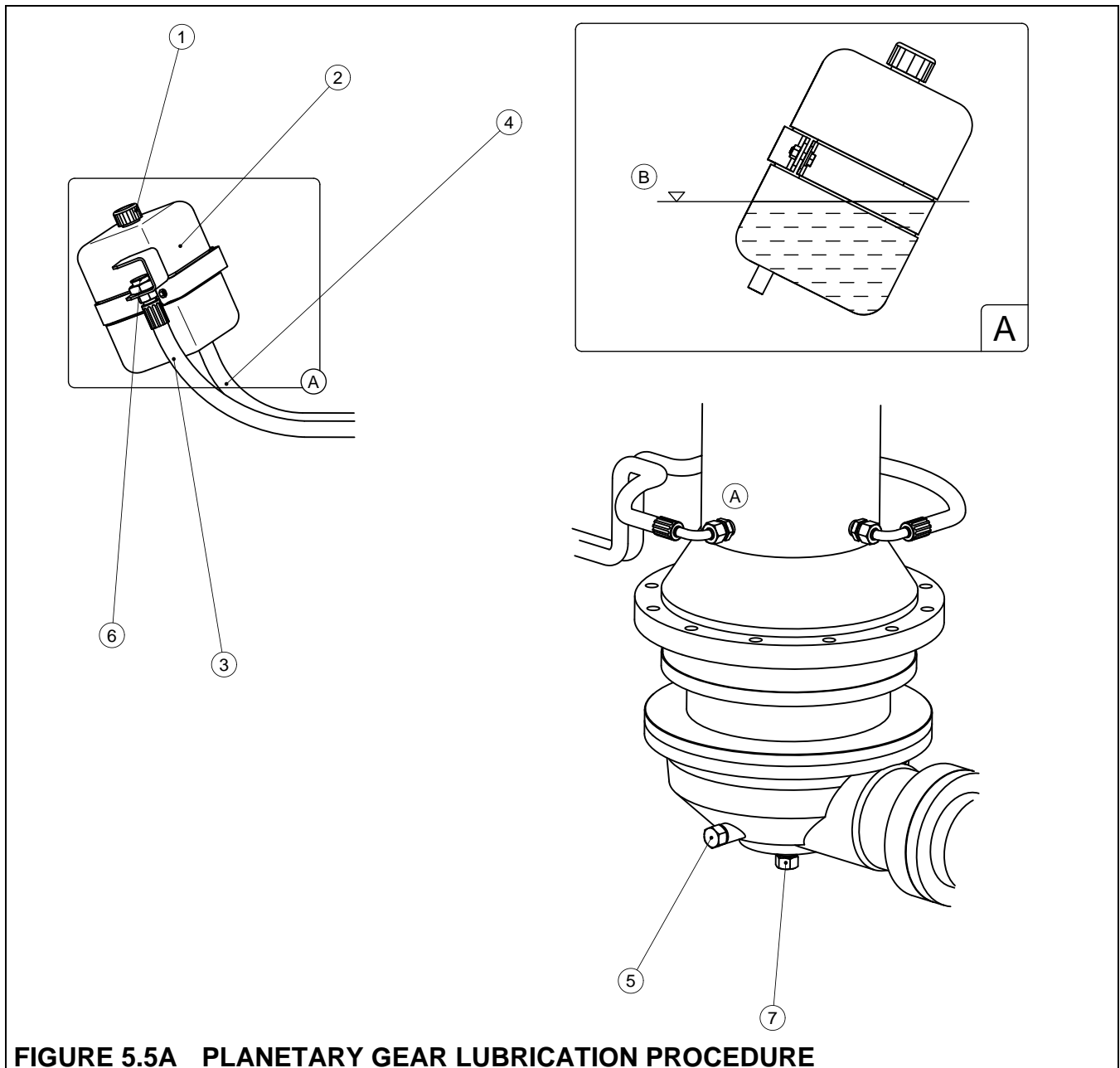


FIGURE 5.5A PLANETARY GEAR LUBRICATION PROCEDURE

(1) oil inlet nut, (2) oil tank, (3) vent pipe, (4) supply pipe, (5) plug, (6) vent plug, (7) drain plug, (A) overflow pipe

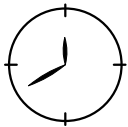
- take off vent pipe (3) and position it below tank bottom so that oil present in this pipe could freely flow out of the pipe,
- pour oil into oil tank (2) until it starts to flow out of the tank through little hole in the plug (5),
- screw plug tight (5),

- pour oil to the gear oil up to the level of overflow coupler (A); if oil occurs in vent pipe, mount the pipe in bracket,
- pour oil to level (B) shown on the figure (5.5A),
- screw oil tank plug (1) tight and screw vent plug (6) tight as well.

Oil volume in the gear is 16 litres. When changing oil, it is necessary to replace sealing gasket under plugs.

TABLE 5.6 GEAR LUBRICANT SPECIFICATION

VISCOSITY RATING ACCORDING TO AGMA		KINEMATIC VISCOSITY IN TEMP. 40°C, [mm ² /s]	VISCOSITY RATING ISO 3448
R&O	EP		
5	5 EP	198 – 242	VG 220



Before each start-up of the machine, one must check oil level in the system. If oil volume is deficient, fill it up. Verify permeability of vent hole on the nut (1) of oil tank.



CAUTION

Temperature of gear casing may go over 80 C. If gear body becomes to warm, it is necessary to contact with technical service.

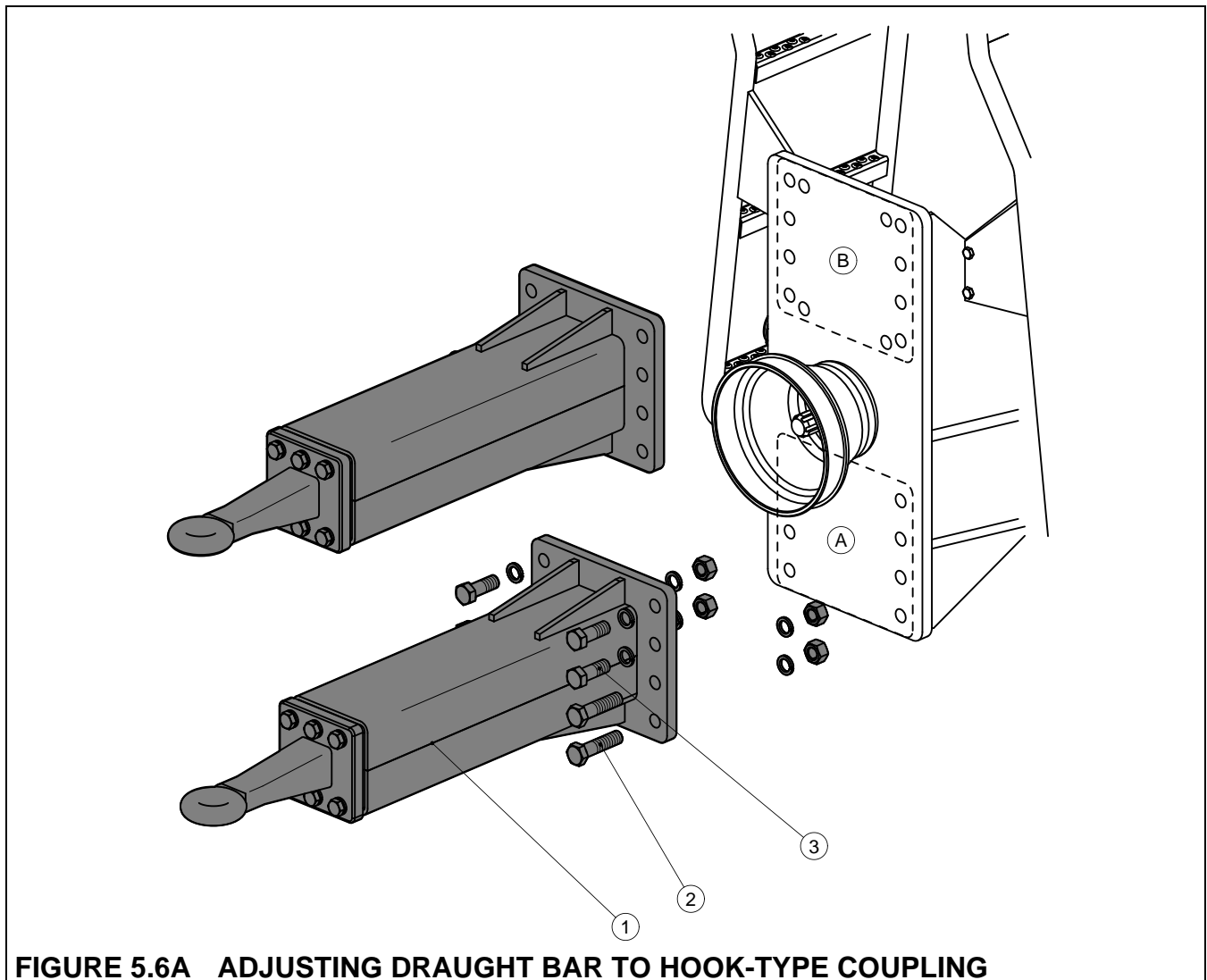
5.8 ADJUSTING DRAUGHT BAR TO TRACTOR’S HOOK-TYPE COUPLING

Before setting about accoupling feed car with tractor, it is essential to adjust draught bar to hook-type coupling of tractor, so that the machine was levelled. There are two options of setting draught bar, they were shown on figure (5.6A). Adjusting position of draught bar ought to be done my two individuals. In order to do so, one ought to:

- position the feed car on flat ground, put wedges under whlles and immobilize the feed car by pulling parking brake,

- unscrew nuts of bolts (2) that fasten draught bar and take them out,
- unscrew bolts (3) from threaded plate,
- change position of draught bar,
- screw elements tight by applying appropriate force.

Changing position of draught bar from bottom (A) into upper (B) needs replacing screw joint (3) with elements listed in table (5.7).



(1) draught bar, (2), (3) screw joint of draught bar with frame

Full assembly of draught bar with string weights 35 kg.

CAUTION



Draught bar of the feed car must be screwed with use of eight bolts.

After having draught bar position changed, after whole day of performance, verify whether screw joints are screwed tight.

When changing position of draught bar, you must exercise special care.

Changing position of draught bar must be done by two individuals.

TABLE 5.7 DRAUGHT BAR SCREW JOINTS

POSITION	BASED ON FIGURE 5.6A	JOINT TYPE	PCS
Upper	Position (2) and (3)	Bolt M20x80-10.9-B-Fe/Zn5 PN-85/M-82101	8
		Nut M20-10-B Fe/Zn5 PN-86/M-82144	8
		Spring-type washer Z20.5 PN - 77/M-82008	8
Bottom	Position (2)	Bolt M20x80-10.9-B-Fe/Zn5 PN-85/M-82101	4
		Nut M20-10-B Fe/Zn5 PN-86/M-82144	4
		Spring-type washer Z20.5 PN - 77/M-82008	4
	Position (3)	Bolt M20x55-10.9-B-Fe/Zn5 PN-85/M-82101	4
		Nut M20-10-B Fe/Zn5 PN-86/M-82144	4
		Spring-type washer Z20.5 PN - 77/M-82008	4

5.9 ADJUSTING MILLING BLADES

Milling light and dry materials require using milling blades (1) – figure (5.7A). Otherwise foodstuff bulk will rotate with the same speed as the worm. Blades were installed on either sides of the tank by means of screw joint (3) and cotter pin (2).

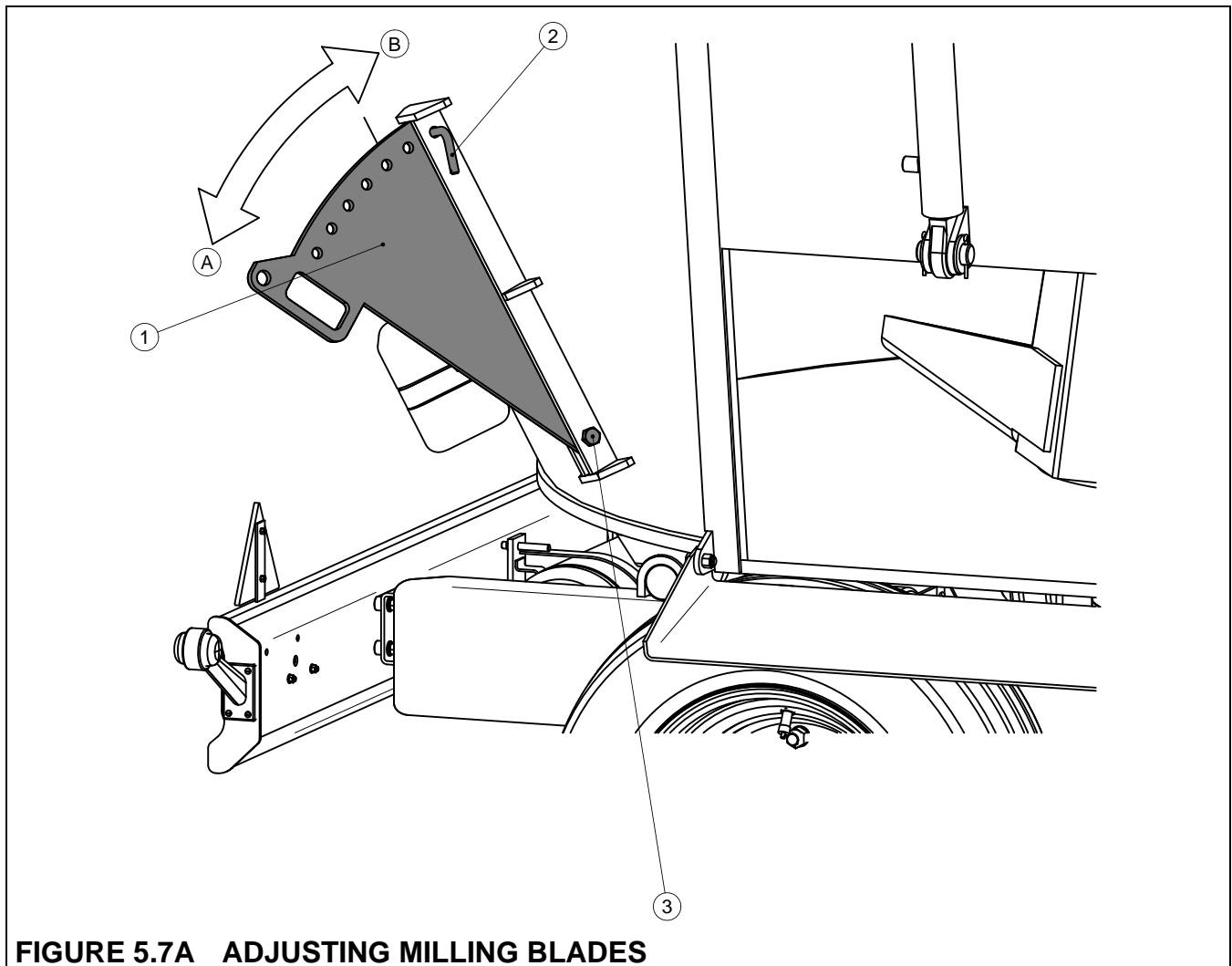


FIGURE 5.7A ADJUSTING MILLING BLADES

(1) milling blade, (2) cotter pin, (3) clamping screw

In order to bend the blade inside the tank (in (B) direction), one ought to take off cotter pin (2) and move the blade into desired working position. After putting cotter pin on, repeat the activity with regard to the blade on either side of the tank. Proper setting of blades needs experience in the field of mixing animal feed and also depends on type of mixed foodstuff bulk – its volume, humidity, etc. Milling blades do not require sharpening. Adjusting blade position may be performed when the worm drive is powered off.



CAUTION

Blades adjusting procedure can only be performed when having worm immobilized.

5.10 ENTERING THE TANK

When taking advantage of the feed car, many times there is a necessity of entering the tank in order to adjust its elements, clean its interior or clean the worm. This action ought to be taken with exercising special care due to high risk of accident. In order to enter the tank, one ought to:

- immobilize the feed car and tractor with use of parking brake,
- open shutters on both sides of the feed car,
- power off tractor's engine and take ignition keys out of ignition,
- secure tractor against strangers,
- disconnect pipes of hydraulic system of shutters, disconnect telescopic-joint shaft that links tractor with feed car,
- prepare two certified ladders of appropriate height,
- rest one ladder on added top wall edge and put the other one inside the tank; make sure that ladders rest stably and will not move when climbing up/down,
- enter the tank exercising special care and mind protruding and sharp elements (cutting blades).



ATTENTION

Before entering the tank, you must secure tractor against strangers and disconnect telescopic-joint shaft, open shutters and disconnect pipes of hydraulic system of tractor.

When entering the tank you must not use the platform of the feed car nor chute windows that are not adapted to such kind of use. When entering the tank you must remember not to stand on blades. It is possible to get to several cutting blades installed in the bottom of the worm, through chute window either on left or right side of the feed car.

ATTENTION



When entering the tank you must exercise special care.

Entering the tank is allowed with use of two ladders, it is forbidden to use platform or else chute window.

Entering the tank is allowed with the machine fully immobilized.

5.11 CUTTING BLADES DISASSEMBLY

Depending on mode of operation of the feed car, cutting blades need to be sharpened, adjusted or else replaced, after particular period of time. Life-time of cutting blades may be significantly shortened in following cases:

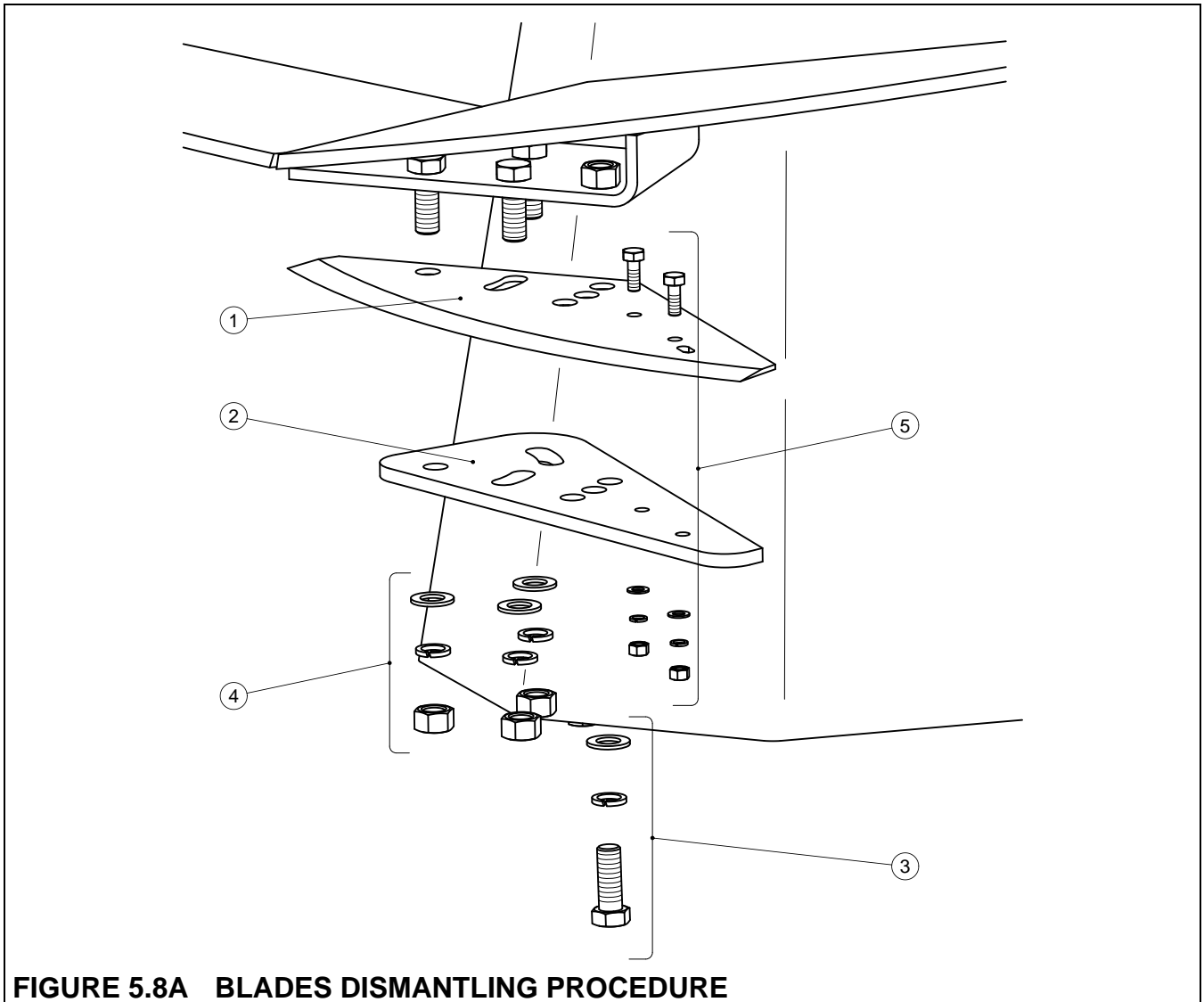
- using high rotational speeds of the worm,
- setting blades in (C) position, shown on figure (5.9A),
- presence of foreign bodies in feed bulk (sand, stones, etc.)

Stones that got into the tank by mistake may damage blades, which later on are qualified to be replaced (bends, cracks, jags). Presence of sand if foodstuff is a reason of faster wear of blades, which can be further used provided that they will be conditioned. In nominal working conditions of the worm and without foreign material in the feed bulk, life-time of blades is about 500 hours.

If there is a necessity of dismantling or installing blades, one must enter the tank. Disassembling blades consists in following:

- unscrew 3 nuts M20 and take washers off – joint (4),
- unscrew 1 bolt M20x55 and take washers off – joint (3),
- dismantle blade (1) along with bottom plate (2),
- joining elements must be screwed tight in same places, this will secure them against getting lost,
- unscrew blade from bottom plate - 2 boltsM10x35 and nuts M10 – joint (5).

Assembling procedure ought to be performed in reverse order. Nuts and bolts must be screwed by applying appropriate force. It is possible to get to blades installed in bottom of the worm through chute window. Dismantling procedure was shown on figure (5.8A).



(1) cutting blade, (2) clamping plate, (3) bolt M20 + washers, (4) nut M20 + washers, (5) bolt M10, nut M10 + washers



ATTENTION

Cutting blades are extremely sharp, thus you must exercise special care when installing or dismantling cutting blades.

5.12 ADJUSTING CUTTING BLADES POSITION

Degree of fragmentation of foodstuff depends not only on rotational speed of the worm but also on setting cutting blades in appropriate position. Figure (5.9A) presents 3 possible working positions of cutting blades, whereat (B) position is a standard one. In position (A)

degree of fragmentation is the lowest and in position (C), the greatest. Adjusting blades consists in taking following actions:

- loosen screw joint (4) – figure (5.8A)
- unscrew nut and dismantle joint (3) – figure (5.8A),
- set the blade in desired working position,
- screw all joints (3) and (4) tight by applying appropriate force.

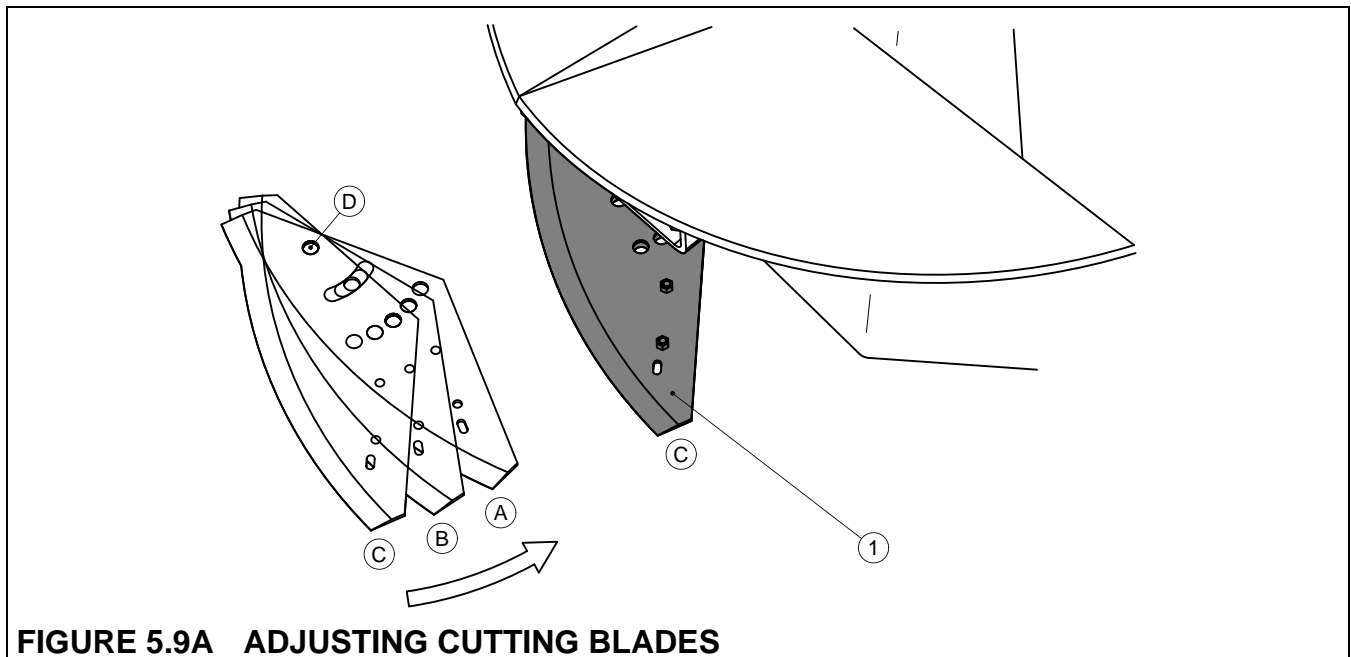


FIGURE 5.9A ADJUSTING CUTTING BLADES

(1) cutting blade, (A), (B), (C) position of blade, (D) rotation axis ob blade during adjusting procedure



ATTENTION

Cutting blades are extremely sharp, thus you must exercise special care when adjusting them.

During adjusting procedure, the blade rotates vs. Hole (D). Changing position in direction marked with an arrow will decrease degree of feed fragmentation (from position (C) to position (A)). Setting the blade in opposite direction (from (A) to (C)) will increase the degree of feed fragmentation, but wear and tear of blades shall increase as well. Position (B) is set in the factory and makes up the standard setting.

5.13 SHARPENING CUTTING BLADES

Sharpening blades should be committed to grinding plant, which have appropriate tools for performing such kind of works. If the blade cutting edge is not nicked, sharpening consists in polishing the flat surface with use of fine grindstone – the opposite surface to surface (A) shown on figure (5.10A). Small cracks or breakages on cutting edge of the blade require sharpening both upper and bottom side of the blade. This procedure needs to be performed with use of purpose-made grindstone. Angle of blade setting must not change. In factory made elements it amounts to 9° . It is important to cool down the blade during sharpening procedure. Overheated element is disqualified for further use.

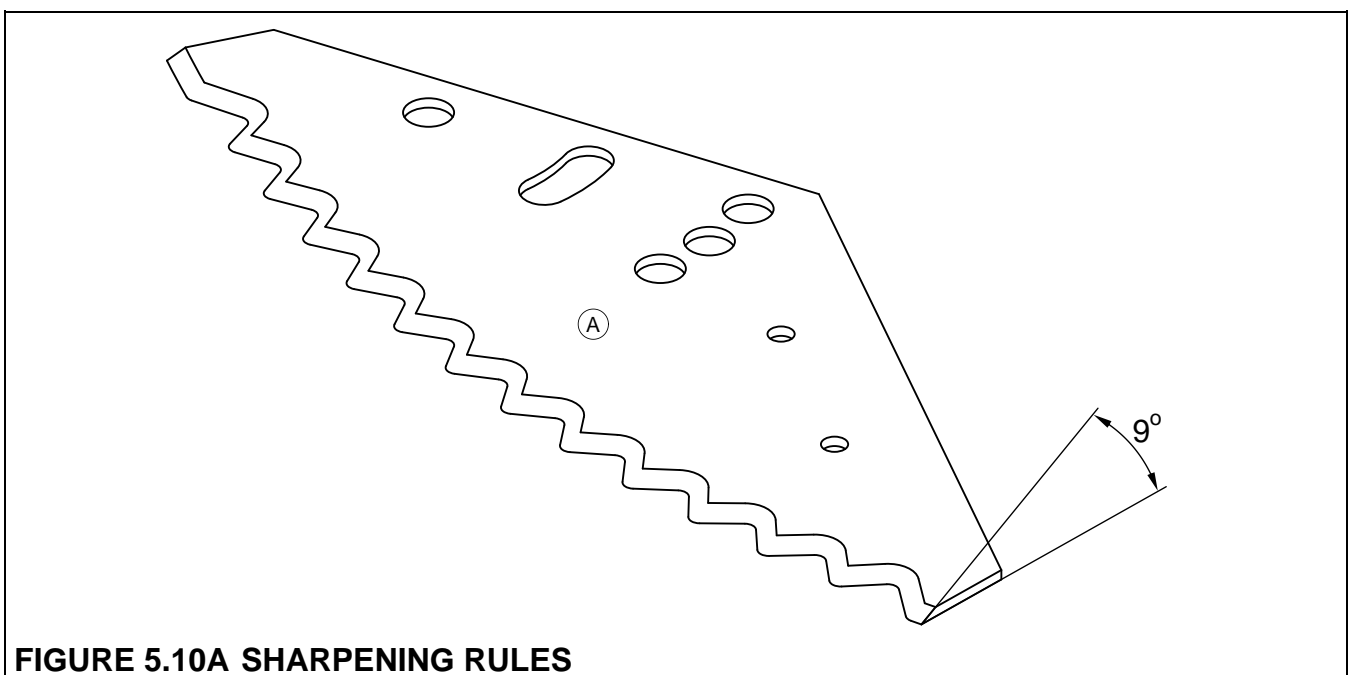


FIGURE 5.10A SHARPENING RULES

(A) upper side of the blade

5.14 STORAGE

At the end of work, you must clean the machine thoroughly and wash it by applying a jet of water. In case you find any damaged with relation to coat of varnish, you must clean these spots from dirt and dust, degrease and then apply new layer of varnish, keeping in mind the same color and thickness of protective coating. Before having these spots varnished, you must protect them with use of grease or anti-corrosion agent. Inside of the tank must be protected against corrosion with use of animal-safe agents.

It is recommended to keep the machine in closed and covered area. Keeping the machine outside for a longer period of time, you must secure its body against negative weather

factors, especially these, that cause steel corrosion and forcing tyres ageing. Tyres ought to be maintained at least once a year with use of available purpose-made agents. Cutting blades ought to be protected with use of biodegradable oil or agents that do not threat animals health. Before setting about working with the feed car, you must remove protecting agents from protected surfaces. Telescopic-joint shaft ought to be stored in horizontal position.

5.15 SCREWING FORCE OF SCREW JOINTS

When performing maintenance-repair works, you must apply appropriate screwing force with relation to screw joints, unless otherwise defined. Advised screwing force for most commonly used screw joints were shown in Figure (5). Defined values refer to steel, not greased screws.

TABLE 5.8 SCREWING FORCE OF SCREW JOINTS

THREAD	STRENGTH RATING	APPLIED SCREWING FORCE [Nm]
M24	8.8	470
M20	10.9	380
M20x1.5	8.8	185
M20x1.5	5.8	115
M18x1.5	8.8	150
M16	8.8	140
M12	8.8	65
M12	5.8	40
M10	8.8	40
M10	5.8	25

THREAD	STRENGTH RATING	APPLIED FORCE [Nm]
M8	8.8	20
M8	5.8	15
M6	5.8	5

NOTES

A series of horizontal dotted lines for writing notes.

