



PRONAR Sp. z o.o.

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

tel.:	+48 085 681 63 29	+48 085 681 64 29
	+48 085 681 63 81	+48 085 681 63 82
fax:	+48 085 681 63 83	+48 085 682 71 10

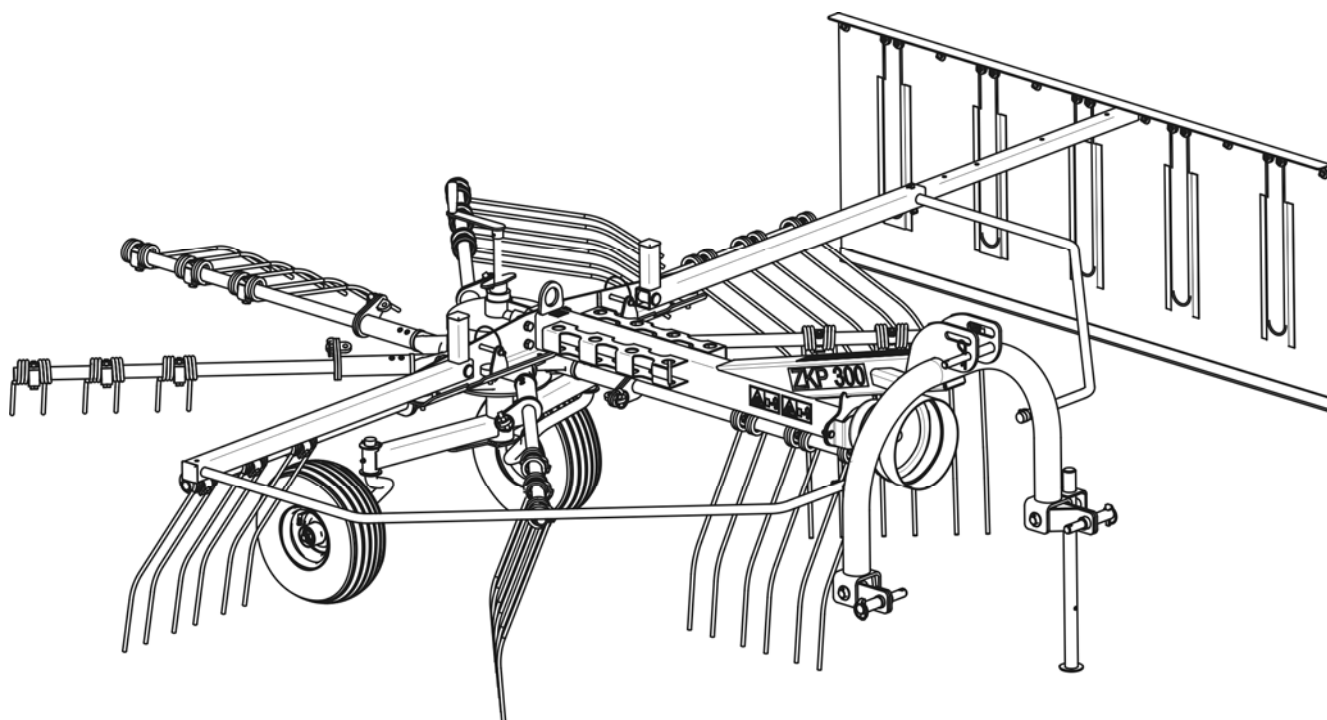
www.pronar.pl

OPERATING INSTRUCTIONS

ROTARY WINDROWER RAKES

PRONAR ZKP300

TRANSLATION OF THE ORIGINAL INSTRUCTIONS



ISSUE 2A-01-2010

PUBLICATION NO 178N-00000000-UM



ROTARY WINDROWER RAKES

PRONAR ZKP300

MACHINE IDENTIFICATION

SYMBOL /TYPE: **ZKP300**

SERIAL NUMBER:

--	--	--	--	--	--

INTRODUCTION

Information contained herein is current at date of publication. As a result of improvements, some numerical values and illustrations contained in this publication may not correspond to the factual specification of the machine supplied to the user. The manufacturer reserves the right to introduce design changes in machines produced that facilitate operation and improve the quality of their work, without making minor amendments to these operating instructions. Please send comments and observations on the subject of the design and operation of the machine to the manufacturer. This information enables objective evaluation of the machines produced and provides indications for their further modernisation. Information on significant design changes are passed on to users with the aid of the information insert attached to these operating instructions (annexes).

The operating instructions are an integral part of the machine's documentation. Before using the tractor, the user must familiarise himself with the content of these instructions and observe all recommendations. This guarantees safe operation and ensures malfunction free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The instructions describe the basic principles of safe use and operation of PRONAR ZKP300 rotary windrower rakes. If the information contained in the operating instructions needs clarification then the user should refer for assistance to the sale point where the machine was purchased or to the manufacturer.

Manufacturer's address:

PRONAR Sp. z o.o.

ul. Mickiewicza 101A

17-210 Narew

Contact telephones

+48 085 681 63 29

+48 085 681 64 29

+48 085 681 63 81

+48 085 681 63 82

Information, descriptions of danger and precautions and also recommendations and orders associated with user safety instructions are marked:



and also preceded by the word "**DANGER**". Failure to observe the instructions may endanger the machine operator's or other person's health or life.

Particularly important information and instructions, the observance of which is essential, are distinguished in the text by the sign:



and also preceded either word "**ATTENTION**". Failure to observe the instructions may lead to damage to the machine as a result of improper operation, regulation or use.

In order to focus the user's attention on the need to perform technical maintenance, the relevant section of the operating instructions is marked with the pictogram:





PRONAR Sp. z o.o.

ul. Mickiewicza 101 A

17-210 Narew, Polska

tel./fax (+48 85) 681 63 29, 681 63 81, 681 63 82,
681 63 84, 681 64 29

fax (+48 85) 681 63 83

<http://www.pronar.pl>

e-mail: pronar@pronar.pl

EC DECLARATION OF CONFORMITY OF THE MACHINERY

PRONAR Sp. z o.o. declares with full responsibility, that the machine:

Description and identification of the machinery	
Generic denomination and function:	Rotary Rake
Type:	ZKP300
Model:	—
Serial number:	
Commercial name:	Rotary Rake PRONAR ZKP300

to which this declaration relates, fulfills all the relevant provisions of the Directive **2006/42/EC** of The European Parliament and of The Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (Official Journal of the EU, L 157/24 of 09.06.2006).

The person authorized to compile the technical file is the Head of Research and Development Department at PRONAR Sp. z o.o., 17-210 Narew, ul. Mickiewicza 101A, Poland.

This declaration relates exclusively to the machinery in the state in which it was placed on the market, and excludes components which are added and/or operations carried out subsequently by the final user.

Narew, the 2013-12-03

Place and date

Z-CIA DYREKTORA
d/s technicznych
czynności
Roman Onielianiuk

*Full name of the empowered person
position, signature*

TABLE OF CONTENTS

1	BASIC INFORMATION	1.1
1.1	IDENTIFICATION	1.2
1.2	INTENDED USE	1.3
1.3	FITTINGS	1.4
1.4	WARRANTY CONDITIONS	1.4
1.5	TRANSPORT	1.6
1.6	ENVIRONMENTAL HAZARDS	1.8
1.7	WITHDRAWAL FROM USE	1.8
2	SAFETY IN USE	2.1
2.1	BASIC SAFETY PRINCIPLES	2.2
2.2	PRINCIPLES WHEN TRAVELLING ON PUBLIC ROADS	2.6
2.3	DESCRIPTION OF MINIMAL RISK	2.6
2.4	INFORMATION AND WARNING STICKERS	2.7
3	CONSTRUCTION AND PRINCIPLE OF OPERATION	3.1
3.1	TECHNICAL SPECIFICATION	3.2
3.2	ROTARY WINDROWER RAKES DESIGN	3.2
3.3	HITCHING SYSTEM	3.4
3.4	OPERATING PRINCIPLE	3.6
4	CORRECT USE	4.1
4.1	PREPARING FOR WORK BEFORE FIRST USE	4.2
4.2	TECHNICAL INSPECTION OF WINDROWER	4.4
4.3	ATTACHING TO TRACTOR	4.5
4.4	PREPARATION OF WINDROWER FOR WORK	4.6
4.4.1	MOUNTING OF RAKING ARMS	4.7
4.4.2	SETTING GUARDS	4.8
4.4.3	SETTING WORKING HEIGHT	4.9
4.5	CONNECTING DRIVESHAFT	4.11
4.6	RAKING	4.13
4.7	DISCONNECTING THE WINDROWER	4.14
4.8	PREPARATION OF WINDROWER FOR TRANSPORT	4.14

5	TECHNICAL MAINTENANCE	5.1
5.1	PRINCIPLES OF SAFE TRACTOR OPERATION	5.2
5.2	REDUCTION GEAR OPERATION	5.2
5.3	STORAGE	5.4
5.4	LUBRICATION	5.5
5.5	INSPECTION AND CHANGING RAKING FINGERS	5.7
5.6	TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS	5.9

SECTION

1

BASIC INFORMATION

IDENTIFICATION

INTENDED USE

FITTINGS

WARRANTY CONDITIONS

TRANSPORT

ENVIRONMENTAL HAZARDS

WITHDRAWAL FROM USE

1.1 IDENTIFICATION

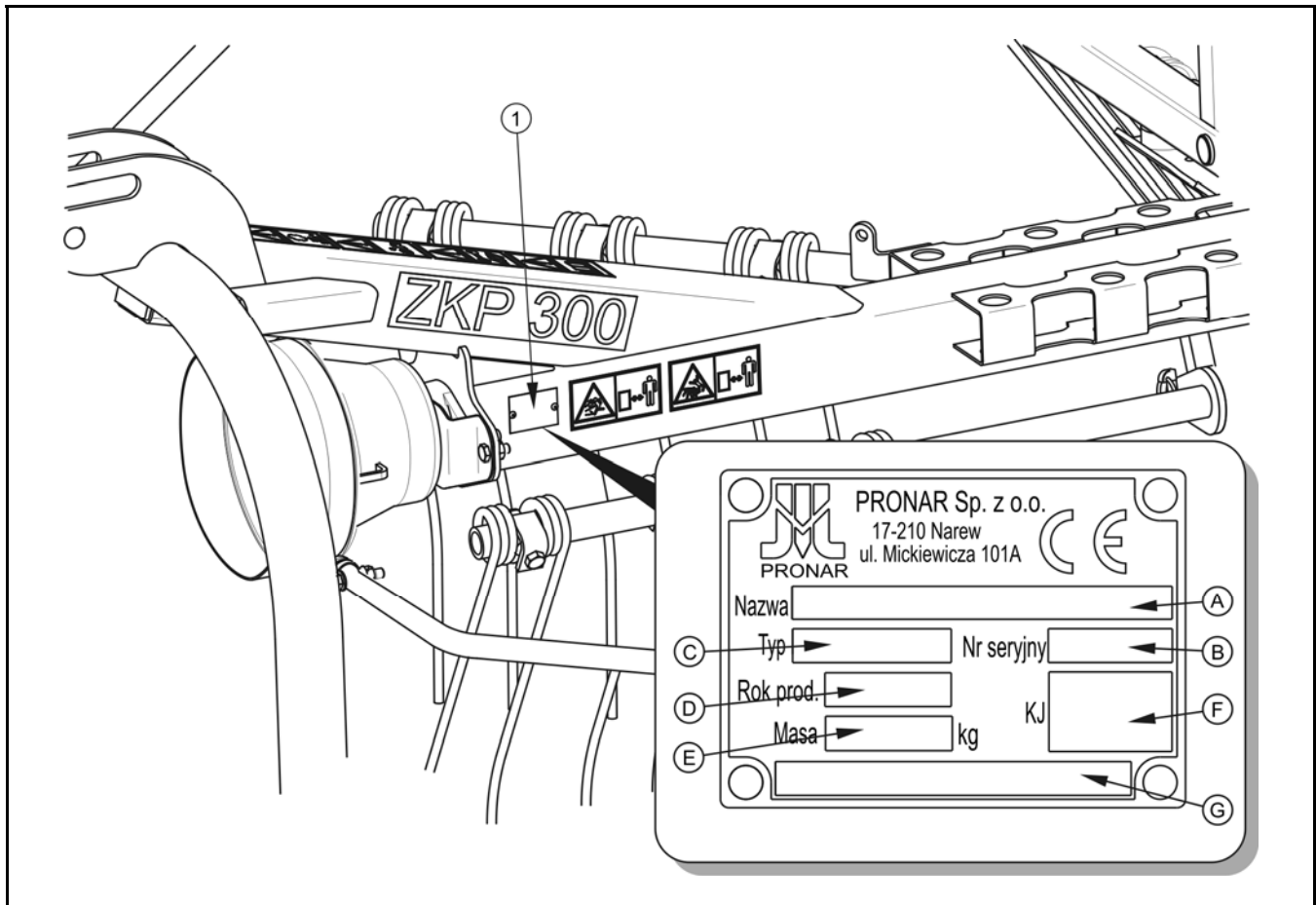


FIGURE 1.1A Location of the data plate

(1) data plate

The ZKP 300 rotary windrower is marked with a data plate (1), placed on left side of machine's lifting arm. When buying the rotary windrower check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and in the *OPERATING INSTRUCTIONS*.

The meaning of the individual fields found on the data plate are presented in the table below:

- A - machine name,
- B - serial number,
- C - machine type/symbol
- D - year of manufacture,
- E - gross weight

F - Quality control stamp,

G - machine name, name extension.

1.2 INTENDED USE

Rotary windrower rakes are designed for agricultural work: raking cut swaths (straw, grass, hays) and gathering it into windrows on stone free grassland with a level surface. Do NOT use the machine for any other purpose. Using it as intended also involves all actions connected with the safe and proper operation and maintenance of the machine. Due to the above, the user is obliged to:

- familiarise himself with the content of this publication and the content of the telescopic articulated shaft operating instructions and adhere to the recommendations contained in these documents,
- understand the operating principle of the machine's operation and of its safe and proper use,
- comply with general safety regulations while working,
- prevent accidents,
- comply with road traffic regulations.

TABLE 1.1 THE AGRICULTURAL TRACTOR'S REQUIREMENTS

CONTENTS	MEASURED AS	REQUIREMENTS
Resr three-point linkage Category	-	I or II
Power take-off shaft Rotation speed	RPM	540
Type / number of PTO splines	-	1 3/8" / 6
Other requirements Minimum power demand	kW / Horsepower	14.7 / 20

Do NOT perform unauthorised repairs and modifications to the windrower as this shall be treated by the Manufacturer as misusing the machine.

The machine may only be used by appropriately trained users, who are aware of the dangers, construction and operating principles of the windrower. Repairs to the machine shall only be made by qualified personnel (in the guarantee period all repairs must be performed in the guarantee service, indicated by the Manufacturer). Maintenance and repairs that can be performed by the user, are described in section 5.



IMPORTANT!

The windrower must not be used for purposes other than those for which it is intended.

1.3 FITTINGS

TABLE 1.2 ZKP 300 ROTARY WINDROWER RAKES FITTINGS

FITTINGS	STANDARD	OPTION
<i>OPERATING INSTRUCTIONS</i>	•	
<i>WARRANTY BOOK</i>	•	
Articulated, telescopic shaft (complete)	•	

Recommended articulated telescopic shafts:

- 7102086CE007128 B&P,
- 1620-6200-086-02 Weasler,
- T200860EN112U24 Comer.

1.4 WARRANTY CONDITIONS

PRONAR Sp. z o.o., Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the OPERATOR'S MANUAL.

The repair period is specified in the *WARRANTY BOOK*.

The guarantee does not cover those parts and sub-assemblies of the machine which are subject to wear in normal usage conditions, regardless of the warranty period. Consumables include the following parts/sub-assemblies:

- tyres,
- spring tine fingers,
- bearings.

The warranty service only applies to such cases as: mechanical damage which is not the user's fault, factory defects of parts, etc.

In the event of damage arising from:

- mechanical damage which is the user's fault, caused by road accidents,
- by inappropriate use, regulation or maintenance, use of the windrower for purposes other than those for which it is intended,
- use of a damaged windrower,
- repairs carried out by unauthorised persons, improperly carried out repairs,
- arbitrary and wilful adjustments to the windrower's structure,

the user will lose the right to warranty service.

The user is obliged to report immediately on noticing any wear in the paint coating or traces of corrosion, and to have the faults rectified whether they are covered by the guarantee or not. Detailed guarantee regulations are contained in the *WARRANTY BOOK* attached to each machine.



ATTENTION!

Demand that the seller carefully and precisely fills out the *WARRANTY BOOK* and guarantee repair coupons. A missing date of purchase or sale point stamp, may make the user ineligible for any warranty repair or refund.

1.5 TRANSPORT

The windrower is prepared for sale in a completely assembled condition and does not require packing. Packing consists solely of the machine's technical documentation and operating instructions.



ATTENTION!

When transporting independently, the user must familiarise himself with the content of these instructions and observe their recommendations. When being transported on a motor vehicle the windrower must be mounted on the vehicle's platform in accordance with the transport safety requirements. The driver of the vehicle should take particular care while driving.

Supply to user takes place by transport vehicle. Transport of the windrower is permissible connected to a tractor provided the tractor's driver familiarises himself with the machine's operating instructions and particularly with information concerning safety and principles of connection and transport of windrower on public roads. Do NOT drive the tractor with windrower connected when visibility is limited.

When loading and unloading the windrower, comply with the general principles of workplace health and safety for reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.

The windrower should be attached to lifting equipment in places shown on figure (1.2A), i.e. to transport lug (1) and central connection pin (2), which are located to the front and rear of lifting arm. Securing point is marked with information sticker. It is recommended that during transport of the machine the extending arm together with forming shield are dismantled. In the event that cable or strap of transloading equipment may be caught by protruding rake elements placed in transport position, it is necessary to dismantle them. When raising the windrower take particular care due to the possibility of tipping over the machine and the risk of injuries from protruding machine parts.

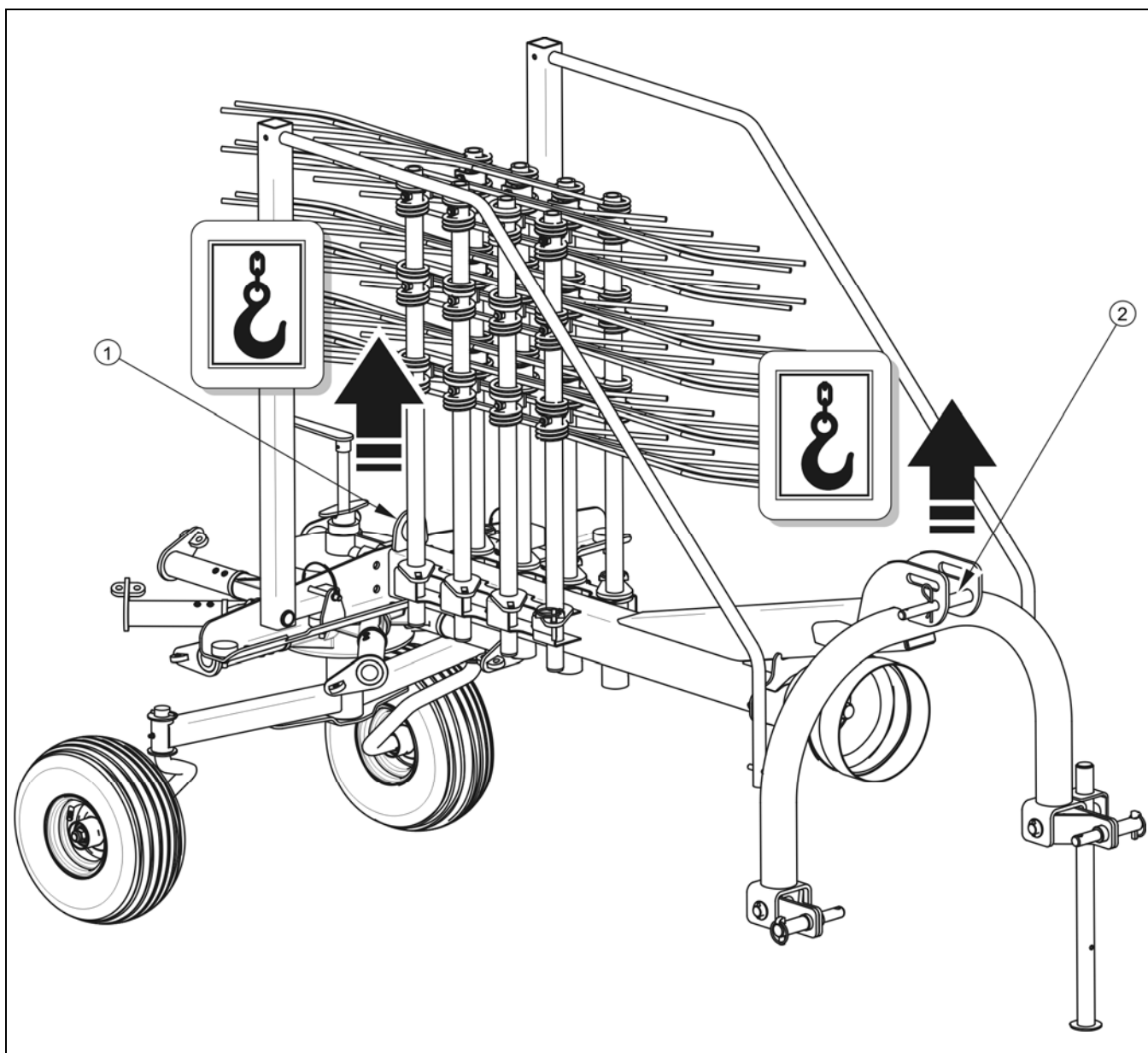


FIGURE 1.2A Points of windrower suspension

(1) transport lug, (2) central connection pin



DANGER

During loading, windrower should be placed in transport position. Extending arm and the forming shield should be dismantled.

The windrower should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. The fastening equipment used must have a valid safety certificate. Wedges or other objects without sharp edges should be placed under the wheels

of the windrower to prevent it from rolling. The wedges must be fixed to the platform of the vehicle. During reloading work, particular care should be taken not to damage parts of the windrower's fittings or the paint coat.

1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak from the reducer constitutes a direct threat to the natural environment owing to its limited biodegradability. While carrying out maintenance and repair work which involves the risk of an oil leak, this work should take place on an oil resistant floor or surface. In the event of oil leaking into the environment, first of all safeguard the source of the leak, and then remove the leaked oil using available means. Remaining oil should be removed using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container, and then passed on to the appropriate oil waste recycling centre. The container should be kept away from heat sources, flammable materials and food.

Oil which has been used up or is unsuitable for further use owing to a loss of its properties should be stored in its original packaging in the conditions described above.

1.7 WITHDRAWAL FROM USE

Should the user decide to withdraw the machine from use, the entire windrower should be taken to a scrap yard. When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Hydraulic oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

SECTION

2

SAFETY IN USE

BASIC SAFETY PRINCIPLES

PRINCIPLES WHEN TRAVELLING ON PUBLIC ROADS

DESCRIPTION OF MINIMAL RISK

INFORMATION AND WARNING STICKERS

2.1 BASIC SAFETY PRINCIPLES

- Before using the windrower the user should thoroughly acquaint himself with the content of these instructions and the articulated telescopic shaft instructions and adhere to the recommendations contained in these documents.
- The windrower may only be used and operated by persons qualified to drive agricultural tractors and trained in the use of the machine.
- If the information contained in the operating instructions is difficult to understand, contact a seller who runs an authorised technical service on behalf of the manufacturer, or contact the manufacturer directly.
- Careless and improper use and operation of the windrower, and non-adherence to the recommendations included in these instructions are dangerous for the health.
- Be warned that a minimal risk does exist, and for this reason the fundamental basis for using this machine should be the application of safety principles and sensible behaviour.
- The windrower must never be used by persons who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol or other drugs.
- Non-adherence to the principles of safe use creates a danger for the health and life of the operator and others.
- The windrower must not be used for purposes other than those for which it is intended. Anyone who uses the machine other than the way intended takes full responsibility on himself for any consequences of this use.
- Any modification to the windrower frees PRONAR Narew from any responsibility for damage or detriment to health which may arise as a result.
- Before using the windrower always check its technical condition. In particular check the technical condition of the hitching system, drive system, mounting of rakes and protective guards.

- Windrower disconnected from tractor must be supported with the aid of supports and secured against rolling away by using wheel wedges or other elements without sharp edges.
- Do NOT ride on the windrower or transport any materials on it.
- The windrower may only be used when all the safety guards and other protective elements are technically sound and correctly positioned. In the event of loss or destruction of the safety guards, they must be replaced with new ones.
- The machine must not be used when not in working order.
- While reversing and during turns, the windrower drive must be disengaged.
- Do NOT leave the tractor cab, when the machine drive is engaged.
- Do NOT stand within the windrower's working zone.
- Before hitching the machine to the tractor, check the technical condition of the hitching system of the windrower and the tractor.
- Be especially careful when attaching the machine.
- When reversing the tractor, there must be nobody between the windrower and the tractor.
- To attach the machine to the tractor only the rear Three-Point Linkage System may be used. After linking the machine, check the safeguards.
- Use an articulated telescopic shaft recommended by the Manufacturer.
- The windrower may not be used or transported in conditions of limited visibility.
- The articulated telescopic shaft has markings on the casing, indicating which end of the shaft shall be connected to the tractor.
- Never use a damaged articulated telescopic shaft, it may cause an accident. A damaged shaft must be repaired or replaced.
- Disconnect the drive shaft each time when it is not necessary to drive the machine, or when the tractor and windrower are at an unsuitable angle to each other.

- The chains preventing the shaft cover from turning while the shaft is working, shall be secured to a fixed element of windrower structure.
- Do NOT use the securing chains to support the shaft while machine is parked or when transporting the windrower.
- Before using the windrower the user should thoroughly acquaint himself with the articulating telescopic shaft instructions and adhere to the recommendations contained in them.
- The windrower may only be connected to the tractor with the aid of the appropriately selected articulated telescopic shaft recommended by the Manufacturer.
- The driveshaft must be equipped with a cover. Do NOT use the shaft with damaged or missing guards.
- After connecting shaft ensure that it is correctly and safely connected to the tractor and to the windrower.
- Before starting the windrower make sure that there are no bystanders (especially children) or animals in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- While windrowing apply working speed recommendations.
- When using the windrower and power takeoff shaft, do not use PTO rotation speed greater than 540 revs/min. Do NOT overload shaft and windrower and also engage the clutch suddenly. Before starting articulated telescopic shaft make certain that the PTO shaft rotation direction is correct.
- During windrowing use the correct working position.
- Before disconnecting the shaft, turn off the tractor engine and remove the key from the ignition.
- When working on the tyres, wedges or other objects without sharp edges should be placed under the wheels of the windrower to prevent it from rolling.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriately selected tools.

- In order to reduce the danger of fire the machine must be kept in a clean condition.
- In the event of work requiring the windrower to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the windrower, stable and durable supports must also be used. Work must not be carried out under a machine which has only been raised with a lift.
- The windrower must not be supported using fragile elements (bricks or concrete blocks).
- Check the tyre pressure regularly.
- In the event of any fault or damage whatsoever, disconnect the windrower from use until the fault has been fixed. The machine must not be used when not in working order.
- When operating the machine wear protective gloves and use the appropriate tools.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.
- Repair, maintenance and cleaning work should be carried out with the tractor's engine switched off and the ignition key removed.
- Regularly check the condition of the screw and nut connections.
- The paint coating should be cleaned off before beginning welding work. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space.
- During welding work pay attention to flammable or fusible elements. If there is a risk that they will catch fire or be damaged, they should be removed or covered with non-flammable material before commencing welding work. The windrower must be disconnected from the tractor before commencing electric welding.
- During the warranty period, any repairs may only be carried out by a Warranty Service authorised by the manufacturer.

- Should it be necessary to change individual parts, use only those parts indicated by the manufacturer. Non-adherence to these requirements may cause danger to the health and the user's and other people's lives, and also damage the machine.
- After completing work connected with greasing, remove excess oil or grease.
- Do NOT wear loose clothing, straps or whatever may become wrapped round the rotating drive shaft. Contact with rotating articulated telescopic shaft may cause severe injuries.
- Do NOT go over and under the shaft or to stand on it equally during work as also when the machine is parked.

2.2 PRINCIPLES WHEN TRAVELLING ON PUBLIC ROADS

- When travelling on public roads, respect the road traffic regulations.
- Do not exceed the maximum speed when travelling. Adjust your speed to the road conditions.
- Before beginning travel, the windrower must be placed in transport position and raised using the rear three-point linkage system. While parking the windrower should be lowered.
- It is forbidden for the tractor driver to leave his position while the tractor is moving.

2.3 DESCRIPTION OF MINIMAL RISK

Pronar Sp. z o. o. in Narew has made every effort to eliminate the risk of accidents. There is, however, a certain minimal risk which could lead to an accident, and this is connected mainly with the actions described below:

- using the windrower for purposes other than those for which it is intended,
- being between the tractor and the windrower while the engine is running and when the machine is being attached,
- being on the machine while the engine is running,
- operating the windrower with the safety guards removed or faulty,

- not keeping a safe distance from the danger zone or being within the zones while the windrower is operating,
- operation of the windrower by persons under the influence of alcohol,
- cleaning, maintenance and technical checks of the windrower.
- using unreliable articulated telescopic shaft.

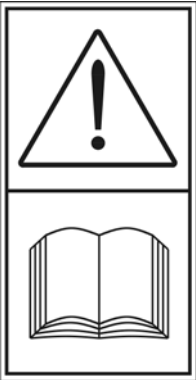



The minimal risk may be kept to a minimum by following the recommendations below:

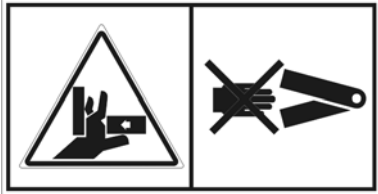
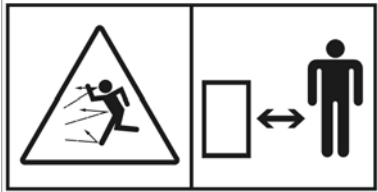
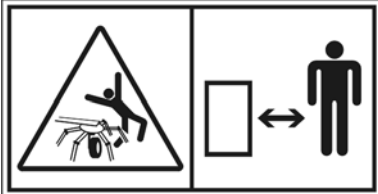


- prudent and unhurried operation of the machine,
- sensible application of the remarks and recommendations contained in the operating instructions,
- keeping a safe distance from forbidden or dangerous places,
- a ban on being on the machine when it is operating,
- carrying out repair and maintenance work in line with operating safety principles,
- carrying out repair and maintenance work by persons trained to do so,
- using strictly suited protective clothing,
- ensuring unauthorised persons have no access to the machine, especially children.

2.4 INFORMATION AND WARNING STICKERS

The windrower is labelled with the information and warning stickers mentioned in table (2.1). The symbols are positioned as presented in figure (2.1A). Throughout the time it is in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the windrower are clear and legible. In the event of their destruction, they must be replaced with new ones. Stickers with notices and symbols are available from the manufacturer, or from the retailer where the windrower was purchased. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs.

TABLE 2.1 INFORMATION AND WARNING STICKERS

ITEM	SAFETY SYMBOL	DESCRIPTION
1		<p>Before starting work, familiarise yourself with the contents of the <i>OPERATING INSTRUCTIONS</i>.</p>
2		<p>Before beginning servicing or repairs, switch off engine and remove key from ignition</p>
3		<p>Danger associated with the rotating articulated telescopic shaft.</p>
4		<p>Maximum allowable PTO shaft rotation speed is 540 revs/min.</p>

ITEM	SAFETY SYMBOL	DESCRIPTION
5		Danger of crushing or severing of limbs. Be careful while folding and unfolding side guards.
6		Thrown out objects, danger to the whole body. Keep a safe distance from machine during work of windrower.
7		Danger of being struck by rotating elements of the machine. Keep a safe distance from raking assembly.
8		Windrower type
9		Transport catch point marking.

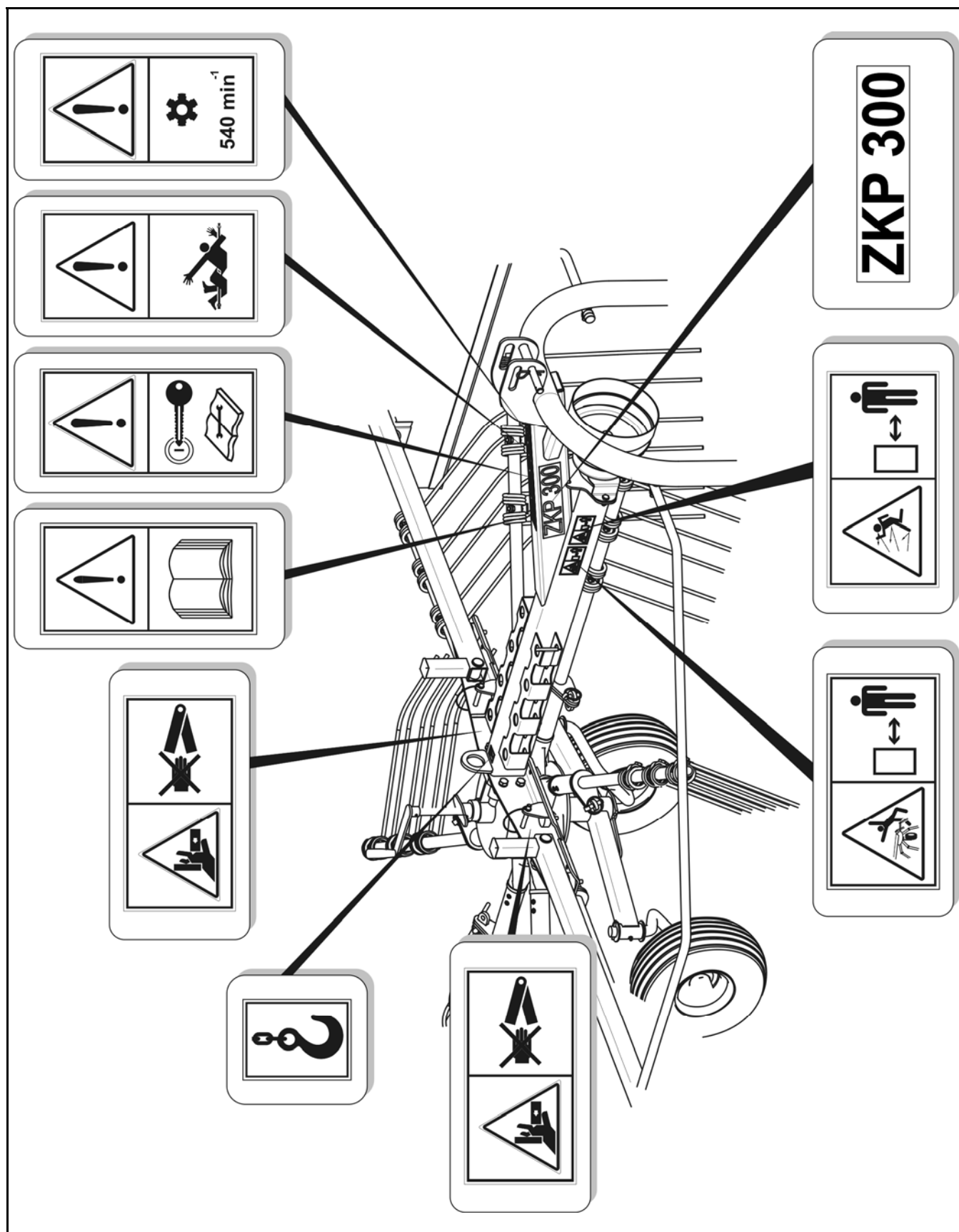


FIGURE 2.1A Locations of information and warning stickers.

Labelling in line with table 2.1 „Information and warning stickers”.

SECTION

3

CONSTRUCTION AND
PRINCIPLE OF
OPERATION

TECHNICAL SPECIFICATION

ROTARY WINDROWER RAKES DESIGN

HITCHING SYSTEM

OPERATING PRINCIPLE

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 ROTARY WINDROWER RAKES TECHNICAL DATA

CONTENTS	UNIT	ZKP 300
Dimensions		
Total length in working setting	mm	3 030
Total length in transport setting	mm	2,190
Width in working setting		
minimum	mm	3,135
maximum	mm	3,635
Width in transport setting	mm	1,110
Height in working setting	mm	1,120
Height in transport setting	mm	1 855
Technical specification		
Raking width	mm	3 000
Minimum tractor power demand	KM	18
Maximum PTO speed	RPM	540
Tare weight	kg	290
Work output	ha/h	3
Recommended working speed	km/h	10
Noise emission level	dB	below 75
Tyres		
Tyre	-	15x6.0-6
Air pressure in the tyres	kPa	200

3.2 ROTARY WINDROWER RAKES DESIGN

Construction of the rake carousel is shown in figure (3.1A). The machine's main sub-assembly is the support frame (1). In the front part is the system for mounting the machine to the Three-Point Linkage of the tractor, category I or II. In the rear part of the windrower is the transmission gearing system (2) of the working assembly. The reducer is powered by the articulated telescopic shaft and then through the driveshaft placed in the extension (4) of the support frame (1).

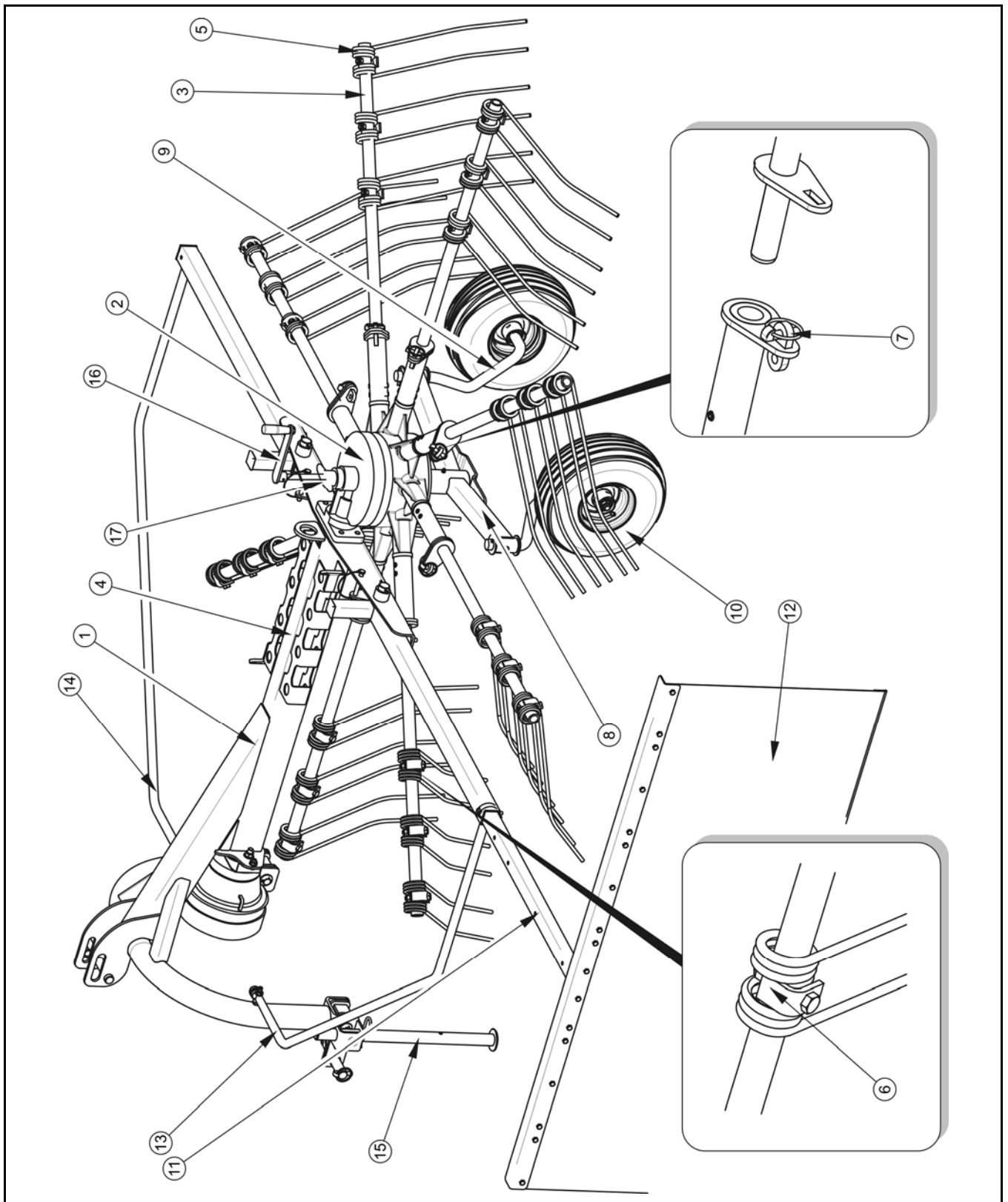


FIGURE 3.1A Rotary windrower rakes design

(1) frame, (2) reducer, (3) raking arm, (4) extender, (5) springtine finger, (6) securing angle, (7) linchpin, (8) wheel beam, (9) undercarriage leg, (10) wheel, (11) extension arm, (12) shield, (13), (14) shield wing struts, (15) support, (16) regulation screw, (17) screw lock

The transmission gearing (2) has 8 radiating shafts, to which are secured raking arms (3). Each of the arms is equipped with 3 springtime fingers for raking the swath. They are mounted on the arm extension with the aid of securing angles (6), which prevent fingers from sliding or rotating. Arms are secured to the gearing transmission with the aid of linchpins (7). Rake suspension is connected in the lower part of the transmission gearing. The undercarriage legs (9) together with the wheels (10) are secured to the wheel beams (8). The extension arm (11) together with the forming shield (12) secured to it is on the left side of the windrower. During machine work the shield constitutes a barrier for the raked swath, due to which it is not scattered but formed into a regular windrow. The extension arm is secured by the left shield wing strut (13) and locked with a linchpin. The height of raking arm setting above the surface is regulated by the regulation screw (16) and secured by the interlock (17).

3.3 HITCHING SYSTEM

The windrower rake carousel is mounted on the tractor using the hitching system integrated in the support frame of the machine. Figure (3.2A), shows detailed mounting structure.

The windrower is adapted to agricultural tractors equipped with three-point linkage of category I or II. Pins (1) and (2) – external - serve to attach the machine to a tractor equipped with category II three-point linkage, similarly pins (3) and (4) – internal - for linkage to tractor equipped with category I three-point linkage. The upper pin it is common to both categories, designed for securing the upper suspension point irrespective of three-point linkage category. The upper pin may be placed in one of two available sockets. The upper socket (A) with an elongated shape, it is used during machine work (working position), socket (B) for transporting the windrower.

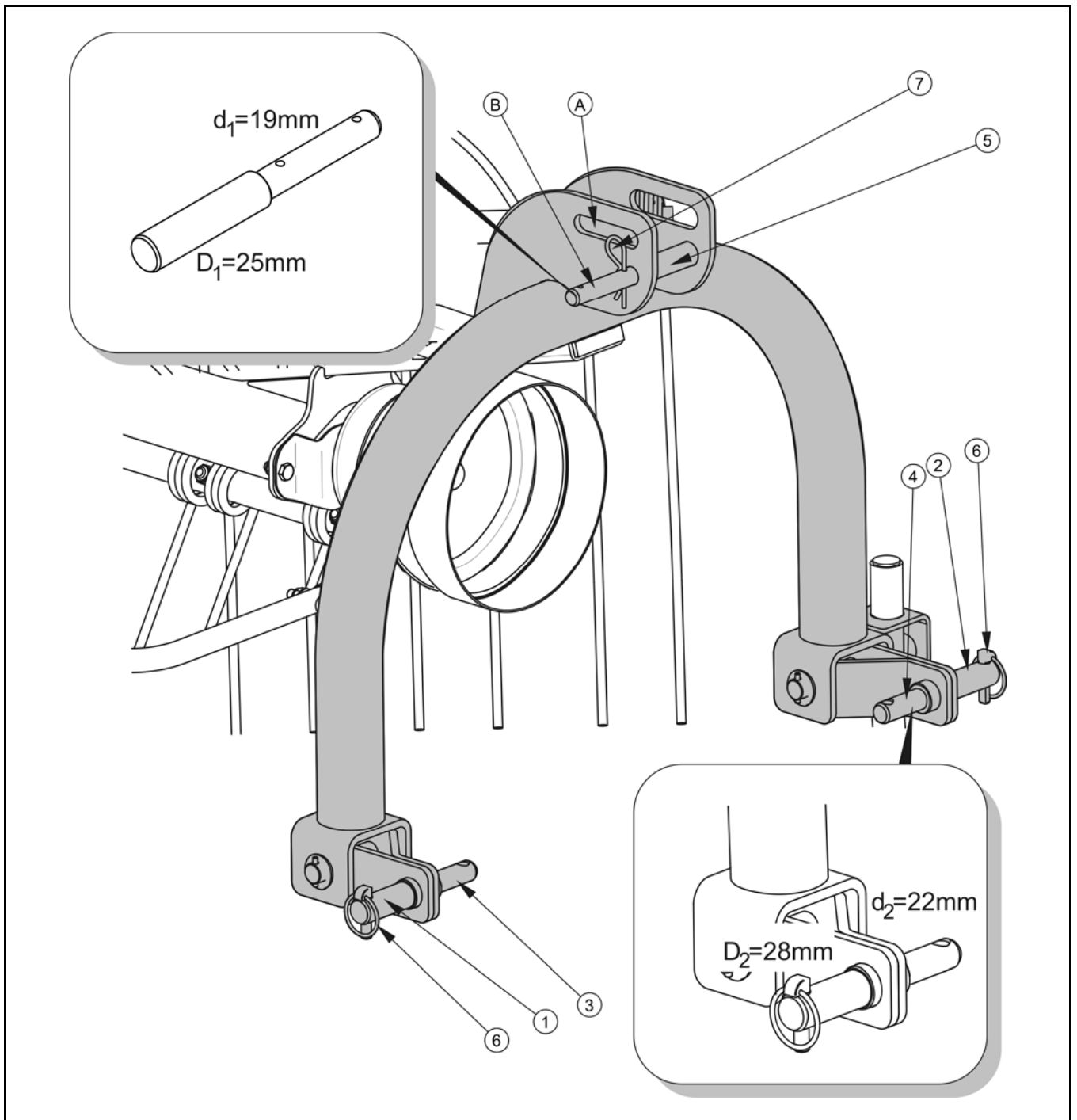


FIGURE 3.2A Hitching system

(1), (2) lower securing pins (three-point linkage – II category), (3), (4) lower securing pins (three-point linkage – I category), (5) upper securing pin, (6), (7) locking linchpins, (A) working pin position socket, (B) travelling pin position socket

3.4 OPERATING PRINCIPLE

The rotary windrower rakes is equipped with the reduction gearing driven by the tractor PTO. The torque is transferred through transfer shafts. The reducer's design ensures the rotation movement of the raking assembly in an anticlockwise direction.

The gear's cam mechanism enables the rotation of individual arms, due to which the springtine fingers are lowered or raised according to current setting. During raking – figure (3.3A), area (A) - springtine fingers are lowered almost vertically. The raked swath is retained by the forming shield, due to which it is formed into an even windrow. In remaining instances the raking springtines are raised to the upper position.

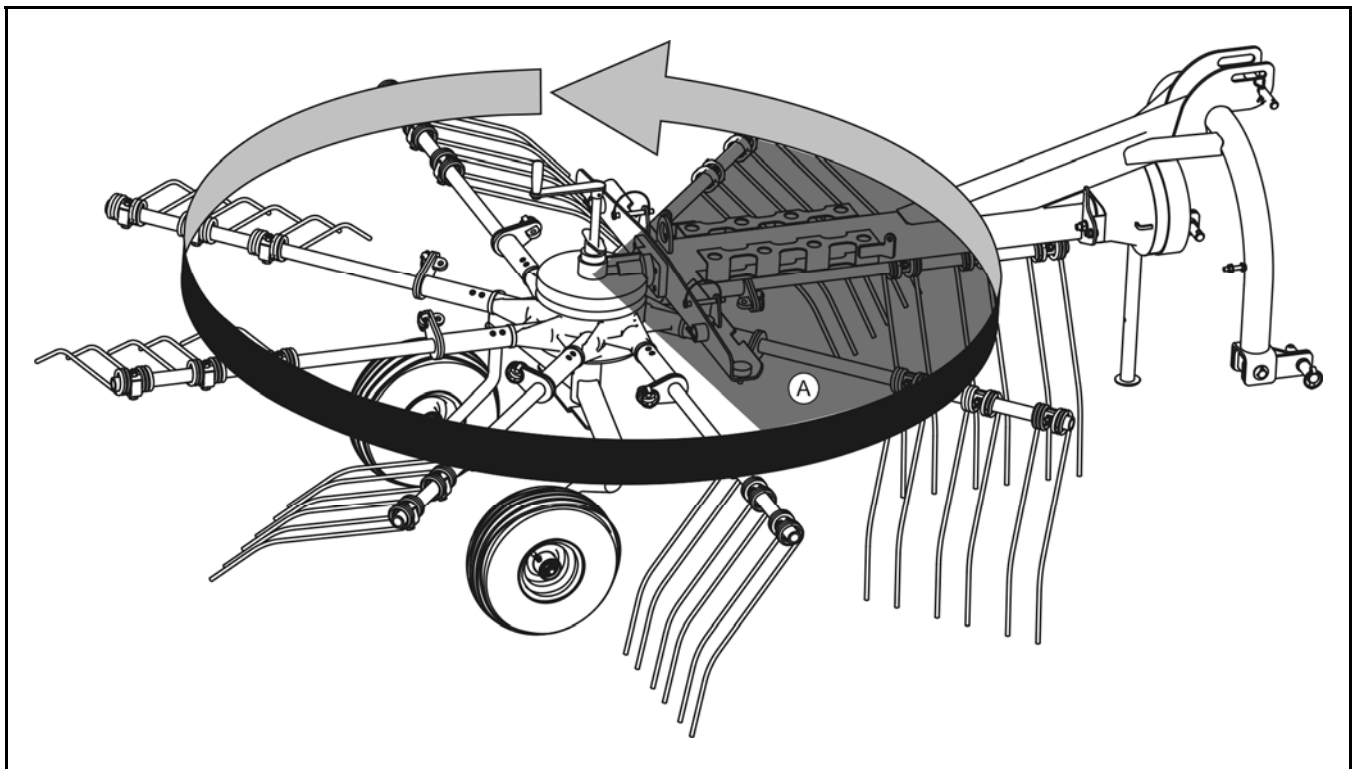


FIGURE 3.3A **The windrower's operating principle**

(A) swath raking phase

SECTION

4

CORRECT USE

PREPARING FOR WORK BEFORE FIRST USE

TECHNICAL INSPECTION OF WINDROWER

ATTACHING TO TRACTOR

PREPARATION OF WINDROWER FOR WORK

CONNECTING DRIVESHAFT

RAKING

DISCONNECTING THE WINDROWER

PREPARATION OF WINDROWER FOR TRANSPORT

4.1 PREPARING FOR WORK BEFORE FIRST USE

The manufacturer guarantees that the windrower is fully operational and has been checked according to quality control procedures and is ready for normal use. This does not release the user from an obligation to check the machine's condition after delivery and before first use. The machine is delivered to the user in a completely assembled state.

Before connecting to tractor, machine operator must inspect the technical condition of the windrower and prepare it for test startup. In order to do this:

- the user must familiarise himself with the content of these instructions and observe all recommendations, understand the design and the principle of machine operation
- check the condition of protective paint coat,
- Inspect windrower's individual components for mechanical damage resulting from incorrect transport (dents, piercing, deflections or broken components),
- Check the windrower's all lubrication points, lubricate the machine as needed according to recommendations provided in section 5,
- Check technical condition of tyres and tyre pressure,
- check if wheel and rocker mounting is correct,
- check if springtime finger and guard mounting is correct,
- check technical condition of hitching system pins and locking linchpins,
- check lubricating oil level in reduction gear.

If all the above checks have been performed and there is no doubt as to the windrower's good technical condition, it can be connected to tractor. Start the tractor's engine, check all systems and test the windrower before beginning work. In order to inspect:

- Hitch windrower to tractor.
- set raking arms, raise windrower upwards maximally using the crank, so that raking fingers do not touch surface,
- connect articulated telescopic shaft to tractor and windrower
- start PTO drive.

Engage rake drive for several minutes, and check the following:

- there is no knocking or noise in the drive system arising from scraping or grinding of metal elements,
- proper rotation of raking system,
- proper action of cam mechanism (raking fingers should be lowered and raised according to current arm position).



ATTENTION!

Before using the windrower always check its technical condition. In particular check the technical condition of the raking system, wheel system, all protective guards and correct condition of mounting of raking fingers.

The windrower's operation at no load should be smooth. Shaking of raking mechanism and whole machine is not acceptable, nor is changed noise and vibrations coming from loose nut and bolt connections. After stopping windrower check fastening of rake fingers and raking arms. Check that the gear oil does not leak from the reduction gearing.



DANGER

Before using the windrower, the user must thoroughly familiarise himself with the content of these instructions.

Careless and improper use and operation of the windrower, and non-adherence to the recommendations included in these instructions are dangerous for the health.

The windrower must never be used by persons who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol or other drugs.

Non-adherence to the principles of safe use creates a danger for the health and life of the operator and others.



DANGER

Before starting the windrower, make sure that there are no bystanders in the danger zone.

If any faults are detected they must be identified and rectified. If a fault cannot be rectified or the repair could void the guarantee, please contact retailer for additional clarifications.

4.2 TECHNICAL INSPECTION OF WINDROWER

When preparing the windrower for normal use, check individual elements according to guidelines presented in table (4.1).

TABLE 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	SERVICE OPERATION	FREQUENCY
Condition of safeguards	check the technical condition of safeguards, if complete and correctly mounted.	Before each use
Check mounting of rake fingers to raking arms	Ensure that fingers are correctly tightened.	
Check technical condition of tyres and tyre pressure,	Visually inspect the tyres and if they are properly inflated.	
Check technical condition of tyres and tyre pressure,	Check the condition of tyre tread, lateral surfaces, wheel rim and if necessary inflate the tyres up to recommend pressure	Every month
Check of all main nut and bolt connections are properly tightened	Torque values should be according to table (5.2)	After the winter
Lubrication	Lubricate elements according to guidelines presented in section "lubrication points".	According to table (5.1)



ATTENTION!

The windrower must not be used when not in working order.

4.3 ATTACHING TO TRACTOR

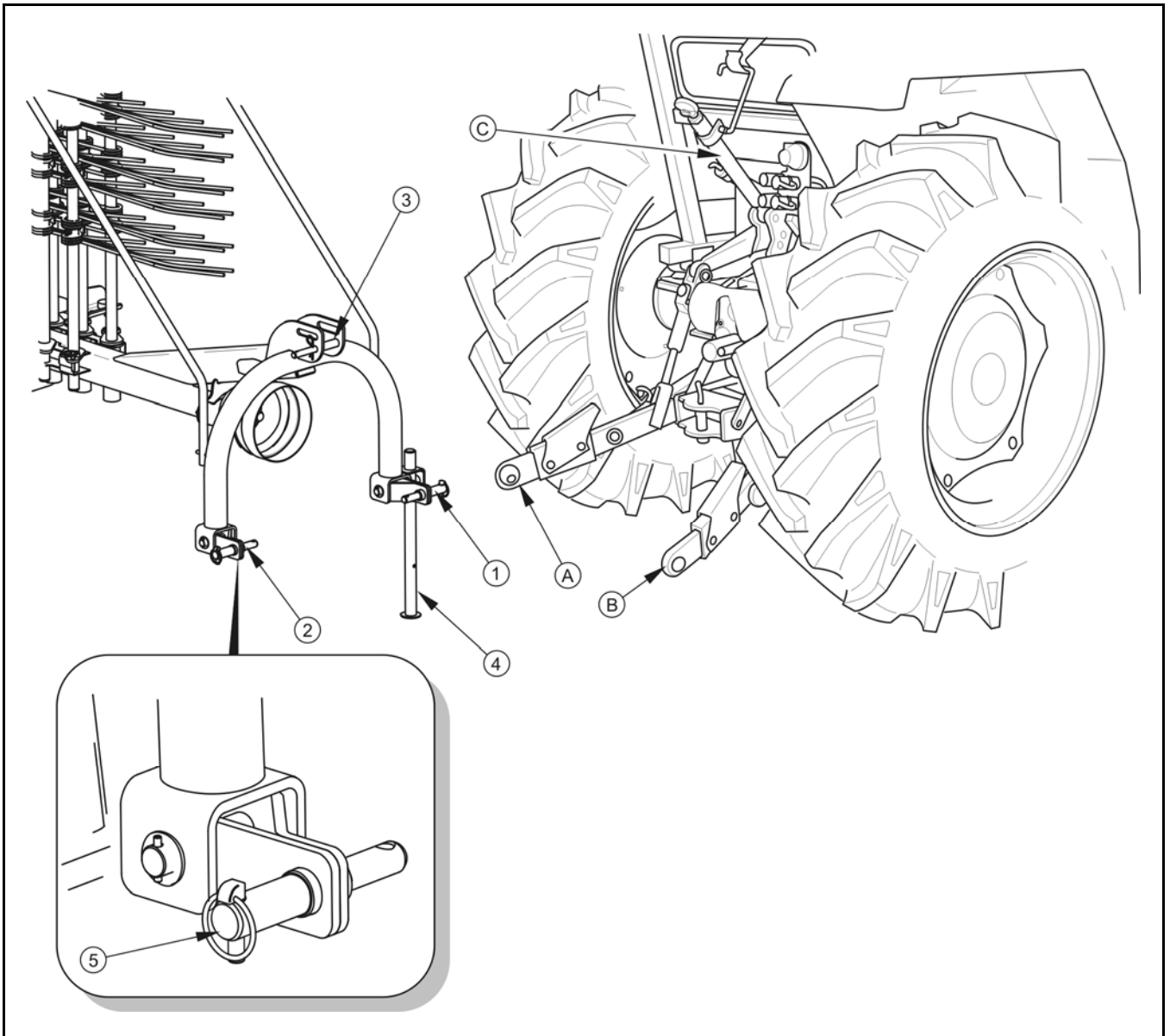


FIGURE 4.1A Attaching windrower to tractor

(1), (2) lower three-point linkage securing pins, (3) upper securing pins, (4) support, (5) locking linchpin, (A), (B) lower three-point linkage hitching points, (C) upper three-point linkage connection

The windrower may only be connected to tractors with power output greater than 20 hp, equipped with category I or II rear three-point linkage.

- Drive tractor to windrower.
- Reverse tractor ensuring that there is nobody between the tractor and the windrower.

- Reversing the tractor bring the lower three-point linkage connection points (A) and (B) close to pins (1) and (2) of windrower.
- Set connection arms (A) and (B) of tractor at appropriate height.
- Switch off tractor's engine and prevent it from rolling.
- Connect lower pins (1) and (2) with connecting arms (A) and (B) and lock with the aid of linchpins.
- Release top link of tractor and connect it with pin (3) of windrower and lock with linchpin.
- Raise support (4) and secure with linchpin.

ATTENTION!



Before using the windrower, the user must thoroughly familiarise himself with the tractor's operating instructions.

The lower connection arms must at identical height. If not the windrower shall be tilted to the left or right side, which will interfere with the machine's operation. Appropriate regulation is made with the aid of the tractor lower three-point linkage suspender rods.



DANGER

Exercise caution when linking the machine.

The top link pin must be in the upper socket of the hitching system, if the windrower is prepared for field work – in working position. To transport the windrower use the lower socket – transport position – compare with figure (3.2A).

4.4 PREPARATION OF WINDROWER FOR WORK

Windrower transported to the field must be set in appropriate working position. Preparing of the machine for work must only take place exclusively where the windrower shall work. Travel of machine on roads with raking arms installed and extended guards is forbidden.

4.4.1 MOUNTING OF RAKING ARMS

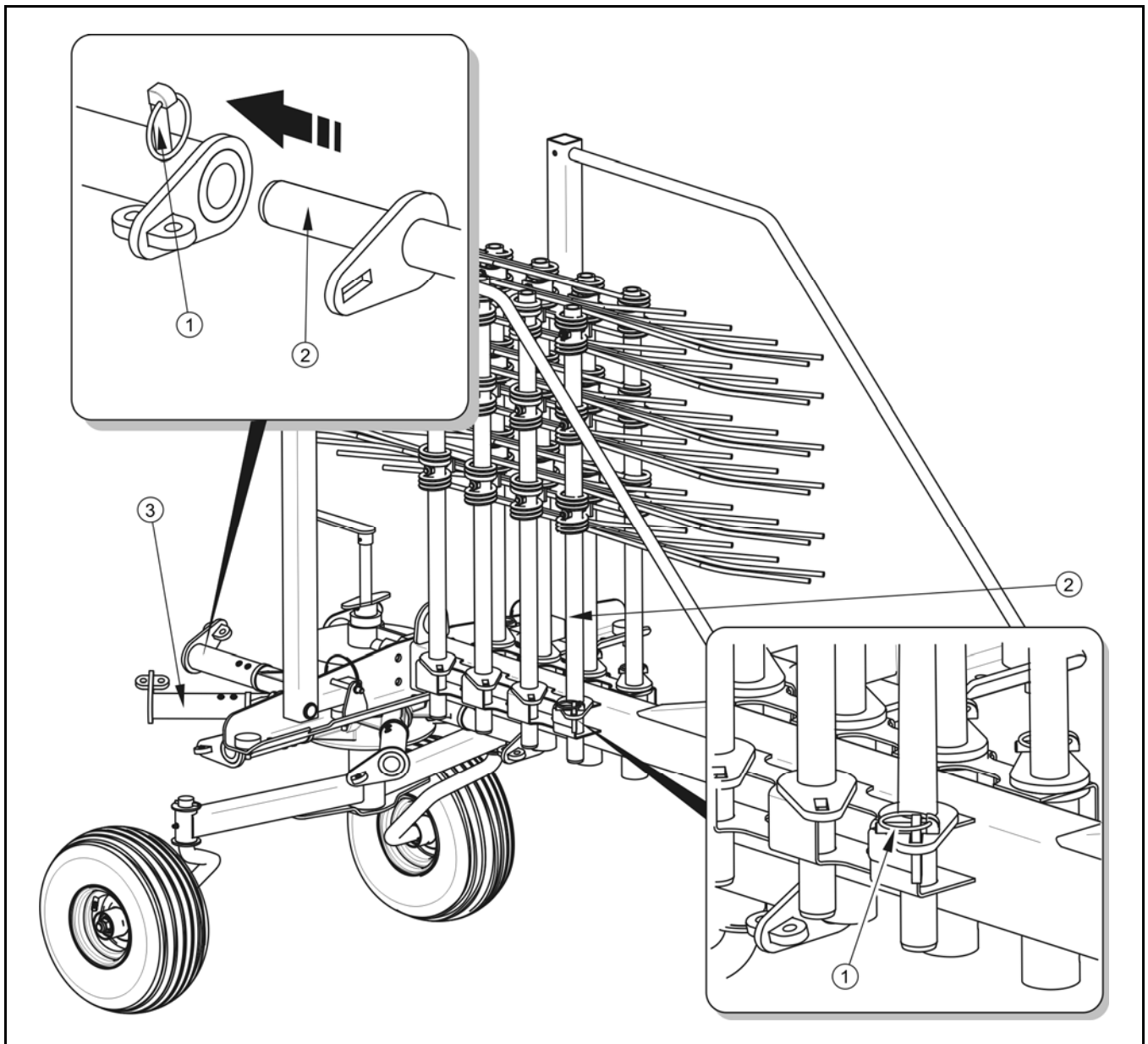


FIGURE 4.2A mounting of raking arms

(1) locking linchpin, (2) raking arm, (3) securing of arm

- Stop tractor and remove the key from the ignition, ensure that unauthorised persons do not have access to the tractor.
- immobilise tractor with parking brake,
- Remove securing linchpin (1) from left and right side of windrower, take out arm (2).
- Insert arms to attachment point (3) and secure with linchpins (1).



ATTENTION!

Raking arms in transport position secured with the aid of 2 linchpins (1 linchpin for each side). These linchpins are used to secure raking arms in working position.



DANGER

Do NOT operate the machine when the complete set of 8 raking arms is not installed.

Raking arms shall be mounted with tractor engine switched off. Remove the key from the ignition, ensure that unauthorised persons do not have access to the tractor. Tractor shall be immobilised with parking brake.

4.4.2 SETTING GUARDS

- Holding guard frame (3) in upper setting, remove locking linchpin (2) from right side of machine.
- Set right guard in working position, insert linchpin in its place.
- Holding left guard frame (1) in upper setting, remove locking linchpin (2) from left side of machine.
- Set left guard in working position, insert linchpin in its place.
- Take out locking linchpin (4), extend arm (5) set forming guard at chosen working width. Insert securing linchpin.



DANGER

During lowering of guards it is necessary to be particularly careful with regard to the danger of uncontrolled lowering of these sub-assemblies.



DANGER

Tractor engine should be switched off during lowering of guards. Remove the key from the ignition, ensure that unauthorised persons do not have access to the tractor. Tractor shall be immobilised with parking brake.

The forming guard is the barrier for the raked swath. Thanks to the swath is formed into an even windrow of the required width. When setting the guard observe the principle that the greater the swath then the wider the working width, and the other way round, the lower the quantity of swath then the barrier distance should be less.

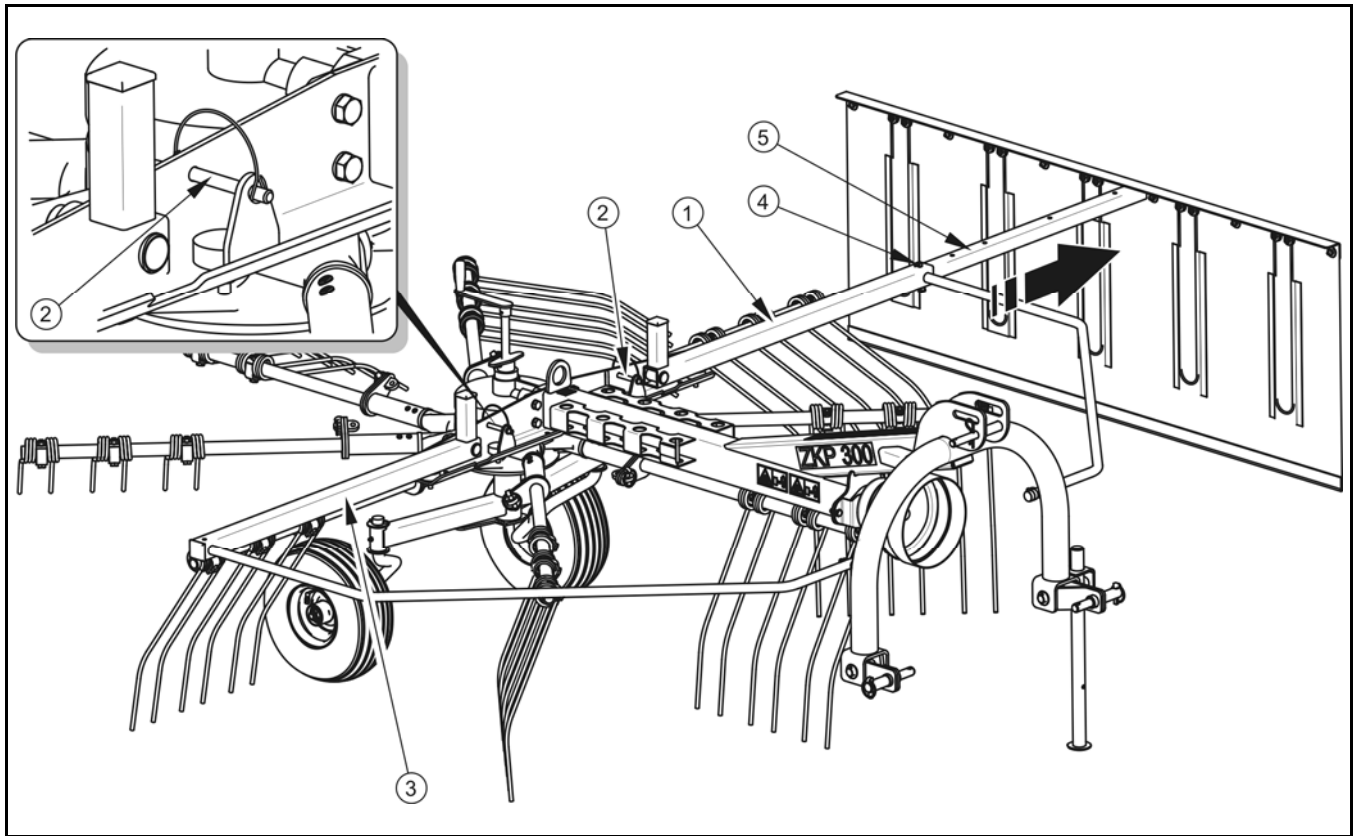


FIGURE 4.3A **Setting side guards**

(1) left guard arm, (2) locking linchpin, (3) right guard arm, (4) linchpin securing extended arm, (5) extended arm

4.4.3 SETTING WORKING HEIGHT

The correct working position of windrower has a decisive influence on the cleanness of the raked swath, quality of windrow forming and working comfort.

One of the basic factors deciding the correctness of machine setting is the correct height regulation of the lower three-point linkage tractor lift arms. Their height is regulated by the suspender rods. Both the lift arms must be at the same height, if not the windrower may be tilted to the left or the right side. This must be done before connecting windrower to the tractor.



ATTENTION!

Read the instructions on regulation of the three-point linkage which are part of the tractor's operating instructions.

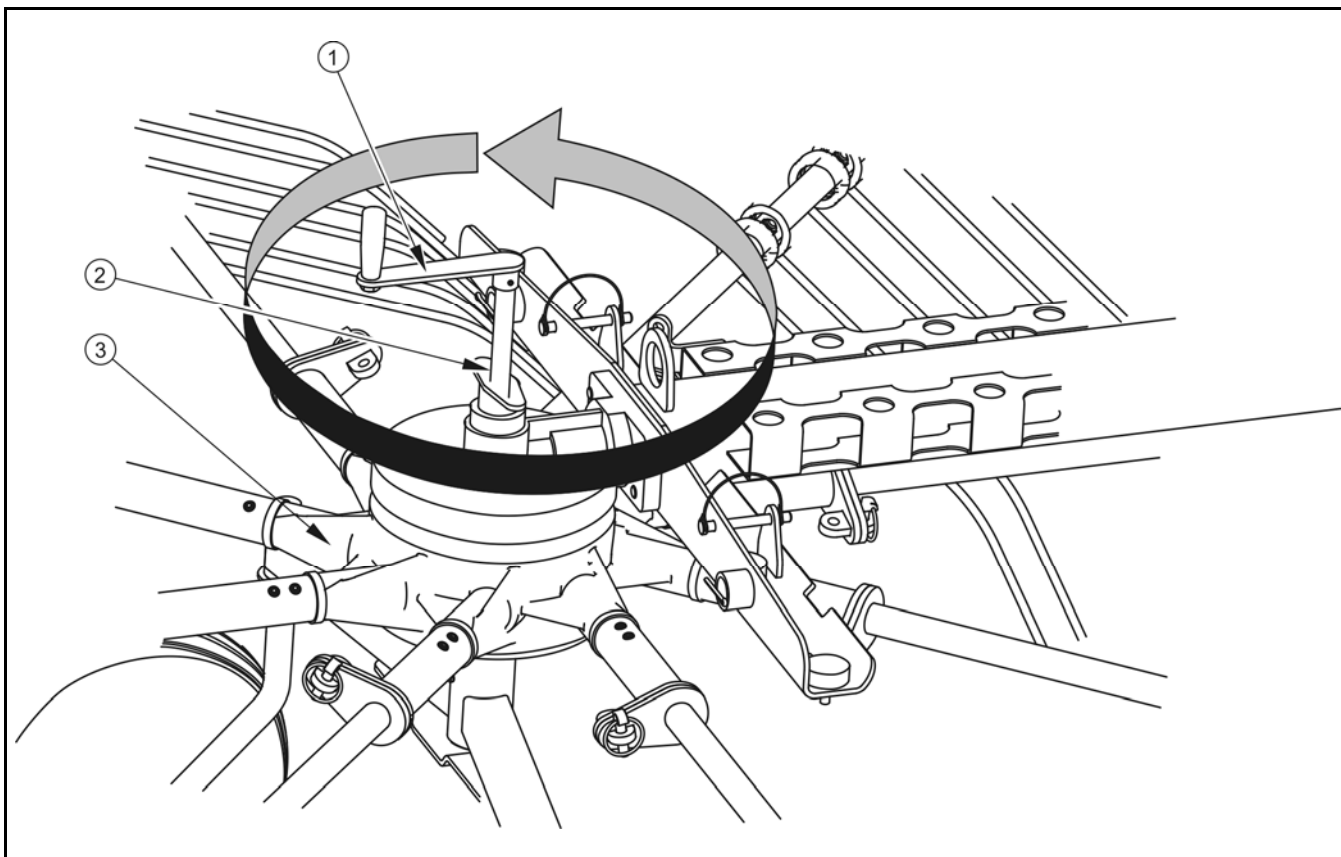


FIGURE 4.4A Setting working height

(1) crank, (2) counter nut, (3) reduction gearing

Regulation of working position is performed after lowering the machine to the ground. Working position of windrower is regulated by performing the following actions:

- park tractor and windrower on flat level ground,
- set top link pin in sliding socket,
- set rear three point linkage in position regulation mode,
- set height of tractor lower three-point linkage forks,
- set length of top link,
- unscrew counter nut (2) anticlockwise - figure (4.4A),

- Regulate height of windrower using the crank in such a way that the rake assembly is in a horizontal plane – parallel to the ground surface and the springtine fingers lightly touch the ground, the top link pin should be in the middle of the sliding socket,
- Tighten counter nut and check machine setting.

Height of rakes shall be set in such a way that springtine fingers of raking assembly delicately touch the ground while working. Windrower's support frame should be set horizontally, parallel to the ground. Height selection also depends on the amount of cut swath, degree of dampness, raking speed and also the ground over which the windrower is moving. If the height is too high there is a risk that not all of the swath will be raked. At a low setting the swath may be contaminated with disturbed earth, turf and stones etc. Furthermore there is increased danger of damage to the windrower, mainly for raking fingers and their mounting to the arms. Height selection should be checked frequently during working and if necessary the setting should be corrected.



DANGER

Regulation of windrower's working height must be done with the tractor engine switched off. Remove the key from the ignition, ensure that unauthorised persons do not have access to the tractor. Tractor shall be immobilised with parking brake.

4.5 CONNECTING DRIVESHAFT

The windrower is equipped with the appropriately selected articulated telescopic shaft with overload protection clutch. Before connecting the windrower it is absolutely necessary to acquaint oneself with the content of the instructions attached by the manufacturer of the shaft and observe the instructions contained in them. Before connection to the tractor check the technical condition of the shaft guard, the completeness and condition of the protecting chains and the general technical condition of the shaft. Multi splined ends are appropriately marked, so it is clear which end should be connected to the tractor.

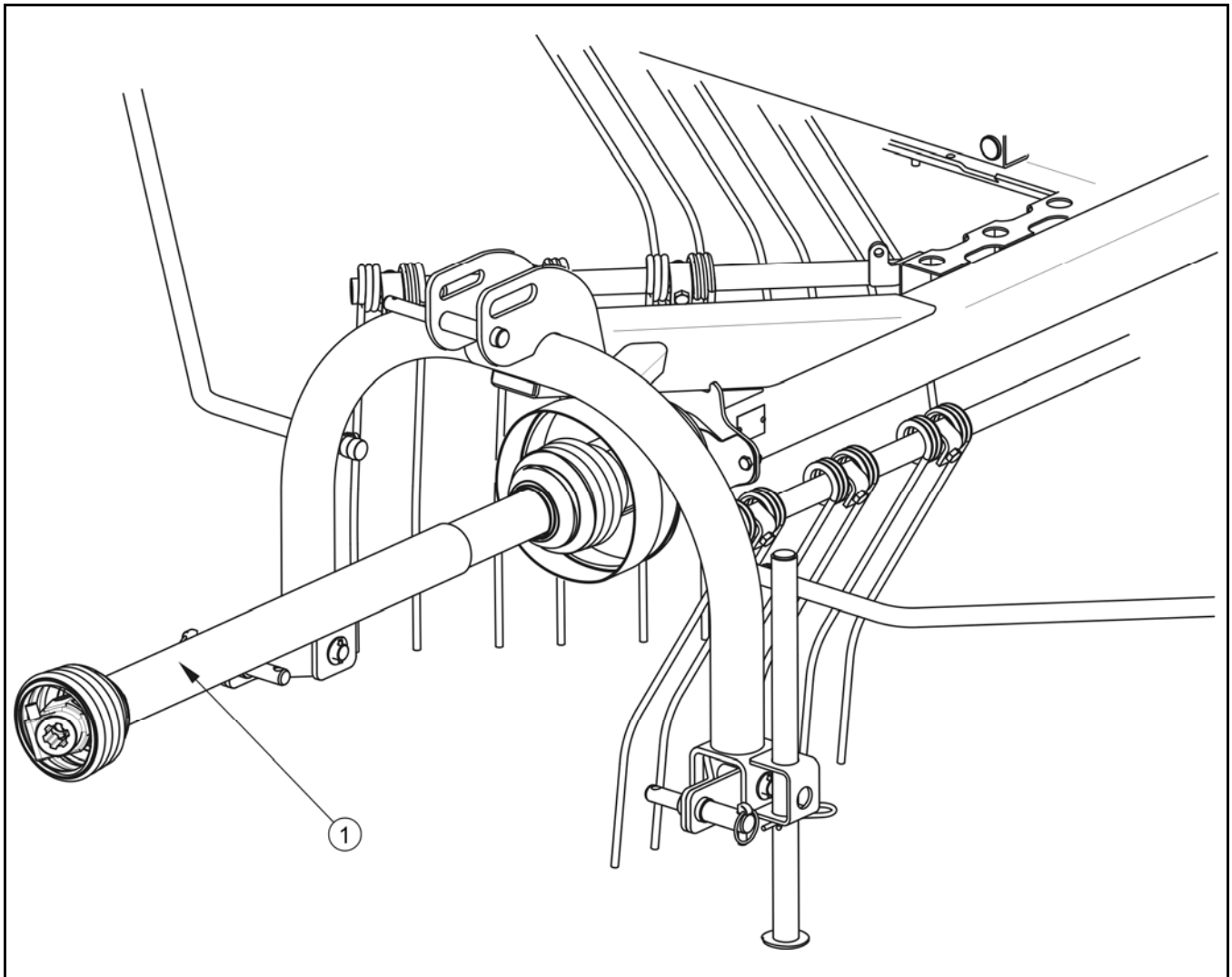


FIGURE 4.5A Articulated telescopic shaft with overload protection clutch

(1) articulated telescopic shaft

Shaft is equipped with overload protection clutch, which prevents damage to windrower or tractor. Torque value for shaft is set in the factory by the manufacturer and may not be changed by the user. Change of overload protection clutch setting may invalidate the guarantee



DANGER

The use of articulated telescopic shaft and its technical condition must be in accord with the operating instructions of articulated telescopic shaft.



DANGER

Before connecting the shaft, turn off the tractor's engine and remove the key from the ignition. Ensure that unauthorised persons do not have access to the tractor.

4.6 RAKING

If the windrower is correctly set for working in the field, is totally serviceable and its technical condition causes no concerns one may commence work. Recommended working speed is 10 km/h or less. At greater travelling speeds the swath may not be properly raked and formed into windrow. Allowable revolution speed of articulated telescopic shaft is 540 revs/min however recommended speed is about 450 revs/min. With a very dry swath it is recommended that PTO shaft speed should be reduced even further.



IMPORTANT!

Do NOT start windrower with PTO revs speed higher than 540 revs/min.

The revolution speed of the shaft and the speed of travel depend on several factors, including size of swath, degree of moisture, length of swath, type of ground, therefore the selection of appropriate working parameters rests on the person operating the windrower. During machine operation the linkage system shall be set in position regulation work mode.



DANGER

Before engaging drive to articulated telescopic shaft make sure that there are no bystanders, especially children, near the windrower. Maintain proper visibility of machine during work

Other persons should be at a safe distance from the windrower during work because of the danger that objects may be thrown (stones, branches from beneath raking fingers).

Raking the swath in order to form it into windrows should be conducted in a system of smaller areas. During turning or reversing, articulated telescopic shaft should be disengaged and windrower raised. Width of windrow should be somewhat less than baler intake pickup – if swath shall be baled.

4.7 DISCONNECTING THE WINDROWER

In order to disconnect the windrower from the tractor perform the following:

- lower windrower support and secure with linchpin,
- lower windrower using three-point linkage to rest position,
- switch of tractor engine and remove key from ignition,
- disconnect articulated telescopic shaft,
- disconnect top link of three-point linkage,
- disconnect lower windrower pins and drive tractor away.

4.8 PREPARATION OF WINDROWER FOR TRANSPORT

After finishing fieldwork the windrower must be set in transport position. Before beginning preparation works switch of tractor engine and remove the key from the ignition. Brake tractor with parking brake and secure tractor cab, ensure that unauthorised persons do not have access to the tractor.

Travel with rake arms extended in work position is forbidden. During travel they must be placed in sockets on frame and secured with linchpins.

Side guards shall be raised to vertical position and also secured with linchpins. It is recommended that forming guard arm is totally retracted.

Disconnection of articulated telescopic shaft is not essential but it is recommended. Turning sharp corners, especially in field conditions may be hindered because of this. If the shaft is not taken off, is essential to remember not to engage the PTO drive of the tractor during transport travel. During transport the windrower must be raised by the three-point linkage.



DANGER

Preparing the windrower for transport may only be done with tractor engine switched off. Remove the key from the ignition, ensure that unauthorised persons do not have access to the tractor. Tractor shall be immobilised with parking brake.

Do NOT drive on public roads when visibility is limited.

SECTION

5

TECHNICAL MAINTENANCE

PRINCIPLES OF SAFE TRACTOR OPERATION

REDUCTION GEAR OPERATION

STORAGE

LUBRICATION

INSPECTION AND CHANGING RAKING FINGERS

TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

5.1 PRINCIPLES OF SAFE TRACTOR OPERATION

- Repair, maintenance and cleaning work should be carried out with the tractor's engine switched off and the ignition key removed. Ensure that unauthorised persons, especially children, do not have access to the tractor.
- The machine must not be used when not in working order.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriately selected tools.
- In the event of work requiring the windrower to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the windrower, stable and durable supports must also be used. Work must not be carried out under a machine which has only been raised with a lift.
- The windrower must not be supported using fragile elements (bricks or concrete blocks).
- When operating the machine wear protective gloves and use the appropriate tools.
- Servicing and repair work should be carried out in line with the general principles of workplace health and safety. In the event of injury, the wound must be immediately cleaned and disinfected. In the event of more serious injuries, seek a doctor's advice.

5.2 REDUCTION GEAR OPERATION

Service of reduction gear is conducted during general inspection, change or topping up gear oil. In the event of damage to reducer contact authorised service point in order perform repairs.

First oil change must be made after the first 50 hours worked. The next oil change should be made after 500 hours of windrower work or once a year. Most suitable time for changing reduction gear oil is when preparing for first fieldwork. The quantity of oil necessary to fill the reduction gear box amounts to 2.8 litres. Reduction gearing oil: SAE90EP.

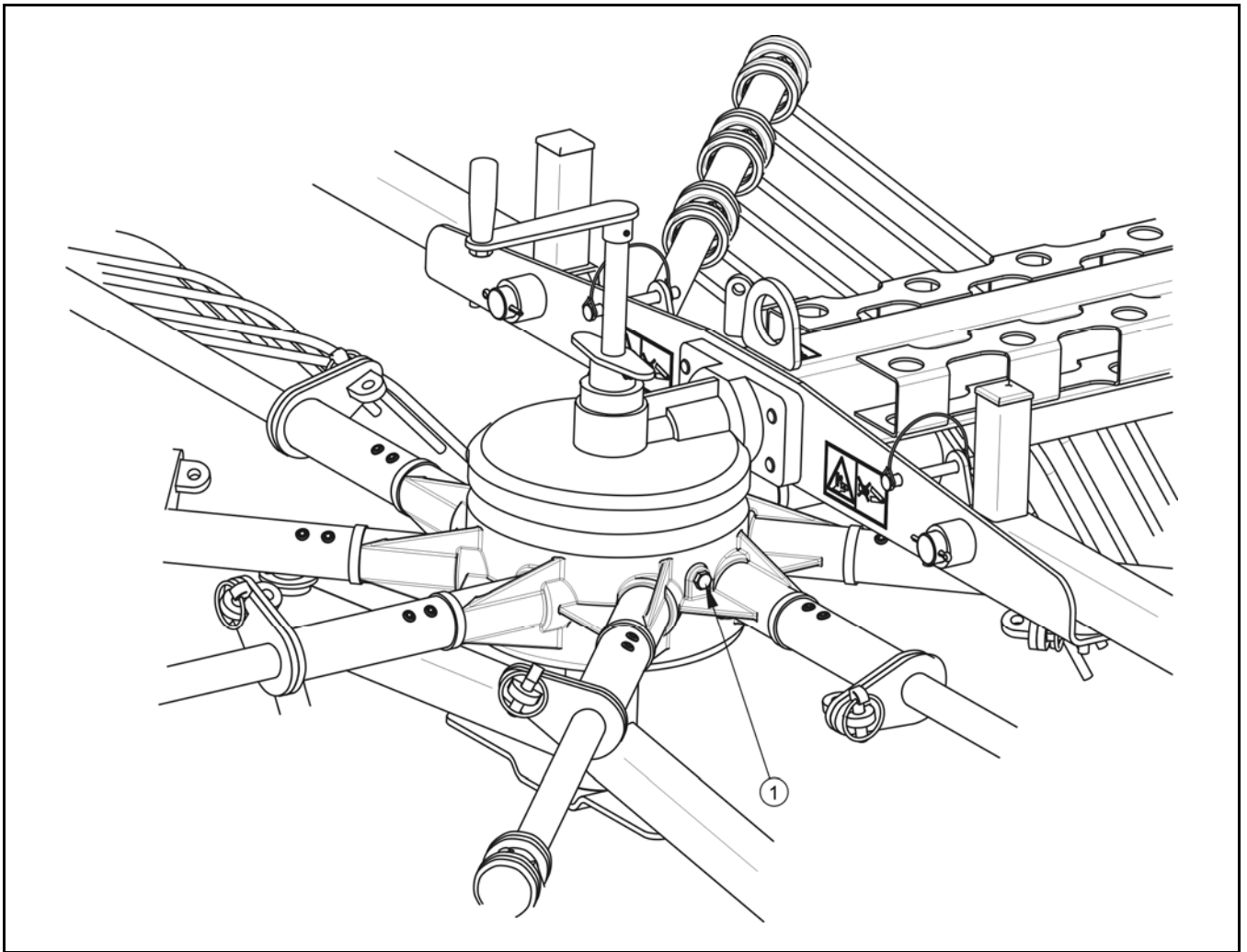


FIGURE 5.1A Changing reduction gear oil

(1) inlet plug

In order to change oil in reducer:

- set windrower on a hard surface and level the machine
- unscrew inlet plug (1),
- unscrew drain plug on lower part of reducer,
- drain oil into oil resistant tight container, container capacity should be about 4 litres,
- if oil manufacturer recommends flushing gearing system, that operation should be performed according to the guidelines of the oil manufacturer (these recommendations may be detailed on the oil packaging)
- tighten drain plug,

- add oil until oil flows out of inlet opening, tighten plug.



The first oil change should be made after 50 hours of windrower work and the next change should be after 500 hours or once a year.

During normal operation, lubrication of the entry shaft and the windrower's height regulation screw is also required – consult section "Lubrication".

If a leak is noticed, carefully inspect seals and check oil level. Work of reduction gearing with insufficient oil may cause permanent damage of the mechanism.

Repair of reduction gear during guarantee period may only be performed at specialised mechanical workshops.

5.3 STORAGE

After completion of work the carousel windrower should be carefully cleaned and washed with a water jet. While washing do not direct a strong water or steam jet at information and warning stickers or bearings. Nozzle of pressure or steam washer should be kept at a distance of not less than 30 cm from cleaned surface.

After cleaning windrower inspect the whole machine, inspect technical condition of individual elements. Used or damaged elements should be repaired or replaced.

In the event of damage to the paint coat, clean rust and dust from damaged area, degrease and then paint with undercoat and after it is dry paint with surface coat paint retaining colour uniformity and even thickness of protective coating. Until the time of repainting the damaged place may be covered with a thin layer of grease or anticorrosion preparation. Windrower should be kept in closed or roofed building.

If the windrower will not be used for a long time, it is essential to protect it from adverse weather, especially rust and accelerated tyre deterioration.

Windrower should be lubricated according to instructions provided. In the event of prolonged work stoppage, it is essential to lubricate all elements regardless of the period of the last lubrication process. Additionally before the winter period hitching system pins should be smeared with grease. The ends of the raking arms and rake mounting sleeves should be cleaned from any contamination and protected with any widely available anticorrosion agent.

Tyres should undergo conservation maintenance at least twice a year using the appropriate preparations designed for this purpose. Complete wheels and tyres should be previously carefully washed and dried. During longer storage of unused windrower it is recommended that every 2 to 3 weeks the trailer may be moved a bit so that the place of contact of tyres with ground is changed. So that tyres are not deformed and maintain proper geometry. Also tyre pressure should be inspected from time to time, and if necessary pressure should be increased to appropriate value.

5.4 LUBRICATION

Greasing of windrower shall be performed where indicated on figure (5.2A) as stipulated in table (5.1). This procedure should be performed using a hand or foot operated grease gun filled with generally available permanent grease. Before beginning greasing in so far as is possible remove old grease and other contamination. Remove excess oil or grease

Oil in reduction gearing shall be changed after the first 50 hours, and then after 500 hours or once a year of use. Detailed description of oil change and service of reduction gear is given in section 5.1 "Service of reduction gear"



During windrower use the user is obliged to observe greasing instructions according to attached schedule. Excess greasing substance causes depositing additional contaminants in places requiring greasing, therefore it is essential to keep individual machine elements clean.

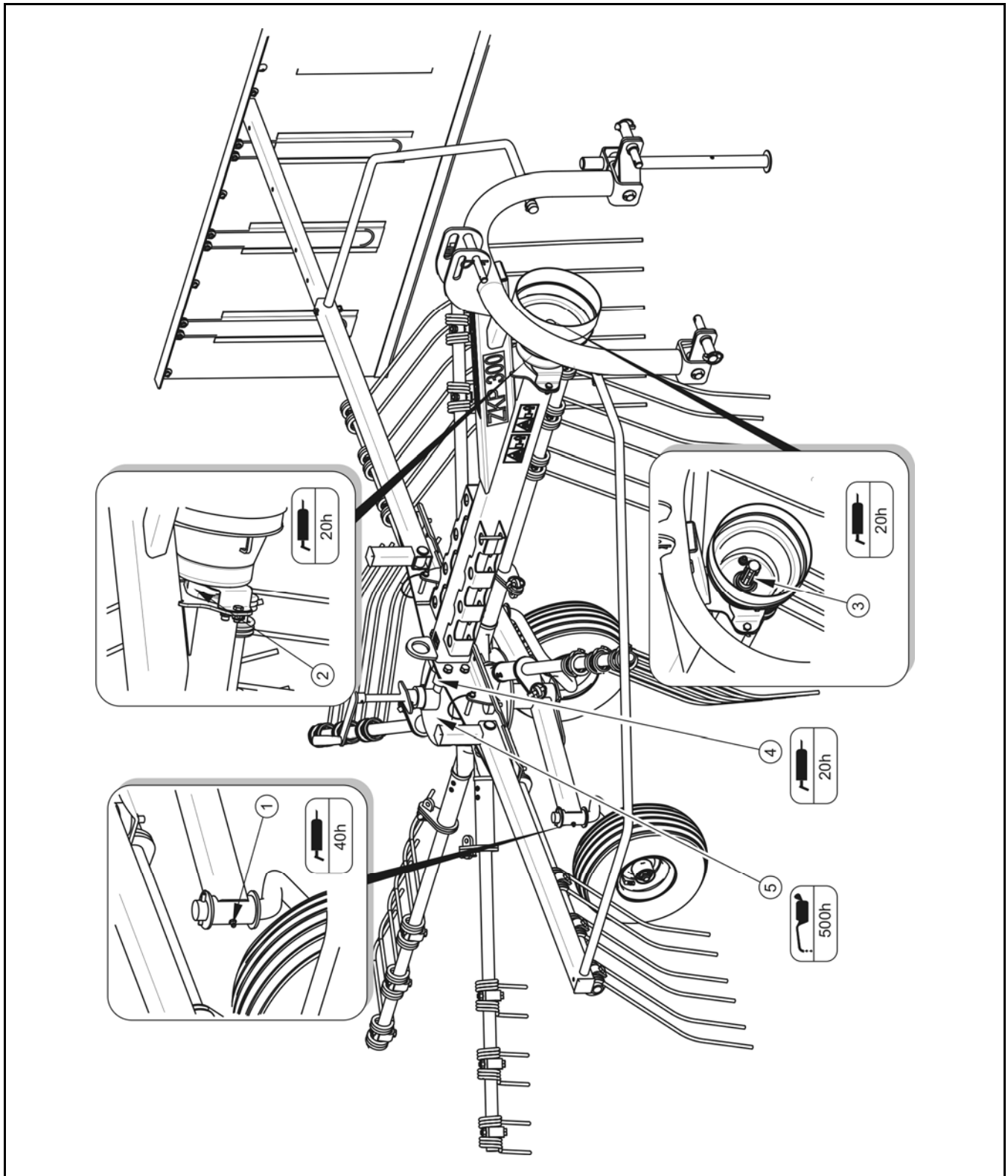


FIGURE 5.2A Windrower greasing points

TABLE 5.1 GREASING POINTS

ITEM	NAME	NUMBER OF GREASING POINTS	TYPE OF GREASE	GREASING FREQUENCY
1	Undercarriage strut arms	2	PERMANENT	40 hours
2	Shaft bearing	1	PERMANENT	20 hours
3	Multi-splined driveshaft	1	PERMANENT	20 hours
4	Reduction gear bearing	1	PERMANENT	20 hours
5	Gear:	1	OIL	500 hours
6	Regulation screw★	2	PERMANENT	60 hours
7	Pin	2	OIL	8 hours
8	Articulated telescopic shaft★★			

IMPORTANT! Marking description in column LP in table (5.1) conforms with numbering shown in figure (5.1A).

★ Apply grease to upper threaded part and the lower part of the regulation screw

★★ Greasing articulated telescopic shaft should be performed according to the instructions of manufacturer.

Detailed information on maintenance is contained in maintenance instructions attached to the shaft.

5.5 INSPECTION AND CHANGING RAKING FINGERS

In order to dismantle raking fingers:

- unscrew nut (4)
- dismantle securing angle (2) and screw (3)
- remove damaged raking finger (1) and mount new finger,
- place angle and insert screw, tighten nut to appropriate moment.

Raking fingers and their mounting should be checked while working with windrower. Damaged elements should be replaced. It is not possible to repair raking fingers.



Each day check condition of raking finger connections to arms and locking linchpins on raking arms frame in case they have fallen out

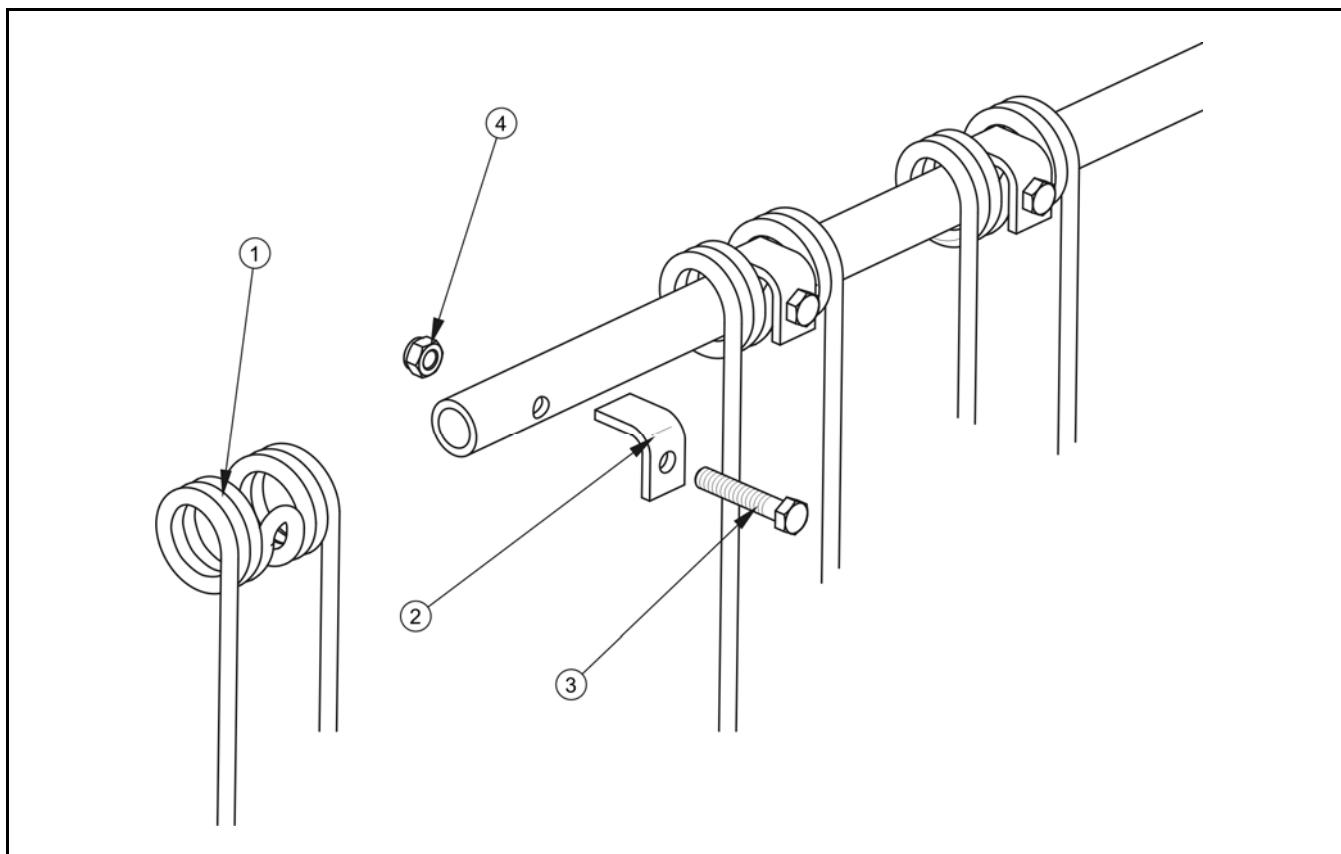


FIGURE 5.3A Changing raking fingers

(1) raking finger, (2) securing angle, (3) screw, (4) self-locking nut



DANGER

Before beginning preparation works switch of tractor engine and remove the key from the ignition and engage tractor parking brake. Ensure that unauthorised persons do not have access to the tractor.

5.6 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

Unless other tightening parameters are given, during maintenance repair work apply appropriate torque to tightening nut and bolt connections. Recommended tightening torque of most frequently applied nut and bolt connections are given in table (5.2). Given values apply to non greased steel bolts.

Detailed inspection of tightness of nut and bolt connections should be made after the first 10 hours of work, and then each time at the end of working year of windrower.

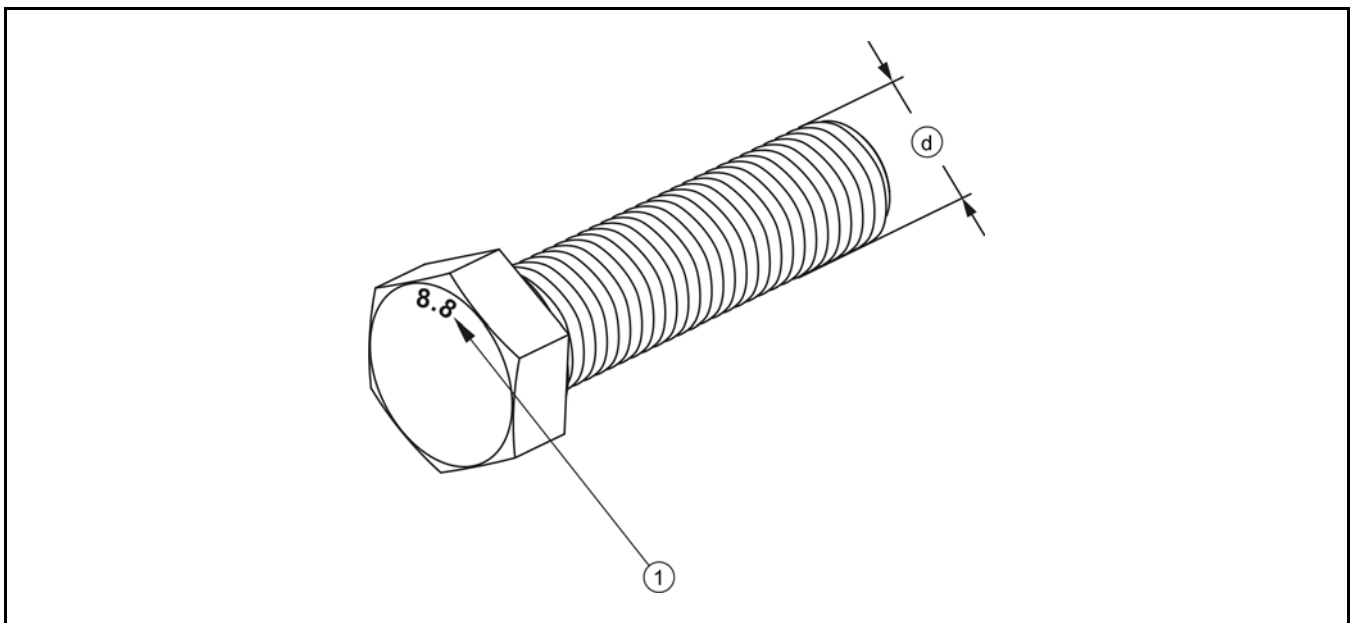


FIGURE 5.4A Bolt with metric thread

(1) bolt strength class, (d) thread diameter

TABLE 5.2 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

THREAD (d) [mm]	5.8	8.8	10.9
	M_D [Nm]		
M6	8	10	15
M8	18	25	36
M10	37	49	72
M12	64	85	125

THREAD (d) [mm]	5.8	8.8	10.9
	M _D [Nm]		
M14	100	135	200
M16	160	210	310
M20	300	425	610
M24	530	730	1 050
M27	820	1 150	1 650
M30	1 050	1 450	2 100

(M_D) – tightening torque, (d) thread diameter

NOTES

This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



