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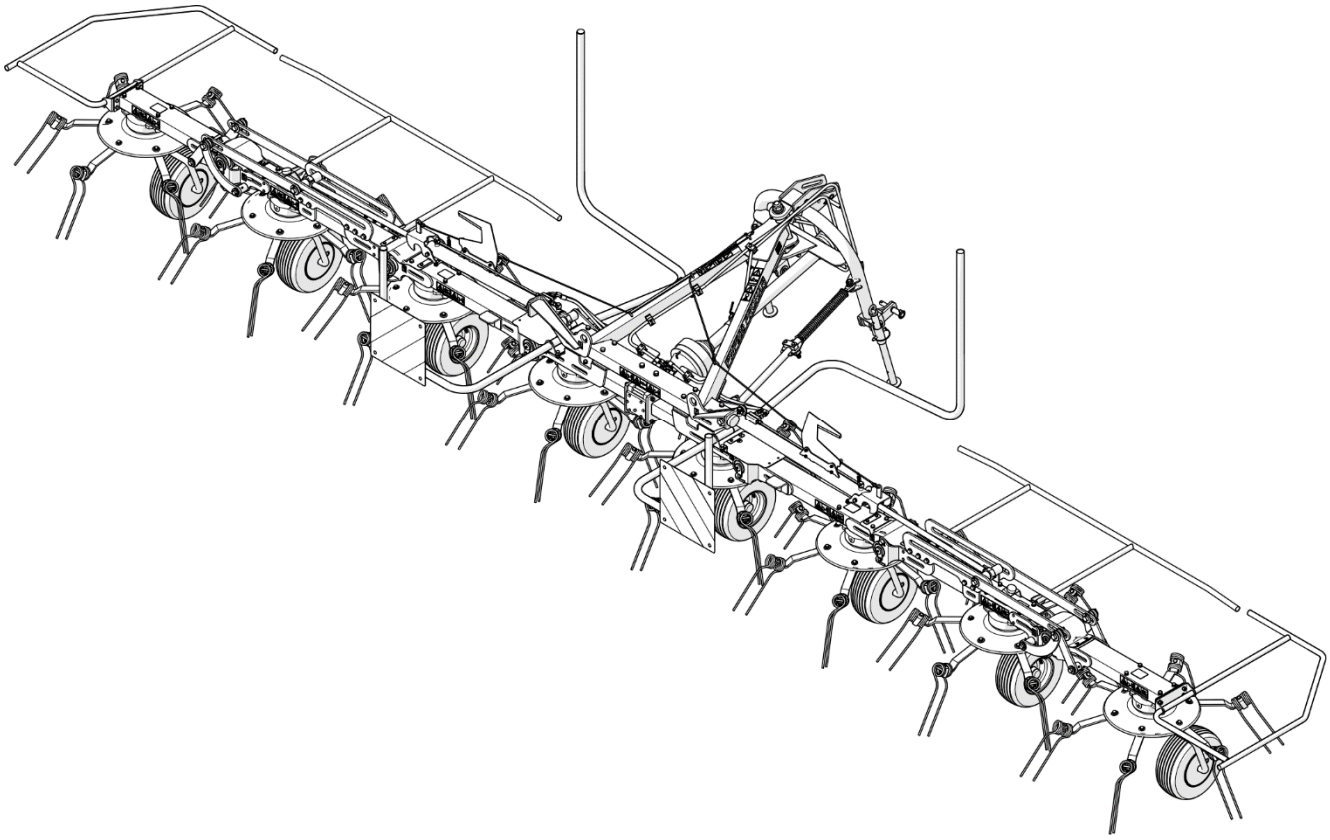
OPERATOR`S MANUAL

ROTARY TEDDER

PRONAR PWP900

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 2A-06-2017

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EN

ROTARY TEDDER

PRONAR PWP900

MACHINE IDENTIFICATION

SYMBOL /TYPE:

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 this Operator's Manual.

This Operator's Manual is an integral part of the machine's documentation. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures failure-free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety rules and operation of PWP900 rotary tedder. If the information stated in the Operator's Manual 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:

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SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

Information, descriptions of danger and precautions and also recommendations and prohibitions 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 by the word **"ATTENTION".** Failure to observe the instructions may lead to damage to the machine as a result of improper operation, adjustment or use.

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

Additional tips and advice for machine operation are marked with the sign:

and also preceded by the word **"TIP".**

DIRECTIONS USED IN THIS OPERATOR'S MANUAL

Left side – side to the left hand of the operator facing in the direction of machine's forward travel.
Right side – side to the right hand of the operator facing in the direction of machine's forward travel.

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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 Tedder**
Type:	**PWP900**
Model:	–
Serial number:	
Commercial name:	**Rotary Tedder PRONAR PWP900**

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.

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Członek Zarządu
Roman Kapelianiuk

Narew, the 2017-08-31

Place and date

Full name of the empowered person position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

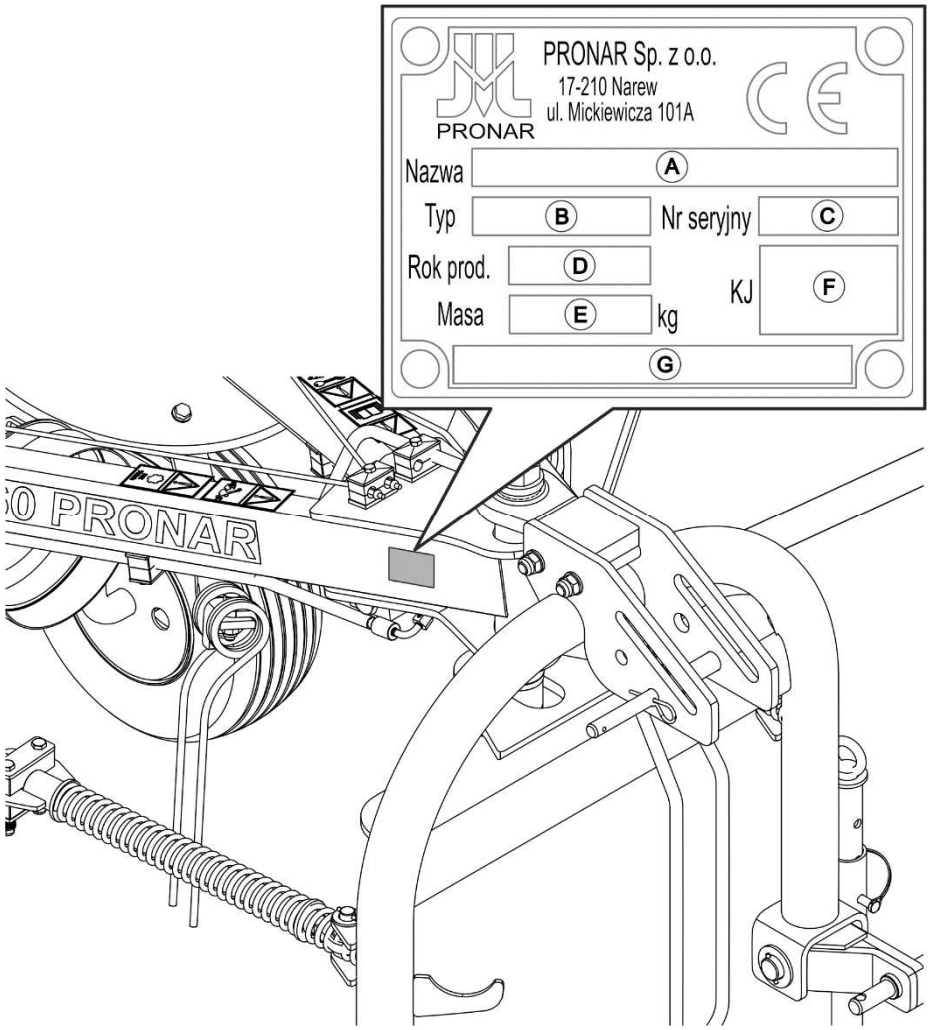


FIGURE 1.1 Location of the data plate.

PWP900 rotary tedder is marked with a data plate placed on the right side of machine's carrying frame (FIGURE 1.1). When buying the machine check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*.

The meanings of the individual fields found on the data plate (FIGURE 1.1) are presented in the table below:

A - machine name, B - machine type/symbol

C – serial number, D – year of manufacture,

E – gross weight [kg], F – Quality control stamp,

G – machine name, name extension

1.2 PURPOSE

PRONAR PWP900 rotary tedder is designed according to current safety requirements and engineering standards.

Rotary tedder is designed for agricultural work: tedding cut swaths (straw, grass, hay) on stone-free grassland with a level surface. Do NOT use the machine for any other purpose.

Transporting people, animals or other materials is prohibited and regarded as contrary to the intended purpose. During the use of the machine comply with all road traffic regulations and transport regulations in force in the given country, and any breach of these regulations is regarded by the Manufacturer as use contrary to its intended purpose.

ATTENTION

The rotary tedder must not be used for purposes other than those for which it is intended, in particular:

- **for transporting people and animals,**
- **for transport of whatever materials or objects.**

Using it as intended involves all actions connected with the safe and proper operation and maintenance of the machine. Due to the above, the user is obliged to:

- carefully read the *OPERATOR'S MANUAL* and comply with its recommendations,
- understand the machine's operating principle and how to operate it safely and correctly,
- adhere to the established maintenance and adjustment plans,
- comply with general safety regulations while working,
- prevent accidents,
- comply with the road traffic regulations and transport regulations in force in a given country, in which the machine is used,
- carefully read the operator's manuals for the tractor and the PTO shaft and adhere to the recommendations contained in these documents.

TABLE 1.1 Requirements for agricultural tractor

CONTENTS	UNIT	REQUIREMENTS
Tractor's three-point linkage		Rear three-point linkage of category I or II according to ISO 730-1 standard
Rear power take-off shaft (PTO)		
Type	-	Type 1 (1 3/8”) acc. to ISO 730-1
Rotation speed	rpm	540
Number of splines on PTO shaft	pc.	6
Rotation direction	-	clockwise
Overload protection of PTO shaft	-	1200 Nm coupling
The tractor's hydraulic outlets are required	-	1 double acting section
Other requirements		
Minimum power demand	hp / /kW	70 / 51

The machine may only be used by persons, who:

- are familiar with the contents of this publication and with the contents of the agricultural tractor Operator's Manual,
- have been trained in the rotary tedder operation and work safety,
- have the required authorisation to drive and are familiar with the road traffic regulations and transport regulations.

Repairs to the machine shall only be made by qualified personnel (in the warranty period all repairs must be performed in the warranty service, indicated by the Manufacturer). Maintenance and repairs that can be performed by the user are described in *SECTION 5*.
Do NOT perform unauthorised repairs and modifications to the tedder as this shall be treated by the Manufacturer as misusing the machine.

1.3 EQUIPMENT

TABLE 1.2 Equipment of PRONAR PWP900 rotary tedder

EQUIPMENT	STANDARD	OPTION
Operator's Manual	•	
Warranty book	•	
PTO shaft	•	

Recommended PTO shafts:

- 7102131CE007159 B&P,
- 1620-6200-131-04 Weasler,
- T401310ENC12U44 Comer.

1.4 WARRANTY TERMS

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*. Defects discovered during the warranty period will be removed by the Warranty Service. The repair period is specified in the Warranty Book.

The warranty 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, road accidents,

- inappropriate use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,
- use of damaged machine,
- repairs carried out by unauthorised persons, repairs carried out improperly,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

TIP

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

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. For detailed Terms & Conditions of Warranty, please refer to the WARRANTY BOOK attached to each machine.

Modification of the machine without the written consent of the Manufacturer is forbidden. In particular, do NOT weld, drill holes in, cut or heat the main structural elements of the machine, which have a direct impact on the machine operation safety.

1.5 TRANSPORT

The rotary tedder is ready for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra fittings.

ATTENTION

Before transporting independently, the tractor driver must carefully read this Operator's Manual and observe its recommendations. When being transported on a motor vehicle the tedder 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. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.

Delivery is either by transport on a vehicle or independently. Transport of the tedder is permissible connected to a tractor provided that the tractor's driver familiarises himself with the machine's Operator's Manual and particularly with information concerning safety and

principles of connection and transport of the tedder on public roads. Do NOT drive the tractor with the rotary tedder connected when visibility is limited.

When loading and unloading the tedder, 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 tedder should be attached to lifting equipment in places designed for this purpose (FIGURE 1.2), i.e. to transport lugs (4) and central connection pin (5). Securing point is marked with information decal. During reloading and transport, the tedder should be set in working position, i.e. the right (1) and left (2) modules of the tedder and it supports (3) should be lowered. In the event that cable or strap of transloading equipment may be caught by protruding machine elements placed in transport position, dismantle them. When raising the tedder take particular care due to the possibility of tipping over the machine and the risk of injuries from protruding machine parts.

ATTENTION

Do NOT secure lifting slings or any types of securing elements to hydraulic cylinders.

TIP

During loading, the rotary tedder should be set in working position (FIGURE 1.2).

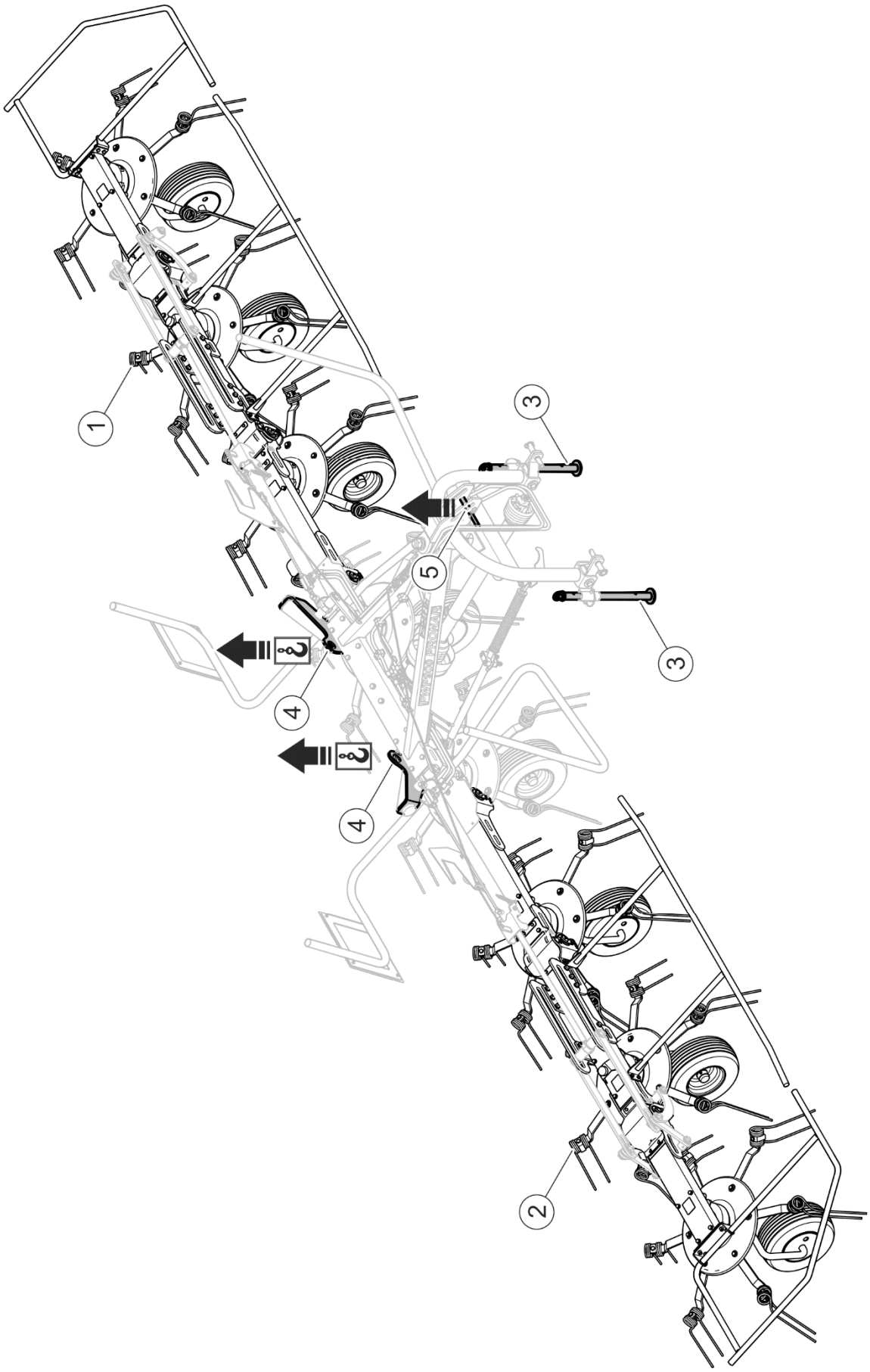


FIGURE 1.2 Working position and attachment points of the rotary tedder during loading.

(1)- right modules of the rotary tedder; (2)- left modules of the rotary tedder; (3)- supports; (4)- transport lug; (5)- central connection fixing pin.

The machine should be firmly fastened on the transportation platform with strips or chains equipped with a tensioning mechanism. The fastening equipment used must have a valid safety certificate. Chocks or other objects without sharp edges should be placed under the wheels of the tedder to prevent it from rolling. The chocks must be fixed to the platform of the vehicle. Exercise due caution when lifting the machine. During reloading work, particular care should be taken not to damage parts of the tedder's fittings or the paint coat.

ATTENTION

Nobody may be in the maneuvering zone when moving the rotary tedder to other means of transport.

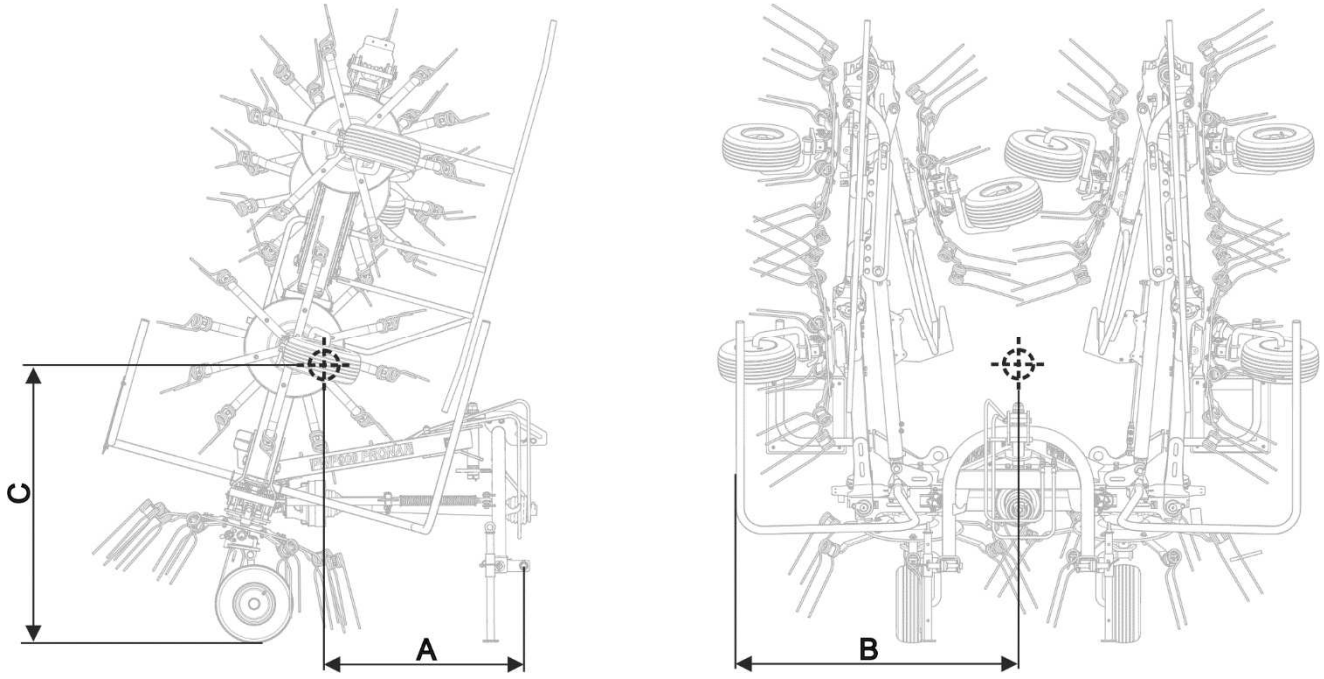


FIGURE 1.3 Location of centre of gravity of the rotary tedder in transport position.

TABLE 1.3 Centre of gravity.

Dimension (FIGURE 1.3)	Unit	PWP900
A	mm	1040
B	mm	1497
C	mm	1620

1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak 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 contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil contaminations, 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 loss of its properties should be stored in its original packaging in the conditions described above.

1.7 WITHDRAWAL FROM USE

In the event of decision by the user to withdraw the machine from use, comply with the regulations in force in the given country concerning withdrawal from use and recycling of machines withdrawn from use.

Before proceeding to dismantle equipment, oil shall be completely removed from hydraulic system and transmission. Locations of drain plugs and method for draining oil are described in section 5.

When spare parts are changed, worn out or damaged parts should be taken to a collection point for recyclable raw materials. Used oil and also rubber and plastic elements should be taken to the appropriate facilities dealing with the recycling of this type of waste.

ATTENTION

During dismantling, personal protection equipment shall be used i.e. protective clothing, boots, gloves and protective goggles etc.

Avoid contact of skin with oil. Do not allow used oil to spill.

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 USE OF MACHINE

- Before using the machine, the user must carefully read this Operator's Manual and the *WARRANTY BOOK*. When operating the machine, the operator must comply with all recommendations contained in the Operator's Manual.
- The tedder may only be used and operated by the persons authorized to drive agricultural tractors and trained in the machine operation. The rotary tedder can be operated by a single person only.
- If the information in this Operator's Manual is difficult to understand, contact the dealer, who runs an manufacturer authorised service, or contact the manufacturer directly.
- Careless and incorrect use and operation of the machine, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- Be aware of the existence of residual risk, and for this reason the fundamental basis for using this machine should be the application of safety rules and sensible behaviour.
- The machine must never be used by persons who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol, drugs or other abusive substances.
- Non-compliance with the safety rules of this Operator’s Manual can be dangerous to the health and life of the operator and others.
- The machine 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 for himself for any consequences of this use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the guarantee.
- The machine 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.

2.1.2 HITCHING AND UNHITCHING FROM CARRYING VEHICLE

- Before hitching the machine to the tractor, check the technical condition of the hitching system of the machine and the tractor.
- Do not hitch the machine to the tractor when the linkage systems of the machine and the tractor are not compatible.
- Only the tractor's rear three point linkage may be used for hitching the machine to the tractor. After hitching the machine, check the safeguards. Carefully read the tractor Operator's Manual.
- To hitch the machine to tractor use only genuine pins and safeguards.
- The tractor to which the tedder will be hitched must be technically reliable and must fulfil the requirements specified by the tedder Manufacturer.
- Be especially careful when hitching the machine.
- When hitching, there must be nobody between the tedder and the tractor.
- Do NOT unhitch the tedder from the tractor when the tedder is not supported on wheels and parking stands. Exercise caution when unhitching the machine.
- Hitching and unhitching may be performed only when the machine's drive and the tractor's engine are turned off and the tractor is immobilised.
- The tedder unhitched from tractor must be supported on stable and level ground using supports and secured against rolling away with wheel chocks or other elements without sharp edges.

2.1.3 HYDRAULIC SYSTEM

- The hydraulic system is under high pressure when operating.
- Regularly check the technical condition of the connections and the hydraulic lines. There must be no oil leaks.
- In the event of the hydraulic system malfunction, discontinue using the machine until the malfunction is corrected.
- When connecting or disconnecting the hydraulic conduit to the tractor's hydraulic quick coupler, make sure that the tractor's hydraulic system is not under pressure. If necessary, reduce residual pressure in the system.

- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may find its way under the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. In the event of contact of oil with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).
- Use the hydraulic oil recommended by the Manufacturer. Never mix two types of oil.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

2.1.4 TRANSPORTING THE MACHINE

- When driving on public roads, comply with the road traffic regulations in force in the country in which the machine is used.
- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust travel speed to the prevailing road conditions and other limitations arising from road traffic regulations limits.
- Before beginning travel, the tedder must be placed in transport position and raised using the rear three-point linkage system.
- When preparing the tedder to transport, check if the mechanical interlocks of the tipping cylinders are properly engaged and if the hydraulic valve of these cylinders is in CLOSED position.
- Do NOT leave the tedder raised while the tractor is parked. When parked, the tedder should be lowered.
- The tedder transported on the tractor must not be set in its working position.
- The tedder may not be used or transported in conditions of limited visibility.
- Do NOT ride on the machine or transport any materials on it.

- Before using the machine always check its technical condition, especially in terms of safety. In particular, check the technical condition of the linkage and connection elements of the hydraulic system.
- Do NOT leave tractor driver's seat when the tractor is moving.
- Reckless driving and excessive speed may cause accidents.

2.1.5 MAINTENANCE

- During the warranty period, any repairs may only be carried out by Service authorised by the manufacturer. It is recommended that necessary repairs to machine should be undertaken by specialised workshops.
- In the event of any fault or damage, do not use the machine until the fault has been corrected. The machine must not be used when not in working order.
- During work use the proper, close-fitting protective clothing, gloves and appropriate tools. When working on hydraulic systems it is recommended to use oil resistant gloves and protective goggles.
- Any modification to the machine frees the manufacturer from any responsibility for damage or detriment to health which may arise as a result.
- Before undertaking any work on the machine, switch off the tractor engine and wait until all rotating parts of the machine come to a stop.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.
- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Do NOT perform service or repair work under raised and unsupported machine.
- Before beginning repair works on hydraulic systems, reduce oil pressure.
- 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. Immobilise the tractor with the

parking brake. Ensure that unauthorised persons do not have access to the tractor cab.

- Should it be necessary to change individual parts, use only original parts. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine and invalidate the warranty.
- Regularly check technical condition and mounting of all guards and protective elements.
- In the event of work requiring the tedder to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After lifting the machine, stable and durable supports must also be used. Do NOT carry out work under a machine, which has been raised only with the three point linkage.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- In order to reduce the danger of fire the machine must be kept in a clean condition.
  - When working on the tyres, chocks or other objects without sharp edges should be placed under the wheels of the tedder 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 appropriate tools.
  - Check the tyre pressure regularly.
  - The paint coating should be removed 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 tedder must be disconnected from the tractor before commencing electric welding.

2.1.6 ROTARY TEDDER OPERATION

- Before each use of the tedder check its technical condition. In particular check the technical condition of the hitching system, drive system, mounting of arms, tedding springtines and protective guards.

- The machine must not be used when not in working order.
- Set the tedder in working position before starting the tedder's drive.
- During tedding use the correct working position.
- When tedding on the edges of streets, public roads, on stony ground there is a risk that thrown out stones and foreign bodies may pose a risk to bystanders and other vehicle passing by.
- Before starting the tedder make sure that there are no bystanders (especially children) or animals in the danger zone (the area with a radius of up to 50 m from the tedder). The machine operator is obliged to ensure proper visibility of the machine and the working area.
- During tedder operation, do NOT exceed the PTO speed of 540 rpm. Do NOT overload shaft and tedder and also engage the clutch suddenly. Before starting the tedder drive, make certain that the PTO rotation direction is correct.
- Do NOT leave the tractor cab, when the machine drive is engaged.
- Do NOT stand within the rotary tedder's working zone.
- Do NOT operate the rotary tedder while reversing. While reversing and during turns, the tedder drive must be disengaged.
- While tedding apply working speed recommendations.

2.1.7 OPERATION OF PTO SHAFT

- While reversing and during turns, the PTO drive must be disengaged.
- The machine may only be connected to the tractor by appropriately selected PTO shaft recommended by the Manufacturer.
- Adjust the length of PTO shaft to compatible tractor according to the Operator's Manual of PTO shaft.
- The PTO shaft has markings on the casing, indicating which end of the shaft shall be connected to the tractor.
- Never use a damaged PTO 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 tedder 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 tedder structure.
- Do NOT use the securing chains to support the shaft while machine is parked or when transporting the machine.
- Before using the machine, the user should thoroughly acquaint himself with the PTO shaft Operator's Manual and adhere to the recommendations contained in it.
- The drive shaft 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 tedder.
- Before starting PTO shaft make certain that the PTO rotation direction is correct.
- Before disconnecting the shaft, turn off the tractor engine and remove the key from the ignition.
- Do NOT wear loose clothing, straps or whatever that may become wrapped round the rotating drive shaft. Contact with rotating PTO shaft may cause severe injuries.
- Do NOT go over and under the shaft or stand on it equally during work as also when the machine is parked.

2.2 RESIDUAL RISK

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

- using the machine for purposes other than those for which it is intended,
- being between the tractor and the machine while the engine is running and when the machine is being attached,
- being on the machine while the engine is running,
- operating the machine with removed or faulty safety guards,
- not maintaining safe distance from the danger zone or being within the zones while the machine is operating,
- operation of the machine by persons under the influence of alcohol,
- cleaning, maintenance and technical checks when tractor is connected and engine is running,
- using unreliable PTO shaft,

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

- operate the machine in prudent and unhurried manner,
- reasonably apply all the remarks and recommendations stated in the Operator's Manual,
- carry out repair and maintenance work in line with operating safety rules,
- carrying out repair and maintenance work by persons trained to do so,
- use close fitting protective clothing,
- ensure unauthorised persons have no access to the machine, especially children,
- maintain a safe distance from forbidden or dangerous places
- do not climb on the machine when it is operating

2.3 INFORMATION AND WARNING DECALS

The rotary tedder is marked with the information and warning decals specified in Table 2.1. 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 machine are clear and legible. In the event of their destruction, they must be replaced with new ones. Safety decals are available from your PRONAR dealer or directly from PRONAR customer service. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During machine cleaning do not use solvents which may damage the coating of information label stickers and do not subject them to strong water jets.

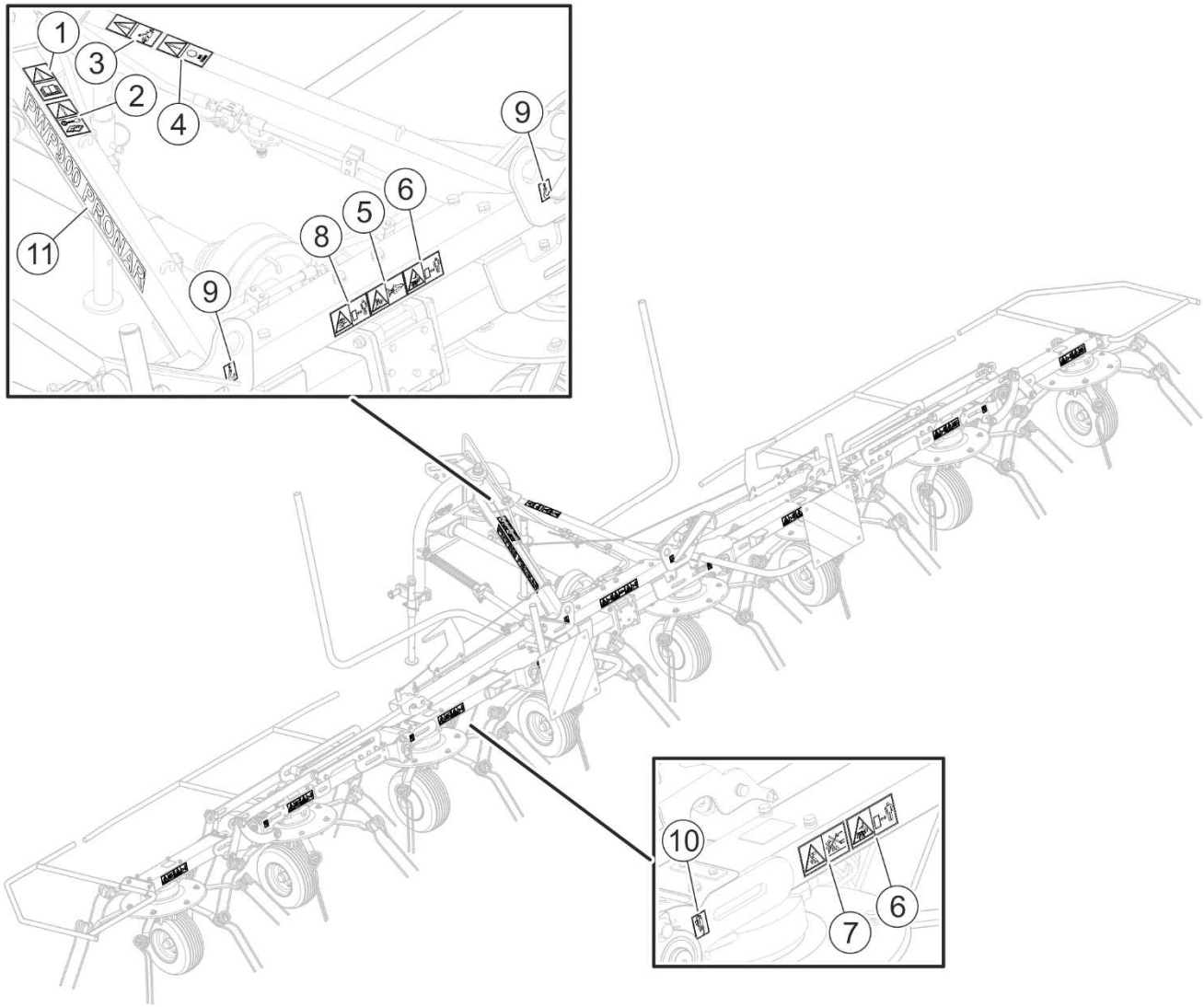
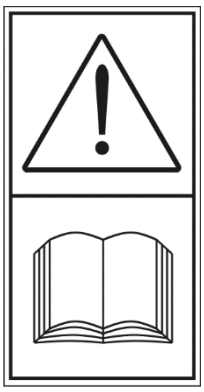
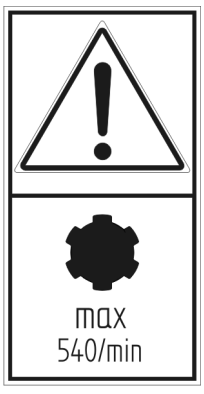
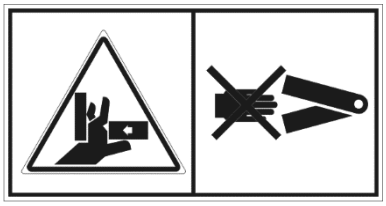
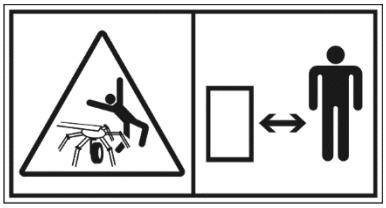
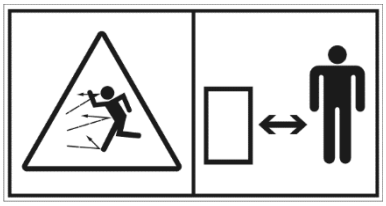


FIGURE 2.1 Locations of information and warning decals.

Meaning of decals (TABLE 2.1)

TABLE 2.1 Information and warning decals

ITEM	DECAL	MEANING
1		Before starting work, carefully read the Operator's Manual.
2		Before beginning servicing or repairs, turn off engine and remove key from ignition
3		Danger associated with the rotating PTO shaft.
4		Maximum allowable PTO shaft rotation speed is 540 rpm.

ITEM	DECAL	MEANING
5		Do not reach into crushing space because elements may move. Danger of crushing hands or fingers
6		Danger of being struck by rotating elements of the machine. Keep a safe distance from raking assembly.
7		Risk of injury when machine is being arranged in transport or working position.
8		Thrown out objects endanger the whole body. Keep a safe distance from machine when tedder is in operation.
9		Transport lug points marking.
10		Lubrication points
11	**PWP900 PRONAR**	Machine type

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 BASIC TECHNICAL DATA

	Unit	**PWP900**
Dimensions		
Total length	mm	2400
Width in working setting	mm	9450
Width in transport setting	mm	2995
Height in working setting	mm	1720
Height in transport setting	mm	3900*
Technical specification		
Number of rotors	szt.	8
Number of working arms on a rotor	szt.	6
Working width	mm	9000
Minimum tractor power demand	hp/kW	70/51
Maximum PTO speed	rpm	540
Tare weight	kg	1200
Type of central transmission	-	wet (in oil bath)
Type of rotor transmission	-	maintenance free (lubricated with grease)
Type of mounting attachment	-	active, shock absorbing
Tyres		
Tyre	-	16 x 6.5 – 8 (6PR)
Air pressure in the tyres	kPa	200
Other information		
Adjustment of rotor inclination	-	Manual adjustment, each wheel adjusted separately within the range of 13°-19°
Limited tedding (to prevent tedding to a neighbouring field)	-	After manual setting of wheels (each wheel adjusted separately)
Rising the rotors to transport position	-	Hydraulic
Ground surface tracking: Frame tipping module 2 (internal) - up - down Frame tipping module 3 (central) - up - down Frame tipping module 4 (external) - up - down	 - - - - - -	 up to 30° up to 6° up to 6° up to 4° up to 30° up to 4°

*- height of the lower links axis from the ground ~ 850 mm

3.2 DESIGN AND OPERATION

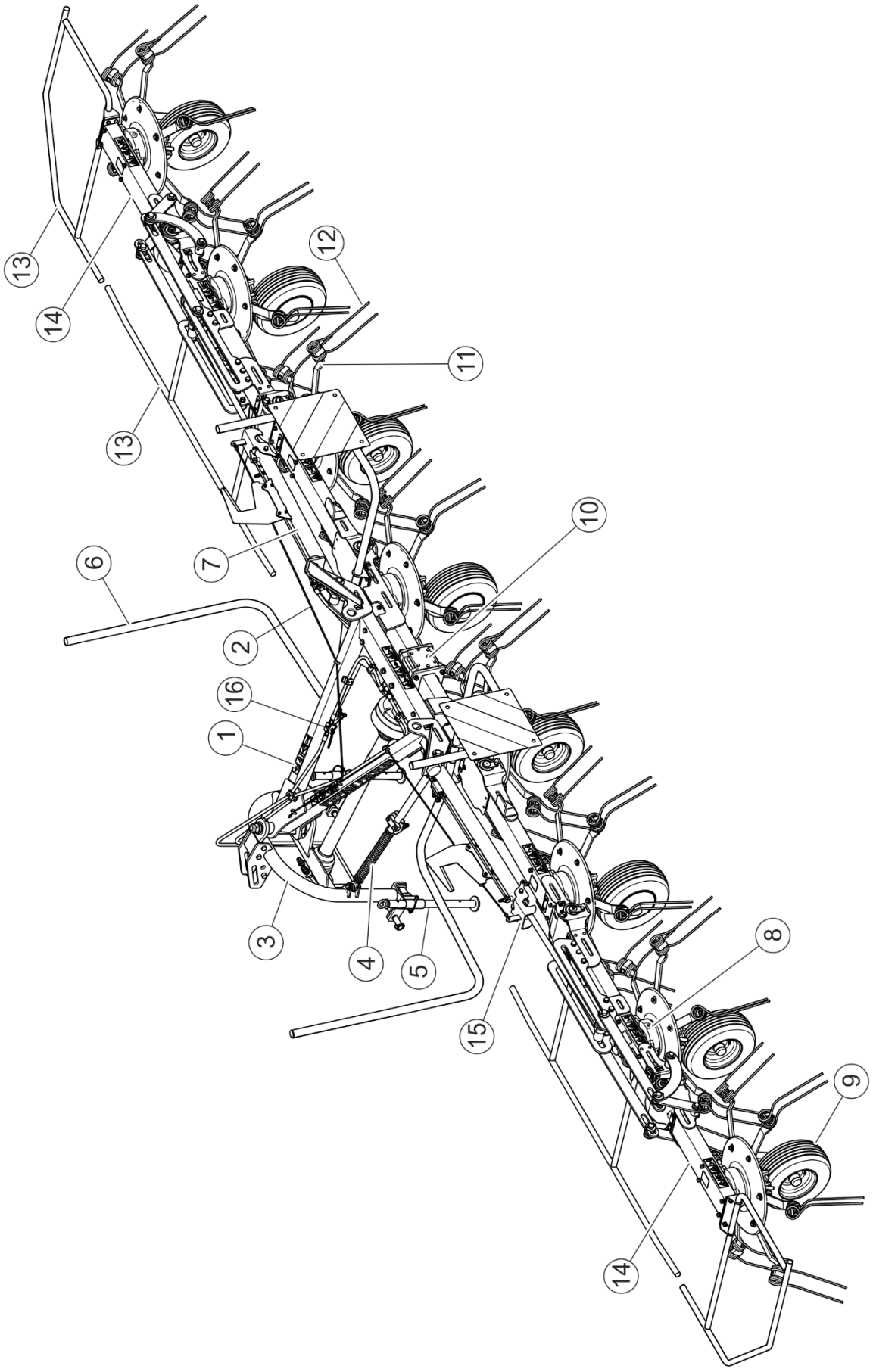


FIGURE 3.1 General design

(1) bearing frame, (2) releasing cable, (3) linkage system, (4) shock absorbers, (5) support, (6), vertical protection arm (7) hydraulic tipping cylinder, (8) rotor transmission, (9) wheel, (10) main transmission, (11) rotor working arm, (12) spring tines, (13) horizontal protection arm, (14) bearing frame tipping modules, (15) mechanical lock, (16) tipping cylinders hydraulic locking valve.

The rotary tedder design is shown in FIGURE 3.1. The main subassembly of the machine is the bearing frame (1) connected through the machine's hitching system (3) to the tractor's three point linkage of category I or II. The bearing frame is protected against mechanical shocks by two shock absorbers (4) placed between the frame and the hitching system. In the central part of the bearing frame there is the main transmission (10) of the working assemblies, which drives the transmissions of the rotors through the drive shafts placed in the frame.

The main transmission (10) is driven by the tractor's PTO shaft. The rotary tedder is equipped with eight backward acting rotors seated on running wheels (9). The six rotors are mounted on the bearing frame tipping modules (14) that enable optimal ground surface tracking. They are raised and lowered using the hydraulic tipping cylinders (7) and locked in transport position using the mechanical lock (15). The mechanical lock is released by pulling the release cable (2). Hydraulic cylinders are operated with the aid of the tractor's hydraulic system. Each of the rotors has six working arms (11). Each of the arms is equipped with one pair of spring tines (12) for tedding the swath. They are mounted on the arm with the aid of securing elements, which prevent fingers from sliding or rotating.

3.3 HITCHING SYSTEM

The rotary tedder is mounted on the tractor using the hitching system integrated with the machine's bearing frame. FIGURE 3.2 shows detailed mounting structure.

The rotary tedder is adapted to agricultural tractors equipped with three point linkage 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 is common, designed for securing the upper suspension point irrespective of three point linkage category. The upper pin may be placed in one of the three available sockets.(A), (B) or (C).

The upper mounting frame is secured to the hitching assembly by the aid of a ball and socket joint (10). In the lower part of the frame mounting there is a sleeve (11), which moves in a

profiled socket. Frame vibrations are absorbed by spring absorbers located on both left and right side of the rotary tedder.

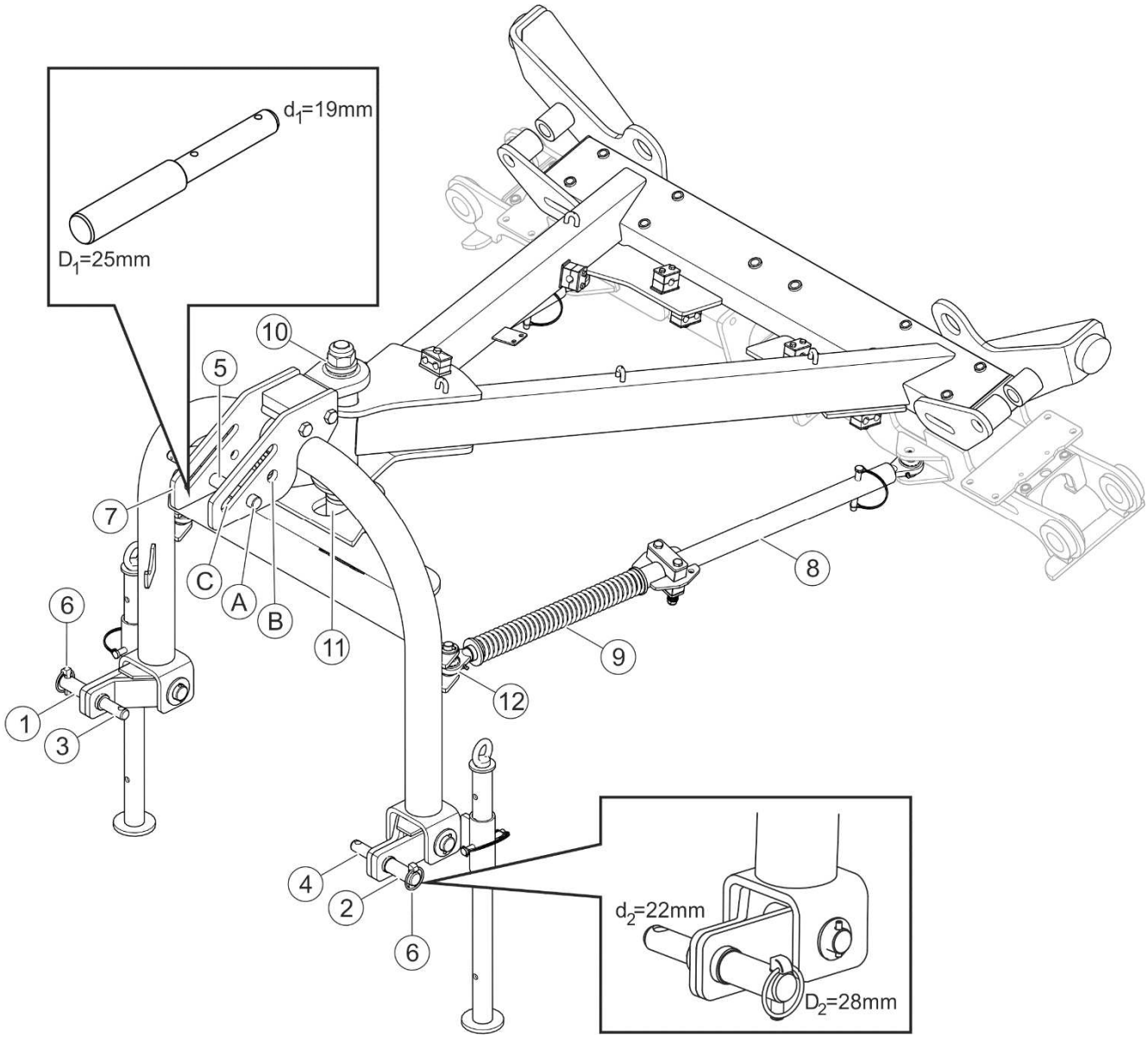


FIGURE 3.2 Hitching system

(1), (2) lower securing pins (three point linkage – category II), (3), (4) lower securing pins (three point linkage – category I), (5) upper securing pin, (6), (7) locking linchpins, (8) shock absorber bar, (9) absorber spring, (10) ball-and-socket joint, (11) sleeve, (12) absorber joints, (A), (B), (C) upper pin securing socket.

3.4 OPERATING PRINCIPLE

The rotary tedder is equipped with main transmission (2) (FIGURE 3.3) driven by the tractor PTO through PTO shaft (1). Torque is transferred through the transfer shafts placed on the frame to individual tedder rotors (3) placed along the bearing frame. The rotor design assures backward rotation of individual rotors, which enables the rotation of neighbouring arms without interference and even spread of the tedded material.

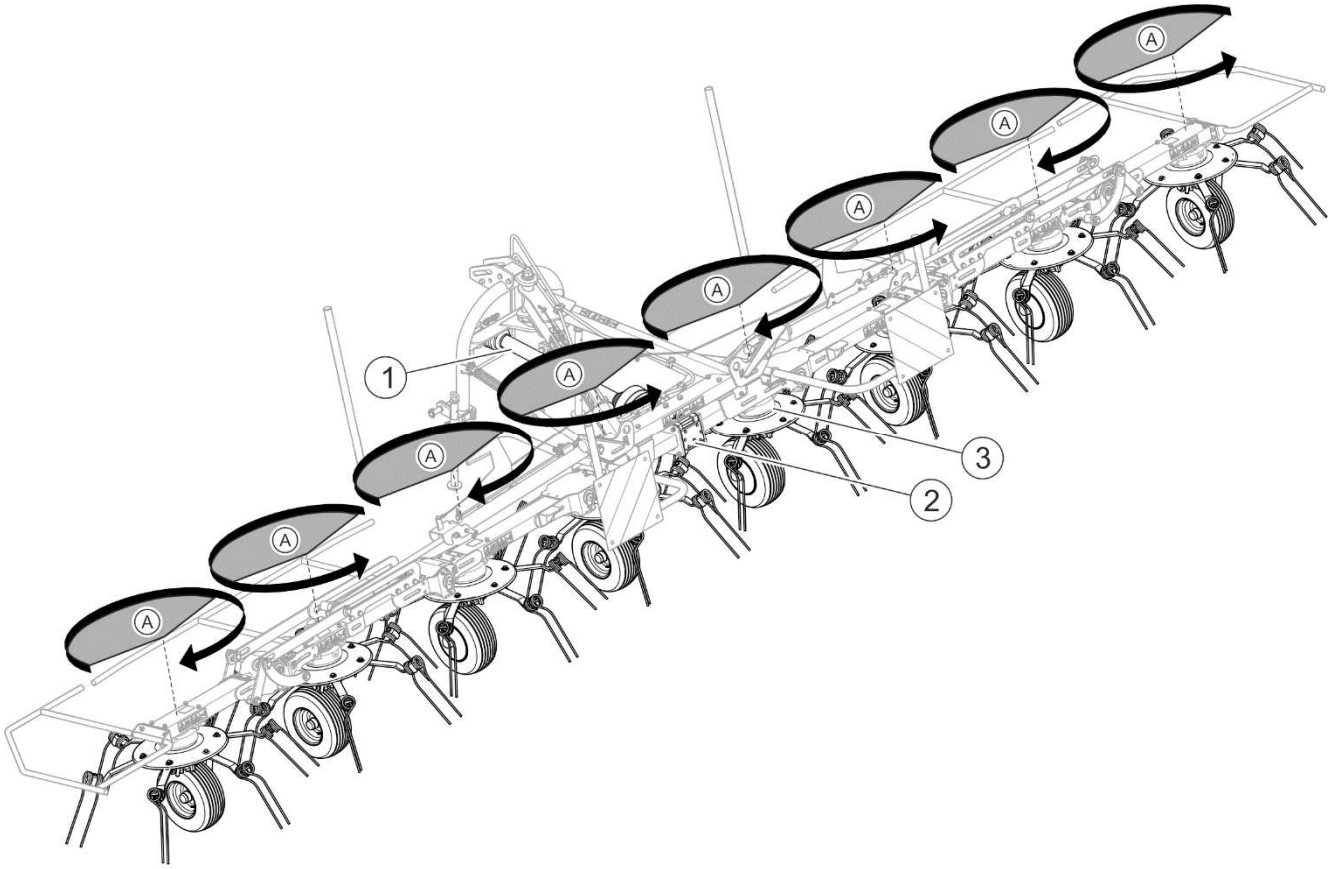


FIGURE 3.3 Tedding operation principle

(1) PTO shaft; (2) main transmission; (3) rotor; (A) swath tedding phase

SECTION

4

CORRECT USE

4.1 PREPARING FOR WORK

The manufacturer guarantees that the machine is fully operational and has been checked according to quality control procedures and is ready for 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 completely assembled.

ATTENTION

Before each use of the tedder check its technical condition. In particular, check the technical condition of hitching system, axle system, drive system, completeness of frames, safety guards and tedding system and mounting of spring tines.

Before hitching to tractor, the operator must check the technical condition of the tedder and prepare it for test start-up. In order to do this:

- the user must carefully read this Operator's Manual and observe all recommendations, understand the design and the principle of machine operation
- check the condition of protective paint coat,
- inspect machine's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components),
- Check all the lubrication points, lubricate the machine according to recommendations provided in section *5 "MAINTENANCE'"*,

ATTENTION

Before beginning work lubricate all lubrication points.

- check technical condition of the hydraulic system;
- check technical condition of tyres and tyre pressure.
- check if wheel and rocker mounting is correct,
- check if mounting of springtines, tedding arms and protective guards is correct,
- check technical condition of hitching system pins and locking cotter pins,
- check lubricating oil level in main transmission.

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

- hitch the tedder to tractor (see Section 4.2 *„HITCHING THE ROTARY TEDDER TO AGRICULTURAL TRACTOR”*)
- lower the right and left tipping modules of the frame from transport position to working position, level the tedder's rotors using the three point linkage so that spring tines do not touch the ground,
- start PTO drive.

DANGER

Never exceed the PTO's rotational speed of 540 rpm. Otherwise, the rotary tedder may get damaged.

Engage the tedder's drive for several minutes and check the following:

- that there is no knocking or noise in the drive system arising from scraping or grinding of metal elements,
- correct rotation of tedding system.

The tedder's operation at no load should be smooth. Shaking of tedding mechanism and whole machine is not acceptable, nor is changed noise and vibrations coming from loose nut and bolt connections. After stopping tedder check the mounting of tedding springtines and rotor arms. Check that the gear oil does not leak from the main transmission.

DANGER

Before using the tedder, the user must carefully read this operator's manual.

Careless and incorrect use and operation of the tedder, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.

The tedder 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-compliance with the safety rules of this Operator’s Manual can be dangerous to the health and life of the operator and others.

Before starting the tedder, 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 warranty, please contact retailer for additional clarifications.

4.2 HITCHING THE ROTARY TEDDER TO AGRICULTURAL TRACTOR

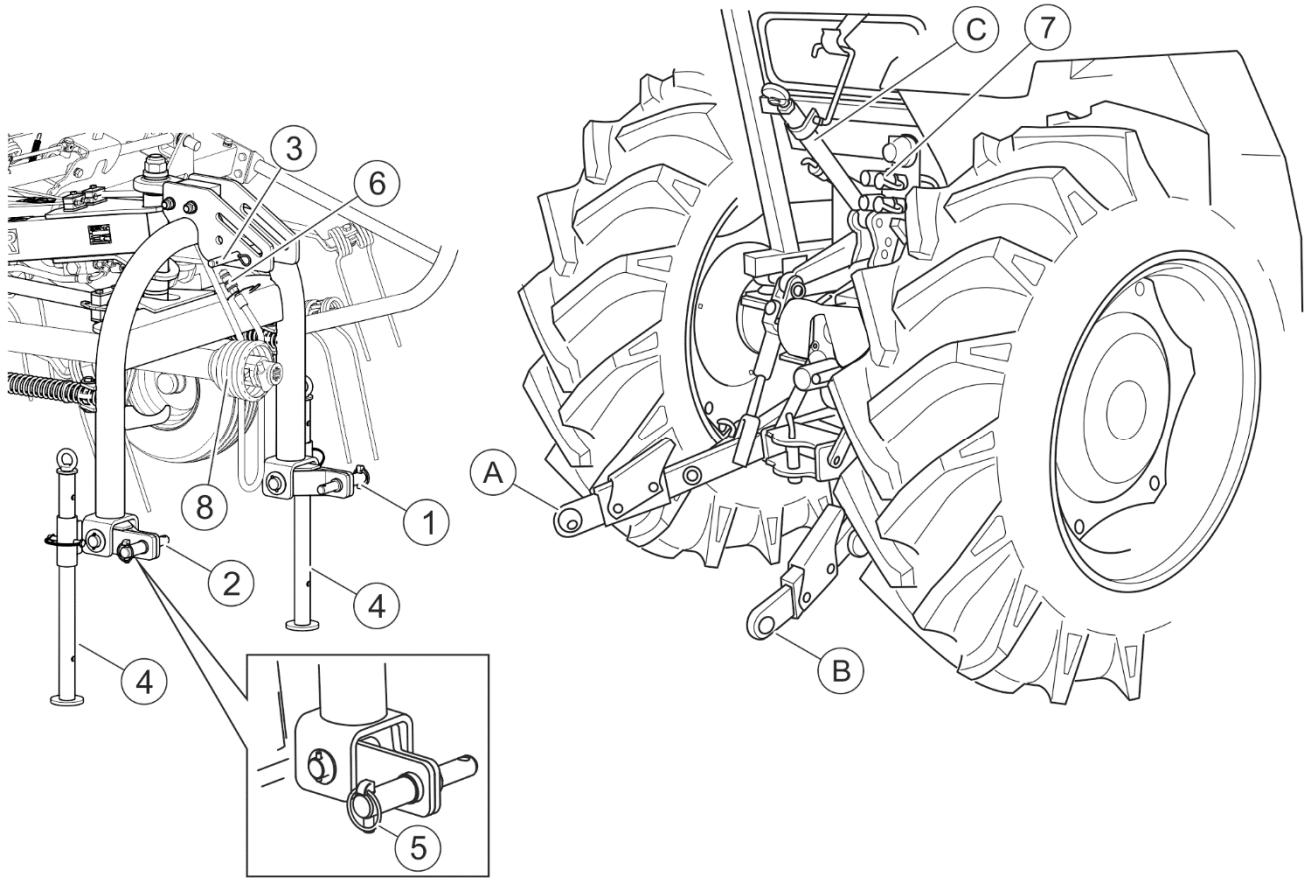


FIGURE 4.1 Hitching the rotary tedder to tractor

(1), (2) lower three point linkage pins, (3) upper securing pin, (4) support, (5) locking cotter pin, (6) tipping cylinders hydraulic conduits, (7) tractor quick couplers, (8) PTO shaft, (A), (B) lower links of three point linkage, (C) top link of three point linkage

ATTENTION

Before using the rotary tedder, the user must carefully read the tractor operator's manual. Comply with the recommendations relating to linkage and mounting points.

DANGER

When hitching, there must be nobody between the machine and the tractor. Exercise caution when hitching the machine.

The rotary tedder can be hitched to a tractor that meets the requirements contained in TABLE 1.1 *REQUIREMENTS FOR AGRICULTURAL TRACTOR*.

In order to hitch the rotary tedder to the tractor's rear three-point linkage, adhere to the following guidelines (FIGURE 4.1):

- While reversing the tractor, bring the lower links (A) and (B) of the tractor's three-point linkage close to lower pins (1) and (2) of the tedder.
- Set links (A) and (B) of tractor at appropriate height.
- Switch off tractor's engine and prevent tractor from unintentional moving.

DANGER

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

- Connect lower pins (1) and (2) with connecting arms (A) and (B) and lock with the aid of cotter pins.

ATTENTION

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

- Unlock the tractor's top link and connect it with the tedder's pin (3) and lock with a cotter pin.
- Connect the tractor's rear PTO with the tedder's main transmission by means of the PTO shaft (8);

DANGER

Turn off the tractor's engine and remove the key from the ignition before connecting the tractor's rear PTO with the PTO shaft. Ensure that unauthorised persons do not have access to the tractor.

The use of PTO shaft and its technical condition must be in accord with the Operator's Manual of PTO shaft.

DANGER

Before the first use, adjust the length of PTO shaft according to the recommendations of the PTO shaft Operator's Manual.

- Connect the tedder's hydraulic conduits (6) to quick couplers (7) of the tractor's double acting hydraulic circuit.

DANGER

Prior to connecting hydraulic system line the user must carefully read the tractor operator's manual and observe all recommendations of the Manufacturer.

DANGER

When connecting the hydraulic lines to the tractor, make sure that the tractor hydraulic system is not under pressure.

- Raise the tedder's left and right support (4) and secure with cotter pins.

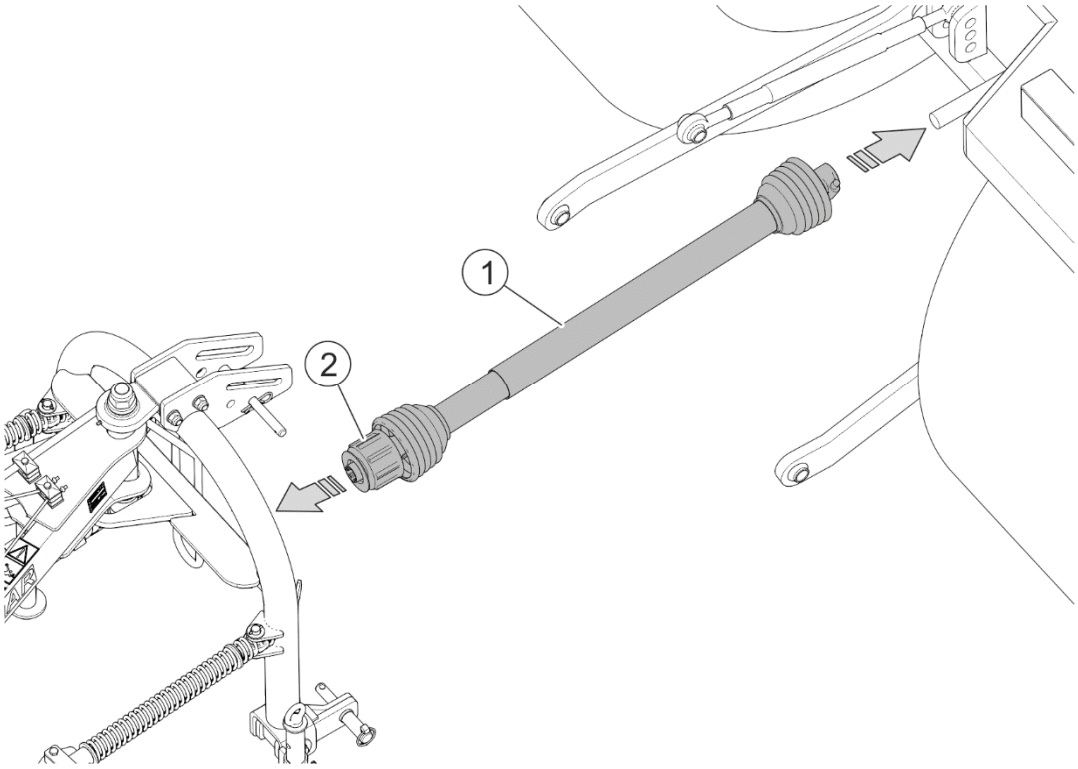


FIGURE 4.2 PTO shaft with overload protection clutch

(1) PTO shaft; (2) overload clutch

The tedder is equipped with the appropriately selected PTO shaft with overload clutch (FIGURE 4.2), which prevents damage to tedder 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 warranty

Before connecting the tedder to the tractor's PTO shaft, the user must read the operator's manual supplied by the PTO shaft's manufacturer and observe all the recommendations

contained in it. Before connecting the PTO shaft, check technical condition of shaft guards, completeness and condition of protecting chains and general technical condition of PTO shaft.

Multisplined ends are appropriately marked, so it is clear which end should be connected to the tractor.

4.3 TRANSPORTING THE MACHINE

ATTENTION

Before driving on public roads in order to transport the tedder to the work site and back, the tedder must be folded to its transport position.

When driving on public roads, comply with the road traffic regulations in force in the country in which the machine is used.

Before driving on public roads, check if all the warning plates on the tedder are properly mounted and visible.

The tedder may not be used or transported in conditions of limited visibility.

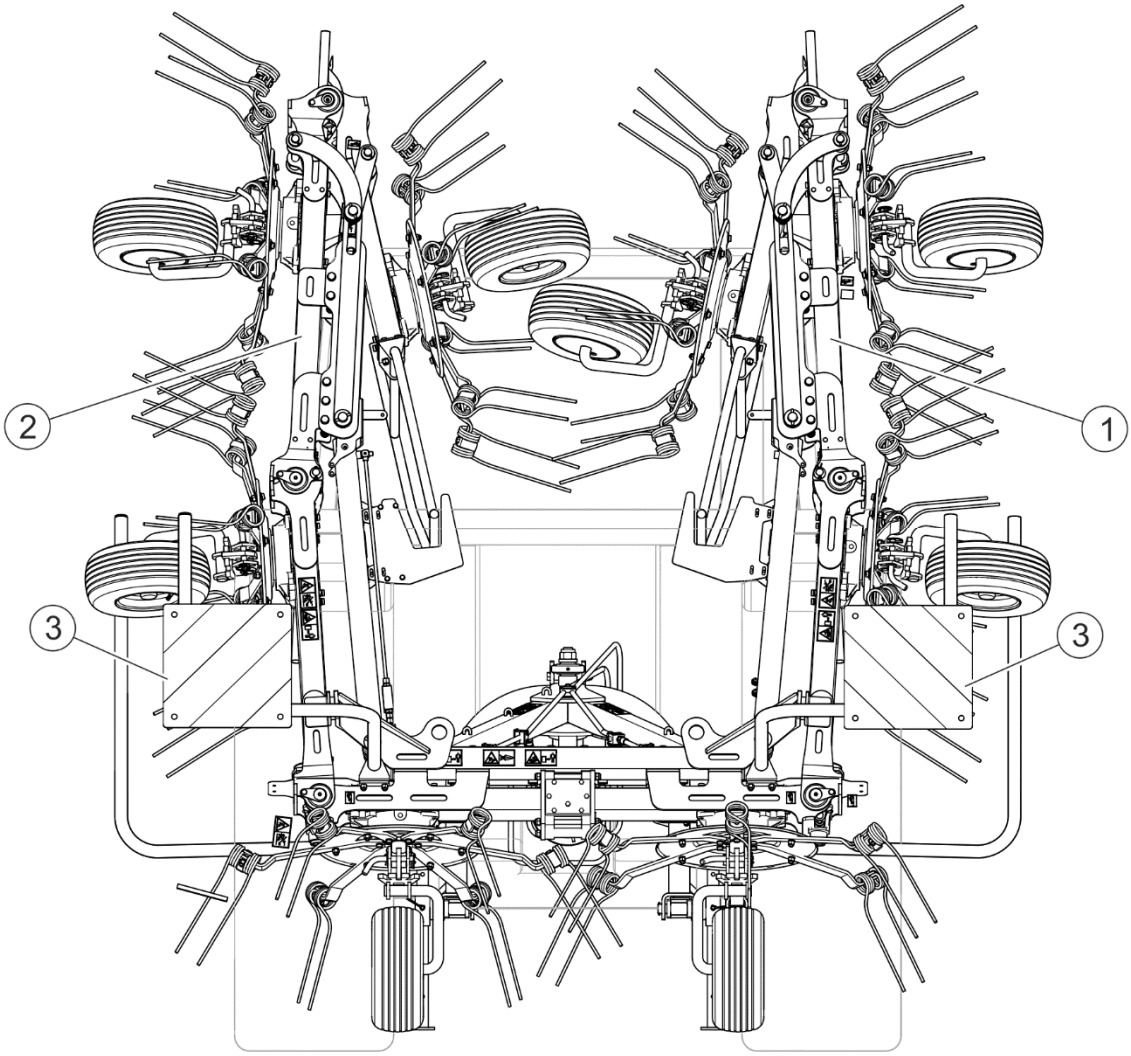


FIGURE 4.3 Transport position of the tedder.

(1)- right tipping modules of the rotary tedder, (2)- left tipping modules of the rotary tedder, (3)- warning plates.

For the transport travel to the work site and back, set the tedder in the transport position (FIGURE 4.3) so that the tedder width is minimal.

In order to set the tedder in the transport position, proceed as follows (FIGURE 4.4):

- Park the tractor and lower tedder onto the jockey wheels.
- Immobilise tractor with parking brake.

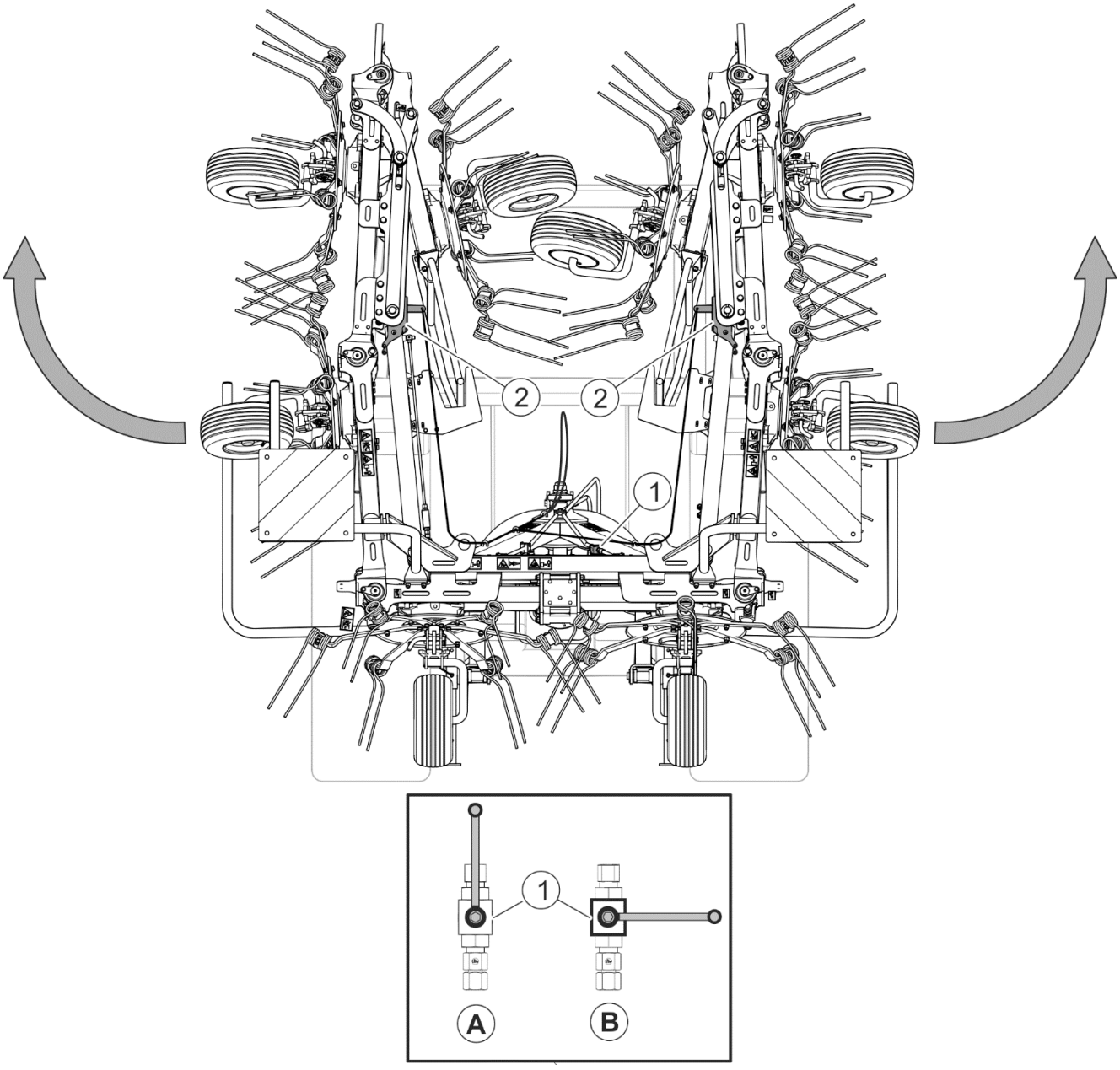


FIGURE 4.4 Setting the tedder in the transport position.

(1) valve of tipping cylinders, (2) mechanical lock of cylinders, (A) OPENED position, (B) CLOSED position.

- Sitting in tractor operator's position, slowly set the hydraulic manifold lever in the position of RISING the tipping cylinders of the tedder's right and left side modules.

- Raise the tedder's right and left modules until the cylinders are locked by the mechanical interlock (2).
- Set the tractor's hydraulic manifold lever for controlling the tipping cylinders in NEUTRAL position.
- Set the valve (1) of cylinders for tipping the tedder's modules in "CLOSED" position.
- Set the tedder's shock absorbers in the locked position (FIGURE 4.7).
- During transport, the PTO shaft should be disconnected from the tractor PTO shaft.
- Raise the tedder above the ground using the three point linkage to the height suitable for transporting the tedder.

DANGER

When preparing the tedder to transport, check if the mechanical interlocks of the tipping cylinders are properly engaged and if the hydraulic valve of these cylinders is in CLOSED position.

DANGER

The drive of the tractor's PTO must not be turned on when the rotary tedder is in its transport position.

During transport, the PTO shaft should be disconnected from the tractor PTO shaft.

4.4 SETTING THE TEDDER IN WORKING POSITION AND OPERATION

The tedder after transport to the field must be set in correct working position. Preparing of the machine for work must only take place exclusively where the tedder shall work. Do NOT drive on public roads with extended side rotors.

4.4.1 SETTING THE TEDDER IN WORKING POSITION

DANGER

Setting from transport position to working position should only be conducted on level and stable surface. Ensure that no one is within reach of tedder rotor arms in the tedder arm tipping area.

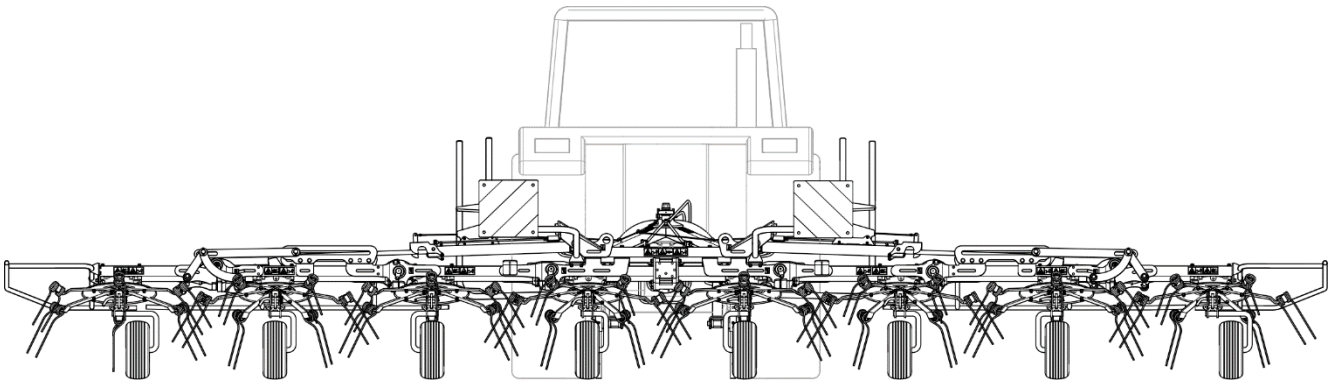


FIGURE 4.5 Tedder working position

In order to set the tedder from transport position to working position (FIGURE 4.5), proceed as follows:

- Park the tractor and lower tedder onto the jockey wheels.
- Immobilise tractor with parking brake.

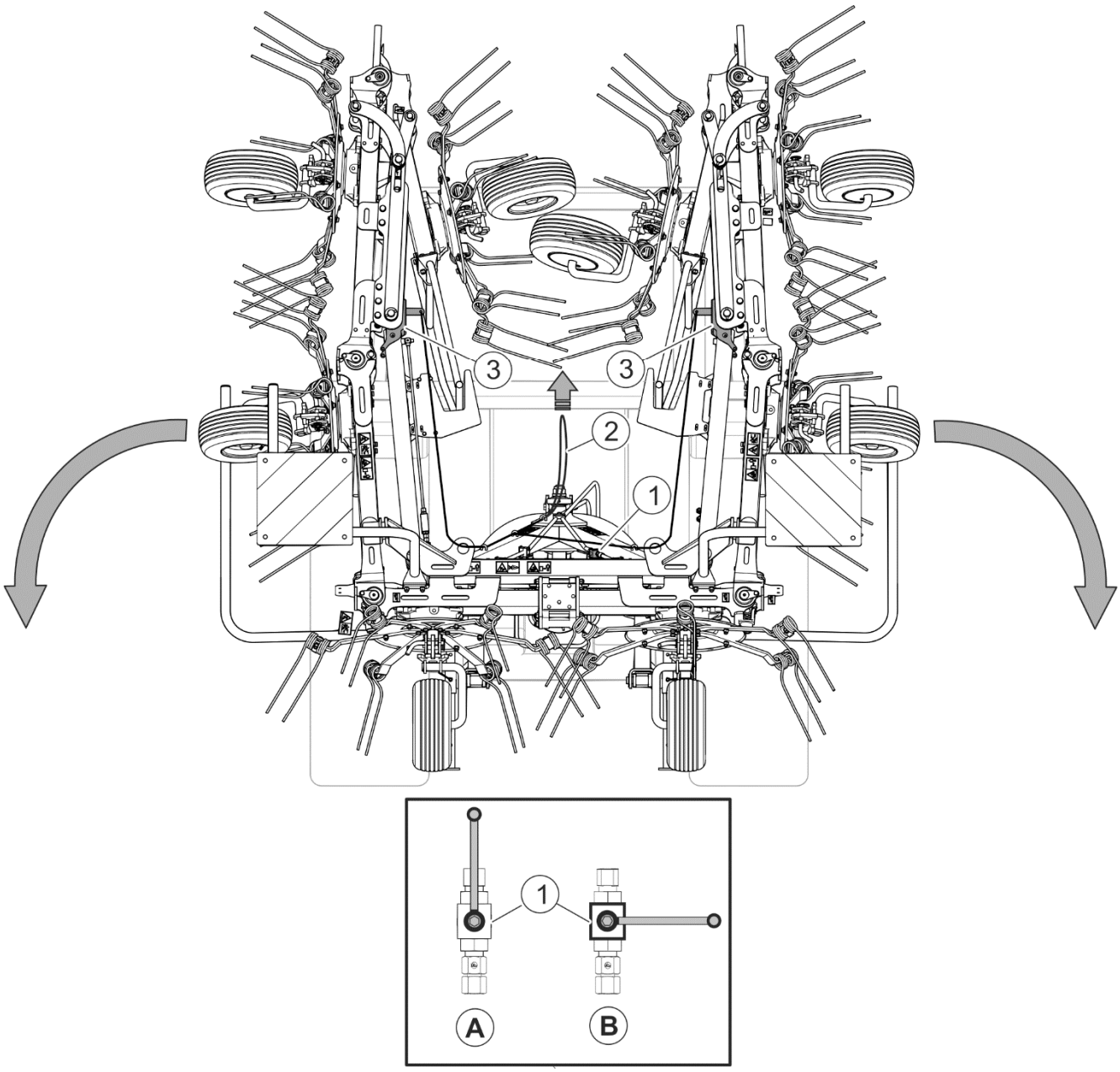


FIGURE 4.6 Set tedder in working position.

(1) valve of tipping cylinders, (A) OPENED position, (B) CLOSED position, (2) cylinders lock release cable, (3) cylinders mechanical lock

- Set the valve (1) of cylinders for tipping the tedder's modules in "OPENED" position
- Sitting in tractor operator's position briefly set lever of hydraulic selective control valve in LIFTING position simultaneously pulling and holding the cable (2) releasing the lock mechanism (3) of right and left external rotor hydraulic arm cylinders. After releasing cylinders lock, slowly set tractor hydraulic selective control valve lever in LOWERING position.

- Lower the tipping modules of the rotors until the wheels touch the ground and release the cylinder lock cable.
- Rods of hydraulic cylinders of left and right rotors arms should be maximally extended.

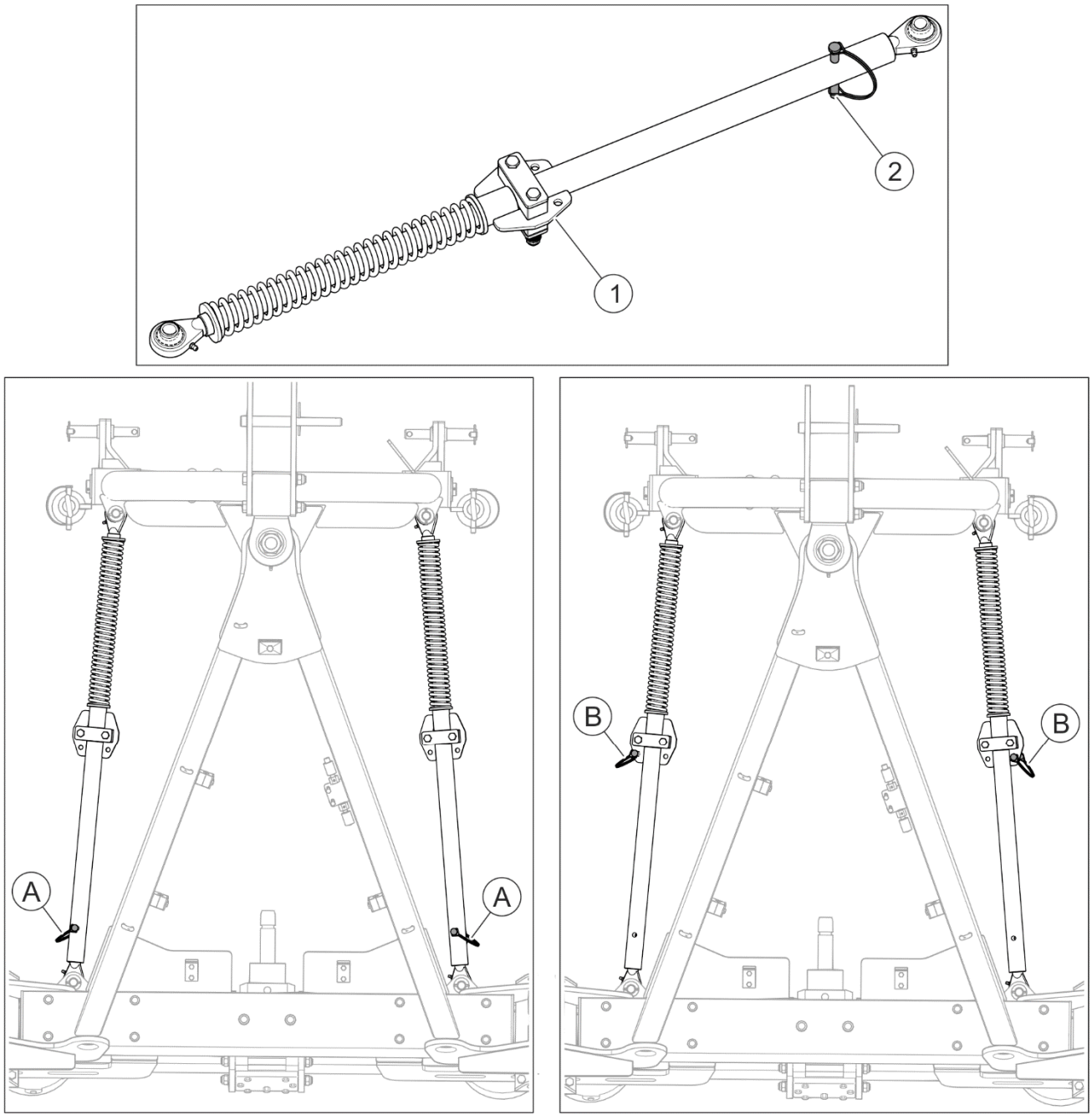


FIGURE 4.7 Set vibration absorber in working position.

(1) shock absorber; (2) cotter pin; (A) shock absorber in locked position, (B) shock absorber in unlocked position

- Take out locking cotter pins in order to unlock the tedder's right and left shock absorbers (2) (FIGURE 4.7).

4.4.2 WORKING POSITION ADJUSTMENT

The correct working position of the tender has a decisive influence on the quality of the tedding and on working comfort.

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

ATTENTION

Read the instructions on adjustment of the three-point linkage, which are part of the tractor operator's manual.

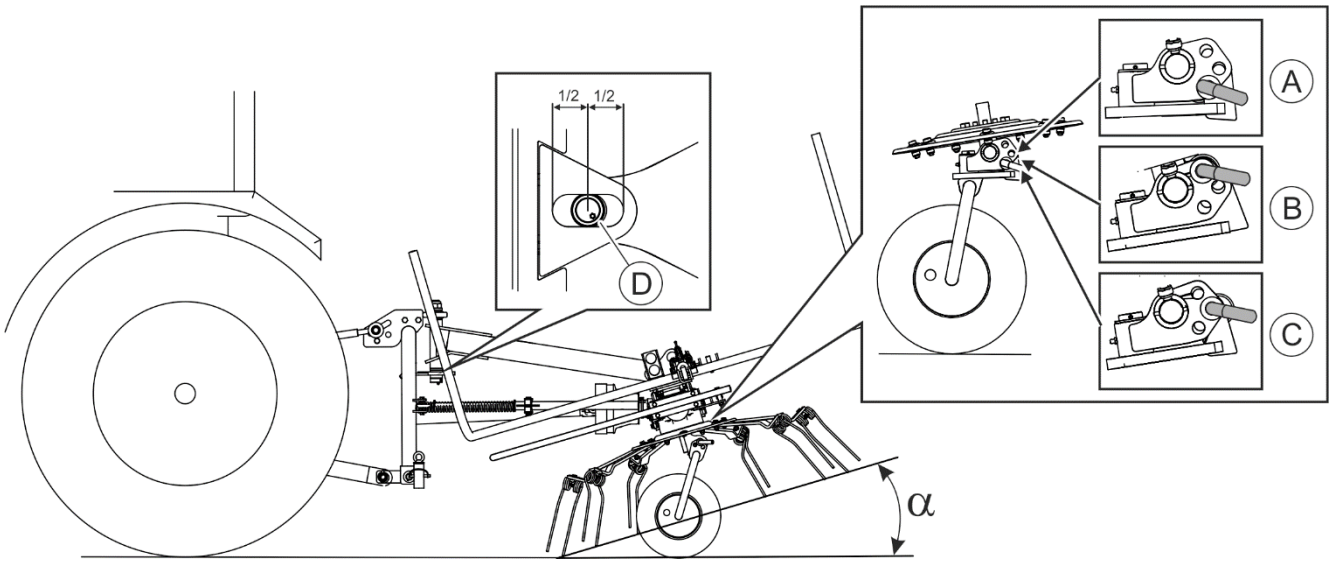


FIGURE 4.8 Work with tedder – rotor inclination angle (spreading angle)

(α) spreading angle, (A) large spreading angle, (B) small spreading angle, (C) normal spreading angle, (D) sleeve setting in openings

DANGER

Adjustment of tedder's working height and swath spreading angle must be done with the tractor engine turned 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.

Adjustment of working position is performed after lowering the machine to the ground. Working position of tedder is adjusted by performing the following actions:

- park tractor and tedder on flat level ground,
- set rear three point linkage in position adjustment mode,
- set the height of the lower links of the tractor three point linkage and adjust the top link length in such a way that the rotors are inclined forward and the spring tines lightly touch the ground, and the articulated joint sleeve is in the centre of the oblong opening D (FIGURE 4.8),

After adjusting the tractor's rear three point linkage, set the swath spreading angle. In order to do this:

- park tractor and tedder on flat level ground,
- raise tedder by the minimal height enabling tilting of support wheels,
- support machine to prevent it falling,
- insert the wheel locking pins into proper openings to set the required inclination angle (A), (B) or (C) (FIGURE 4.8) and secure them with cotter pins
- lower machine onto jockey wheels.

Springtines should lightly touch the ground. Selection of height and inclination angle of rotors depends on the volume of the cut swath, swath moisture, speed of tedding and condition of field surface. If springtines are too high from the ground there is a risk that not all of the swath will be tedded. If the spring tines are too low from the ground, the swath may be contaminated with earth, turf, stones etc. Furthermore, there is an increased risk of damage to the tedder, mainly to the spring tines and their mounting to the arms. Height selection should be checked frequently during tedding and if necessary the setting should be corrected

If the height setting of the tedder sprintines is incorrect, adjust the height setting of lower three point linkage forks, length of the link and readjust the height setting of the tedding assembly.

4.4.3 TEDDER OPERATION

DANGER

The rotary tedder may only be started when all the safety guards and frames are properly mounted and the tedder is set in working position.

Before engaging PTO drive, make sure that there are no bystanders, especially children, near the tedder. Ensure proper visibility of the machine during work

Bystanders should stay at a safe distance (minimum 50 metres) from the working tedder because of the danger that objects (stones, branches) may be thrown from beneath the spring tines.

DANGER

Never exceed the PTO's rotational speed of 540 rpm. Otherwise, the rotary tedder drive unit may get damaged.

The machine starting procedure may begin when the rotary tedder is hitched to the tractor and set in its working position.

Engage the tractor's rear PTO drive at a suitably low engine speed and then gradually increase the speed until PTO speed of 540 rpm is reached. When the proper speed of the tractor PTO shaft is reached, one may commence work.

During operation, the tractor operator must ensure proper visibility of the machine and work area so that the operator can see obstacles and possible dangers in the route of the working tedder.

Recommended working speed is 10 km/h or less. At greater travelling speeds the swath may not be properly tedded. Allowable revolution speed of PTO shaft is 540 rpm however recommended speed is about 500 rpm. With a very dry swath it is recommended that PTO shaft speed should be reduced even further.

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 tedder. During machine operation, the position control mode of the tractor three point linkage should be set.

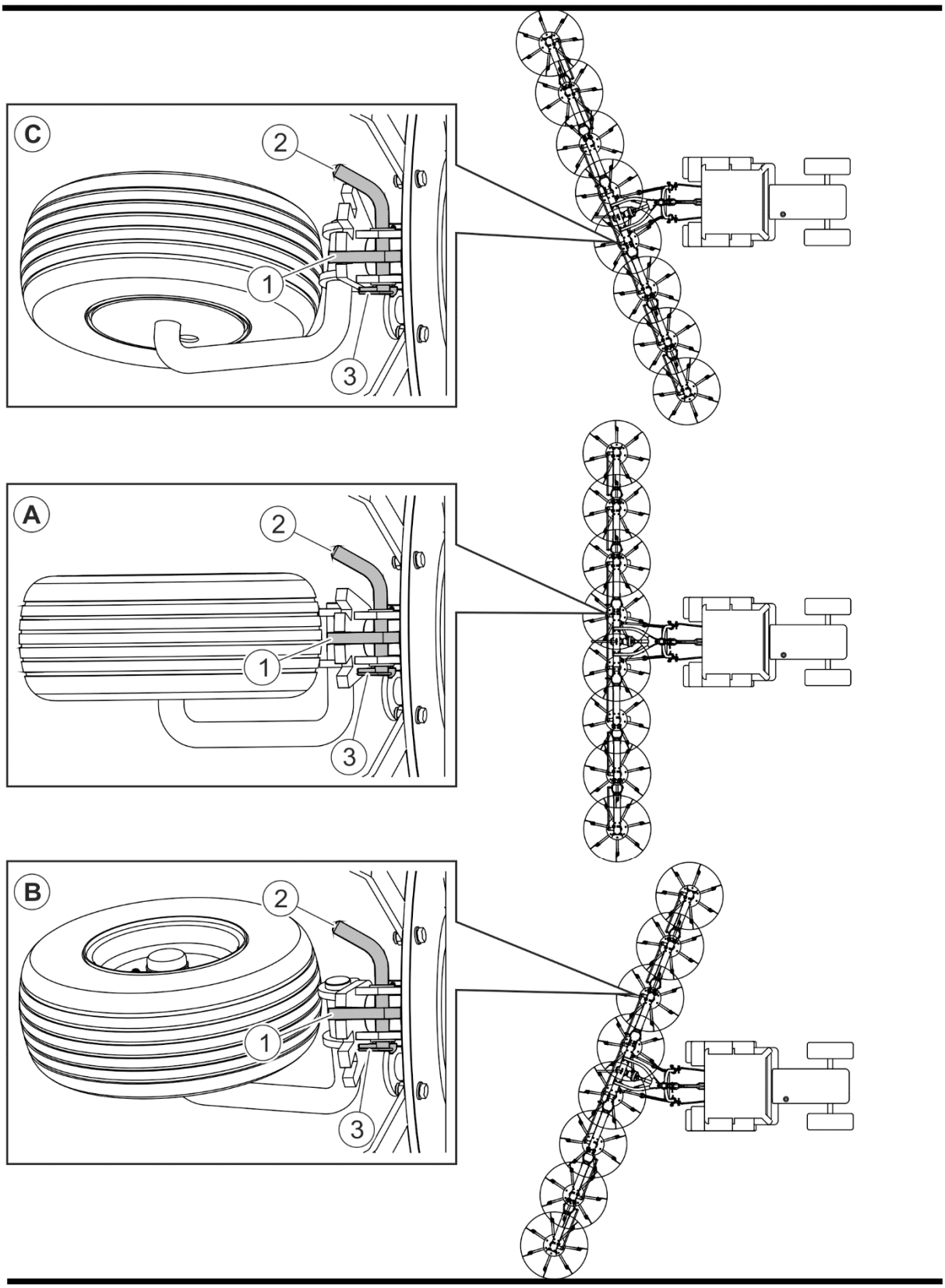


FIGURE 4.9 Tedder operation – tedding along the field edge

(1) wheel tilt adjustment bracket; (2) locking pin; (3) cotter pin;

(A) tedding to the centre, (B) tedding right side edge, (C) tedding left side edge

When tedding along the field edge, the tilt of all the wheels should be properly set (FIGURE 4.9). When tedding along the right side field edge, all the wheels should be tilted to the right (B), when tedding along the left side field edge, all the wheels should be tilted to the left (C). When tedding in the middle of the field, all the wheels should set be in the central position (A). Before setting the wheels, raise the machine to the minimum required height and take out the pin (2) locking the wheel in the desired position.

When turning or reversing, disengage the tractor PTO drive and raise the tedder on the three point linkage.

4.5 UNHITCHING THE ROTARY TEDDER FROM THE TRACTOR

DANGER

Unhitching the rotary tedder from the tractor should be performed only on a flat and stable surface.

In order to unhitch the tedder from the tractor proceed as follows (FIGURE 4.1):

- lower the tedder on the tractor three point linkage until it rests on wheels,
- turn off tractor engine and remove key from ignition,
- immobilize the tractor and prevent it from moving,
- lower the tedder's left and right supports (4) and secure them with cotter pins,
- disconnect the PTO shaft (8),
- disconnect the tedder's hydraulic conduit (6) from the quick coupler on the tractor,
- disconnect the top link (C) of the tractor three point linkage from the upper fixing point (3) of the tedder hitching system,
- disconnect the lower pins (1) and (2) of the tedder hitching system from the lower links (A) and (B) of the tractor three point linkage
- start the tractor engine and drive the tractor away from the tedder;

4.6 LIGHTING INSTALLATION AND ADDITIONAL MARKING (OPTIONAL)

4.6.1 CONSTRUCTION

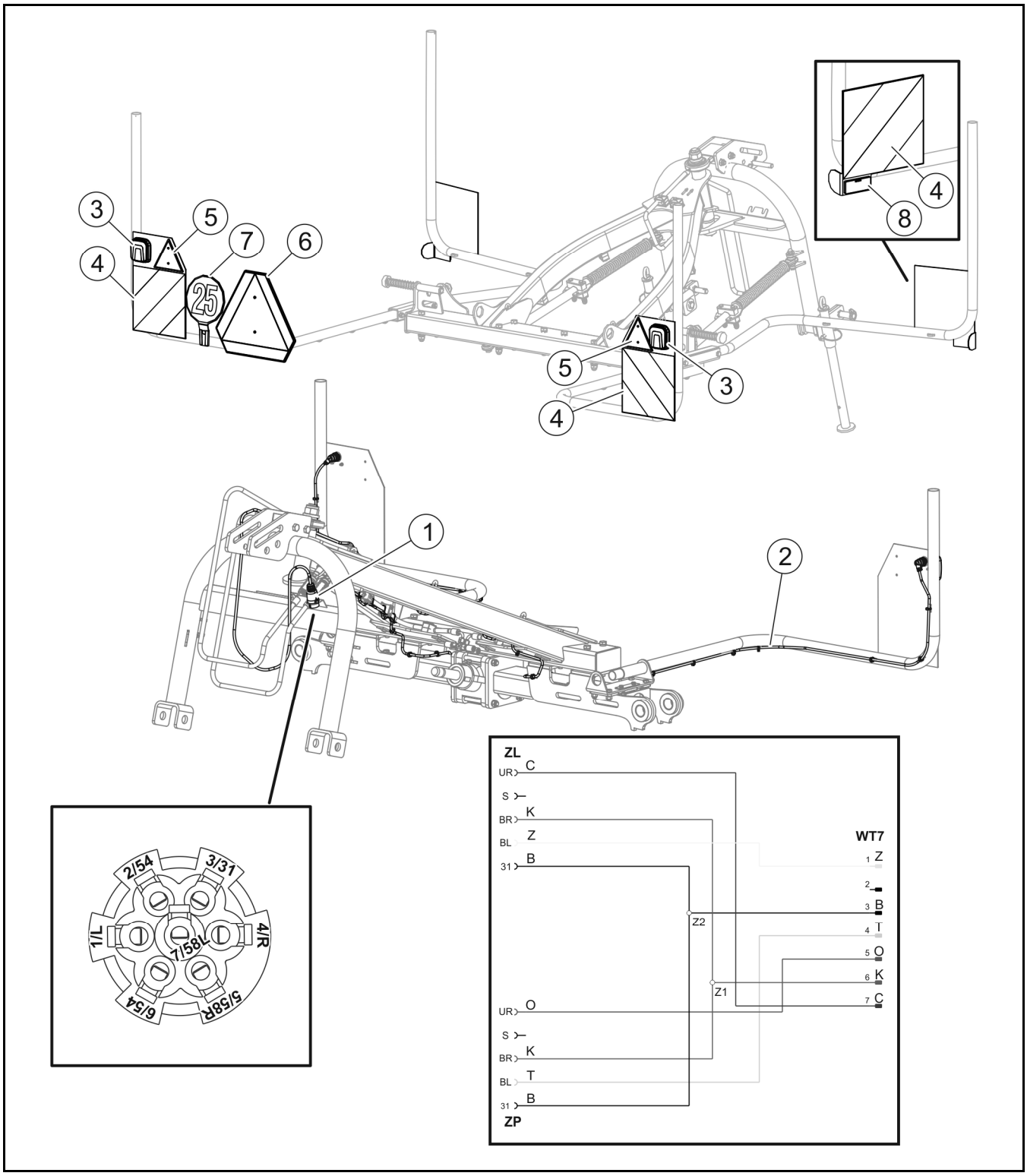


FIGURE 4.10 Lighting installation and additional marking.

1) 7-pin electric plug, (2) central harness, (3) combination rear lamps, (4) contour marking, (5) reflective triangle DOB-31 (option), (6) TW-11 slow-moving vehicle sign (option), (7) 25 km/h sticker (option), (8) DOB-35 white rectangular reflector (option)

TABLE 4.1 MARKINGS OF CONNECTION SOCKET

MARKING	FUNCTION
3/31	Weight
2/54	Not used
1/L	Left direction indicator
6/54	STOP light
7/58L	Rear left position light
5/58R	Rear right position light
4/R	Right direction indicator

TABLE 4.2 COLOUR CODING OF WIRES

MARKING	FUNCTION
b	White
c	Black
f	Purple
k	Red
l	Azurite
n	Blue
o	Brown
p	Orange
r	Pink
s	Grey
t	Green
z	Yellow

TABLE 4.3 ELECTRICAL ELEMENTS MARKINGS

MARKING	FUNCTION
WT7	7-pin plug
ZP	Multifunctional rear right lamp
ZL	Multifunctional rear left lamp

4.6.2 USAGE AND MAINTENANCE

The power supply to the lighting system of the machine requires the electrical installation of a tractor with a voltage of 12V with a 7-pin electrical outlet.

CAUTION

Driving with defective lighting installations is prohibited. Damaged lamps should be replaced immediately before driving off. Lost or damaged reflectors should be replaced with new ones.

Before travelling, make sure that all lamps and reflectors are clean.

Works related to the repair, replacement or regeneration of electrical installation components should be entrusted to specialized workshops that have appropriate technologies and qualifications to perform this type of work.

Your duties include only technical inspection of the electrical installation and reflectors.

The scope of service activities

1. Connect the lighting system of the machine to the tractor with a suitable electrical outlet.

CAUTION

If the tractor does not have the correct sockets or if the sockets are of a different type, have them installed by qualified personnel.

2. Check the completeness, technical condition and correct functioning of the machine lighting.
3. Check the tractor connection socket and the cable plug on the machine.

CAUTION

A damaged body of the socket or plug of the electric cord qualifies for replacement.

4. Check the the wiring harness for damage (rubbed insulation, wire break, etc.).
5. Check the mounting of the SMV triangular plate and its bracket.

Before travelling on a public road, make sure that the tractor has a reflective warning triangle.

SECTION

5

MAINTENANCE

5.1 TECHNICAL INSPECTION

When preparing the tedder for normal use, check its individual components according to guidelines presented in Table 5.1.

TABLE 5.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Check if the tedder is correctly mounted on the tractor's linkage	Check if correctly installed	Daily before beginning work
Condition of safety guards and frames	Check the technical condition of safety guards and frames, if complete and correctly mounted.	
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	
Technical condition of the tedder's hydraulic system	For details please refer to section *„5.4 HYDRAULIC SYSTEM OPERATION"*	
Check lubricating oil level in main transmission.	Check according to section „5.3 *OPERATION OF MAIN TRANSMISSION"*	
Check if all main nut and bolt connections are properly tightened	Torque values should be according to Table 5.3	
Correctness of mounting tedding springtines to arms and arms to rotor.	Ensure that springtines are correctly tightened.	
Lubrication	Lubricate elements according to section „5.5 *LUBRICATION*".	
Changing oil in main transmission	Change oil according to section „5.3 *MAINTENANCE OF MAIN TRANSMISSION"*	After the first 50 h, then every 500 h or once a year

ATTENTION

Do NOT use unreliable rotary tedder.

5.2 CHECKING AND REPLACEMENT OF SPRINGTINES

DANGER

Before beginning preparation work turn off 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.

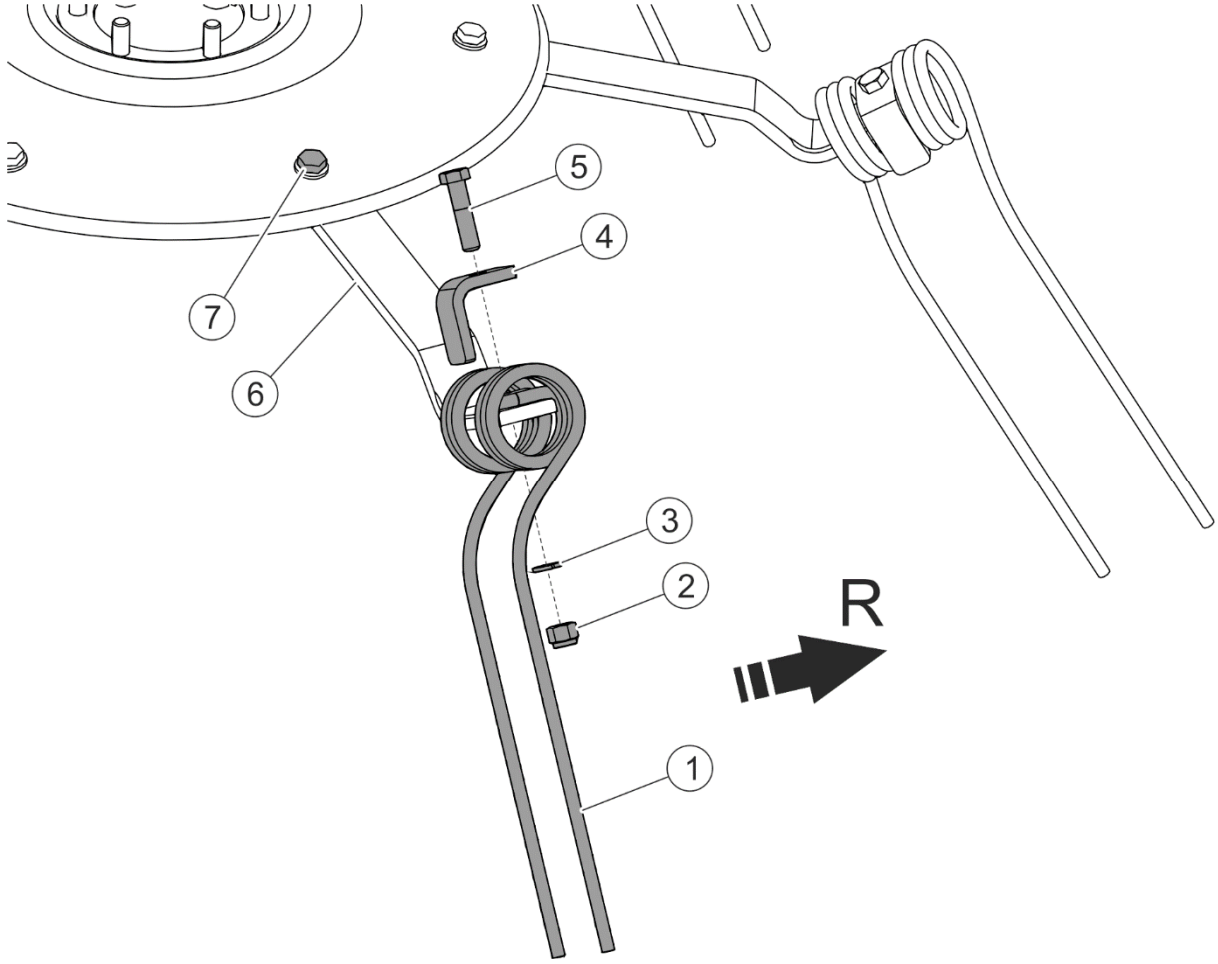


FIGURE 5.1 Changing springtines

(1) springtine, (2) self locking nut, (3) washer, (4) mounting element, (5) bolt securing springtime to arm, (6) rotor arm, (7) bolts securing arm to rotor, (R) rotor rotation direction.

In order to dismantle springtines:

- unscrew nut (2)
- dismantle securing element (4) and bolt (5)
- remove damaged springtine (1) from arm (6) and mount new springtine,
- insert bolt (5) and mounting element (4) and tighten nut with appropriate torque

ATTENTION

When mounting springtines check the rotation direction (R) of rotor.

Springtines and their mounting should be checked while working with tedder. Damaged elements should be replaced. It is not possible to repair springtines.

Each day check condition of springtine connections to arms and connections of arms to rotors.

5.3 OPERATION OF MAIN TRANSMISSION

Service of main transmission is conducted during general inspection, change or topping up gear oil. In the event of damage to transmission, contact authorised service point in order to 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 tedder work or once a year. Most suitable time for changing gear oil is when preparing for first fieldwork. The quantity of oil necessary to fill the reduction gear box amounts to 1.2 litres. Transmission oil required: SAE90EP.

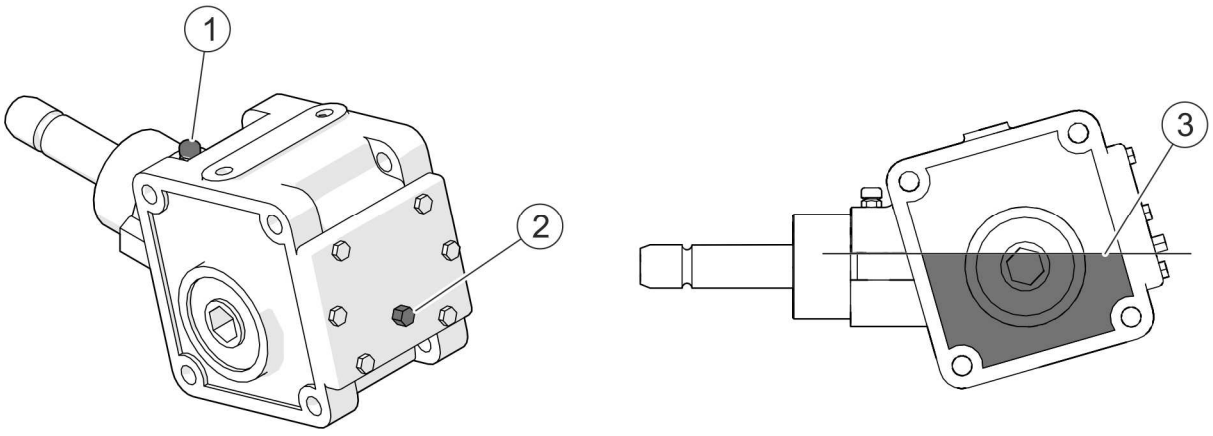


FIGURE 5.2 Changing gear oil

(1) filler plug, (2) inspection-drain plug, (3) correct oil level

To change oil in main transmission:

- set tedder on a hard surface and tilt machine maximally backwards,
- unscrew filler plug (1),

- unscrew inspection-drain plug (2) on the rear of the reduction gear,
- drain oil into oil-resistant tight container, container capacity should be about 3 litres,
- level the machine
- pour oil into filler opening (1) until oil flows out of inspection-drain opening (2),
- tighten inspection-drain plug (2),
- tighten filler plug (1).

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

If a leak is noticed, carefully inspect seals and check oil level. Operation of the gear with insufficient amount of oil may cause permanent damage to the gear mechanism.

Repair of the gear during warranty period may only be performed at authorised mechanical workshops.

5.4 HYDRAULIC SYSTEM OPERATION

DANGER

Before commencing whatever work on hydraulic system reduce the pressure in the system.

DANGER

During work on hydraulic system, use the appropriate personal protection equipment i.e. protective clothing, footwear, gloves and eye protection. Avoid contact of skin with oil.

Always adhere to the principle that the oil in the tedder hydraulic system and in the tractor hydraulic system are of the same type. Application of different types of oil is not permitted. The hydraulic system in a new tedder is filled with AGROL U hydraulic oil.

ATTENTION

The condition of hydraulic system should be inspected regularly while using the machine.

The hydraulic system should be completely tight sealed. Inspect the seals when hydraulic ram cylinders are completely extended. If oil is found on hydraulic cylinder body, check origin of leak. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the machine until faults are remedied.

In the event oil leak is detected in hydraulic line connections, tighten the connections, and if this does not remedy the problem, replace the leaking hydraulic line or connection. Always exchange each mechanically damaged component. Also, pay attention to ensure that flexible hydraulic lines are not fractured.

Flexible hydraulic lines should be replaced after 4 years of use.

Because of its composition the oil applied is not classified as a dangerous substance, however long-term action on the skin or eyes may cause irritation. In the event of contact of oil with skin wash the place of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the

occurrence of irritation consult a doctor. Hydraulic oil in normal conditions is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released. Oil fires should be quenched with the use of carbon dioxide (CO_2), foam or extinguisher steam. Do NOT use water for fire extinguishing.

Spilt oil should be immediately collected and placed in a marked tight container. Used oil should be taken to the appropriate facility dealing with recycling or regeneration of oils.

TABLE 5.2 AGROL U HYDRAULIC OIL CHARACTERISTICS

ITEM	NAME	UNIT	VALUE
1	Kinematic viscosity at 100ºC	-	10.0- 11.5
2	Viscosity index, min.		>95
3	Pour point, max.	ºC	<-24
4	Base number mgKOH/g	-	9.9
5	Flash-point	ºC	>230

5.5 LUBRICATION

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

Grease all grease nipples located on the machine in places marked with the lubrication pictogram. These places are shown in Figure 5.3 and specified in Table 5.3.

Machine lubrication should be performed with the aid of a manually or foot operated grease gun, filled with generally available grease. Before commencing lubrication insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease

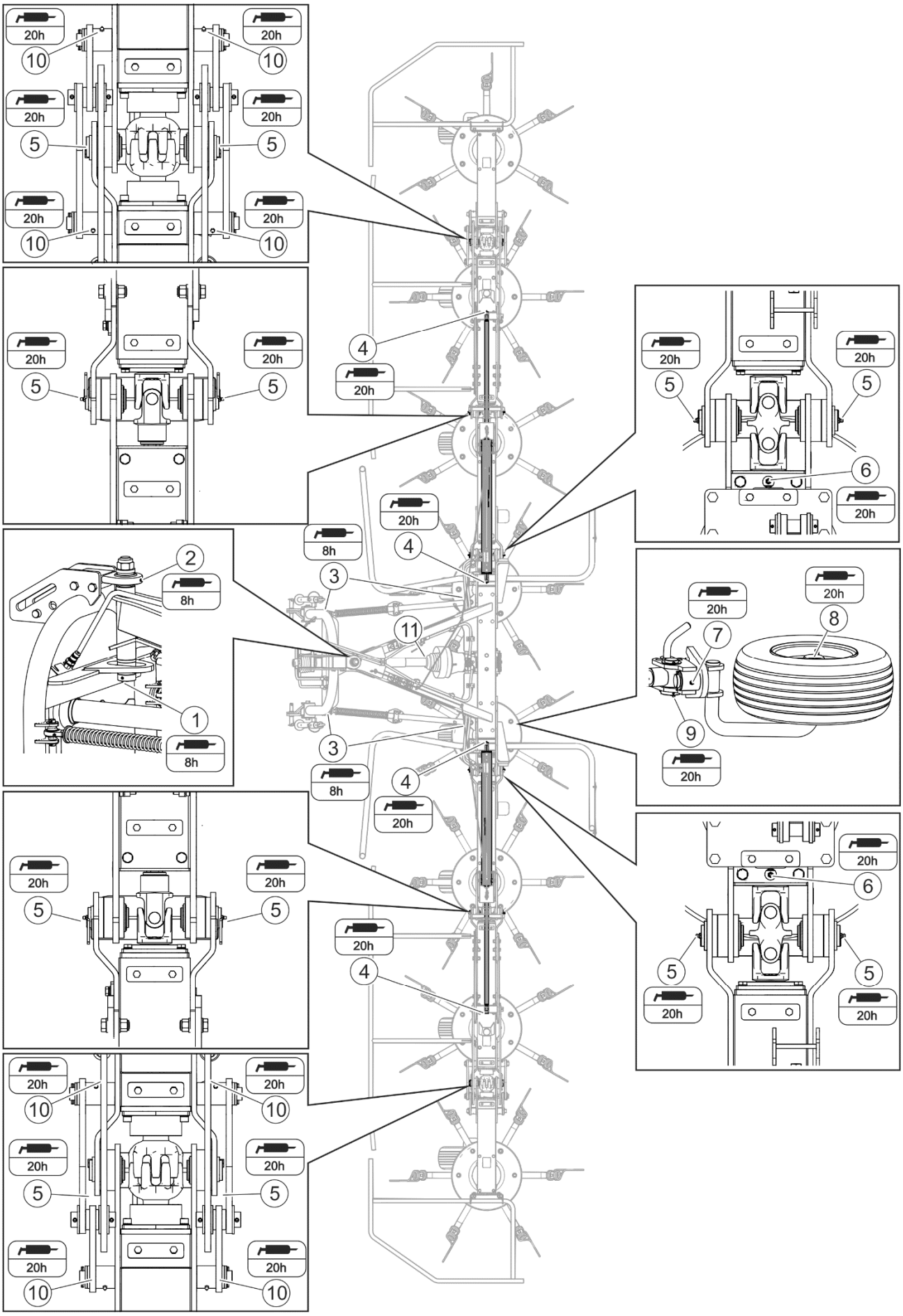


FIGURE 5.3 Positions of the tedder's lubrication points.

TABLE 5.3 LUBRICATION POINTS

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
1	Turntable ring	1	PERMANENT	8 hours
2	Frame suspension ball-and-socket joint	1	OIL	8 hours
3	Vibration absorber ball-and-socket joint	4	OIL	8 hours
4	Tipping cylinder eye	4	PERMANENT	20 hours
5	Tipping arm rotation axis	12	PERMANENT	20 hours
6	Articulations of rotors' drive shaft	2	PERMANENT	20 hours
7	Runner wheel bracket axis	8	PERMANENT	20 hours
8	Runner wheel rotation axle	8	PERMANENT	20 hours
9	Runner wheel bracket axis	8	PERMANENT	20 hours
10	Axles of strings	8	PERMANENT	20 hours
11	PTO shaft★			

ATTENTION Description of markings in Item column in Table 5.3 conforms with numbering shown in Figure 5.3.

★ PTO shaft lubrication should be performed according to the instructions of Manufacturer. For detailed information on maintenance please refer to maintenance instructions attached to the shaft.

5.6 TIGHTENING BOLT CONNECTIONS

Before each use of the machine and during maintenance and repair work, confirm that all bolt connections are properly tightened. If any clearances in bolt connections are found, tighten bolt connections using appropriate tightening torque (TABLE 5.4), unless other tightening parameters are given. Recommended torque values apply to non-greased steel bolts.

ATTENTION

Should it be necessary to change individual parts, use only original parts or those indicated by the Manufacturer. Non-adherence to these requirements may put the user and other people's health and life at risk, and also cause damage to the machine.

TABLE 5.4 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

THREAD DIAMETER [mm]	**5.8**	**8.8**	**10.9**
	TIGHTENING TORQUE [Nm]		
M6	8	10	15
M8	18	25	36
M10	37	49	72
M12	64	85	125
M14	100	135	200
M16	160	210	310
M20	300	425	610
M24	530	730	1 050
M27	820	1 150	1 650
M30	1050	1 450	2 100
M32	1050	1 450	2 100

5.7 STORAGE

After completing work the tedder should be carefully cleaned and washed with water jet. While washing do not direct a strong water or steam jet at information and warning decals 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 tedder 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 touch-up painting, the damaged place may be covered with a thin layer of grease or anticorrosion preparation. Tedder should be kept in closed or roofed building.

DANGER

The tedder should only be stored with the side rotor modules unfolded to working position (to prevent danger of tipping over).

If the tedder will not be used for a long time, it is essential to protect it from adverse weather, especially rust and accelerated tyre deterioration. Cylinder pistons should be cleaned and conserved with grease.

Lubricate tedder according to the instructions provided. In the event of a prolonged work stoppage, it is essential to lubricate all components regardless of the date of the last lubrication. Additionally before the winter period apply grease to hitching system pins.

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 tedder it is recommended that every 2 to 3 weeks the machine may be moved a bit so that the place of contact of tyres with ground is changed. The tyres will not be 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.

5.8 TROUBLESHOOTING

TABLE 5.5 TROUBLESHOOTING

TYPE OF FAULT	CAUSE	REMEDY
It is impossible to set the tedder in working position using the tipping cylinders	Incorrectly connected or damaged quick coupler	Check quick couplers and manner of their connection
	The tractor's hydraulic system is out of order	Check condition of tractor hydraulic system
Excessive vibration during work	Damaged rotors' drive shaft	Check shaft, if necessary replace
	Damaged PTO shaft	Check shaft, if necessary replace
Excessive heating of bevel gear	Incorrect oil level	Check oil level.
	Damaged bearing	Repair at an authorised service point
The tedder's rotors stop during operation	Damaged rotors' drive shaft	Check shaft, if necessary replace
	Damaged PTO shaft	Check shaft, if necessary replace
	Damaged gear	Repair at an authorised service point

NOTES