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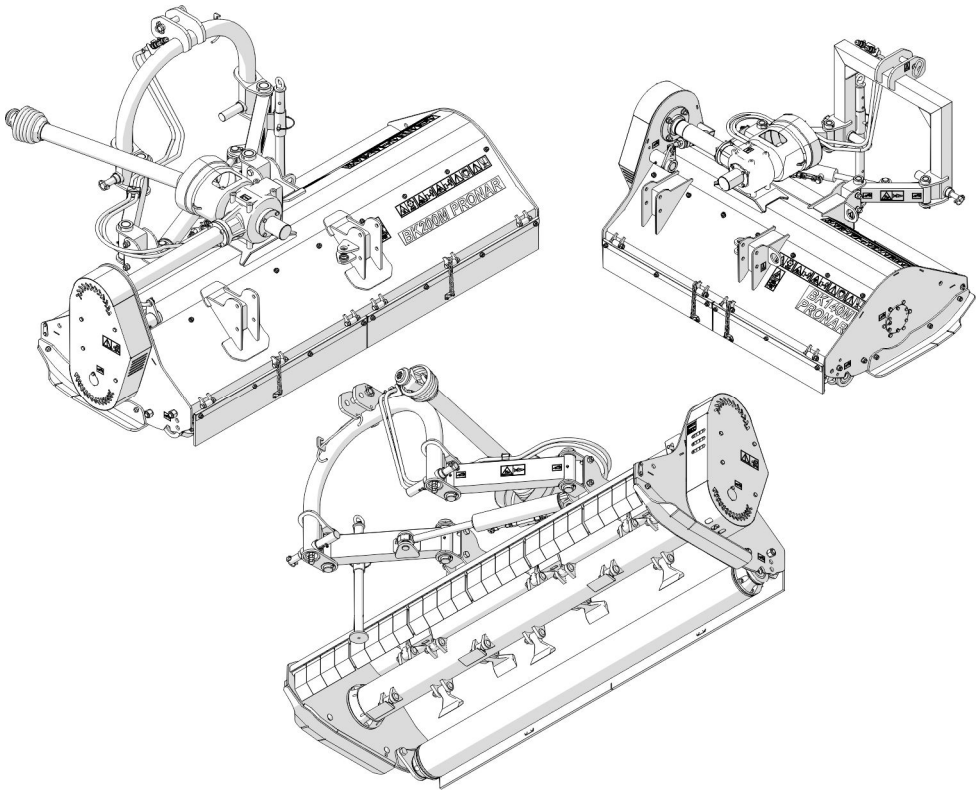
OPERATOR MANUAL

FLAIL MOWER

PRONAR BK110M / PRONAR BK140M
PRONAR BK160M / PRONAR BK180M
PRONAR BK200M / PRONAR BK250M

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 1B-03-2015, PUBLICATION NO 433N-00000000-UM

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FLAIL MOWER

PRONAR BK110M
PRONAR BK140M
PRONAR BK160M
PRONAR BK180M
PRONAR BK200M
PRONAR BK250M

MACHINE IDENTIFICATION

SYMBOL /TYPE:

SERIAL NUMBER:

INTRODUCTION

Information in this document is current at date of publication. As a result of improvements, some numerical values and illustrations in this publication may not correspond to the actual specification of the machine supplied to the user. The manufacturer reserves the right to introduce design changes in machines produced that facilitate and improve the quality of machine operation, without making minor amendments to this Operator Manual.

This Operator Manual is an integral part of the machine documentation. Before using the machine, the user must carefully read this Operator 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 principles of safe use and operation of Flail Mowers PRONAR BK110M / BK140M / BK160M / BK180M / BK200M / BK250M. If the information in this Operator Manual needs clarification, 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 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.

Vital information and instructions that must be observed are by the symbol:

and also preceded by the word **"IMPORTANT".** 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 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 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:	**Flail mower**					
Type:	**BK250M**	**BK200M**	**BK180M**	**BK160M**	**BK140M**	**BK110M**
Model:	–	–	–	–	–	–
Serial number:						
Commercial name:	**Flail mower PRONAR BK250M** **Flail mower PRONAR BK200M** **Flail mower PRONAR BK180M** **Flail mower PRONAR BK160M** **Flail mower PRONAR BK140M** **Flail mower PRONAR BK110M**					

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.

Z-CA DYREKTORA
d/s technicznych
członek zarządu
Roman Omelianiuk

Narew, the 2015-03-19

Place and date

Full name of the empowered person position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

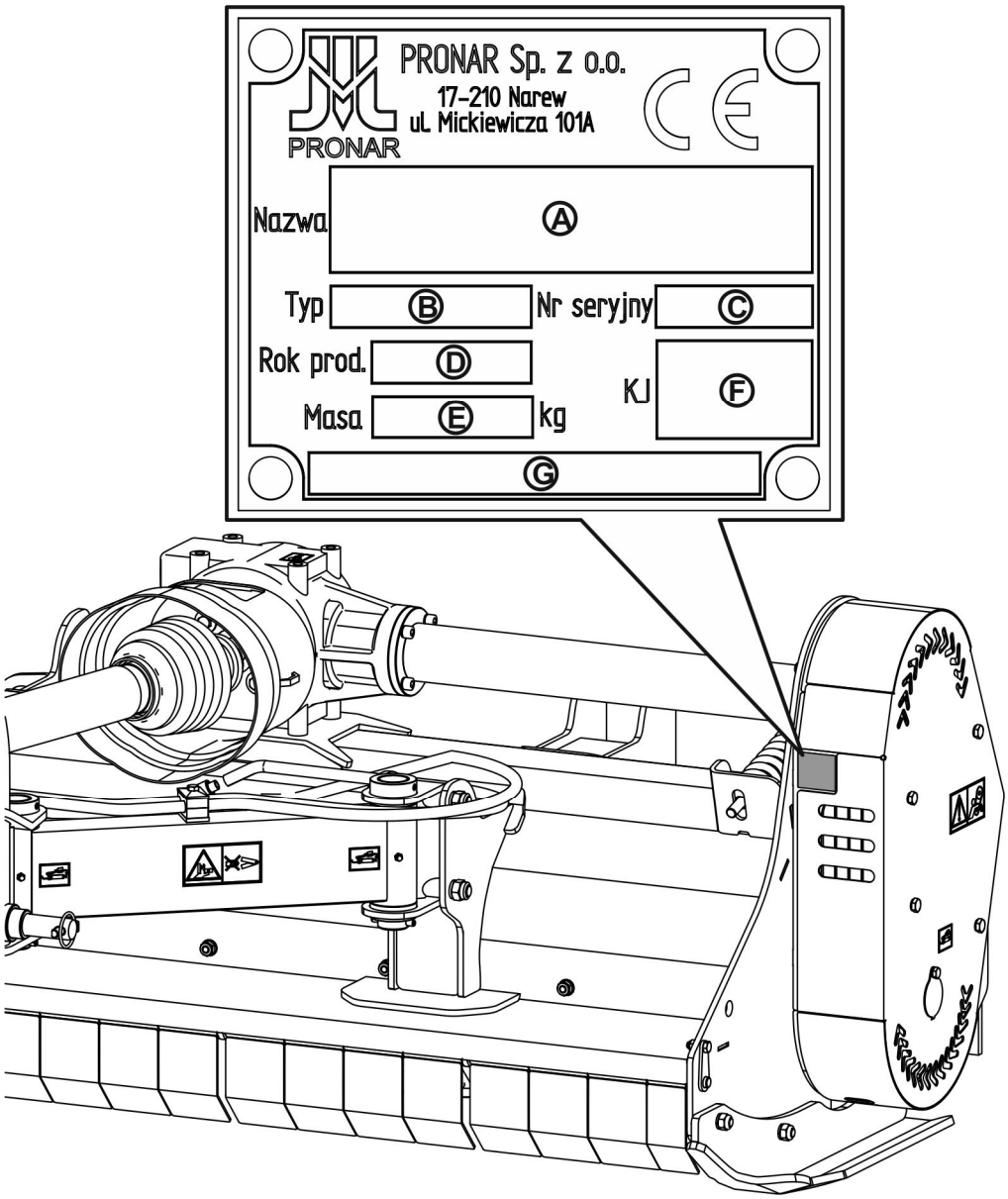


FIGURE 1.1 Location of the nameplate.

PRONAR BK110M / BK140M / BK160M / BK180M / BK200M / BK250M mowers are marked with the nameplate located on the belt transmission housing. When purchasing the machine, make sure that the serial numbers on the machine are the same as entered in the *WARRANTY BOOK*, in sales documents and in the *OPERATOR MANUAL*.

The meaning of individual items of the nameplate – figure (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 INTENDED USE

PRONAR BK110M / BK140M / BK160M / BK180M / BK200M / BK250M rear-front flail-mowers are designed and constructed according to current safety and engineering standards.

PRONAR rear-front flail-mowers are designed for the maintenance of municipal infrastructure, urban greenery, orchards and wooded areas and for agricultural works. These machines are used for cutting and chopping weeds, bushes and grass in undeveloped areas, on road shoulders and for chopping thin cut tree branches (up to 2 cm in diameter) in orchards. They are also used for meadow reclamation in undeveloped areas to leave swath as well as for disintegrating post-cultivation corn and tobacco residues (stalks) on fields. Flail mowers are designed to mow and break up and evenly scatter the material across the mown area, which leaves natural swath and allows mineralization of plant debris and re-introducing nutrients into the soil.

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 the intended use of the machine.

ATTENTION

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

- **for transporting people and animals,**
- **for transporting 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 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 the given country, in which the machine is used,
- carefully read the Operator Manual and comply with its recommendations,

TABLE 1.1 Requirements for agricultural tractor

CONTENTS	UNIT	REQUIREMENTS
Hydraulic system		
Hydraulic oil	-	HL 32
System pressure rating	MPa	16
Number of hydraulic sockets	pc.	2 sockets (1 double acting section)
Implement suspension system (three-point linkage)		
- BK110M / BK140M		
Front three point linkage	-	Category I according to ISO 730
Rear three-point linkage	-	Category II and II according to ISO 730
- BK160M		
Front three point linkage	-	Category II according to ISO 730
Rear three-point linkage	-	Category I according to ISO 730 (optional) Category II and III according to ISO 730 Category I and II according to ISO 730 (optional)
- BK180M / BK200M / BK250M		
Front three point linkage	-	Category II according to ISO 730
Rear three-point linkage	-	Category II and III according to ISO 730

CONTENTS	UNIT	REQUIREMENTS
Power take-off shaft (PTO)		
- BK110M / BK140M /BK160M		
Maximum engine speed	rpm	1000
		540 (option)
Number of splines on PTO shaft	pc.	6
Rotation direction	-	clockwise
- BK180M / BK200M /BK250M		
Maximum engine speed	rpm	1000
Number of splines on PTO shaft	pc.	6
Rotation direction	-	clockwise
Other requirements		
Minimum power demand		
- BK110M	KM / kW	25 / 18
- BK140M	KM / kW	30 / 22
- BK160M	KM / kW	40 / 29
- BK180M	KM / kW	50 / 37
- BK200M	KM / kW	70 / 51
- BK250M	KM / kW	90 / 66
Maximum tractor power		
- BK110M	KM / kW	54 / 40
- BK140M	KM / kW	60 / 45
- BK160M	KM / kW	67 / 50
- BK180M	KM / kW	88 / 65
- BK200M	KM / kW	102 / 75
- BK250M	KM / kW	122 / 90

The mower may only be used by persons, who:

- are familiar with the contents of this publication and with the contents of the Operator Manual of the agricultural tractor
- have been trained in mower service and safe operation,
- have the required authorisation to drive and are familiar with the road traffic regulations and transport regulations.

1.3 EQUIPMENT

TABLE 1.2 Optional equipment for PRONAR BK110M / BK140M / BK160M / BK180M / BK200M / BK250M mowers

EQUIPMENT	STANDARD	OPTION
Operator Manual	•	
"Warranty Book"	•	
PTO shaft BK110M „Comer" T401010ENC12C12 BK140M „Comer" T401010ENC12C12 (1000 rpm) BK140M „Comer" T501010ENC12C12 (540 rpm) BK160M „Comer" T601110ENC12C12 BK180M „Comer" T501110ENC12C12 BK200M „Comer" T601110ENC12C12 BK250M „Comer" T601110ENC12C12	 • • • • • •	 •
Blade type: - flail blades (hammer blades) - Y type - „YI" typ	 •	 • •

1.4 TERMS & CONDITIONS OF WARRANTY

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 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:

- flail blades,
- rubber shields,
- 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, damage caused by road accidents,
- by incorrect 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 warranty or not. For detailed Terms & Conditions of Warranty, please refer to the WARRANTY BOOK attached to each newly purchased machine.

Do NOT attempt to modify the mower without the written consent of the Manufacturer. 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 mower is ready for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra accessories.

ATTENTION

When transporting independently, the user must carefully read this Operator Manual and observe all its instructions. When being transported on a motor vehicle the mower must be mounted on the vehicle's platform in accordance with the transport safety requirements. The driver of the vehicle should use extreme caution while driving. This is due to the vehicle's centre of gravity shifting upwards when the machine is loaded.

Delivery is either by transport on a vehicle or independently. Transport of the mower is permissible connected to a tractor provided the tractor driver familiarises himself with the machine's Operator Manual and particularly with information concerning safety and principles of connection and transport of mower on public roads. Do NOT drive the tractor with mower connected when visibility is limited.

When loading and unloading the mower, follow the general health and safety regulations for reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.

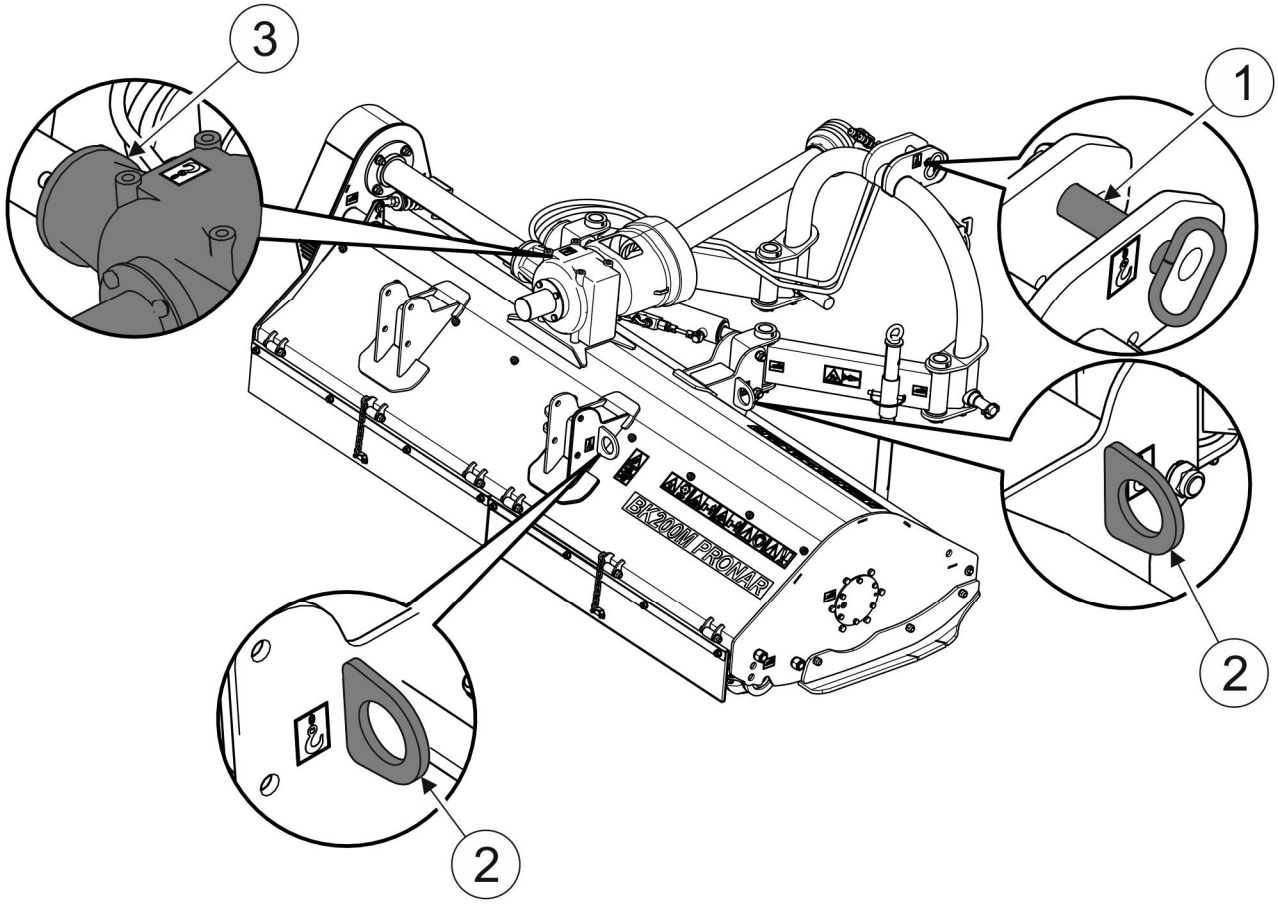


FIGURE 1.2 Transport lugs.

(1)- central connection pin; (2)- lifting arm lug; (3)- housing of bevel gear

The mower should be attached to lifting equipment in places shown on figure (FIGURE 1.2), i.e. to central connection pin, to transport lug and bevel gear housing.

ATTENTION

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

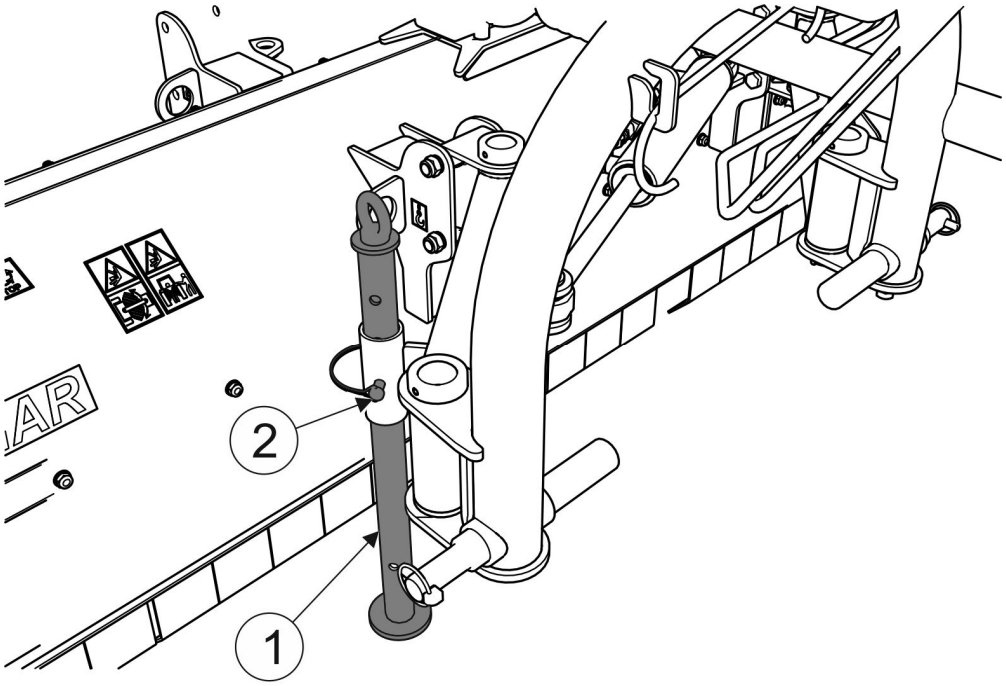


FIGURE 1.3 Mower correctly secured with a parking stand during loading

(1)- parking stand; (2)- securing linchpin;

TIP

The mower must be set in park position during unloading with lifting equipment. Parking stand should be lowered and secured with a linchpin (FIGURE 1.3).

The machine should be firmly secured on the transport vehicle platform with belts or chains equipped with a tensioning mechanism. The fastening equipment used must have a valid safety certificate. Exercise due caution when lifting the machine. To keep lifted machine in the correct direction it is recommended to apply additional guy cables. During reloading work, special care should be taken not to damage the paint coating.

ATTENTION

Persons must NOT be present in the manoeuvring zone when transferring the mower to another means of transport.

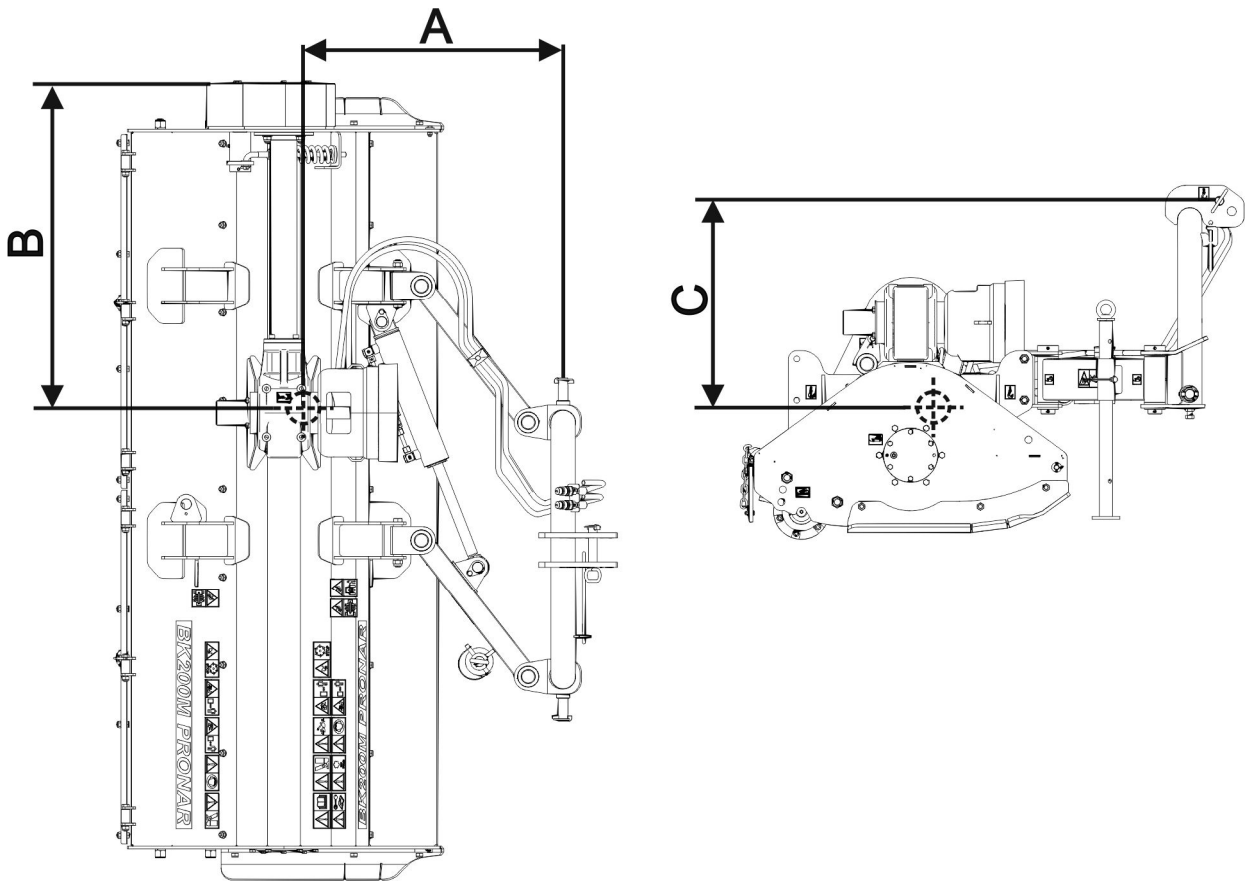


FIGURE 1.4 Centre of gravity of the mower.

TABLE 1.3 Centre of gravity.

		Mower model					
Dimension (FIGURE 1.4)	**Unit**	**BK110M**	**BK140M**	**BK160M**	**BK180M**	**BK200M**	**BK250M**
A	mm	590	610	715	720	730	740
B	mm	610	680	810	890	970	1 130
C	mm	560	565	625	630	820	830

1.6 ENVIRONMENTAL RISK

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

Should you decide to withdraw the machine from use, comply with the regulations in force in the given country regarding 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, use the appropriate tools, equipment and use personal protection equipment, i.e. protective clothing, footwear, gloves and eye protection etc.

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

SECTION

2

SAFETY USE

2.1 BASIC SAFETY RULES

2.1.1 MACHINE USE

- Before use, the user must carefully read this Operator Manual and the *WARRANTY BOOK*. When operating the machine, follow all instructions in these documents.
- The mower may only be used and operated by persons qualified to drive agricultural tractors and agricultural machines and trained in the use of the machine. Mower can be operated by a single person only.
- If the information in this Operator Manual is difficult to understand, contact the seller who runs the authorised technical service on behalf of the Manufacturer, or contact the Manufacturer directly.
- Careless and improper use and operation of the machine, and failure to comply with the instructions of this operator manual is dangerous to your health.
- Be aware of the residual risk. Use caution when operating this machine and follow all relevant safety instructions.
- 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 mower other than the way intended takes full responsibility for himself for any consequences of this potentially incorrect 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 damage to the protective guards , they must be replaced with new ones.
- In order to limit occupational risks associated with exposure to noise during mower operation use individual protection (hearing protectors). In order to reduce the level of noise during work, the operator cab windows and door should be closed.

2.1.2 HITCHING AND UNHITCHING THE MACHINE

- Do NOT link the mower to a tractor, if hydraulic oil applied in both machines are of different types, or if the three point linkage system of the mower is not compatible with the category of the linkage system of the tractor.
- Only the rear three point linkage may be used for hitching the machine to the tractor. After hitching the machine, check the safeguards After coupling the machine, check the safeguards. Carefully read the tractor Operator Manual.
- To hitch the machine to tractor use only genuine pins and safeguards.
- The agricultural tractor to which the machine will be coupled must be technically reliable and must meet all manufacturer's requirements.
- Be especially careful when hitching the machine.
- During hitching there must be nobody between the mower and the tractor.
- Do NOT unhitch the mower from the tractor if the cutting system is raised. Exercise caution when unhitching the machine.
- Hitching and unhitching may only take place when the machine and the tractor are switched off.
- Mower uncoupled from the tractor must be supported with the aid of supports and linchpin must be protected.

2.1.3 HYDRAULIC SYSTEM

- The hydraulic system is under high pressure when operating.
- Regularly check the technical condition of the hydraulic lines and connections. 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 the hydraulic lines to the tractor, make sure that the tractor hydraulic system and mower are 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 penetrate 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.
- After changing the hydraulic oil, the used oil should be properly disposed of. Used oil or deteriorated oil should be stored in original containers or replacement containers resistant to hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- 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, observe all road traffic regulations in force in the country, in which the machine is used.
- Do not exceed the maximum speed resulting from road conditions and design restrictions. Adjust speed to the prevailing road conditions and other limitations arising from road traffic regulations.
- Before beginning travel, the mower must be placed in transport position and raised using the rear three-point linkage system.
- Do NOT leave machine raised and unsecured while the tractor is parked. When parked, the machine should be lowered.
- Do not transport the machine with the cutting assembly set in the working position.
- During transport disconnect PTO shaft from tractor.
- The mower 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, cutting assembly and the hydraulic system connections.
- Reckless driving and excessive speed may cause accidents.

2.1.5 MAINTENANCE

- During the warranty period, any repairs may only be carried out by warranty 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 mower until the fault has been corrected.
- During work, use appropriate, close-fitting protective clothing, gloves and appropriate tools. When working on hydraulic system it is recommended to use oil resistant gloves and protective goggles.
- Any modification of the mower releases the manufacturer (PRONAR Narew) from any responsibility for damage or detriment to health which may arise as a result.
- Before commencing any work on the mower, turn off the tractor engine and wait until all rotating parts have 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 maintenance or repair work under raised and unsupported machine.
- Before beginning repairs 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 engine turned off and the ignition key removed. Immobilise tractor with 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 mower 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.
- Damaged, missing or worn blades must be replaced in pairs (simultaneously with a blade located on the opposite side of the shaft axis) in order to maintain the balance of the flail shaft.
- In order to reduce the danger of fire the machine must be kept in a clean condition.

2.1.6 OPERATE THE MOWER

- Before lowering or lifting the mower mounted on the three-point linkage, make sure there are no bystanders, especially children, near the machine.
- Before starting mower drive, the cutting assembly must be in working position.
- Before starting the mower 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.
- Mowing should begin after reaching nominal PTO speed of 1000 rpm (540 rpm- option). Do NOT overload the shaft and the mower and also do NOT engage the clutch suddenly.
- During cutting do NOT use PTO revolution speed greater than 1000 rpm (540 rpm-option).
- When mowing on the edges of streets, public roads, on stony ground there is a risk that thrown out stones and foreign objects may pose a risk to bystanders and other vehicle passing by.
- Do NOT leave the tractor cab, when the machine drive is engaged.
- Do NOT stand within the mower's working zone.
- Do NOT approach cutting unit guards until the rotating cutting parts come to a complete standstill.
- Do NOT operate mower while reversing. Raise the machine while reversing.
- When driving with a raised cutting assembly, keep a safe distance from electric lines.

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.
- 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 PTO shaft drive each time when it is not necessary to drive the machine.
- The chains preventing the shaft cover from turning while the shaft is working, shall be secured to a fixed element of machine structure.
- Do NOT use the securing chains to support the shaft while machine is parked or when transporting the machine.
- Before using the machine, carefully read the PTO shaft Operator Manual and follow all instructions.
- 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 mower.
- Before starting the machine make sure that there are no bystanders (especially children) in the danger zone. The machine operator is obliged to ensure proper visibility of the machine and the working area.
- 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 hitched,
- being on the machine while the engine is running,
- operating the mower with removed or faulty safety guards,
- failure to maintain a safe distance from the danger zone or being within the zones while the machine is operating,
- machine operation by unauthorized persons or persons under the influence of alcohol
- cleaning, maintenance and technical checks when tractor is connected and engine is running.

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

- operate the machine in prudent and unhurried manner,
- sensibly apply the remarks and recommendations contained in the Operator Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- repair and maintenance work should be carried out 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 mower is labelled with the information and warning decals listed in table (*2.1*). The arrangement of symbols is shown in figure (*2.1*). Throughout the machine use, you must ensure that any warning messages and information decals located on the machine are clear and legible. If any are destroyed or damaged, they must be replaced with new. 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. When cleaning, do not use solvents that can damage the coating of information decals and do not subject them to strong water jets.

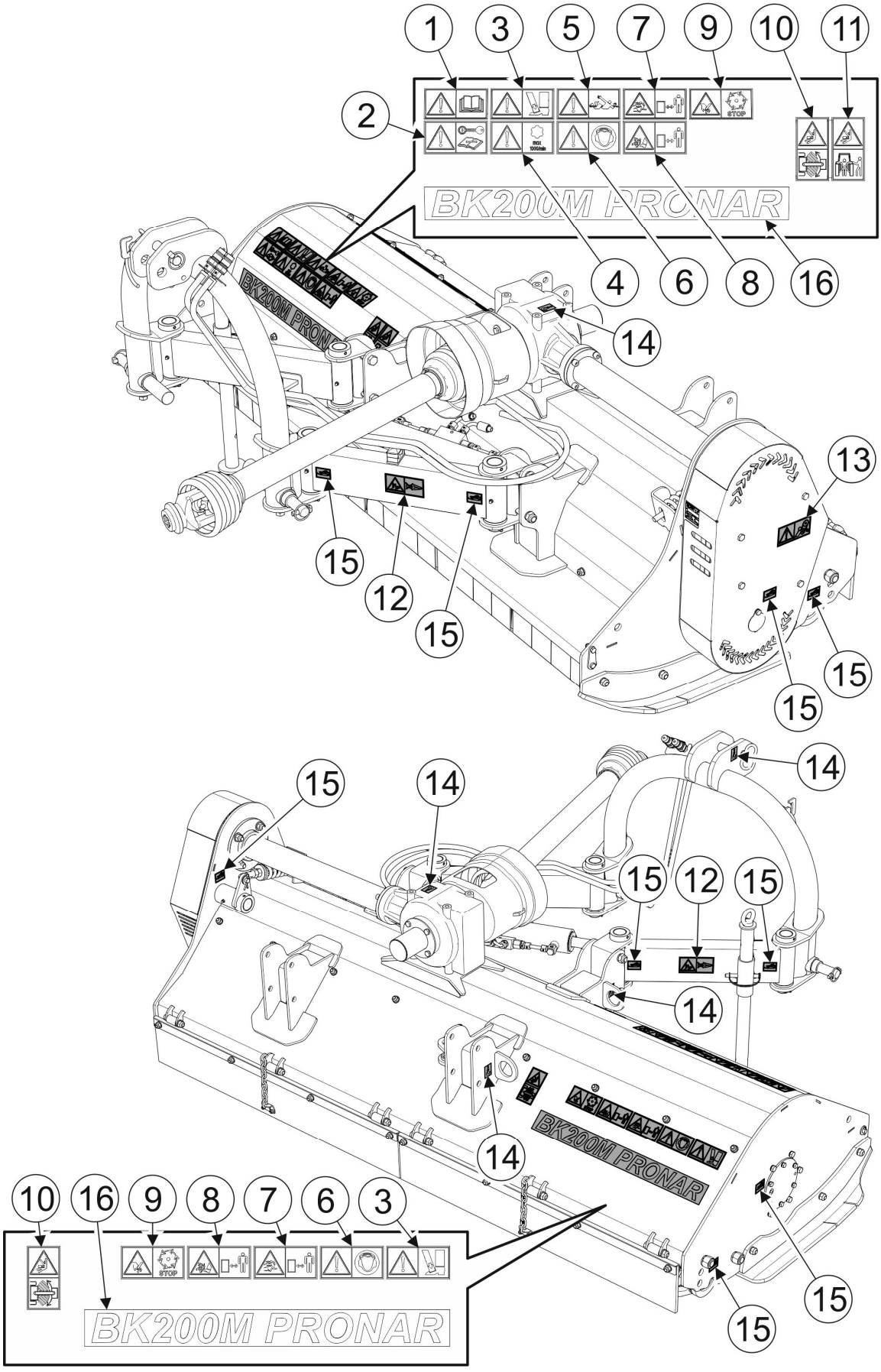
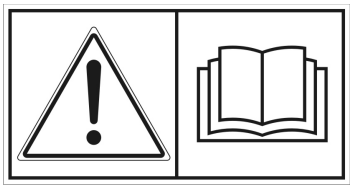
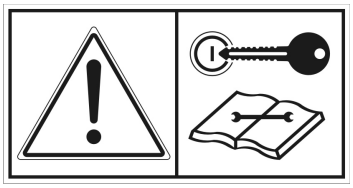
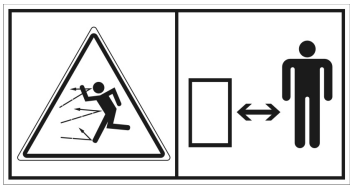
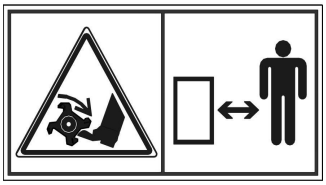
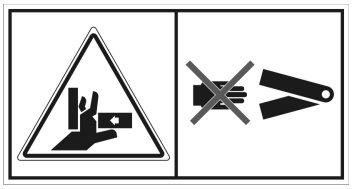


FIGURE 2.1 Locations of information and warning decals

Meaning of symbols (TABLE 2.1)

TABLE 2.1 Information and warning decals

ITEM	DECAL	MEANING
1		Before starting work, carefully read the Operator Manual.
2		Before maintenance or repairs, turn off engine and remove key from ignition.
3		Danger of crushing toes or feet.
4		Maximum allowable PTO shaft rotation speed is 1000 rpm.
4*		Maximum allowable PTO shaft rotation speed is 540 rpm (option).
5		Danger associated with the rotating PTO shaft.
6		High noise level warning.
7		Thrown out objects endanger the whole body. Keep a safe distance from the operating machine.

ITEM	DECAL	MEANING
8		Risk of injury to foot or leg. Keep a safe distance.
9		Do not touch any rotating elements until they come to a complete stop.
10		Risk of injury when machine is being arranged in transport or working position.
11		Do not stand directly behind the tractor while operating the rear hitch.
12		Do not reach into crushing space because elements may move. Danger of crushing hands or fingers
13		Attention! Belt transmission, take extreme care.
14		Transport lug points marking.

ITEM	DECAL	MEANING
15		Lubrication points
16	**BK110M PRONAR** or **BK140M PRONAR** or **BK160M PRONAR** or **BK180M PRONAR** or **BK200M PRONAR** or **BK250M PRONAR**	Machine type

Numbers in the Item column correspond to decals (FIGURE 2.1)

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 BASIC TECHNICAL DATA BK110M / BK140M / BK160M

	Unit	BK110M	BK140M	BK160M
Dimensions				
Total length in transport setting	mm	1,140		1,420
Width in transport setting	mm	1370	1590	1,810
Height in transport setting	mm	920		1020
Technical specification				
Cutting width	mm	1100	1400	1,600
Adjustment of cutting height	mm	20, 40, 60 (by changing the tracking shaft position)		
Horizontal shift of the mower (hydraulic shift)	mm	440		785 640 (cat. I and II three-point linkage) (option)
Capacity	ha/h	0.4	0.6	1.2
Tare weight	kg	350	390	525
Minimum power demand	KM / kW	25 / 18	30 / 22	40 / 29
Maximum tractor power	KM / kW	54 / 40	60 / 45	67 / 50
Maximum PTO speed	rpm	1000 (standard) 540 (option)		
Linkage: - front three point linkage - rear three-point linkage	 - -	 cat. I according to ISO 730 cat. I and II according to ISO 730		 cat. II according to ISO 730-1 (standard) cat. I acc. to ISO 730 (optional)) cat. II and III according to ISO 730(standard) cat. I and II according to ISO 730 (optional)
Flail shaft diameter	mm	∅133		∅152
Tracing shaft diameter	mm	∅133		∅152
Type and number of blades: - flail blades (hammer blades) (standard) - Type „Y" (option) - Type „YI" (option)	 pc. pc. pc.	 10 20 30	 12 24 36	 14 28 42
Rotation speed of flail shaft: - PTO 1000 (standard) - PTO 540 (option)	 rpm rpm	 2550 2425		 2450 2460
Type of vee-belts	-	XPB 1400		
Number of vee-belts - PTO 1000 (standard) - PTO 540 (option)	 pc. pc.	 3 4		 4 5

TABLE 3.2 BASIC TECHNICAL DATA BK180M / BK200M / BK250M

	Unit	BK180M	BK200M	BK250M
Dimensions				
Total length in transport setting	mm	1,420		
Width in transport setting	mm	2,070	2,280	2,720
Height in transport setting	mm	1020		
Technical specification				
Cutting width	mm	1,800	2,000	2,500
Adjustment of cutting height	mm	20, 40, 60 (by changing the tracking shaft position)		
Horizontal shift of the mower (hydraulic shift)	mm	785		
Capacity	ha/h	1.3	1.6	2.2
Tare weight	kg	560	600	660
Minimum power demand	KM / kW	50 / 37	70 / 51	90 / 66
Maximum tractor power	KM / kW	88 / 65	102 / 75	122 / 90
Maximum PTO speed	rpm	1000		
Linkage: - front three point linkage - rear three-point linkage	 - -	 cat. I according to ISO 730 cat. I and II according to ISO 730		
Flail shaft diameter	mm	∅152	∅160	
Tracing shaft diameter	mm	∅152	∅160	
Type and number of blades: - flail blades (hammer blades) (standard) - Type „Y" (option) - Type „YI" (option)	 pc. pc. pc.	 16 32 48	 18 36 54	 22 44 66
Rotation speed of flail shaft for PTO 1000 rpm	rpm	2,450		
Type of vee-belts	-	XPB 1400		
Number of vee-belts	pc.	4	5	5

3.2 GENERAL DESIGN

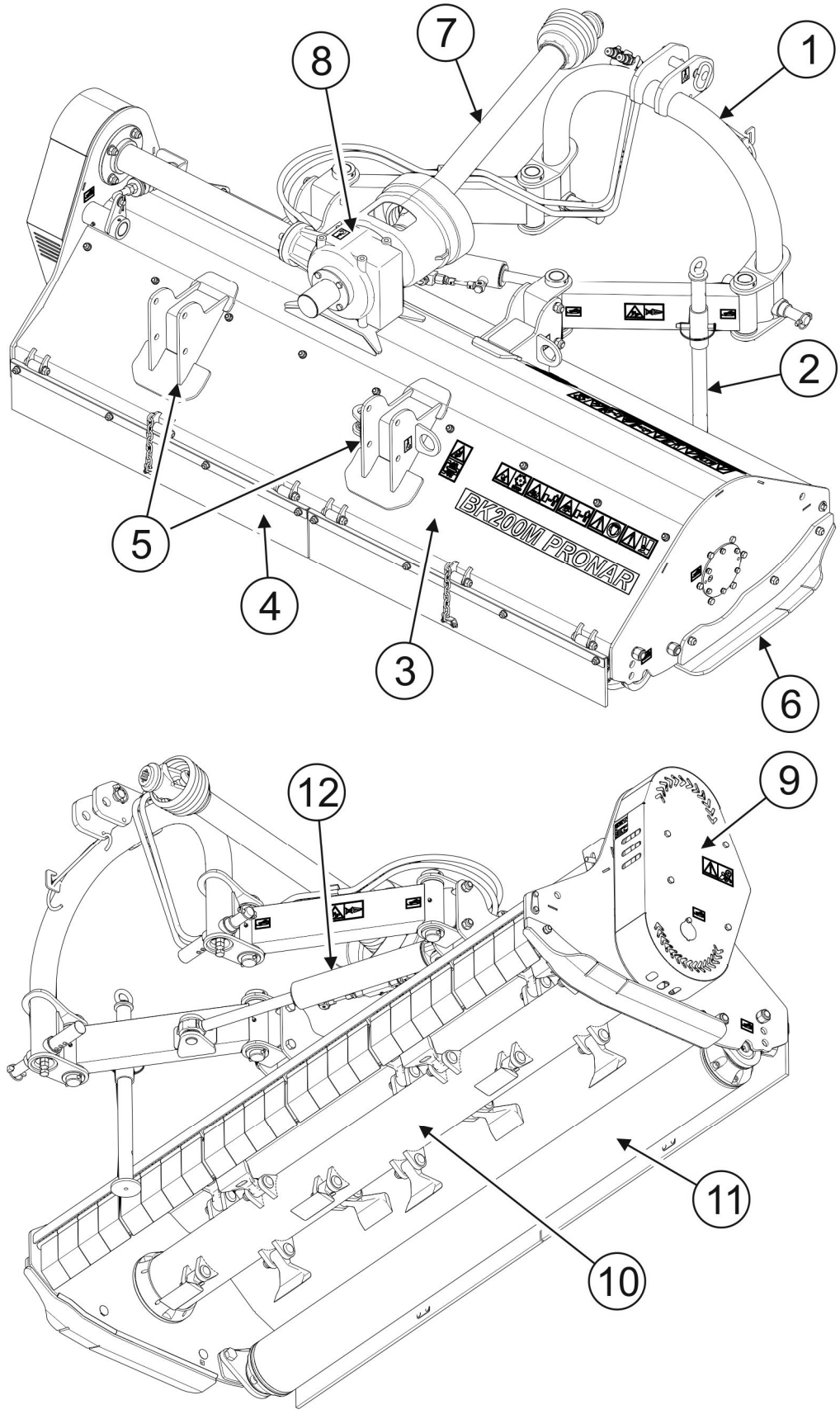


FIGURE 3.1 General design

(1)- linkage; (2)- parking stand; (3)- cutting unit housing; (4)- rubber guard; (5)- linkage lugs; (6)- slide; (7)- PTO shaft; (8)- bevel gear; (9)- belt transmission; (10)- flail shaft; (11)- tracking shaft; (12)- hydraulic system;

3.3 LINKAGE

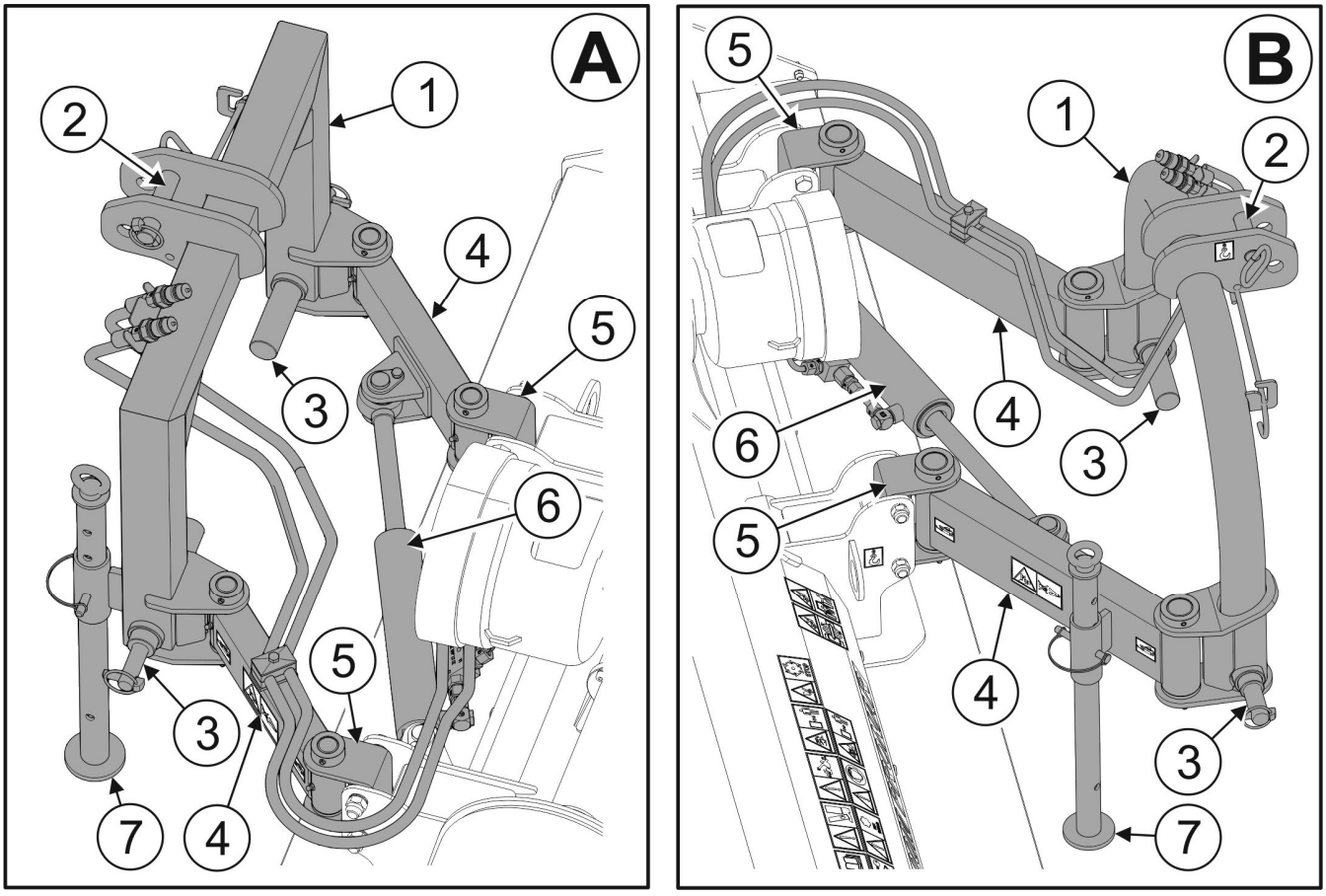


FIGURE 3.2 Linkage

(A)- BK110M / BK140M mower linkage;

(B)- BK160M / BK180M / BK200M / BK250M mower linkage;

(1)- three-point linkage frame; (2)- central connection pin; (3)- three-point linkage lower hitching eye pin; (4)- left and right movable hitching eyes of the mower's linkage; (5)- hitching eye lugs (6)- tipping cylinder; (7)- parking stand;

The mower linkage enables connection of the mower to the tractor rear three-point linkage as well as the tractor front three-point linkage. Such a connection is made possible by easily demountable linkage, which can be moved to the other side of the mower after unscrewing four bolts.

The main element of the mower linkage (FIGURE 3.2) is the three-point linkage frame (1), equipped with two lower pins (3) and upper pin (2) for connection to the tractor rear three point linkage. Movable hitching eyes (4) connected to hydraulic tipping cylinder (6) enable shift of the cutting unit to the left or right in relation to tractor. Such design facilitates manoeuvring the mower between trees, road signs or roadside posts and barriers.

3.4 HYDRAULIC SYSTEM

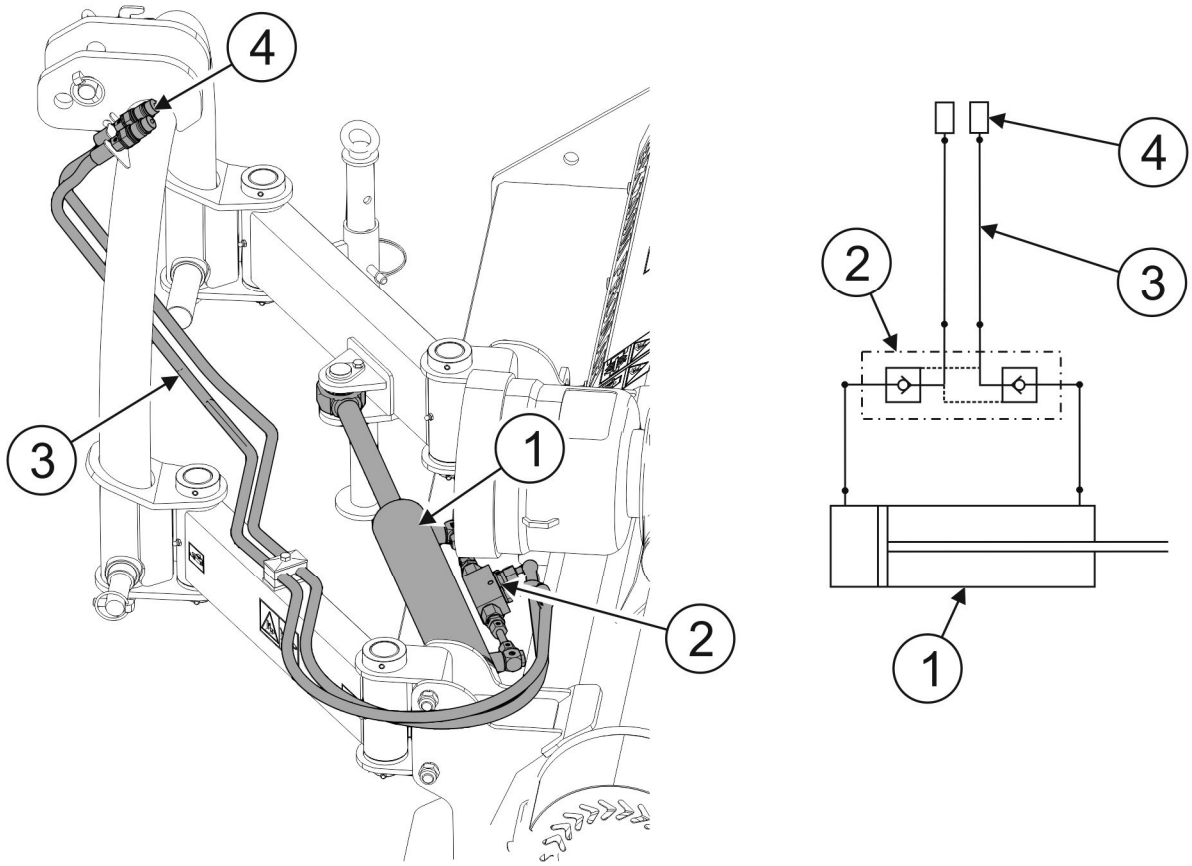


FIGURE 3.3 Hydraulic system design.

(1)- side tipping hydraulic cylinder; (2)- hydraulic lock; (3)- hydraulic lines; (4)- hydraulic quick couplings for tipping control.

The mower hydraulic system enables lateral movement of the mower to the right or left in relation to tractor and facilitates manoeuvring the mower between trees in orchards and roadside posts and barriers. When shifted maximally to the left, the mower is positioned centrally behind the tractor. Such configuration facilitates transport on public roads.

The mower hydraulic system consists of double-acting hydraulic cylinder *(1)*, hydraulic lock *(2)* and supply lines *(3)*. Hydraulic lock *(2)* blocks movement of the hydraulic cylinder in both directions after the mower position is set by hydraulic cylinder *(1)*.

3.5 DRIVE TRANSMISSION

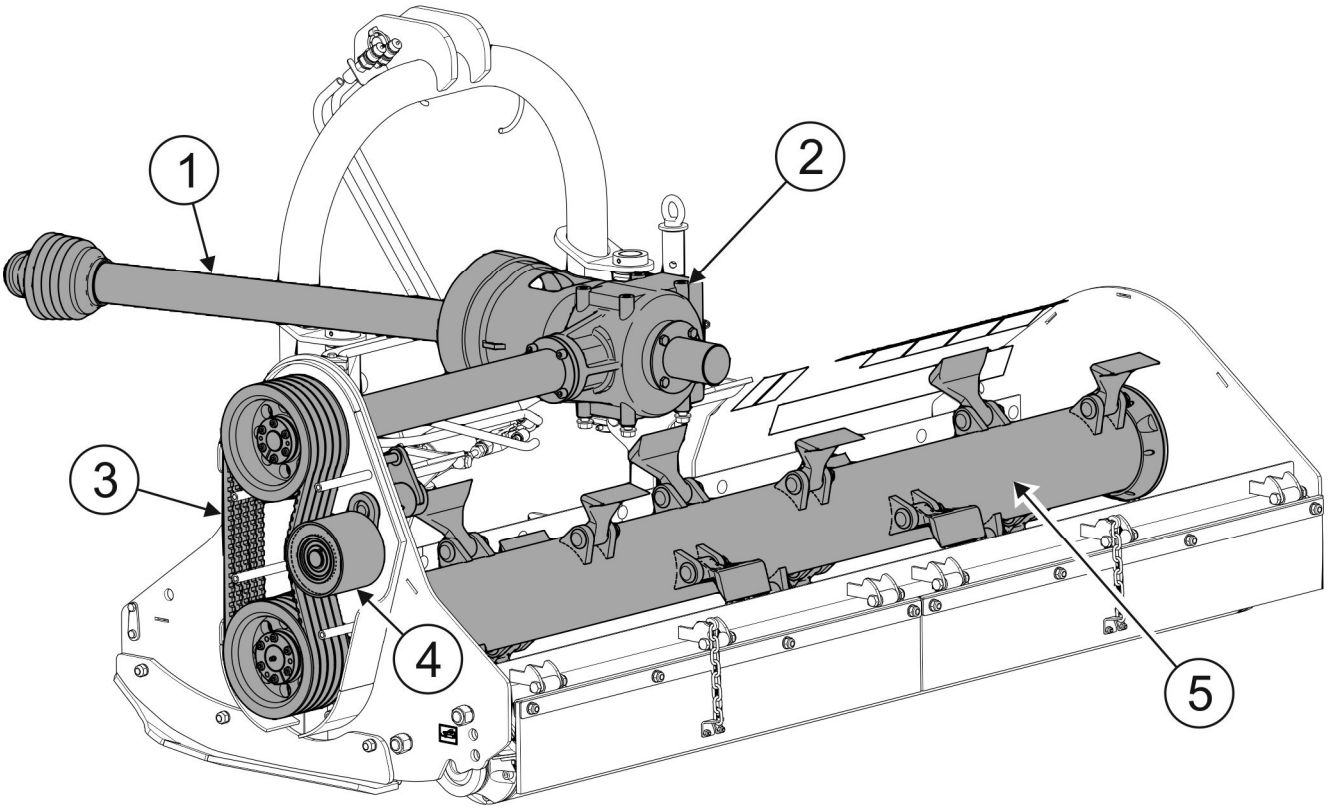


FIGURE 3.4 Drive transmission.

(1)- PTO shaft with backstop clutch; (2)- bevel gear; (3)- belt transmission; (4)- tensioner; (5)- flail shaft.

Drive is transmitted from the power take-off shaft (PTO) of the tractor through the PTO shaft (1) with backstop clutch to bevel gear (2). Next, torque from bevel gear (2) is transmitted to flail shaft (5) with the use of the shaft and belt transmission (3). In this case, the belt transmission performs also the function of overload protection clutch.

3.6 CUTTING UNIT

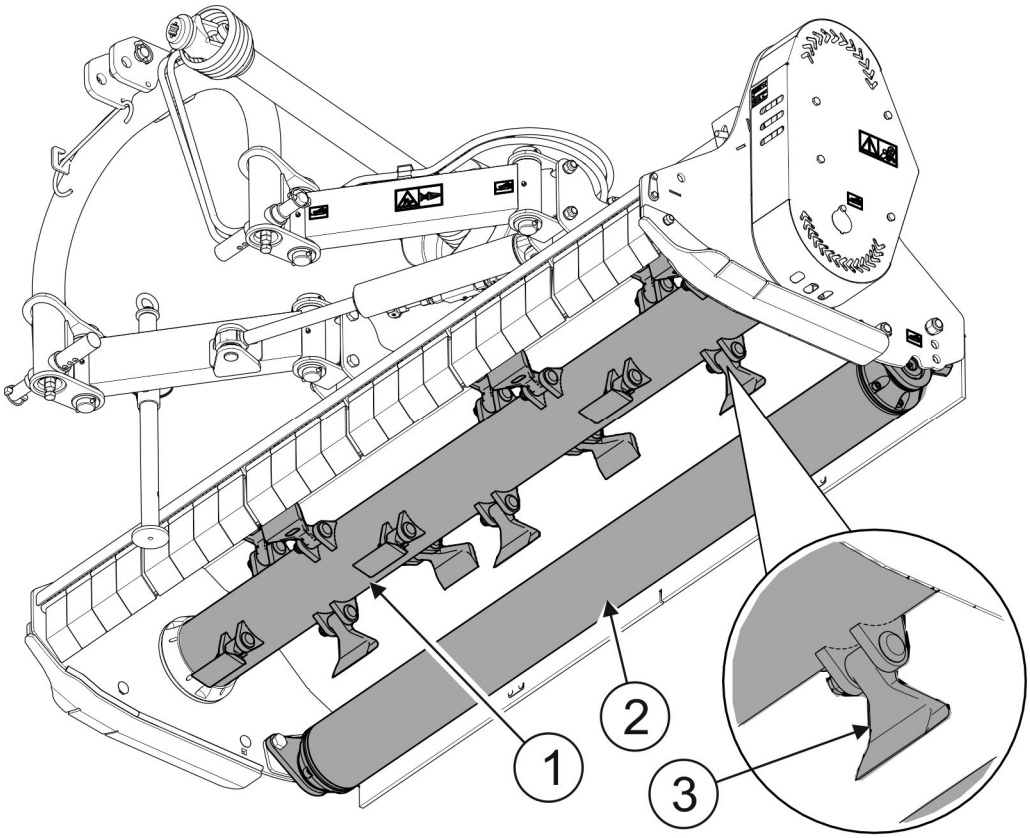


FIGURE 3.5 Cutting unit

(1)- flail shaft; (2)- tracking shaft; (3)- flail blade.

The cutting unit of PRONAR BK110M / BK140M / BK160M / BK180M / BK200M / BK250M mowers consists of flail shaft (1) on which flail blades are mounted (3). The flail blades are designed to swing and avoid obstacles which cannot be cut. Cutting height is adjusted by changing the tracking shaft (2) setting. Flail shaft is mounted on bearings installed in the cutting unit housing.

SECTION

4

CORRECT USE

4.1 GET READY FOR OPERATION

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.

NOTE

Before using the mower always check its technical condition. In particular check the technical condition of the cutting unit, drive system, and integrity of safety guards.

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

- the user must carefully read this Operator 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"*,

NOTE

Before beginning work lubricate flail shaft bearings and tracking shaft bearings until grease appears between the shaft and bearing housing.

- check technical condition of the hydraulic system;
- check if flail blades, cutting shaft, linkage and safety guards are correctly installed.
- check technical condition of hitching system pins and locking cotter pins,
- check lubricating oil level in bevel gear.

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 engine, check all systems and perform a test run before beginning work. In order to inspect:

- hitch the mower to tractor (see "*HITCHING TO TRACTOR"*)

- set it in working position,
- adjust the length of PTO shaft to compatible tractor according to the Operator Manual of PTO shaft,
- connect PTO shaft to tractor and mower,
- start PTO drive.

Engage mower's drive for 3 minutes and check the following:

- that there is no knocking or noise in the drive system arising from scraping or grinding of metal elements,
- whether there is excessive vibration in the cutting unit,
- synchronised rotation of cutting unit (FIGURE 4.1).

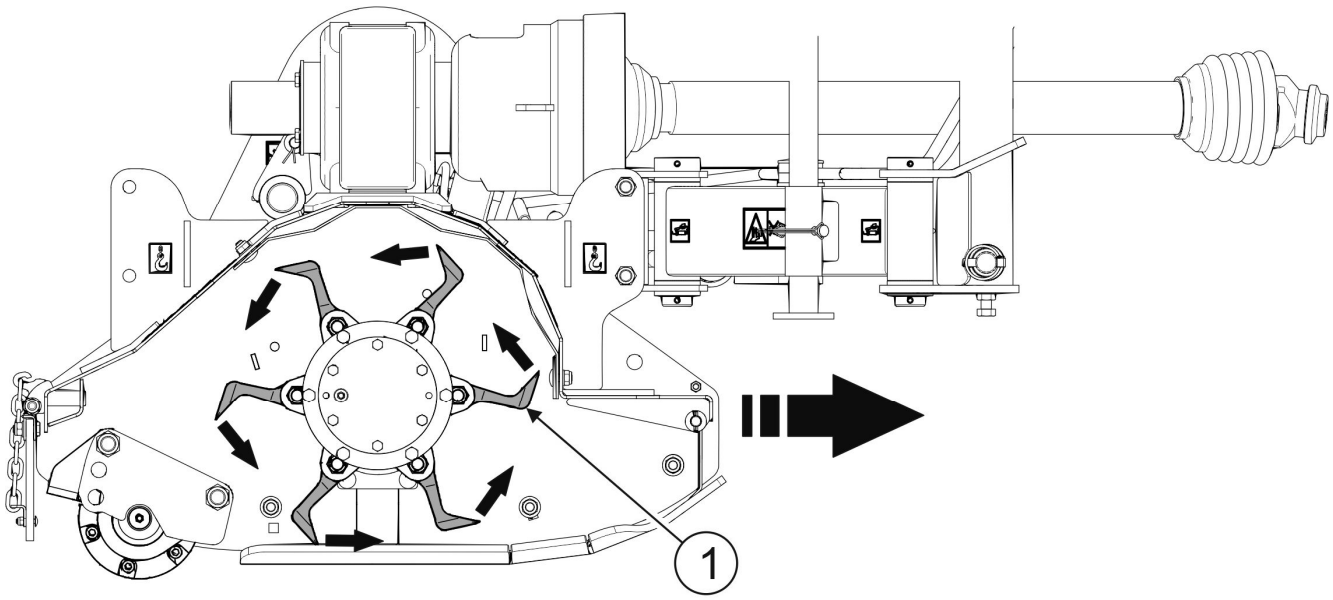


FIGURE 4.1 Rotation of cutting unit synchronised with direction of tractor travel.

(1)- cutting unit

If the rotation direction is incorrect, disassemble and turn 180° the bevel gear (1) (FIGURE 4.2) so as to ensure that the bevel gear transmits torque from the PTO shaft to the belt transmission in the correct direction.

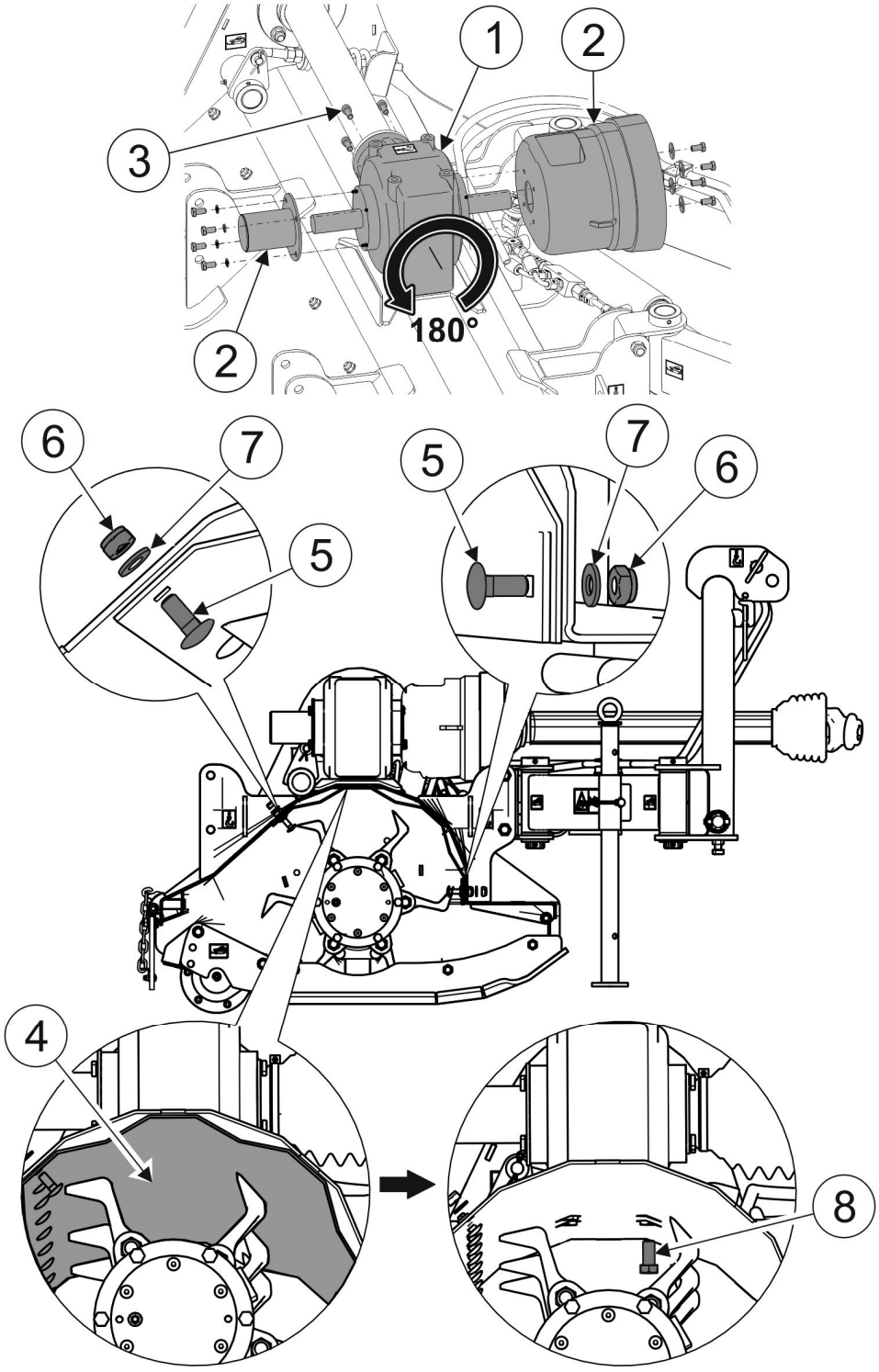


FIGURE 4.2 Disassembly of bevel gear

(1)- bevel gear; (2)- bevel gear shaft casing; (3)- bolt; (4)- internal casing of the mower housing; (5)- bolt; (6)- nut; (7)- washer; (8)- bolt

To do this, dismantle internal casing of the mower housing (4) by removing bolts (5) that fix the casing to the housing. Next, slide the casing sideways to gain access to bolts (8) securing bevel gear to housing. After unscrewing bolts (8) that secure the bevel gear to the mower housing and bolts (3) that secure the bevel gear to the housing of the shaft connecting the bevel gear to the belt transmission, the bevel gear can be turned 180° and reinstalled. Swap the bevel gear shafts casings (2).

NOTE

Before connecting the mower to tractor adjust the length of PTO shaft according to the PTO shaft Operator Manual.

NOTE

Before using the mower always check its technical condition. In particular check the technical condition of the cutting unit, linkage, drive system, and integrity of protective guards.

The mower operation at no load should be smooth. Shaking of drive transmission, cutting unit and whole machine is not acceptable, nor is changed noise and vibrations coming from loose nut and bolt connections. After stopping mower, check fastening of flail blades. Check that oil does not leak from the bevel gear.

DANGER

Before using the machine, carefully read this Operator Manual

Careless and incorrect use and operation of the machine, and failure to follow instructions in this Operator Manual is dangerous to your health.

The mower 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 machine, ensure 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 TECHNICAL INSPECTION

To get the machine ready for use, check components according to guidelines presented in Table *4.1*.

TABLE 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Condition of safety guards	Check the technical condition of safety guards, if complete and correctly mounted.	Daily before beginning work
Check if the shaft and linkage are correctly installed	Check if correctly installed	
Technical condition of flail blades	Visually inspect and, if necessary, replace according to section *"CHECK AND REPLACE BLADES"*	
Oil level in bevel gear	Check according to section "*DRIVE SYSTEM MAINTENANCE"*	
Check if all main nut and bolt connections are properly tightened	Tightening torque should be according to table (*5.4*).	Every six months
Lubrication	Lubricate the components according to section "*LUBRICATION*".	According to table (*5.3*)

NOTE

Do NOT use an inoperative machine.

4.3 HITCHING TO TRACTOR

4.3.1 HITCHING TO THE TRACTOR REAR THREE-POINT LINKAGE

The PRONAR BK110M / BK140M / BK160M / BK180M / BK200M / BK250M mowers may only be mounted on a tractor fulfilling the requirements presented in Table „*1.1 AGRICULTURAL TRACTOR REQUIREMENTS"*.

NOTE

Before using the mower, the user must carefully read the tractor Operator Manual.

DANGER

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

Exercise caution when hitching the machine.

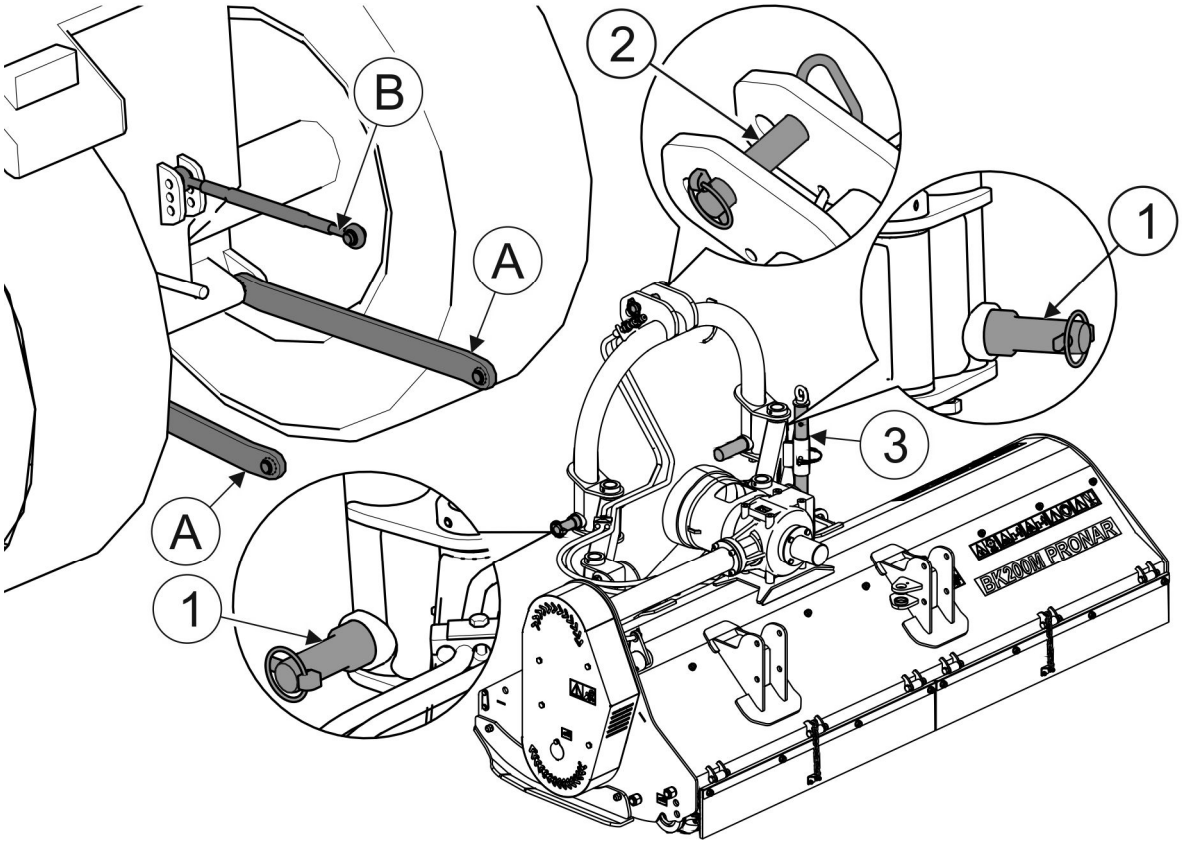


FIGURE 4.3 Hitching to tractor

(A)- lower three point linkage arms; (B)- top link; (1)- mower linkage lower pins; (2)- top link mounting pin; (3)- support leg

In order to attach the mower to tractor rear three-point linkage (FIGURE 4.3), proceed as follows:

- Reversing the tractor bring the lower three point linkage connection points (A) of the tractor close to pins (1) of the mower.
- Set connection arms (A) of tractor at appropriate height.
- Switch off tractor engine and prevent tractor from unintentional moving.
- Connect lower pins (1) with linkage arms (A) and lock with the aid of cotter pins.
- Connect tractor top link (B) with mower pin (2) and secure with cotter pin.
- Lift mower using tractor three point linkage.
- Raise parking stand *(3)* and secure with cotter pin.

Set both tractor lower linkage arms at the same height.

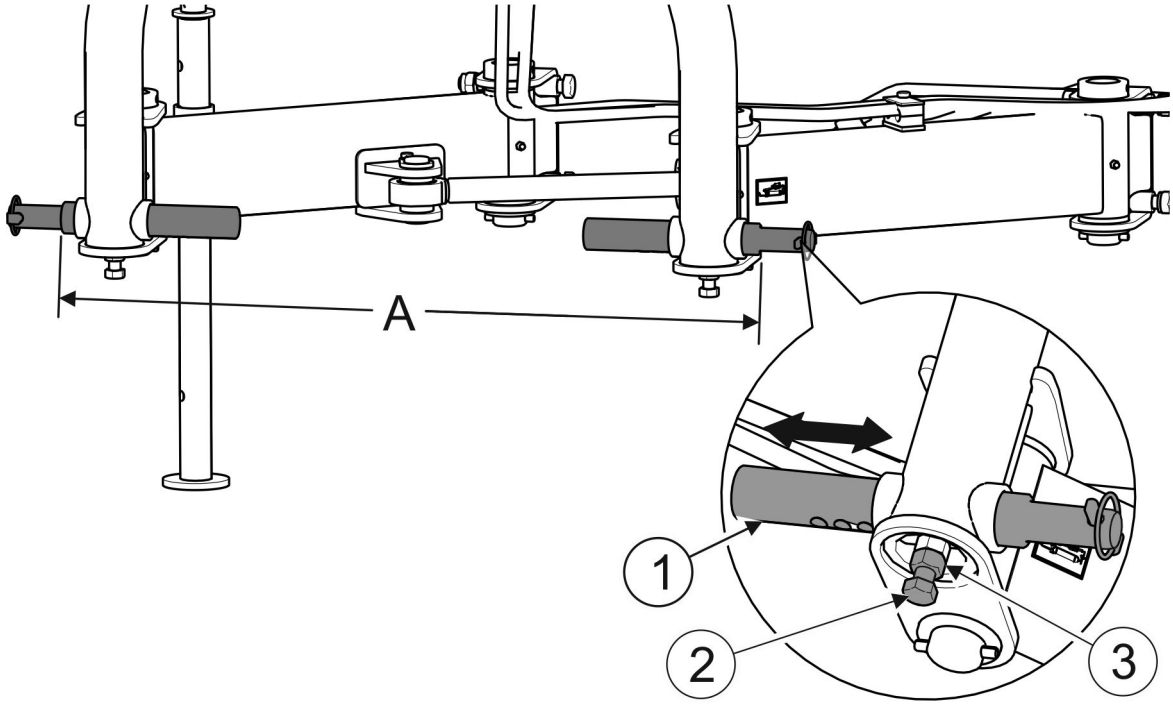


FIGURE 4.4 Adjustment of lower pins of the mower's linkage.

(A) pin spacing in range 795 ÷ 970mm; (1)- linkage lower pins; (2)- retaining bolt; (3)- lock nut

Lower pins (1) of the mower linkage enable spacing adjustment (FIGURE 4.4). To change spacing of linkage pins:

- loosen lock nut (3),

- unscrew setting bolt *(2)*,
- move pin (1) to the right or the left to obtain the required spacing,
- block pin position with setting bolt *(2)* and lock nut *(3)*.

The method of adjustment of right and left pins is identical.

As standard mower is equipped with pins for linking with category II linkage according to ISO 730. To link the mower to category III linkage (PRONAR BK160M / BK180M / BK200M / BK250M), use the appropriate transition balls (option).

NOTE

Comply with the recommendations relating to linkage and mounting points.

DANGER

Prior to connecting the hydraulic system lines, carefully read the Operator Manual of the tractor and observe all manufacturer's recommendations.

Line connections of mower side tipping cylinder should be connected to double acting hydraulic circuit.

DANGER

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

4.3.2 HITCHING TO THE TRACTOR FRONT THREE-POINT LINKAGE

Mower design enables also its connection to the tractor front three-point linkage. In order to adapt the mower to working when hitched to the tractor front three-point linkage, proceed as follows (FIGURE 4.5):

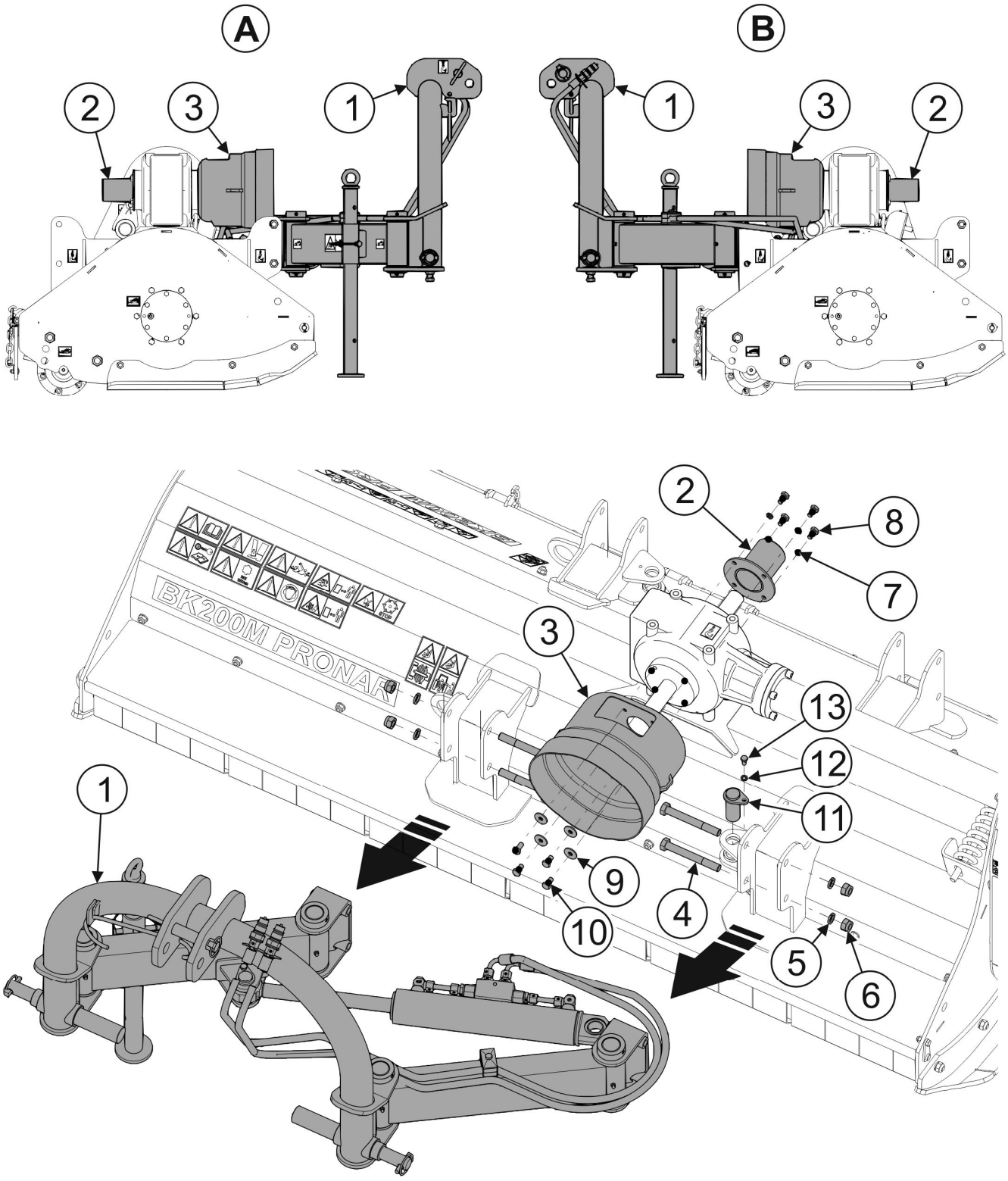


FIGURE 4.5 Changing the linkage mounting. (see the description on the next page)

(A) – linkage adapted to operation of the mower hitched at the rear of the tractor; (B) - linkage adapted to operation of the mower hitched at the front of the tractor; (1) – mower linkage; (2) – rear shaft casing; (3) – front shaft casing; (4) – linkage securing bolts; (5) – washer; (6) – nut; (7) – washer; (8) – rear shaft casing securing bolts; (9) – washer; (10) – front shaft casing securing bolts; (11) – cylinder pin; (12) – washer; (13) – cylinder pin securing bolt;

- unscrew the four bolts *(4)* securing linkage *(1)* to front lugs of the housing;
- take out pin *(11)* securing cylinder to the mower housing - unscrew bolt *(13)* and take out pin upwards;
- move complete linkage to the rear of the housing and secure to rear lugs of the housing using four previously unscrewed fixing bolts (4) and pin (11) securing the cylinder;
- swap the shaft casings (2) and (3) on bevel gear.

4.4 TRANSPORTING THE MACHINE

For transport to place of work and back, raise mower on tractor three point linkage so that the lower pins are at height of not less than 500 mm above the ground. Set the mower minimum lateral tipping using the side tipping cylinder (cylinder piston should be maximally extended). Disconnect PTO shaft from tractor PTO drive and place it on support. Three point linkage lower arms must be secured so that mower does not swing sideways.

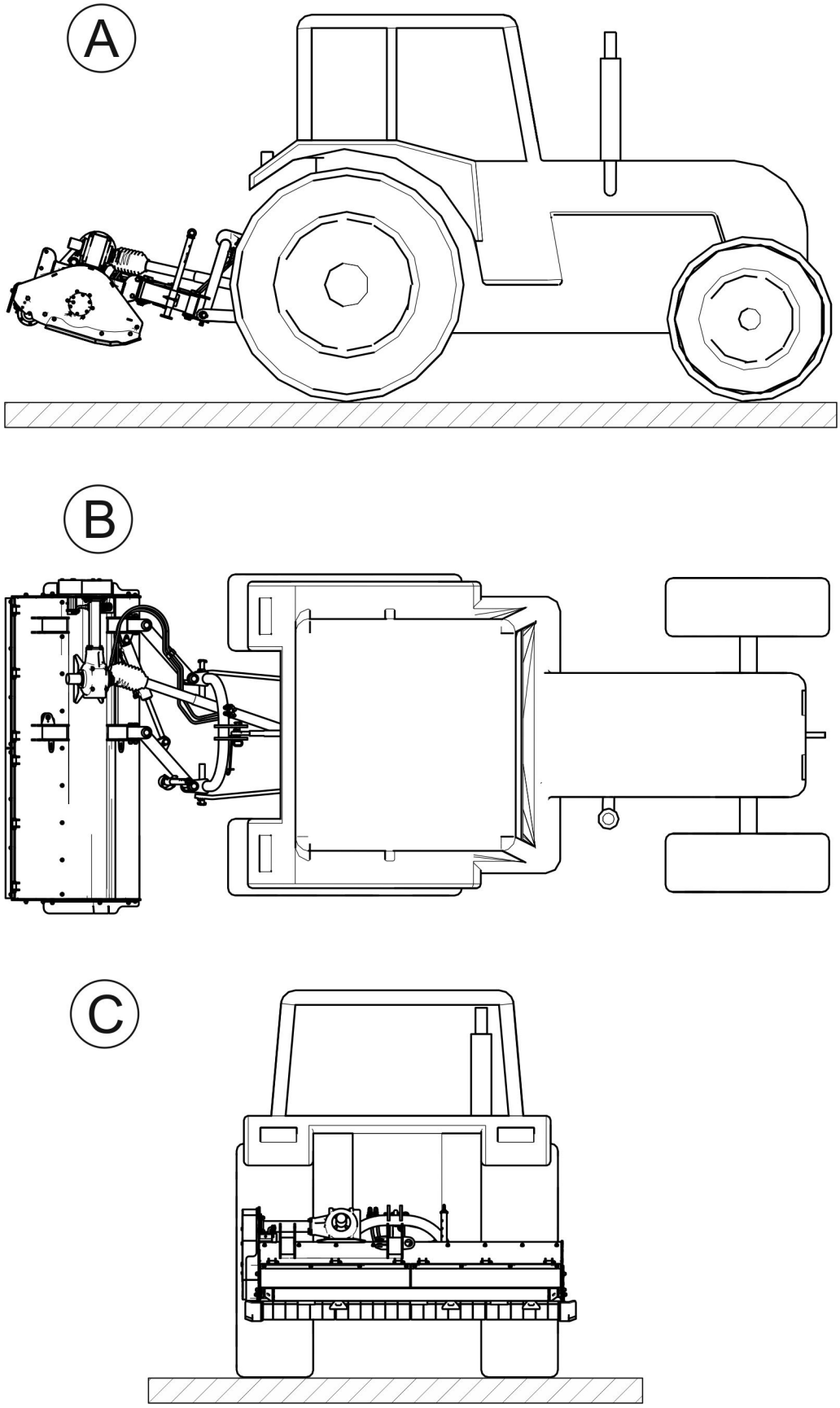


FIGURE 4.6 Transport position

(A)- right side view, (B)- overview, (C)- rear view

4.5 SETTING AND MOWING

4.5.1 SET THE MOWER IN WORKING POSITION

To set the mower in working position:

- raise the mower on the tractor three point linkage so that the mower does not touch the ground
- controlling appropriate hydraulic circuits in the tractor, slide the piston of the cutting unit tipping cylinder to appropriate length

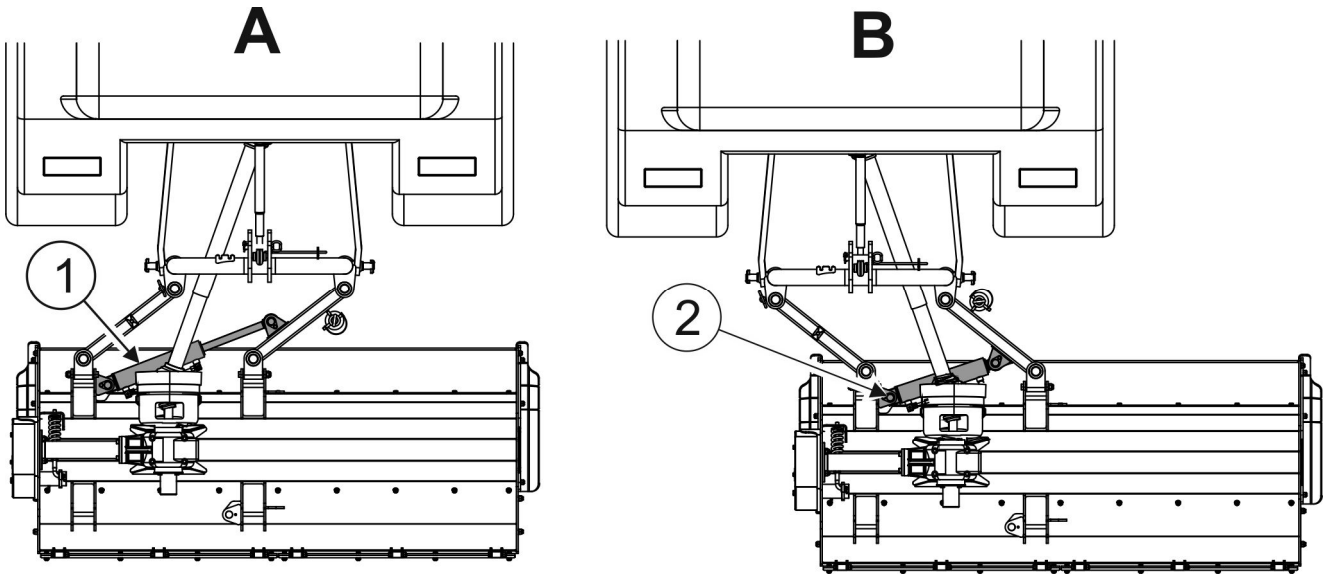


FIGURE 4.7 Setting mower in working position

(A)- transport position; (B)- working position; (1)- tipping cylinder in transport position (cylinder piston is maximally extended); (2)- tipping cylinder in working position (cylinder piston is extended to required length)

- lower the mower so that the cutting unit is supported freely on the ground, on the tracking shaft. Slides should not touch the ground and the complete cutting unit should be set in parallel to the ground (FIGURE 4.8).

4.5.2 ADJUST CUTTING HEIGHT

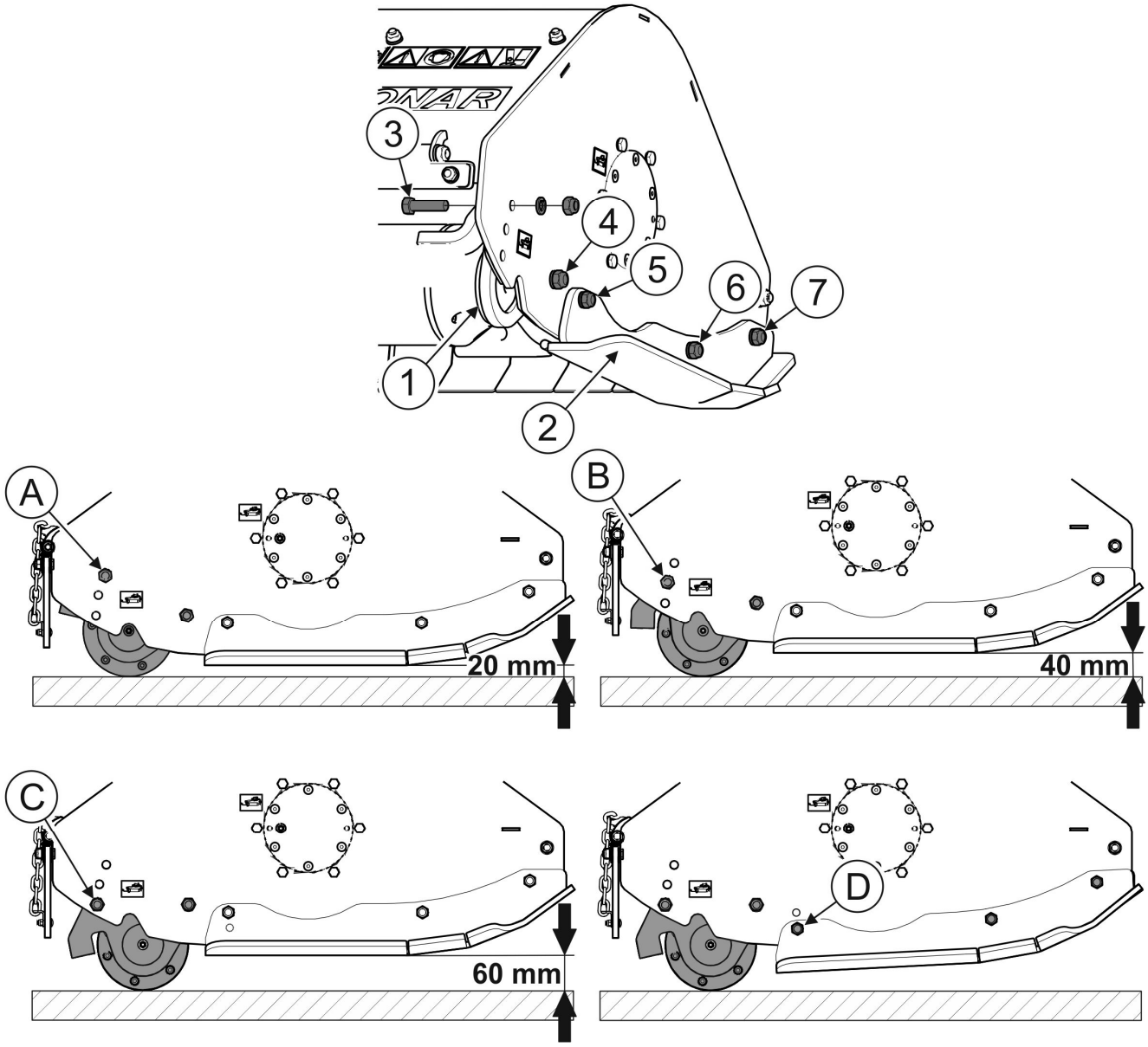


FIGURE 4.8 Setting mower cutting height.

(1)- tracking shaft; (2)- slide; (3)- tracking shaft fixing bolt; (4)- nut; (5)- slide fixing bolt; (6)- nut; (7)- nut; (A)- position of the bolt setting cutting height of 20 mm; (B)- position of the bolt setting cutting height of 40 mm; (C)- position of the bolt setting cutting height of 60 mm; (D)- position of the bolt setting slide angle.

Adjust the length of the top link of the three point linkage in such a way as to ensure that the mower slides are set in parallel to the ground. Cutting height can be modified by changing the tracking shaft (1) position with regard to the mower housing. In order to do this (FIGURE 4.8):

- loosen nuts (4) of bolts on both sides of the tracking shaft *(1)* on which the tracking shaft will be turned;

- undo nuts and remove fixing bolts *(3)* on both sides of the tracking shaft
- turn the tracking shaft with bracket so as to ensure that the opening in the bracket aligns with the opening in the side of the mower housing, depending on the cutting height to be achieved: A (20 mm), B (40 mm) or C (60 mm),
- insert fixing bolts (3) into appropriate openings and screw on the nuts;
- tighten nuts (4) of the bolt on which the tracking shaft was turned, on both sides of the tracking shaft.

When changing cutting height to 40 mm or 60 mm, it is recommended to change slides (2) angle simultaneously. Consequently, the tracking shaft rake angle at the moment of collision with obstacle will be reduced. In order to do this:

- loosen nuts *(6)* and *(7)* of the bolts securing the slide;
- unscrew nut and take out bolt *(5)* fixing the slide;
- turn the slide so as to ensure that the slide opening aligns with the lower opening in the side of the mower housing *(D)* (FIGURE 4.8);
- insert fixing bolt *(5)* into the aligned openings and screw on the nut
- tighten nuts *(6)* and *(7)* of the bolts securing the slide.
- Angle of the slide located on the opposite side of the mower housing should be also changed.

4.5.3 CONNECTING DRIVE SHAFT

DANGER

Before connecting the shaft, turn off the tractor engine and remove the key from the ignition. 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 Manual of PTO shaft.

Before connecting the mower it is absolutely necessary to carefully read the Operator Manual attached by the Manufacturer of the shaft and observe the instructions contained in it. Before connection to the tractor, check technical condition of shaft guards, completeness and condition of protecting chains and general technical condition of PTO shaft.

NOTE

Before connecting the mower to tractor adjust the length of PTO shaft according to the PTO shaft Operator Manual.

The PTO shaft, which connects PTO of the tractor with the mower bevel gear is equipped with backstop clutch. When connecting PTO shaft, its end should be terminated with a clutch (1) and connected to the mower gear (A).

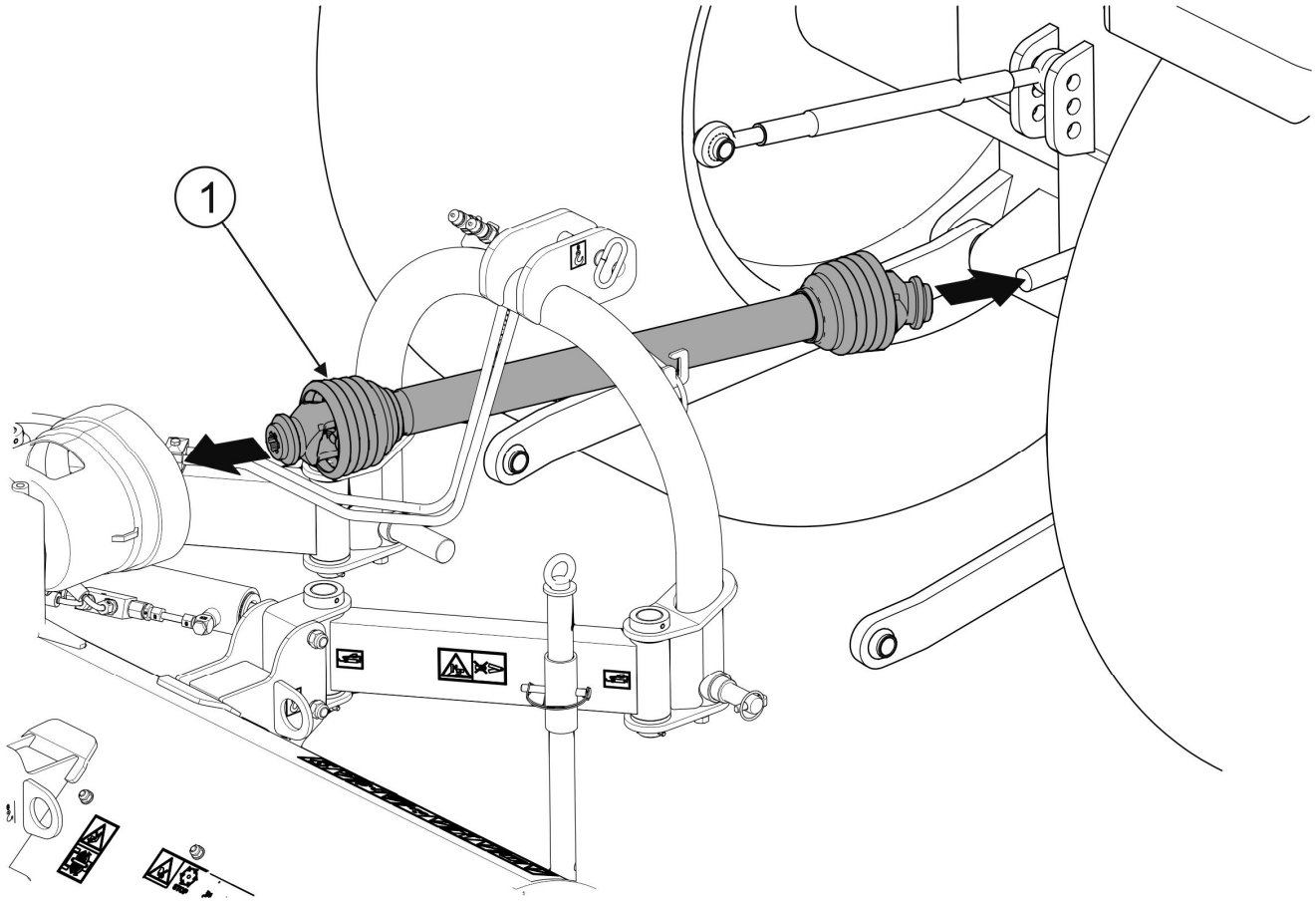


FIGURE 4.9 Connecting the PTO shaft

(1)- PTO shaft backstop overload release clutch,

4.5.4 MOWING

DANGER

The mower may only be started when all guards are in place and the cutting unit is set in working position.

Before engaging drive to PTO shaft make sure that there are no bystanders, especially children, near the mower.

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

NOTE

Before beginning work lubricate flail shaft bearings and tracking shaft bearings until grease appears between the shaft and bearing housing.

After setting the mower in working position and adjusting cutting height, the machine starting procedure may begin. Engage the PTO in the tractor at a suitably low speed and then gradually increase the speed until PTO speed of 1000 rpm is reached (540 rpm - option). During mowing the lever controlling the three-point linkage hydraulic lifting circuit should be set in "floating" position, however the lever controlling the tipping cylinder should be set in neutral position.

HIGH NOISE LEVEL WARNING

Depending on the working conditions, the tractor with the machine may generate noise exceeding the level of 85dB at the driver position. In such conditions, the operator should use personal protective equipment (ear protectors).

In order to reduce the level of noise during work, the operator cab windows and door should be closed.

When mowing and chopping pay attention to uneven surface and obstacles in the mown crop. Mowing speed depends on the quantity and quality of mown crop but also on the type of terrain.

Mowing speed must be reduced if:

- mown ground is uneven,
- mown and chopped crop is very high and dense,
- there is a great risk of running into foreign objects e.g. stones, thick branches, steel or concrete objects.

When driving across the road, pavement or other obstacles and when making turns, raise the mower by means of the tractor three-point linkage and disengage the drive.

Be especially careful when mowing along ditches, furrows and slopes. If the drive belts slip in the belt transmission during mowing, disengage the drive and check the cause of the overload. Belt slipping may occur because of too low rotation speed of the cutting unit.

4.5.5 REMOVING BLOCKAGES

DANGER

If the mower drive transmission system or cutting unit is blocked, turn off tractor engine and remove key from ignition. Secure tractor using parking brake and ensure that unauthorised persons, especially children, have no access to the tractor.

In the event of work requiring the mower to be raised, 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).

If the belts slip in the belt transmission during mowing, disengage the drive and check the cause of blockage. If blockage occurs as a result of accumulation of mown crop or wrapping of mown crop around the mower's cutting unit or as a result of contact with foreign objects (stones, branches, heaps of soil), remove accumulated crop (using a sharp tool) and check condition of cutting elements and their mounting.

In order to reduce the risk of blockage of cutting elements to minimum, mowing speed must be reduced if:

- mown ground is uneven,
- mown and chopped crop is very high and dense,
- there is a great risk of running into foreign objects e.g. stones, thick branches, steel or concrete objects.

4.6 UNHITCHING THE MACHINE FROM THE TRACTOR

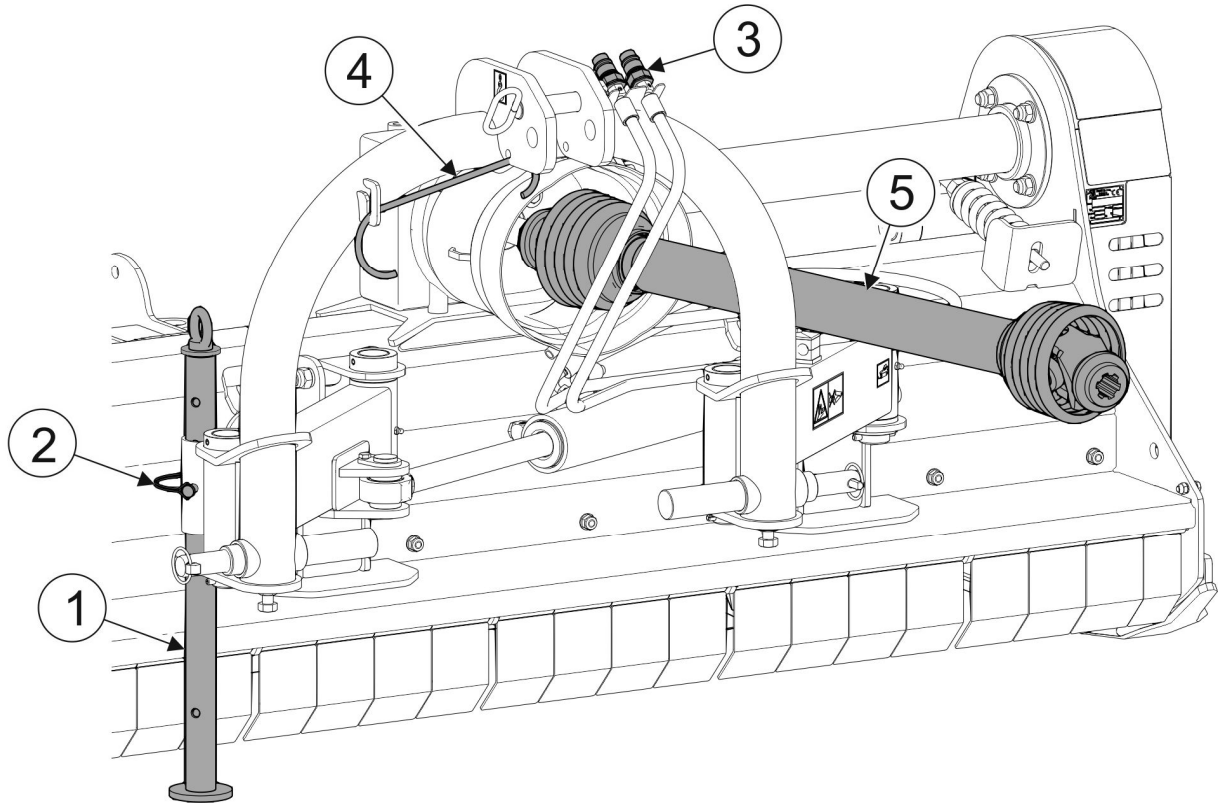


FIGURE 4.10 Disconnecting mower from tractor

(1)- parking stand; (2)- parking stand; (3)- hydraulic line connectors; (4)- PTO shaft bracket; (5)- PTO shaft.

DANGER

Reduce pressure prior to disconnecting the hydraulic system.

In order to disconnect the disc mower from the tractor(FIGURE 4.10), proceed as follows:

- lower mower using three-point linkage to rest position,
- turn off the tractor engine and remove the key from the ignition,
- take out securing linchpin *(2),* lower parking stand *(1)* and lock it again with securing linchpin *(2);*
- reduce residual pressure in the hydraulic system using the appropriate hydraulic circuit control lever,

- disconnect hydraulic line plugs (3) from tractor and secure with stoppers and place in special brackets on the mower frame,
- disconnect PTO shaft (5) from tractor PTO drive and place on bracket (4),
- disconnect top link of three-point linkage,
- disconnect lower pins and drive tractor away.

After disconnecting from tractor, mower should be supported on parking stand (1) (FIGURE 4.10) and on tracking shaft.

SECTION

5

MAINTENANCE

5.1 INSPECTION AND DISASSEMBLY OF SAFETY GUARDS

The machine may only be used when all the safety guards and other protective elements are technically sound and correctly positioned. Safety guards should protect against stones and other foreign objects thrown from the mower. In the event of loss or damage to the protective guards , they must be replaced with new ones.

DANGER

During inspection and dismantling of guards, turn off tractor engine and remove the key from the ignition and disengage PTO shaft. Mower must rest on the ground. Ensure unauthorised persons, especially children, have no access to the machine.

Method of disassembly of safety guards is shown in FIGURE 5.1.

When disassembling the rubber guards *(1)*:

- remove the chains *(9)* supporting the rubber guards from the eyelet *(10)*
- unscrew the nuts *(7)* securing the clamping strips *(2)*,
- remove the strips *(2)* and rubber guards *(1)* from the fixing bolts *(6)*.

When disassembling the front guard *(4)*

- undo the bolt *(11)* securing the rod *(5)* on which the front guard elements *(4)* are suspended,
- remove the pin *(12)* securing the rod *(5)*,
- pull out the rod *(5)* so as to enable removal of the damaged element *(4)* and replace it with a new one.

Pay special attention to correct mounting of safety guards. Bolts should be tightened using appropriate tightening torque according to TABLE 5.3. TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS**.**

ATTENTION

The mower must not be started if safety guards are damaged, incorrectly mounted or unsecured.

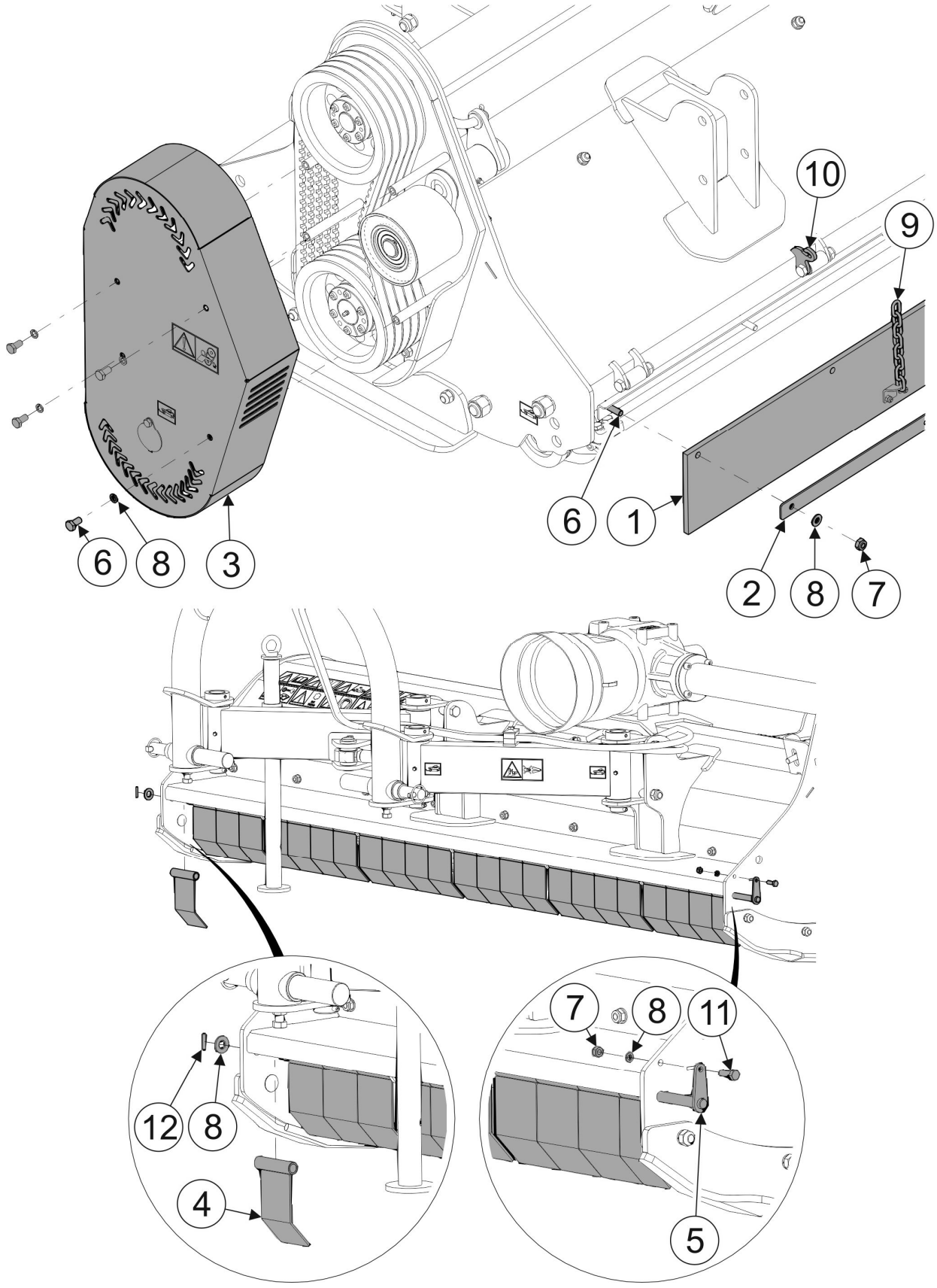


FIGURE 5.1 Disassemble safety guards

(1)- rubber guard; (2)- clamping strip; (3)- belt transmission guard; (4)- front guard; (5)- front guard fixing rod; (6)- guard fixing bolt; (7)- nut; (8)- washer; (9)- chain; (10)- chain fastening eye; (11)- rod fixing screw; (12)- pin.

5.2 CHECK AND REPLACE CUTTING BLADES

DANGER

During inspection and replacement of flail blades, turn off tractor engine and remove the key from the ignition and disengage PTO shaft. Mower must rest on the ground.

Regularly inspect the blades. Visual inspection involves checking the blade condition and its mounting. Blades should be worn down uniformly and have the same weight and be of the same type. A bent or damaged blade must be replaced with a new one provided by the mower manufacturer. Flail blades must be replaced in pairs (simultaneously with a blade located on the opposite side of the shaft axis) in order to maintain the balance of the flail shaft. Before proceeding to replace the blades, clean the residue of mown material from the flail shaft.

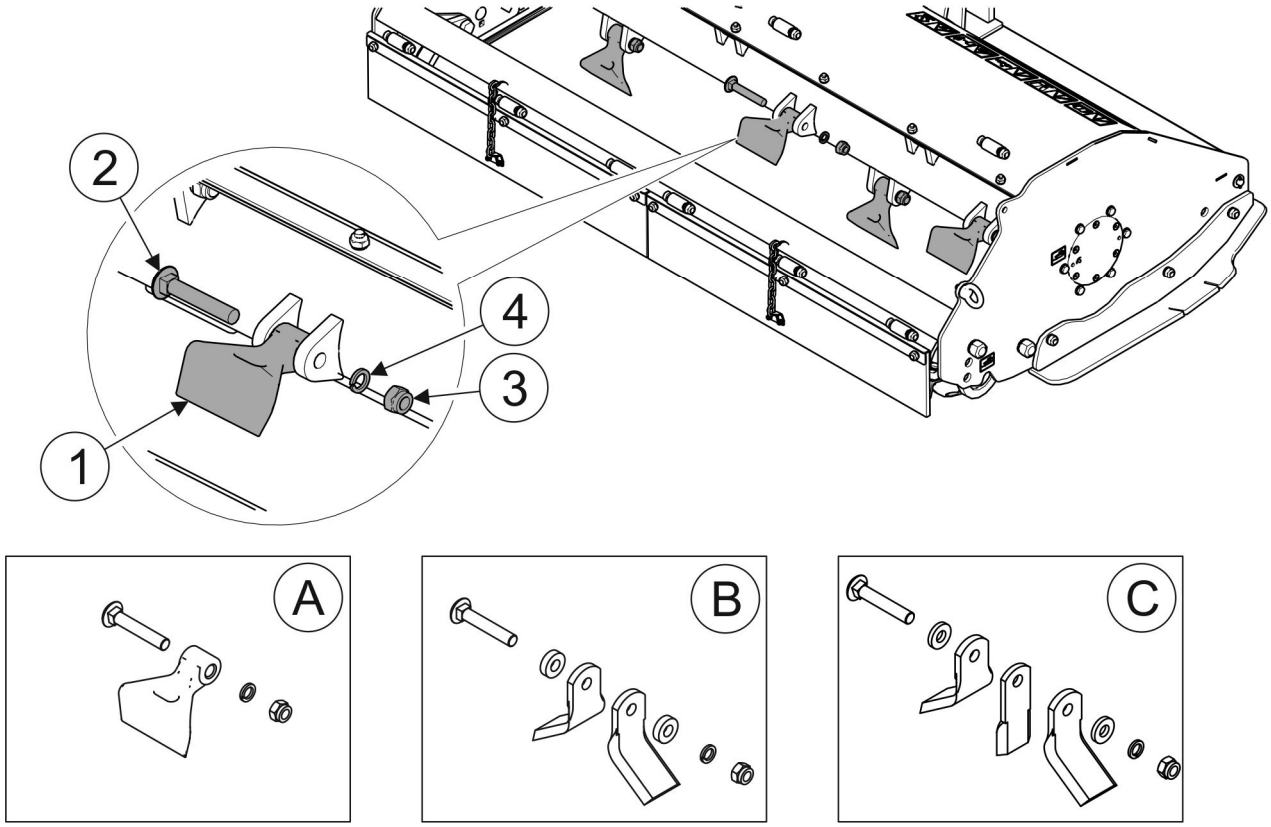


FIGURE 5.2 Replacement of cutting blades

(1)- flail blade; (2)- blade fixing bolt; (3)- nut; (4)- spring washer

(A)- flail-type blade assembly Catalogue number: 276N-03080100 (standard)

(B)- "Y" blade assembly, Catalogue number: 276N-03080200 (option)

(C)- "YI" blade assembly, Catalogue number: 276N-03080300 (option)

When replacing blades (1) pay attention to the condition of bolts (2) securing blade to the flail shaft. Excessively worn or damaged bolt must be replaced with a new one of the same strength class (class 10.9). Bolt nut (3) should be tightened so that flail blades can move freely in the lugs of the flail shaft.

TIP

Damaged or worn blades must be changed in pairs (simultaneously with a blade located on the opposite side of the shaft axis) in order to maintain the balance of the flail shaft.

NOTE

Missing blade or its fragment will cause imbalance and excessive flail shaft vibration and may damage the mower.

DANGER

Use only the blades provided by the mower Manufacturer.

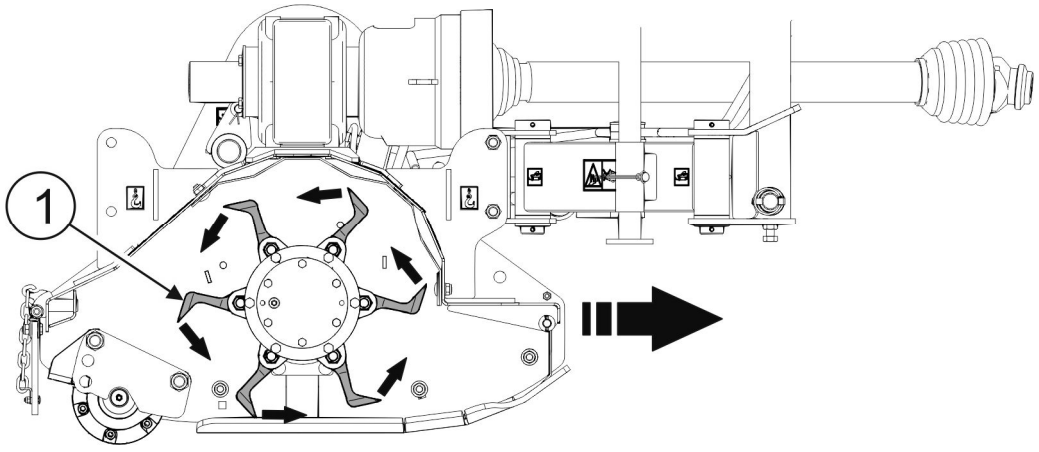


FIGURE 5.3 Method of flail blade mounting depending on the rotation direction of the flail shaft and the tractor travel direction.

(1)- flail blades

When replacing blades pay attention to blade mounting with regard to the rotation direction of the flail shaft and the tractor travel direction. Blades should be mounted as shown on FIGURE 5.3.

NOTE

Check the technical condition of blades and then mounting on each occasion after driving over obstacle e.g. stone, piece of wood, metal etc.

5.3 DRIVE SYSTEM MAINTENANCE

Drive system maintenance involves periodic inspection, adjustment and possible replacement of vee belts and change of oil in bevel gear.

Inspection of vee-belts (FIGURE 5.4) involves checking of the belt tension. The deflection of the V-belt measured between the transmission pulleysafter applying a force of 7.5 kG should not exceed 10 mm (BK250M), 11 mm (BK110M / BK180M / BK200M) and 13 mm (BK140M / BK160M). Belt tension may be altered using nut *(4)* of spring tensioner. If one of the belts is damaged the whole belt set should be changed. To change the vee belts loosen the spring tensioner, remove cotter pin *(7)* and disconnect tensioner lever *(6)* from tensioning bolt *(8)*.

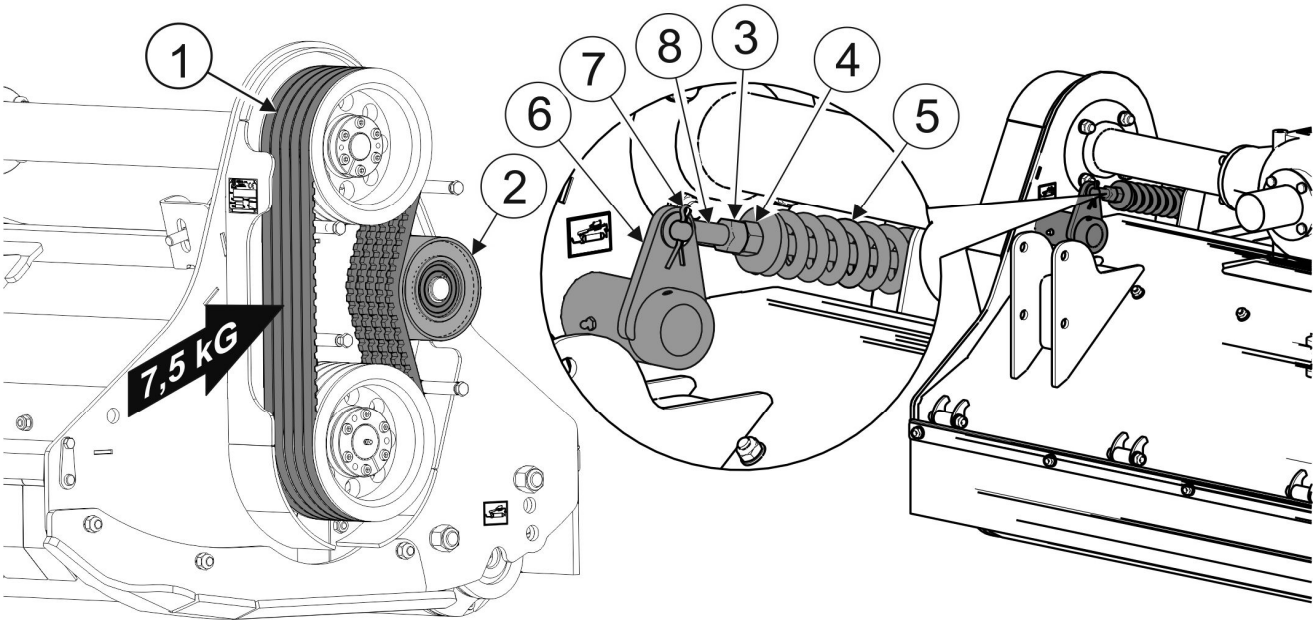


FIGURE 5.4 Checking and adjusting the tension of the serpentine belts

(1)- vee belts XPB 1400; (2)- tensioner roller; (3)- securing nut; (4)- adjustment nut; (5)- tensioner spring; (6)- tensioner lever; (7)- cotter pin; (8)- tensioning bolt.

DANGER

Do NOT perform service or repair work under raised and unsupported machine.

Check oil level in bevel gear daily.

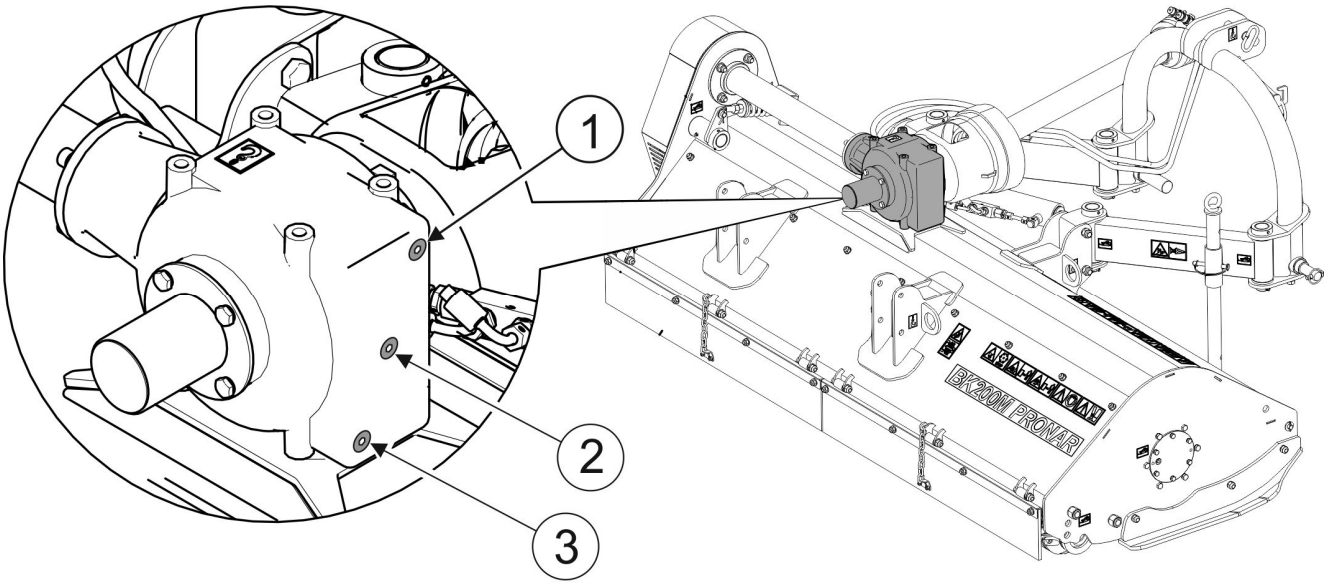


FIGURE 5.5 Check and change of oil in bevel gear

(1) filler plug, (2) inspection plug, (3) drain plug

To check the oil level in bevel gear:

- set the mower horizontally,
- unscrew inspection plug (2) (FIGURE 5.5),
- oil level should reach the lower edge of the inspection plug opening (2),
- if necessary, add oil through filler opening (1) to the required level.

DANGER

When checking oil level and changing oil, use the suitable personal protection equipment i.e. protective clothing, footwear, gloves eye protection. Avoid contact of skin with oil.

Oil in bevel gear must be changed after the first 50 hours of work. The next oil change should be made after 500 hours of work or once a year, whichever occurs first.

To change oil in bevel gear:

- set mower on a hard and level surface
- unscrew filler plug (1) and inspection plug (2),
- unscrew drain plug (3) and drain oil to previously prepared container,
- if oil Manufacturer recommends flushing transmission, that operation should be performed according to the guidelines of the oil Manufacturer (guidelines may be detailed on packaging),
- tighten drain plug (3),
- add oil until oil flows out of inspection opening (2),
- tighten filler plug (1) and inspection plug (2).

Used oil should be taken to the appropriate facility dealing with recycling or regeneration of oils.

To lubricate bevel gear use gear oil SAE 80W90 GL-5 to quantity of BK110M/BK140M - 0,9 litre, BK160M/BK180M - 1,2 litre, BK200M/BK250M - 2,0 litre.

If a leak is noticed, carefully inspect seals and check oil level. Operating the transmission with insufficient amount of oil may cause permanent damage.

Repairs of the transmission during warranty period may only be performed at authorised mechanical workshops.

5.4 HYDRAULIC SYSTEM MAINTENANCE

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 mower hydraulic system and in the tractor hydraulic system are of the same type. Application of different types of oil is not permitted. In a new mower, the hydraulic system is filled with HL32 hydraulic oil.

NOTE

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

The hydraulic system must be tight. Inspect the seals when the hydraulic cylinder is 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.

If oil leak is detected in hydraulic conduit connections, tighten the connection, and if this does not remedy the problem, replace the leaking hydraulic conduit or connection components. Always exchange each mechanically damaged component.

Flexible hydraulic lines should be replaced every 4 years of the machine operation.

TIP

Bleeding air from the mower hydraulic system is not required.

TABLE 5.1 HL32 hydraulic oil specification

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at40^{o}C	28.8 ÷ 35.2 mm^2/s
3	ISO 6743/99 quality classification	HL
4	DIN 51502 quality classification	HL
5	Flash-point	above 210°C

Because of its composition, the oil 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 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.

5.5 STORAGE

After finishing work, clean and wash the machine thoroughly with a water jet. While washing do not direct a strong water or steam jet at information and warning decals, bearings or hydraulic lines. Nozzle of pressure or steam washer should be kept at a distance of not less than 30 cm from cleaned surface.

After cleaning, inspect the whole machine, inspect technical condition of individual elements. Repair or replace any used or damaged components.

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. Mower should be kept in closed or roofed building.

If the mower will not be used for an extended period of time, protect it against adverse weather conditions. Lubricate mower according to the instructions provided. In the event of a prolonged storage, 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.

5.6 LUBRICATION

Machine lubrication should be performed with the aid of a manually or foot operated grease gun, filled with generally available grease SKF LGHB 2. Before commencing lubrication insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease

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

For detailed instructions on how to change oil in bevel gears please refer to section *5.3 DRIVE SYSTEM MAINTENANCE.* Lubrication points are shown on figure *5.6* and detailed in table *5.2LUBRICATION POINTS AND LUBRICATION FREQUENCY*.

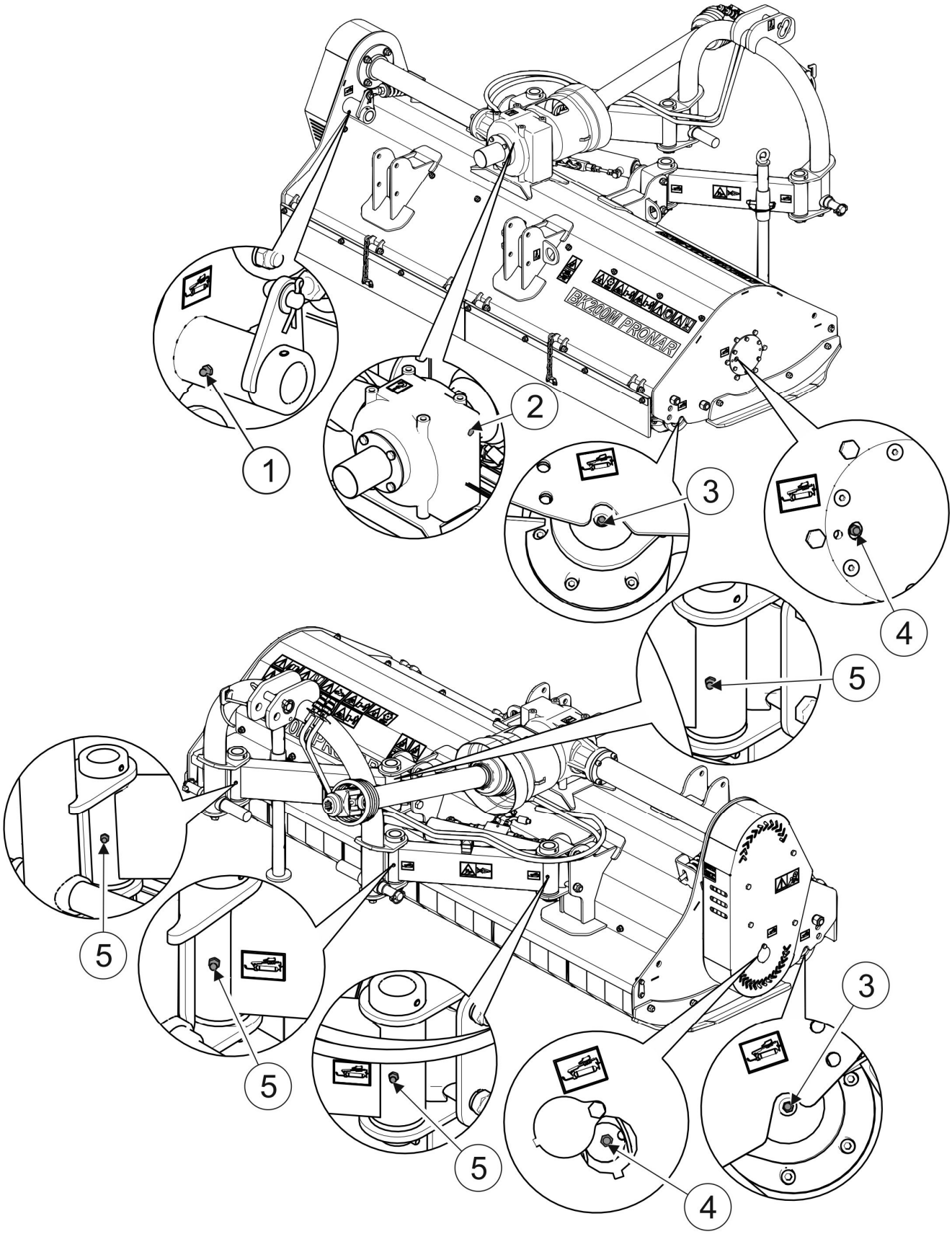


FIGURE 5.6 Lubrication points

Lubrication points are described in Table 5.2

TABLE 5.2 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
1	Tensioner arm axle	1	Grease	20 hours
2	Bevel gear	1	oil	500 hours
3	Tracking shaft bearing	2	grease	daily
4	Flail shaft bearing	2	grease	daily
5	Linkage link pin	4	grease	20 hours
6	PTO shaft *	*	*	*

Marking description in Item column (TABLE 5.2) conforms with numbering shown (FIGURE 5.6)

**-For detailed information on operation and maintenance please refer to Operator Manual enclosed with the shaft.*

5.7 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

During maintenance or repair work, apply appropriate torque when tightening bolt and nut connections, unless other tightening torque values are given. Recommended torque values apply to non-greased steel bolts.

NOTE

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 5.3 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

5.8 TROUBLESHOOTING

TABLE 5.4 TROUBLESHOOTING

TYPE OF FAULT	POSSIBLE CAUSE	REMEDY
Lateral setting of the mower by means of the tipping cylinder is impossible	Incorrectly connected or damaged quick coupler	Check quick couplers and manner of their connection
	The tractor hydraulic system is out of order	Check condition of tractor hydraulic system
Excessive vibration during work	Damaged or missing blade	Check blades, if necessary replace
	Damaged PTO shaft	Check shaft, if necessary replace
	Damaged bearings of the flail shaft	Repair at an authorised service point
Excessive heating of bevel gear	Incorrect oil level	Check oil level.
	Damaged bearing	Repair at an authorised service point
Mower drive stops during cutting	Belt slip on belt drive transmission	Disconnect power from mower; remove collected grass or foreign body from cutting unit. Check condition and tension of belts.
	Damaged bevel gear	Repair at an authorised service point

NOTES