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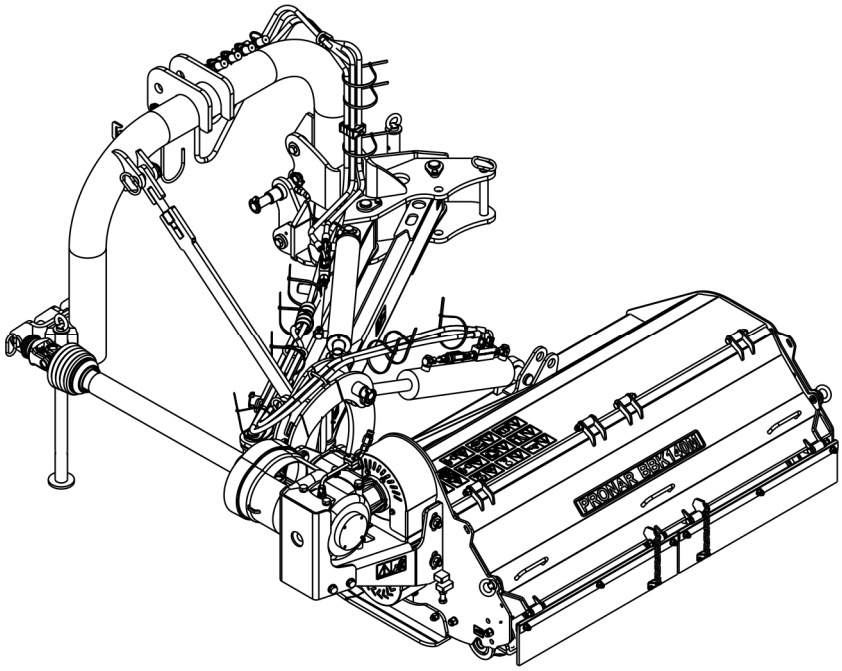
OPERATOR MANUAL

FLAIL MOWER

PRONAR BBK120M
PRONAR BBK140M
PRONAR BBK160M
PRONAR BBK180M
PRONAR BBK200M

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 2C-08-2020, PUBLICATION NO 427N-00000000-UM

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FLAIL MOWER

PRONAR BBK120M
PRONAR BBK140M
PRONAR BBK160M
PRONAR BBK180M
PRONAR BBK200M

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 Operator Manual describes the basic principles of safe use and operation of the machine. 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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17-210 Narew

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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:	**BBK120M**	**BBK140M**	**BBK160M**	**BBK180M**	**BBK200M**
Model:	–	–	–	–	–
Serial number:					
Commercial name:	**Flail mower PRONAR BBK120M** **Flail mower PRONAR BBK140M** **Flail mower PRONAR BBK160M** **Flail mower PRONAR BBK180M** **Flail mower PRONAR BBK200M**				

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

Narew, the 2017-07-11

Place and date

Full name of the empowered person position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

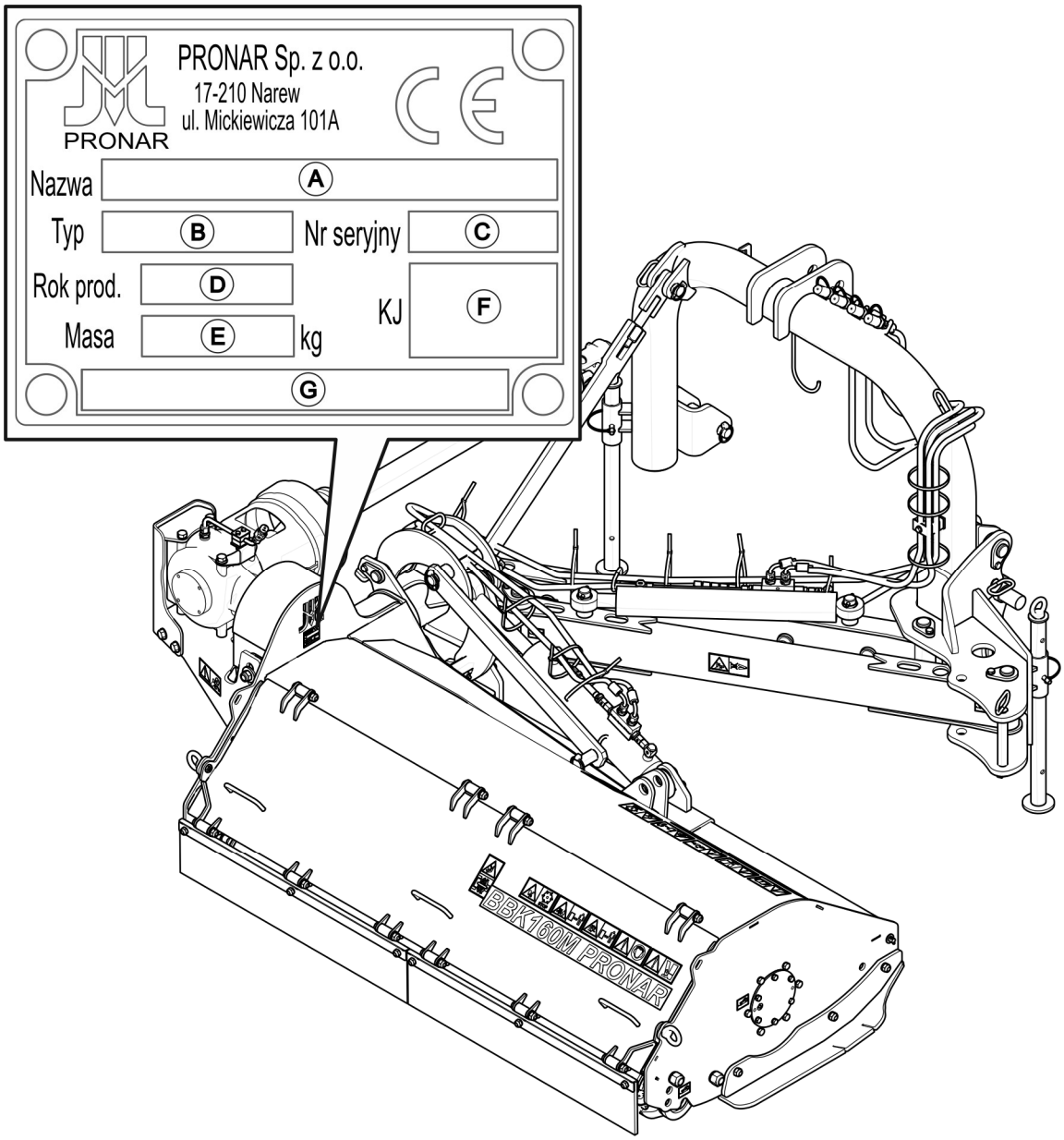


FIGURE 1.1 Location of the nameplate

The mowers are marked with the nameplate located on the cutting unit housing. When purchasing the machine, make sure that the serial number 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

Rear-side flail mowers have been designed and manufactured in accordance with applicable safety requirements and machinery standards.

Rear-side flail mowers are designed for tasks related to the maintenance of municipal infrastructure, urban green spaces, as well as for use in orchards, forested areas, and agriculture. These machines are used for mowing and breaking up weeds, bushes and grass in undeveloped areas, on road shoulders, embankments, in drainage ditches, water channels and for chopping cut tree branches (up to 2 cm in diameter). 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

Using the mower for purposes other than intended is forbidden, especially:

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

TABLE 1.1 AGRICULTURAL TRACTOR REQUIREMENTS

CONTENTS	UNIT	REQUIREMENTS
Hydraulic system		
Hydraulic oil	-	HL 32
System pressure rating	MPa	16
Number of hydraulic sockets	pc.	4 sockets (2 double acting sections including one "floating" section)
Implement suspension system (three-point linkage) Rear three-point linkage	-	Category II and III according to ISO 730-1
Power take-off shaft (PTO)		
Rotation speed	rpm	540
Number of splines on PTO shaft	pc.	6
Rotation direction	-	clockwise
Other requirements		
Minimum power / maximum power		
- BBK120M	KM	30 / 60
- BBK140M	KM	30 / 60
- BBK160M	KM	50 / 88
- BBK180M	KM	60 / 95
- BBK200M	KM	70 / 102

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,

The mower may only be used by persons, who:

- are familiar with this publication and with the tractor's Operator Manual,
- 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 MOWER EQUIPMENT

EQUIPMENT	STANDARD				
	BBK120M	BBK140M	BBK160M	BBK180M	BBK200M
"Operator Manual"	•	•	•	•	•
"Warranty Book"	•	•	•	•	•
Wide angle PTO shaft: - „Bondioli&Pavesi" DS6N178CEKR7K01 - „Bondioli&Pavesi" DH8N178CEKR7K01	 • -	 • -	 • -	 • -	 - •

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 machine 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.

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.

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.

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

A mower should be attached to lifting devices only at designated points, which are marked with a transport hook decal.

ATTENTION

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

TIP

The mower must be set in park position during unloading with lifting equipment. Support leg should be lowered and secured with a pin.

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. The platform onto which the machine is loaded must be equipped with elements that prevent it from moving spontaneously during loading. 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.

In accordance with safety requirements for transport, the machine must be placed on the vehicle in a manner that does not exceed the vehicle's permissible axle loads on the road or its permissible payload capacity. The machine must not compromise the vehicle's stability or impede its steering. It also must not obstruct the view of the road, or obscure any lights, signaling devices, license plates, or other plates or markings with which the vehicle is equipped.

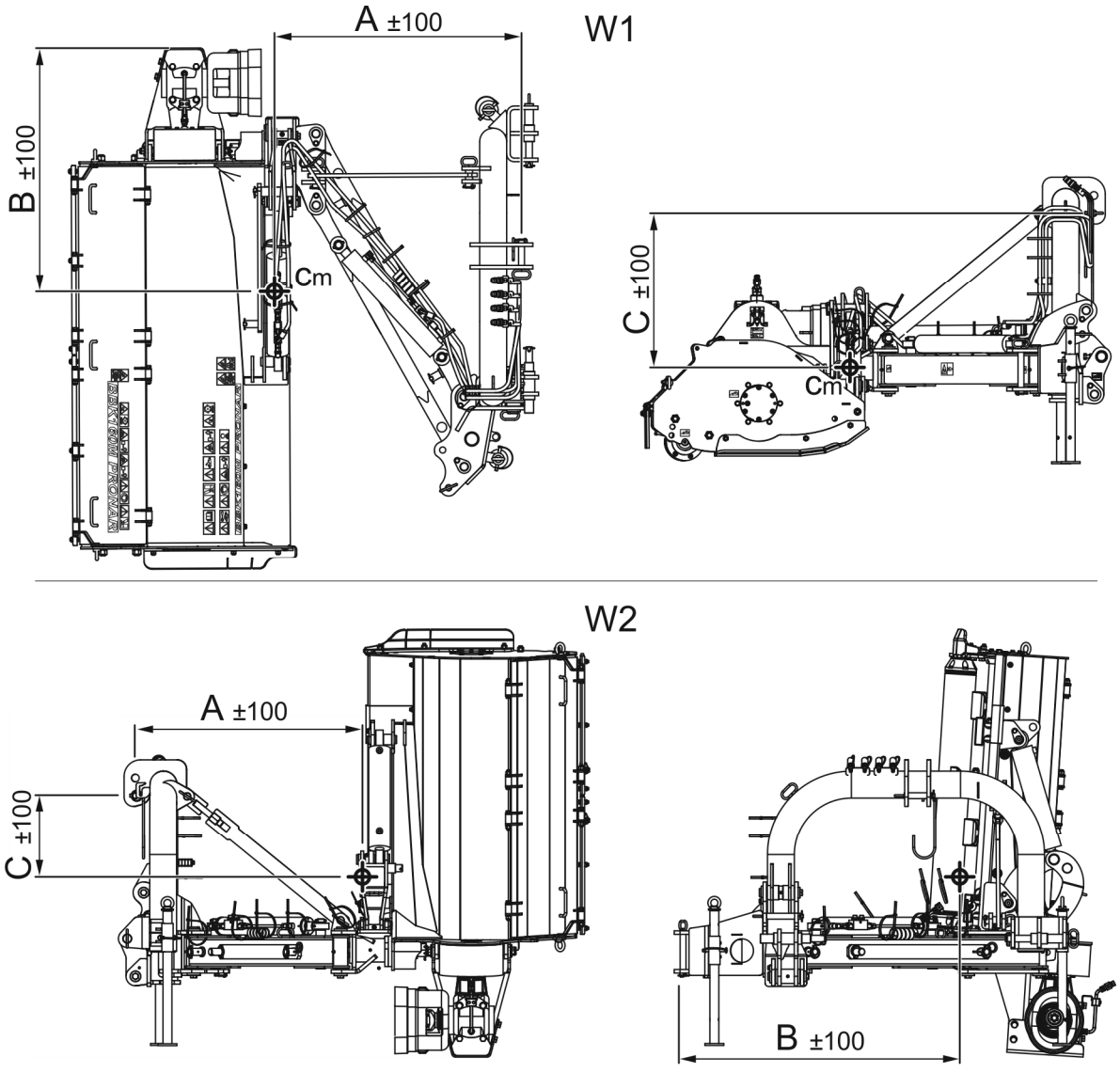


FIGURE 1.2 Centre of gravity of the mower

Attention must be paid to ensure the center of gravity of the transported machine is as low as possible, i.e., as close as possible to the platform floor and as close as possible to its center of mass.

ATTENTION

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

TABLE 1.3 CENTER OF GRAVITY POSITION (MOWER PLACED ON TRANSPORT PLATFORM)

View W1		Mower model				
Dimension (FIGURE 1.2)	Unit	BBK120M	BBK140M	BBK160M	BBK180M	BBK200M
A	mm	966	985	1030	1050	1065
B	mm	919	963	1040	1090	1150
C	mm	637	643	655	660	665

TABLE 1.4 CENTER OF GRAVITY POSITION (MOWER CONNECTED TO TRACTOR IN TRANSPORT POSITION)

View W2		Mower model				
Dimension (FIGURE 1.2)	Unit	BBK120M	BBK140M	BBK160M	BBK180M	BBK200M
A	mm	960	980	1030	1050	1080
B	mm	1190	1200	1220	1230	1250
C	mm	350	300	200	140	60

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 ADVICE

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. 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.
- During hitching there must be nobody between the mower and the tractor.
- Be especially careful when hitching and unhitching the machine.
- Do NOT unhitch the mower from the tractor if the cutting system is raised.
- Hitching and unhitching may only take place when the machine and the tractor are switched off.
- Mower uncoupled from the tractor must be supported by means of supports secured with pins.
- After detaching the mower from the tractor, the horizontal tilt cylinder must be secured with a lock.

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 (max.25km/h). 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.
- For transport on the road, the PTO drive must be disengaged.

- 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.
- 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 modifications to the mower release PRONAR Sp. z o.o. in Narew from liability for any resulting damages or personal injury.
- 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 etc.).
- 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 RPM of 540 rpm. 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 540 rpm.
- 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

- The machine may only be connected to the tractor by appropriately selected PTO shaft recommended by the Manufacturer.
- Before using the machine, carefully read the PTO shaft Operator Manual and follow all instructions.
- The PTO shaft has markings on the casing, indicating which end of the shaft shall be connected to the tractor.
- Adjust the length of the PTO shaft to match the cooperating tractor, in accordance with the shaft manufacturer's instructions.
- After connecting shaft ensure that it is correctly and safely connected to the tractor and to the mower.
- The drive shaft must be equipped with a cover. Do NOT use the shaft with damaged or missing guards.
- 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 starting PTO shaft, make certain that the PTO rotation direction is correct.
- While reversing and during turns, the PTO drive must be disengaged.
- 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.
- 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.
- 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.
- Before disconnecting the shaft, turn off the tractor engine and remove the key from the ignition.
- When detaching the machine, place the shaft on its designated holder and install the protective cover on the tractor's power take-off (PTO) shaft.

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,
- operation of the machine by unauthorised persons or persons under the influence of alcohol or other intoxicating substances,
- 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,
- reasonably apply all the remarks and recommendations stated 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 prohibited 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 can be purchased from the Manufacturer of the machine or your PRONAR dealer. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. When cleaning the mower, do not use solvents that can damage the coating of information decals and do not subject them to strong water jets.

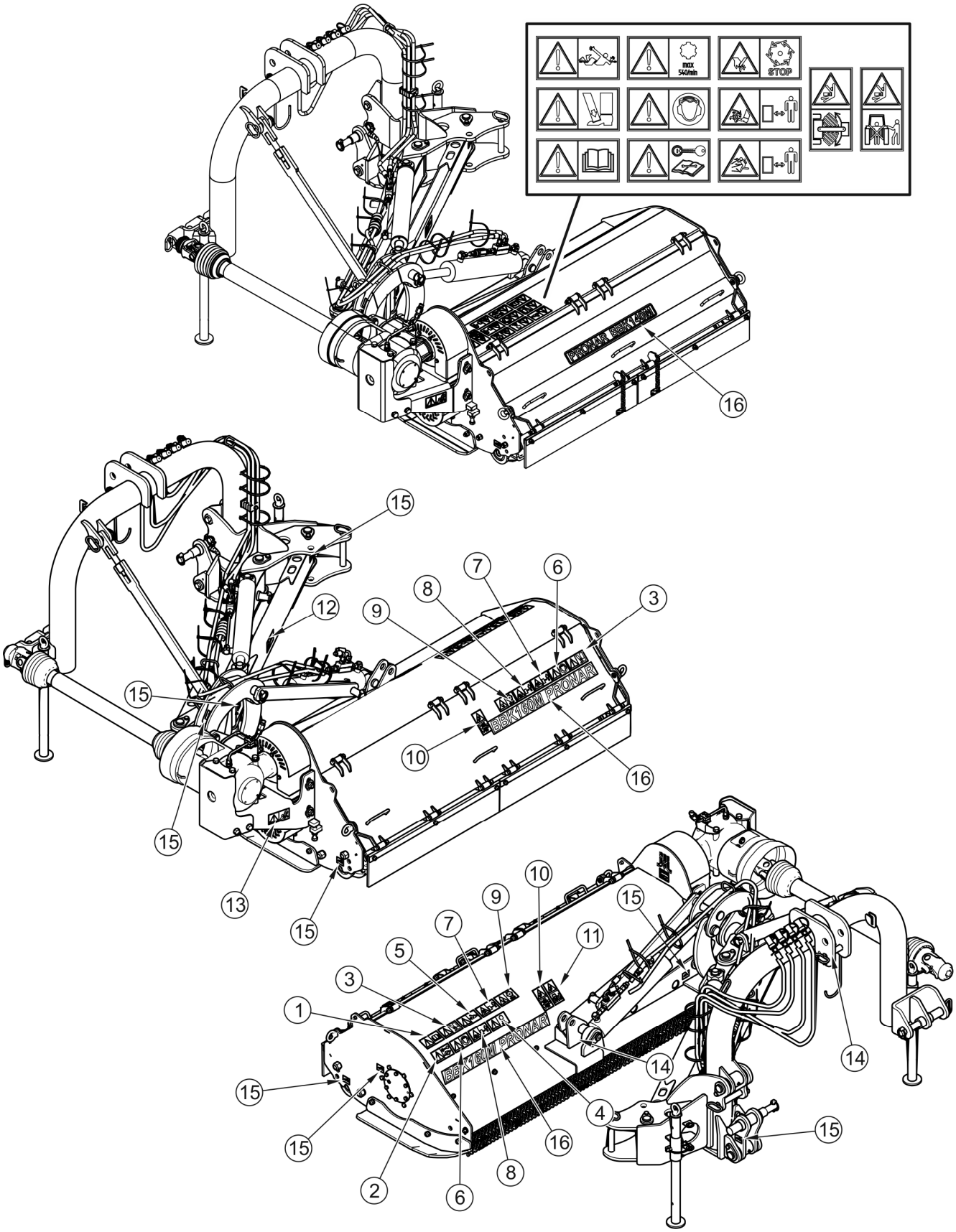
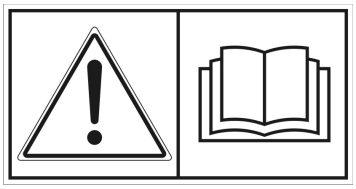
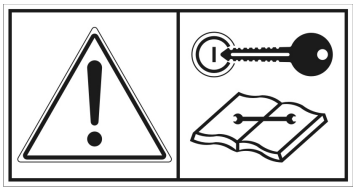
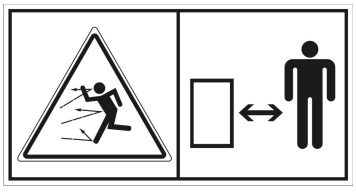
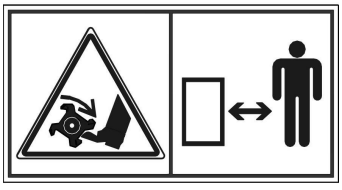
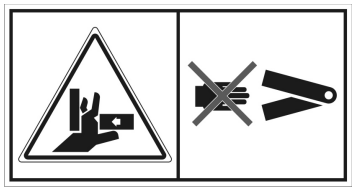


FIGURE 2.1 Locations of information and warning decals

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 540 rpm.
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.
8		Risk of injury to foot or leg. Keep a safe distance.

ITEM	DECAL	MEANING
9		Do not touch any rotating elements until they come to a complete standstill.
10		Risk of injury when machine is being arranged in transport or working position
11		Do not stand behind the tractor while lifting arm is operated.
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 lugs marking.
15		Lubrication points

ITEM	DECAL	MEANING
16	PRONAR BBK120M or PRONAR BBK140M or BBK160M PRONAR or BBK180M PRONAR or BBK200M 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 specification

		Unit	BBK120M	BBK140M	BBK160M	BBK180M	BBK200M
Dimensions (FIGURE 3.2)	A	mm	2000	2000	1990	1990	1990
	B	mm	1780	1980	2210	2430	2650
	C	mm	1180	1180	1200	1200	1200
Technical specification							
Cutting width		mm	1200	1400	1600	1800	2000
Adjustment of cutting height (by changing the tracking shaft position)		mm	10, 30, 50		20, 40, 60		
Horizontal movement of the mower (hydraulic side shift)		mm	1800				
Tare weight		kg	750	770	850	895	965
Minimum power demand		KM/kW	30/22		50/37	60/44	70/51
Maximum tractor power		KM/kW	60/45		88/65	95/70	102/75
Maximum PTO speed		rpm	540				
Linkage: - rear three-point linkage		-	cat. II and III according to ISO 730-1				
Flail shaft diameter		mm	∅133		∅160		
Tracing shaft diameter		mm	∅133		∅160		
Type and number of blades: - flail blades (hammer blades) - type „Y" (option) - type „YI" (option)		pc.	 10 20 30	 12 24 36	 14 28 42	 16 32 48	 18 36 54
Type and number of vee-belts: - XPB 1250		pc.	4	4	4	5	5
Rotation speed of flail shaft		rpm	2500		2450		
Mower working range	A	mm	1890				
	B		390				
	C		2620	2830	3040	3260	3480
	D		1210	1410	1620	1840	2060
	E		1200	1400	1610	1830	2050
Working angle – downwards	α	degrees	65				
Working angle – upwards	β	degrees	94				

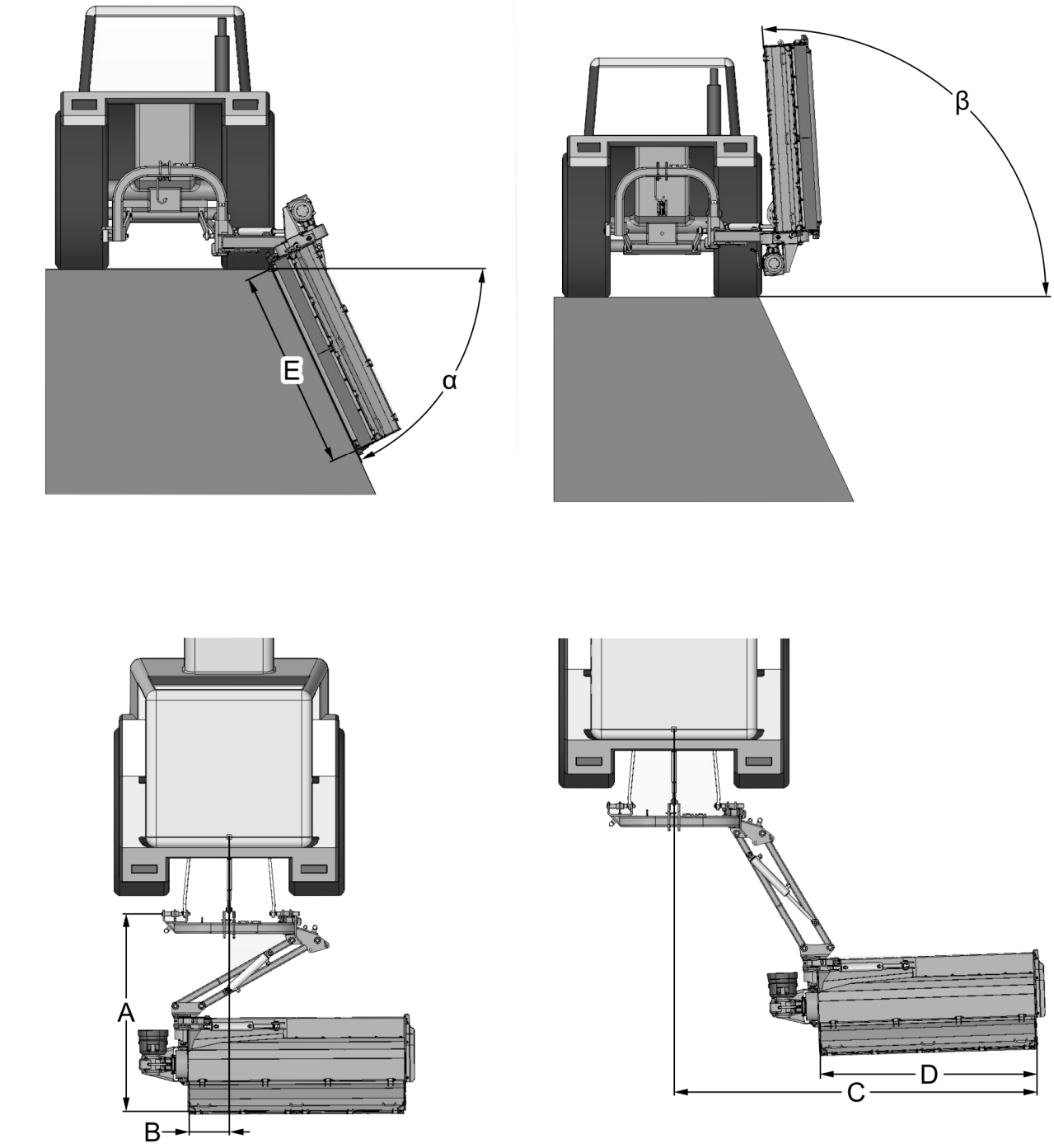


FIGURE 3.1 Working range and angle of the mower

Meaning of symbols (TABLE 3.1)

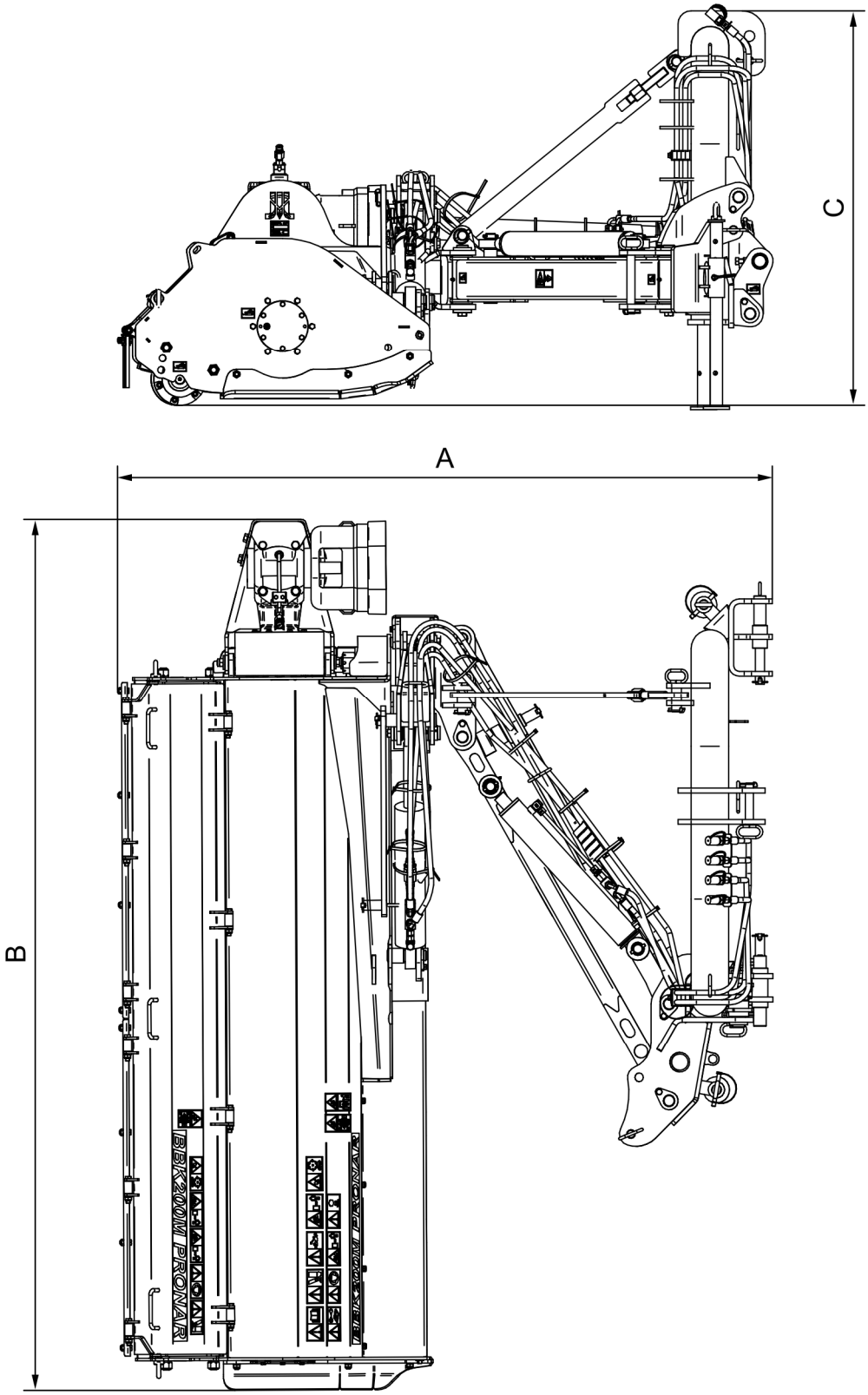


FIGURE 3.2 Overall dimensions of the mower

Meaning of symbols (TABLE 3.1)

3.2 GENERAL DESIGN

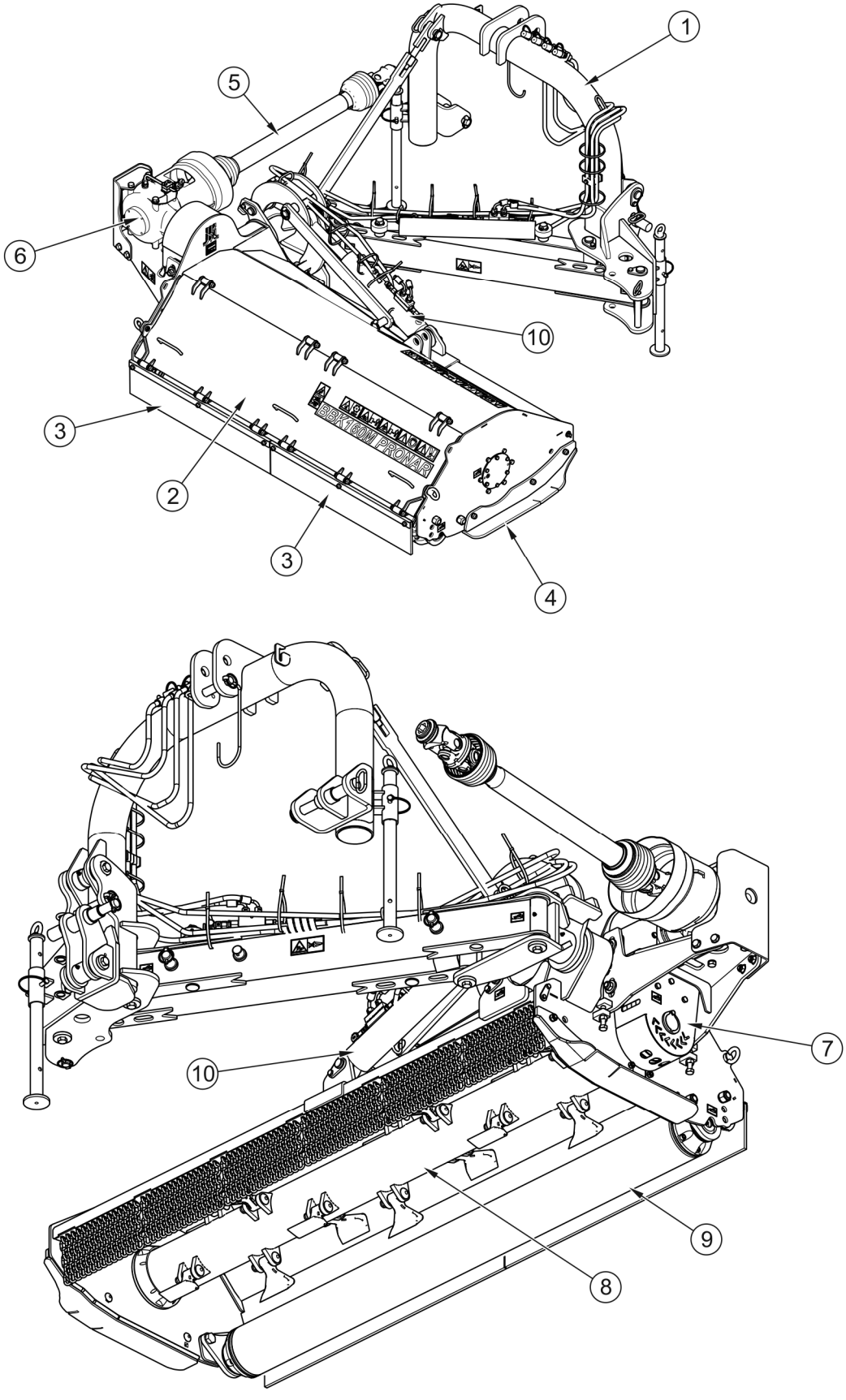


FIGURE 3.3 General design

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

3.3 LINKAGE

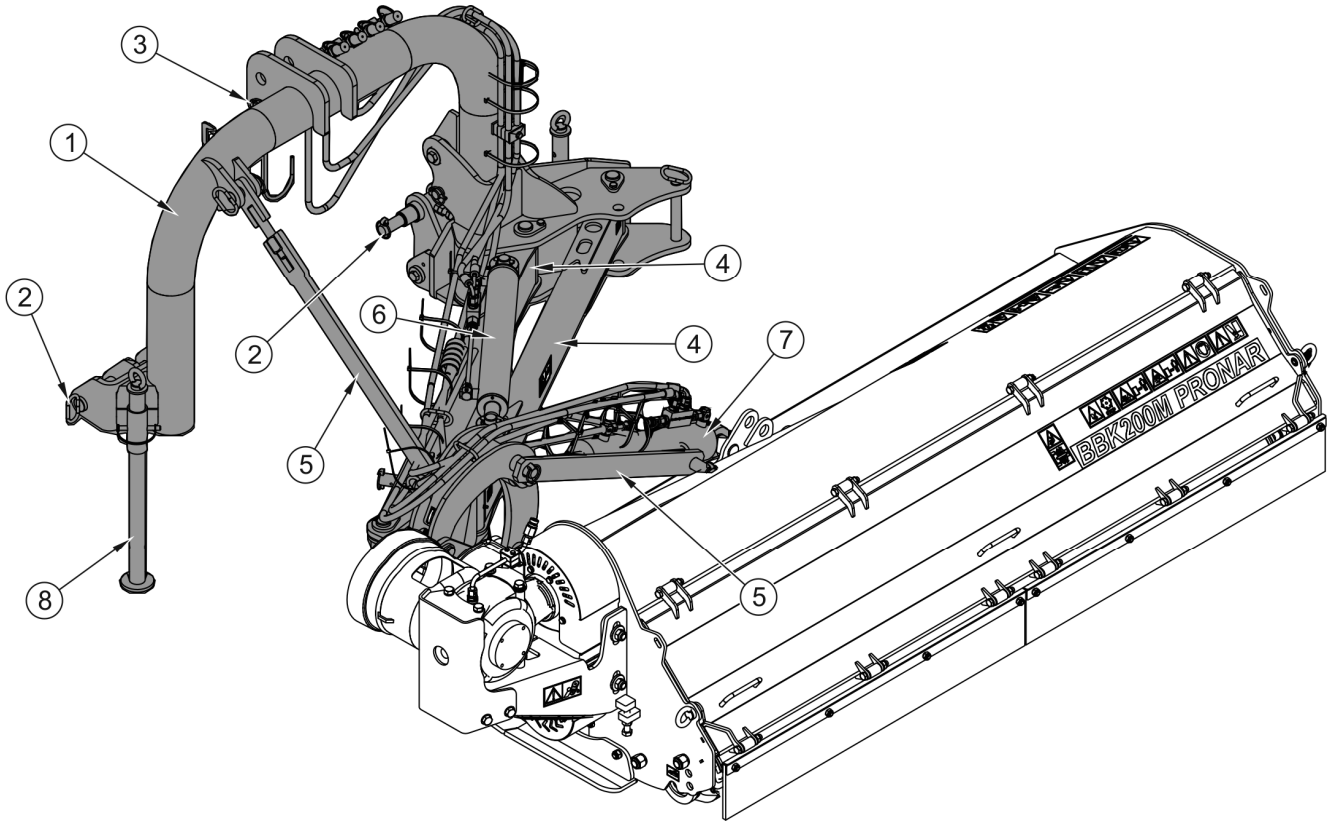


FIGURE 3.4 Linkage

(1)- three-point linkage frame; (2)- pins of lower links; (3)- central link pin; (4)- movable hitching eyes I and II of mower linkage; (5)- hydraulic cylinder locks; (6)- tipping cylinder; (7)- tilt cylinder; (8)- stand with a pin

3.4 HYDRAULIC SYSTEM

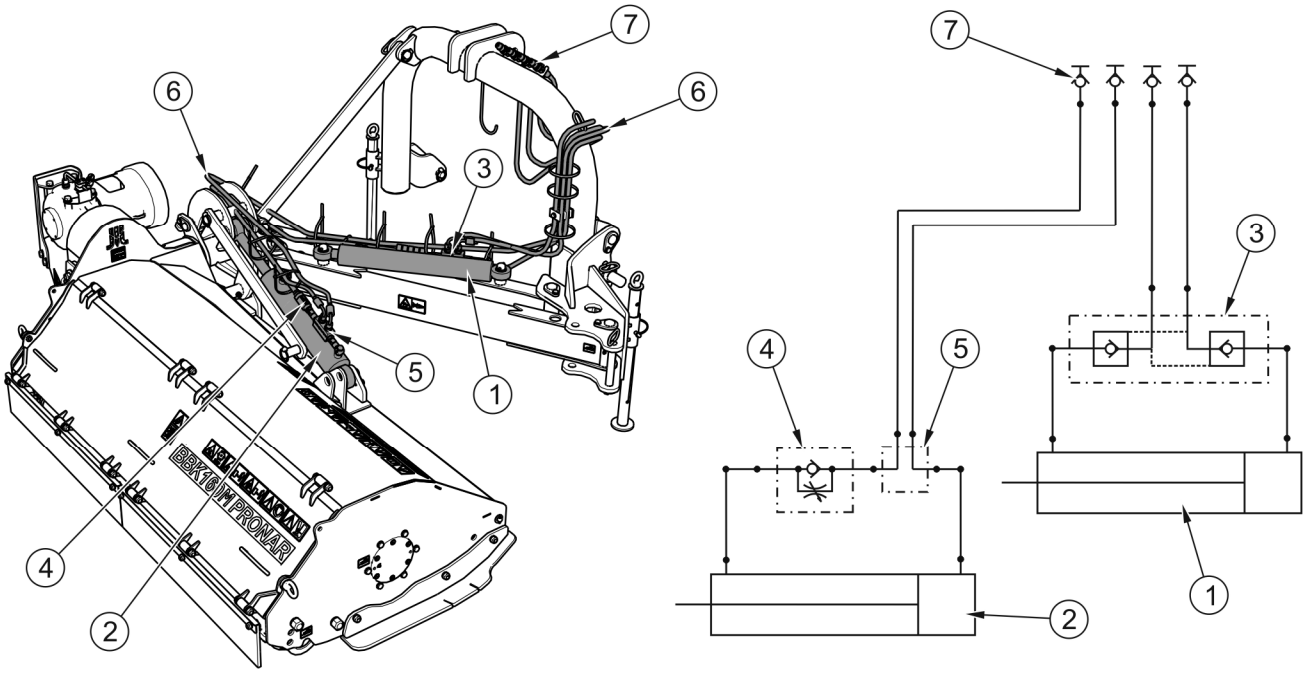


FIGURE 3.5 Hydraulic system design

(1)- horizontal tipping hydraulic cylinder; (2)- hydraulic cylinder for inclination and transport; (3)- hydraulic lock; (4)- adjustable throttle valve; (5)- connection block; (6)- hydraulic lines; (7)- hydraulic quick couplers

The mower's hydraulic system is used for adjusting horizontal tipping and inclination angle. Such a design facilitates manoeuvring the mower when mowing on road shoulders, slopes, embankments, in drainage ditches and water channels, without changing the tractor route.

The mower's hydraulic system consists of double-acting hydraulic cylinders (1, 2) that are supplied from the tractor external hydraulic system and connected by means of hydraulic lines (6) through hydraulic quick couplers (7). On the horizontal tipping cylinder (1) there is a hydraulic lock (3) that blocks movement of the hydraulic cylinder in both directions after the mower position is set. Throttle valve (4) on inclination adjustment cylinder (2) enables smooth adjustment of machine position.

3.5 DRIVE TRANSMISSION.

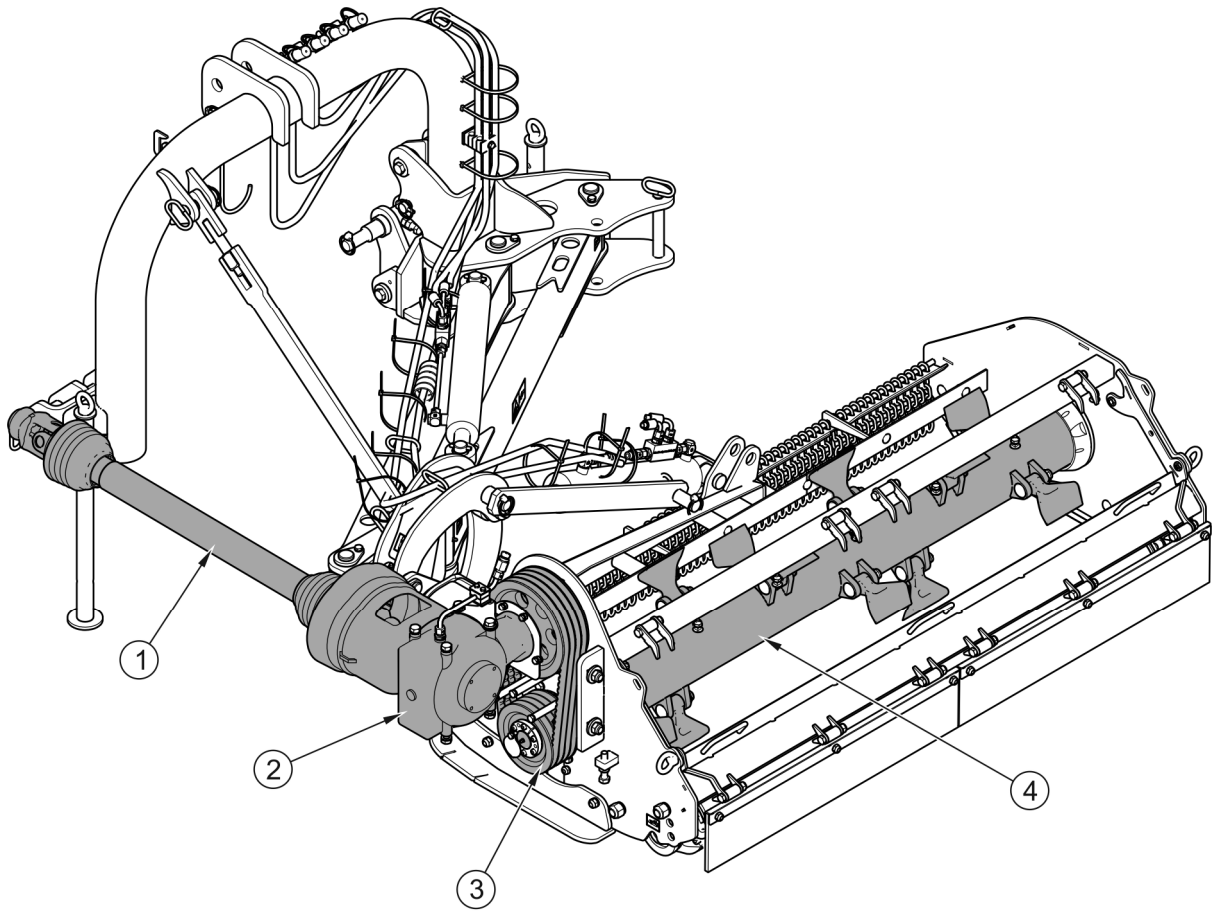


FIGURE 3.6 Drive transmission.

(1)- PTO shaft; (2)- bevel gear; (3)- belt transmission; (4)- flail shaft

The torque is transmitted from the tractor PTO shaft through a wide-angle PTO shaft (1) to bevel gear (2) equipped with a backstop clutch. Next, the torque from bevel gear (2) is transmitted to flail shaft (4) with the use of the belt transmission (3). In this case, the belt transmission performs also the function of overload protection clutch.

3.6 CUTTING UNIT

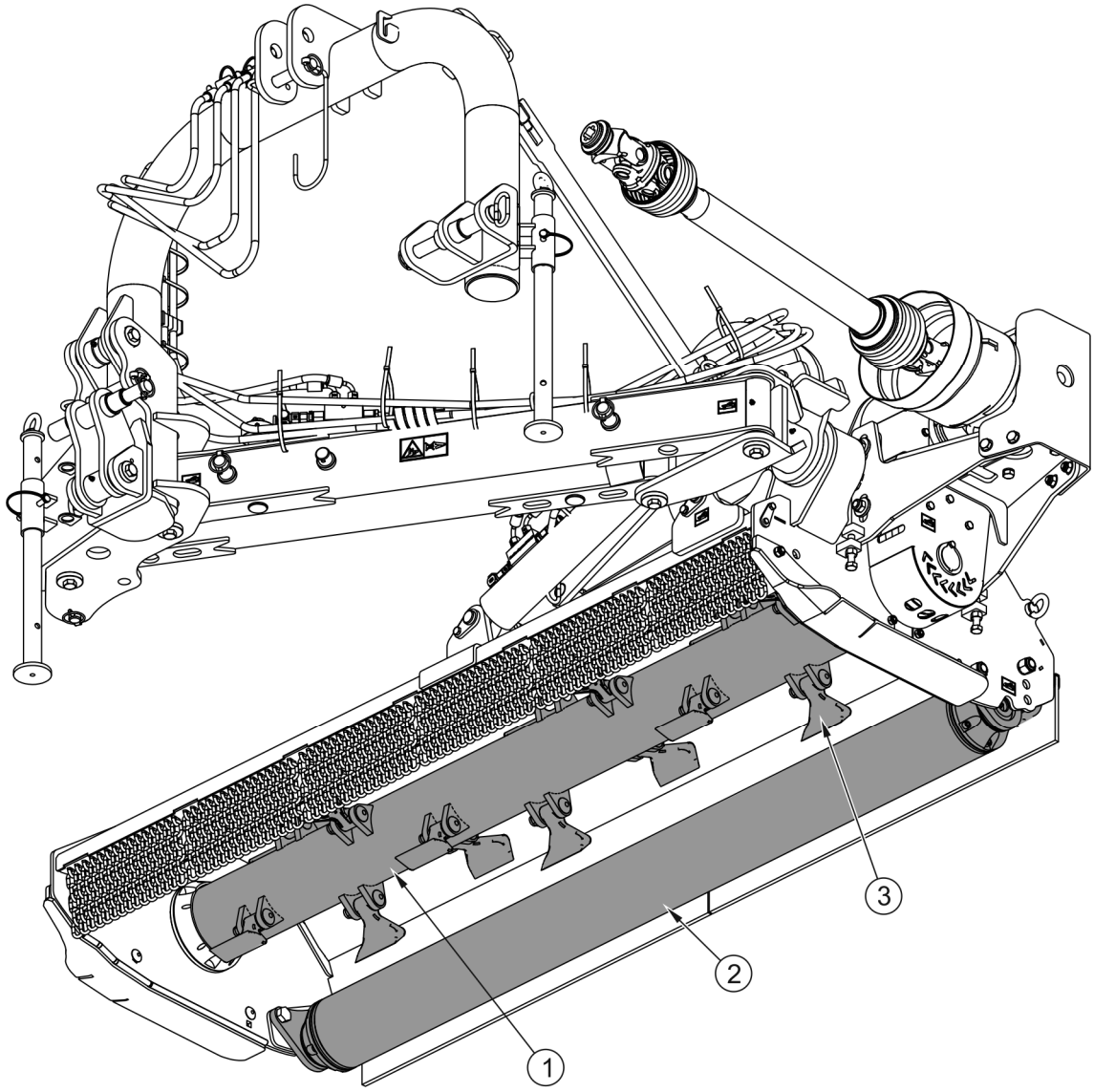


FIGURE 3.7 Cutting unit

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

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 protective guards.

NOTE

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

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”),
- adjust the length of PTO shaft to compatible tractor according to the Operator Manual of PTO shaft,
- remove hydraulic cylinder locks and place them on special pins and secure with linchpins (FIGURE 4.5),
- change the position of transport pin (4) and lock pin (5) and secure with linchpins (6) (FIGURE 4.5),
- set it in working position,
- 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).

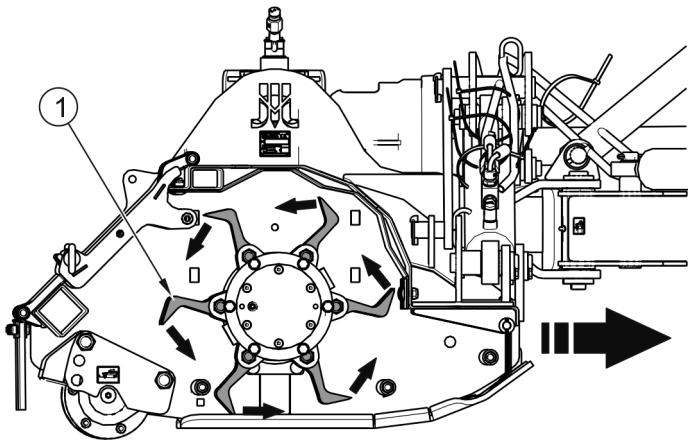


FIGURE 4.1 Rotation of cutting unit synchronised with direction of tractor travel.

(1)- cutting unit

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 values should be according to table „*TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS*”	Every six months
Lubrication	Lubricate elements according to table *LUBRICATION*.	According to table (5.2)

NOTE

Do NOT use an inoperative machine.

4.3 HITCHING TO TRACTOR

4.3.1 BALLASTING THE TRACTOR

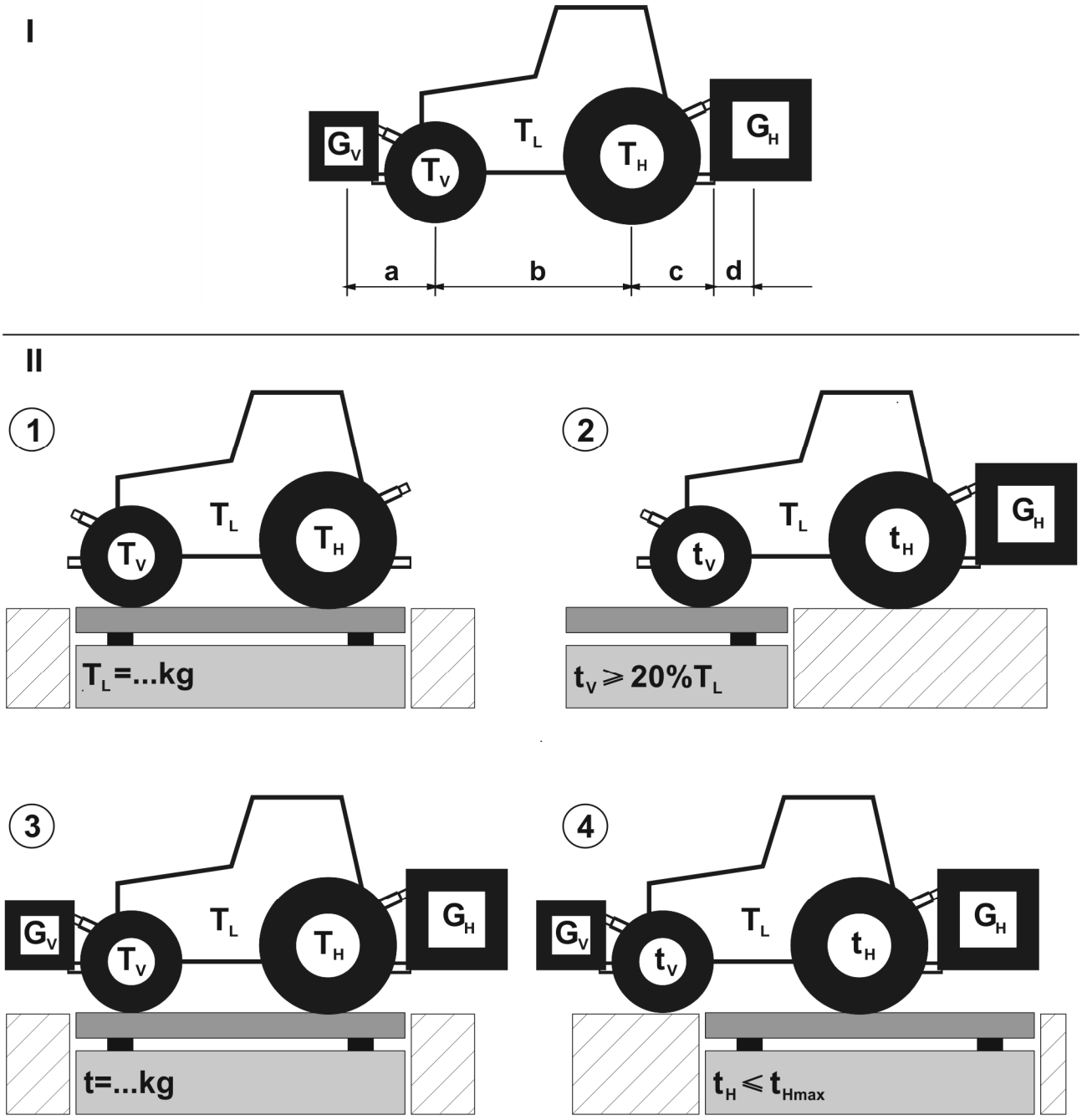


FIGURE 4.2 Ballasting the tractor

NOTE

Using the tractor for purposes other than intended can cause structural failure, insufficient stability, and reduced steering and braking capability.

Before hitching the machine to the tractor, confirm that the tractor is suitable for this purpose. Installation of implements on the front or rear three-point linkage must not result in exceeding the permissible total weight, permissible axle load and load capacity of tractor's tyres. The tractor's front axle must be always loaded with at least 20% of the tractor's weight.

Make the following calculations in order to confirm that these conditions are met:

CALCULATION OF THE MINIMUM FRONT BALLAST G_{Vmin}

$$G_{Vmin} = \frac{G_H \bullet (c+d) - T_V \bullet b + 0{,}2 \bullet T_L \bullet b}{a + b}$$

CALCULATION OF THE MINIMUM REAR BALLAST G_{Hmin}

$$G_{Hmin} = \frac{G_V \bullet a - T_H \bullet b + 0{,}45 \bullet T_L \bullet b}{b + c + d}$$

It is assumed that all parameters for the calculations of the minimum front and rear ballast are known.

TABLE 4.2 BALLASTING THE TRACTOR

SYMBOL / DIMENSION (FIGURE 4.2)	Unit	DESCRIPTION
T_L	kg	Tractor tare weight
T_V	kg	Front axle load for tractor without machine
T_H	kg	Rear axle load for tractor without machine
t	kg	Load applied to axles of tractor with machine
t_V	kg	Front axle load for tractor with machine
t_H	kg	Rear axle load for tractor with machine
G_H	kg	Total weight of a rear-mounted machine or a rear ballast
G_v	kg	Total weight of a front-mounted machine or a front ballast
a	m	Distance between the centre of gravity of a front-mounted machine / front ballast and the centre of the front axle
b	m	Tractor axle base
c	m	Distance between the centre of the rear axle and the centre of the lower linkage arms of the tractor
d	m	Distance between the centre of the lower linkage arms of the tractor and the centre of gravity of a rear-mounted machine or a rear ballast

If the parameters are unknown and cannot be determined, make the measurements using a weighing scale (FIGURE 4.2 – II).

MEASUREMENT OF PERMISSIBLE AXLE LOADS USING A WEIGHING SCALE

- Measure the tare weight of the carrier vehicle (T_L).
- Hitch the machine to tractor and measure the front axle load (t_V). If the axle load is smaller than 20% of the carrier vehicle weight (T_L), add weights to exceed the minimum axle load value ($t_V \geq 20\% T_L$).
- Measure the total weight (t) of the carrier vehicle with the machine and weights. Check in the tractor's Operator Manual if the measured value is smaller than the average value of gross weight.
- Measure the rear axle load (t_H) and check in the carrier vehicle's Operator Manual if the measured value is smaller than the maximum permissible rear axle load of the carrier vehicle(t_{Hmax}).

NOTE

The load on the front axle of the carrier vehicle (tractor) must be at least 20% of its own weight.

4.3.2 HITCHING TO THE TRACTOR REAR THREE-POINT LINKAGE

The mower may 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.

Before hitching the mower to tractor three-point linkage, make sure that the category of the tractor linkage is compatible with that of the machine.

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

- Move the tractor's lower three-point hitch (3-PT) links closer to the mower's suspension system pins. Both links of the three-point linkage should be set at the same height.
- Switch off tractor engine and prevent tractor from unintentional moving.
- Connect the lower pins of the mower's suspension system to the tractor's lower links and secure with linchpins. Connect the tractor's upper three-point hitch (3-PT) link (central link) with a pin to the appropriate hole on the mower's upper suspension point and secure it.
- If your tractor has hook-type lower links, place the hitch balls onto the mower's suspension system pins, secure them with linchpins, and then raise the links until the balls are locked in the hooks.
- Eliminate the machine's side-to-side movement by properly adjusting the lower link stabilizers in accordance with the tractor's operator's manual. The tractor's lower three-point hitch (3-PT) links should be set at the same height.
- Raise the mower with the tractor's three-point hitch (3-PT), lift the parking stands, and secure them with a linchpin in the upper position.

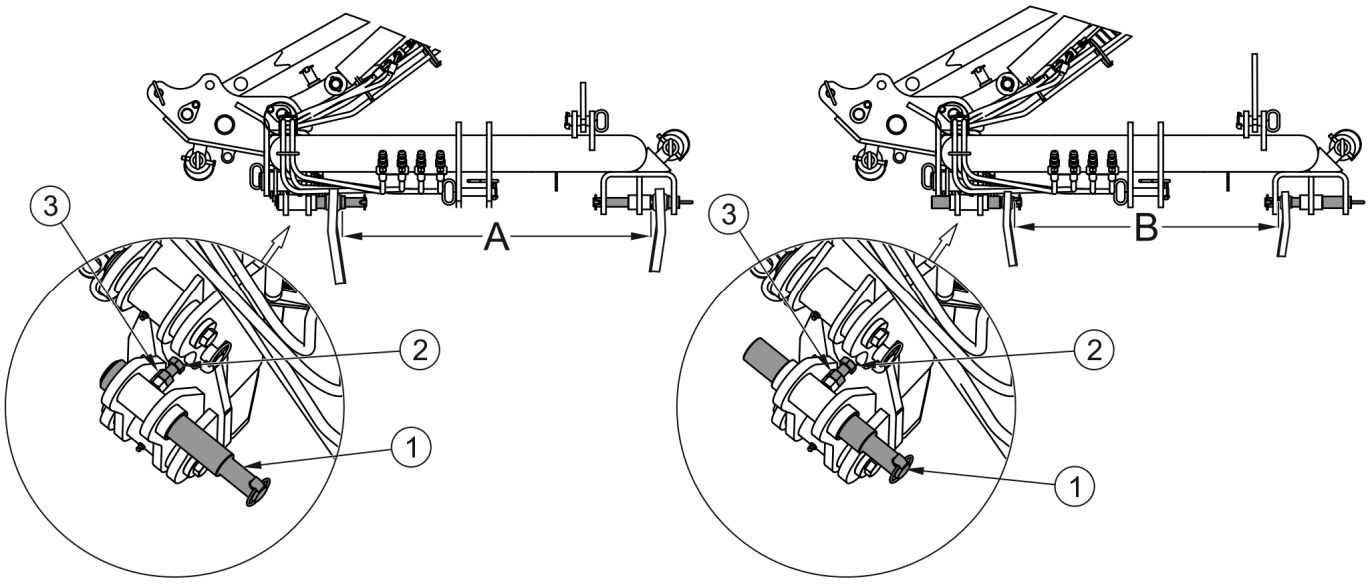


FIGURE 4.3 Adjustment of lower pins of the mower's linkage

(A)- spacing of pins for cat. III three-point linkage; (B)- spacing of pins for cat. II three-point linkage; (1)- lower pin of the mower linkage; (2)- retaining bolt; (3)- lock nut

The lowers pin *(1)* of the mower linkage enables adjustment of spacing (FIGURE 4.3). To change spacing of linkage pins:

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

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

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.

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

4.4 TRANSPORTING THE MACHINE

For transport to place of work and back, raise the mower on the tractor three point linkage so that the lower pins of the linkage are at a height of not less than 500 mm above the ground. Retract the support feet. Set the minimum lateral tipping of the mower by means of the horizontal tipping cylinder (the cylinder piston should be maximally retracted). Raise the mower to vertical position by means of the inclination adjustment cylinder and secure the cylinders using cylinder locks (1, 2), pins (3) and linchpins (4). Change the position of transport pin (5) and lock pin (6) and secure with linchpins (7) (FIGURE 4.4),

DANGER

Do not exceed the maximum transport speed of 25 km/h. Reduce your speed when driving on uneven roads and surfaces.

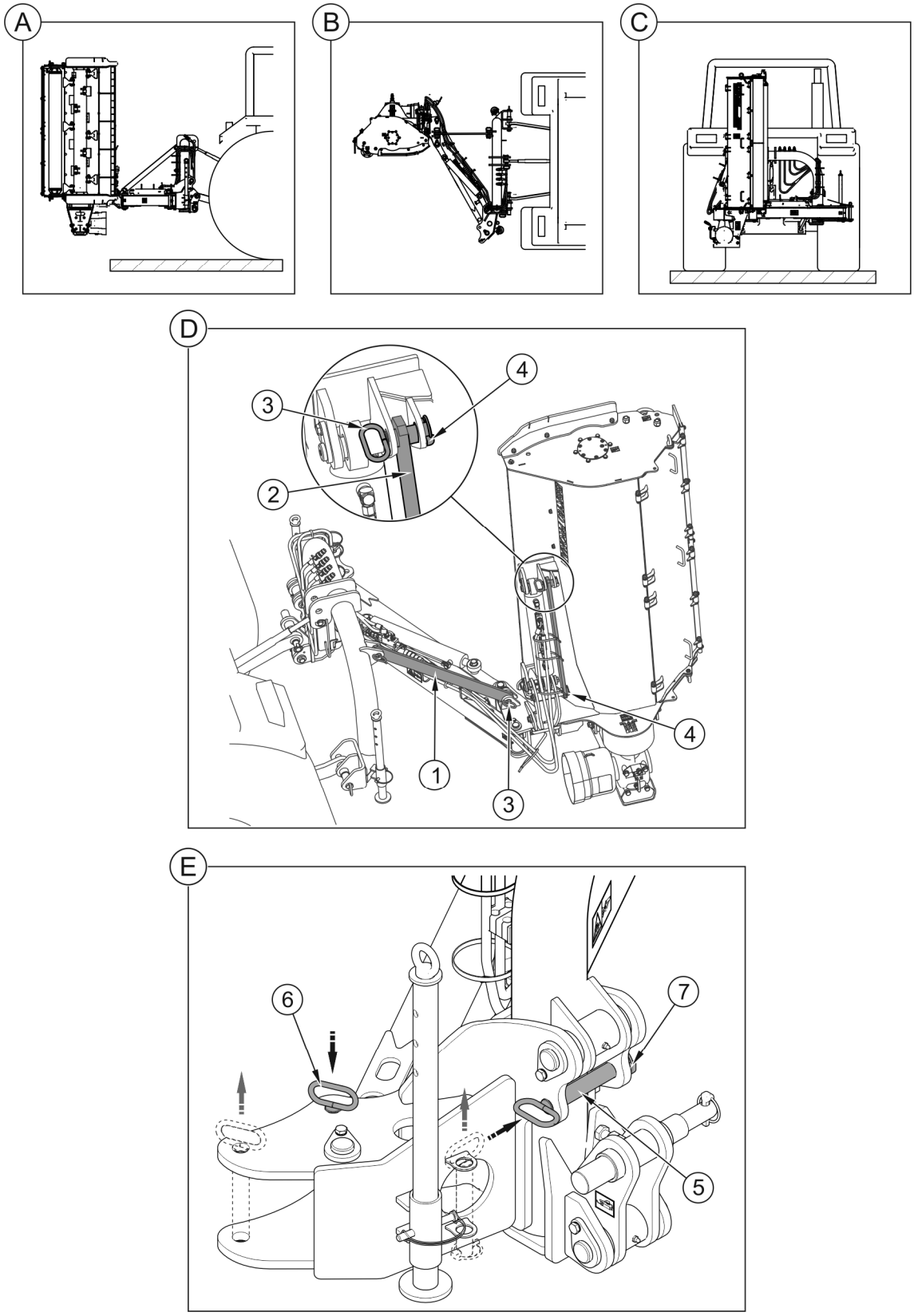


FIGURE 4.4 Transport position

(A)- right side view; (B)- overview; (C)- rear view; (D)- locking of cylinders; (E)- locking of linkage strings; (1)- lock I; (2)- lock II; (3)- lock pin; (4)- linchpin; (5)- transport pin; (6)- lock pin; (7)- linchpin

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,
- disconnect cylinder locks (1, 2), fix them as shown in figure 4.5 and secure with linchpins (3),
- change the position of transport pin (4) and lock pin (5) and secure with linchpins (6) as shown in figure 4.5,

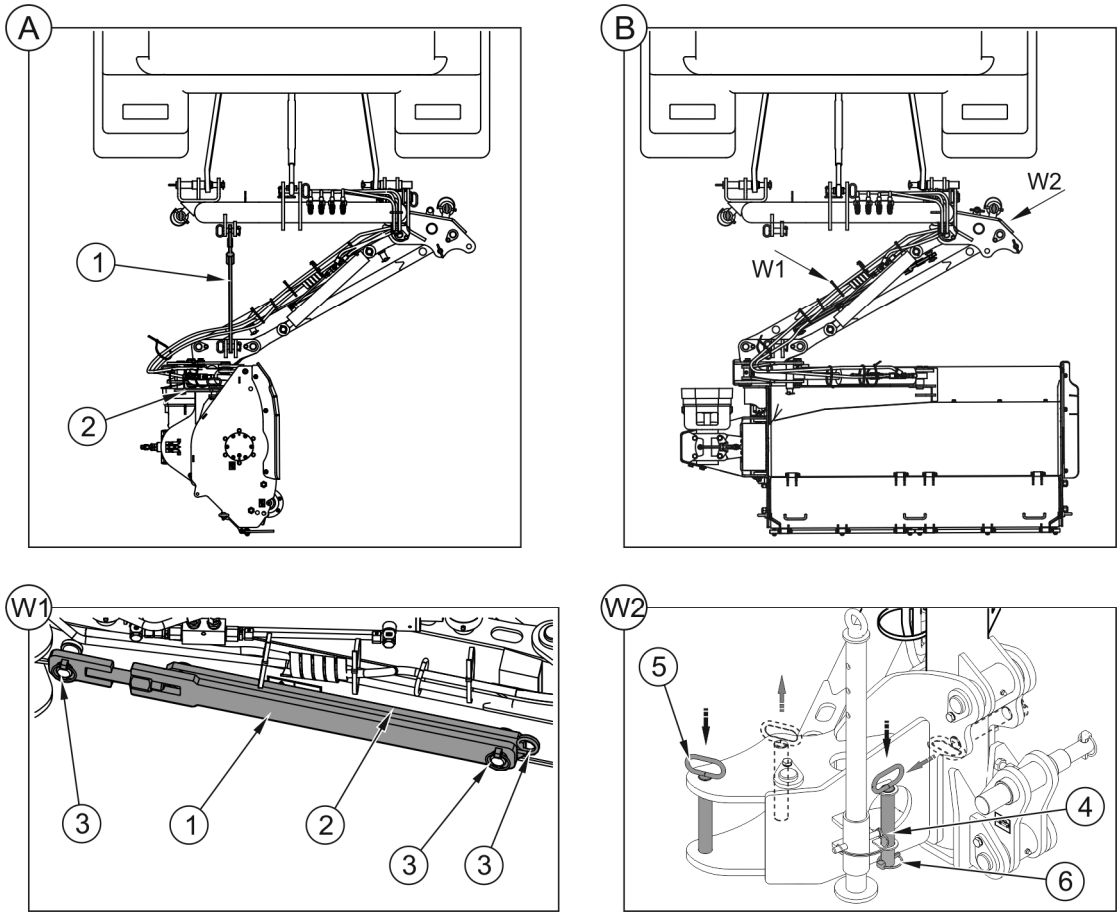


FIGURE 4.5 Setting mower in working position

(A)- transport position; (B)- working position; (1)- cylinder lock I; (2)- cylinder lock II; (3)- linchpin; (4)- transport pin; (5)- lock pin; (6)- linchpin

- controlling appropriate hydraulic circuits in the tractor, slide the piston of the cutting unit tipping cylinder to appropriate 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 4.6).

4.5.2 ADJUST CUTTING HEIGHT

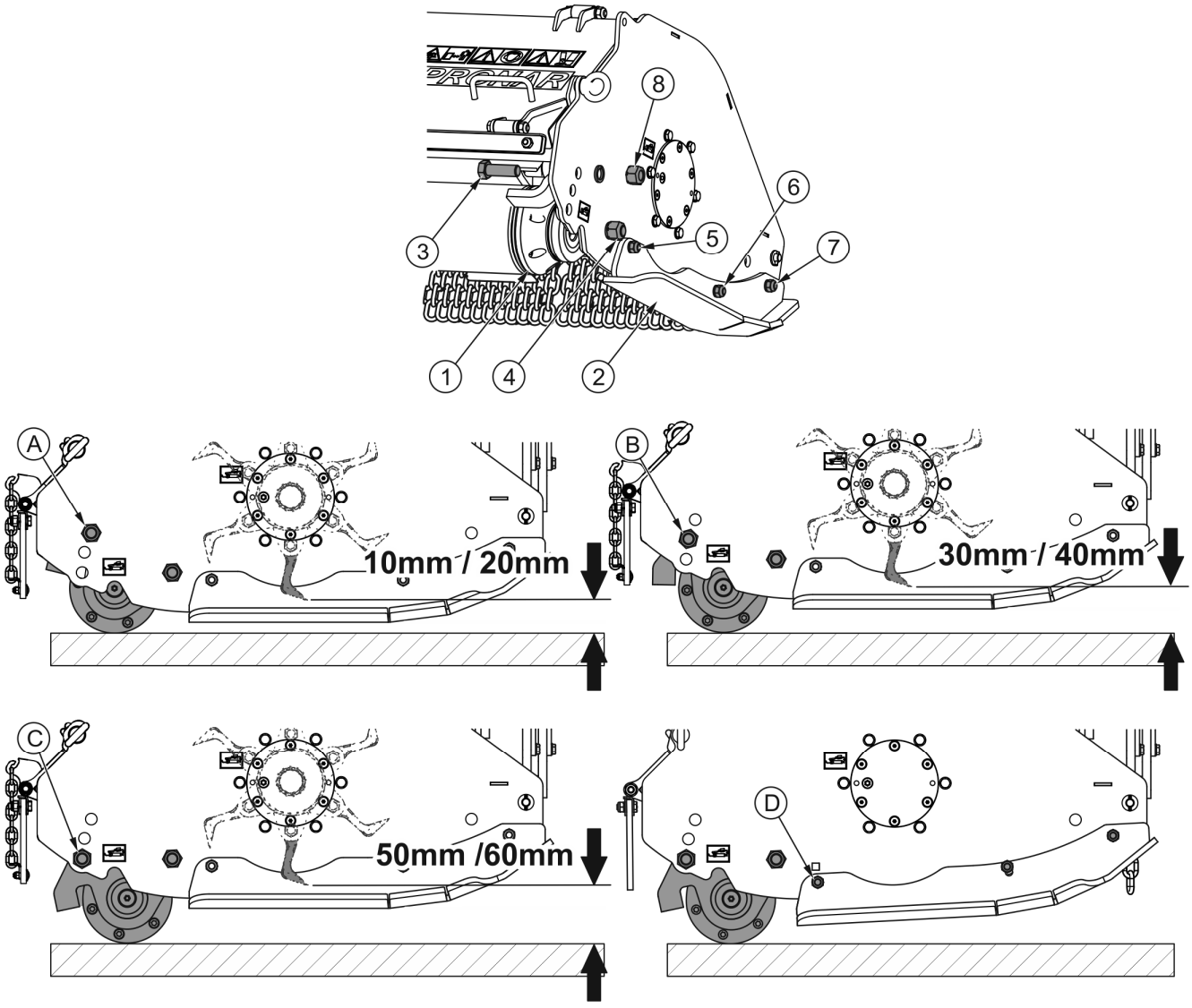


FIGURE 4.6 Setting mower cutting height.

(1)- tracking shaft; (2)- slide; (3)- tracking shaft fixing bolt; (4)- nut; (5)- slide inclination setting screw; (6)- nut; (7)- nut; (8)- nut; (A)- position of the bolt setting cutting height of 10mm/20 mm; (B)- position of the bolt setting cutting height of 30mm/40 mm; (C)- position of the bolt setting cutting height of 50mm/60 mm; (D)- position of the bolt setting slide angle

Adjust the length of the upper linkage linkage so that the mower slides are 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:

- loosen the nuts (4) on both sides of the copying shaft (1) (FIGURE 4.6),
- undo nuts (8) 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, B or C),
- insert fixing bolts (3) into appropriate openings and screw on the nuts (8),
- tighten the nuts (4) on both sides of the copying shaft.

When changing cutting height to 30mm/40 mm or 50mm/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,
- urn the slide so as to ensure that the slide opening aligns with the lower opening in the side of the mower housing (D) (FIGURE 4.6),
- 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 PTO 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 the technical condition of the shaft guards (1) (FIGURE 4.7), the completeness and condition of the protecting chains and the general technical condition of the shaft.

NOTE

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

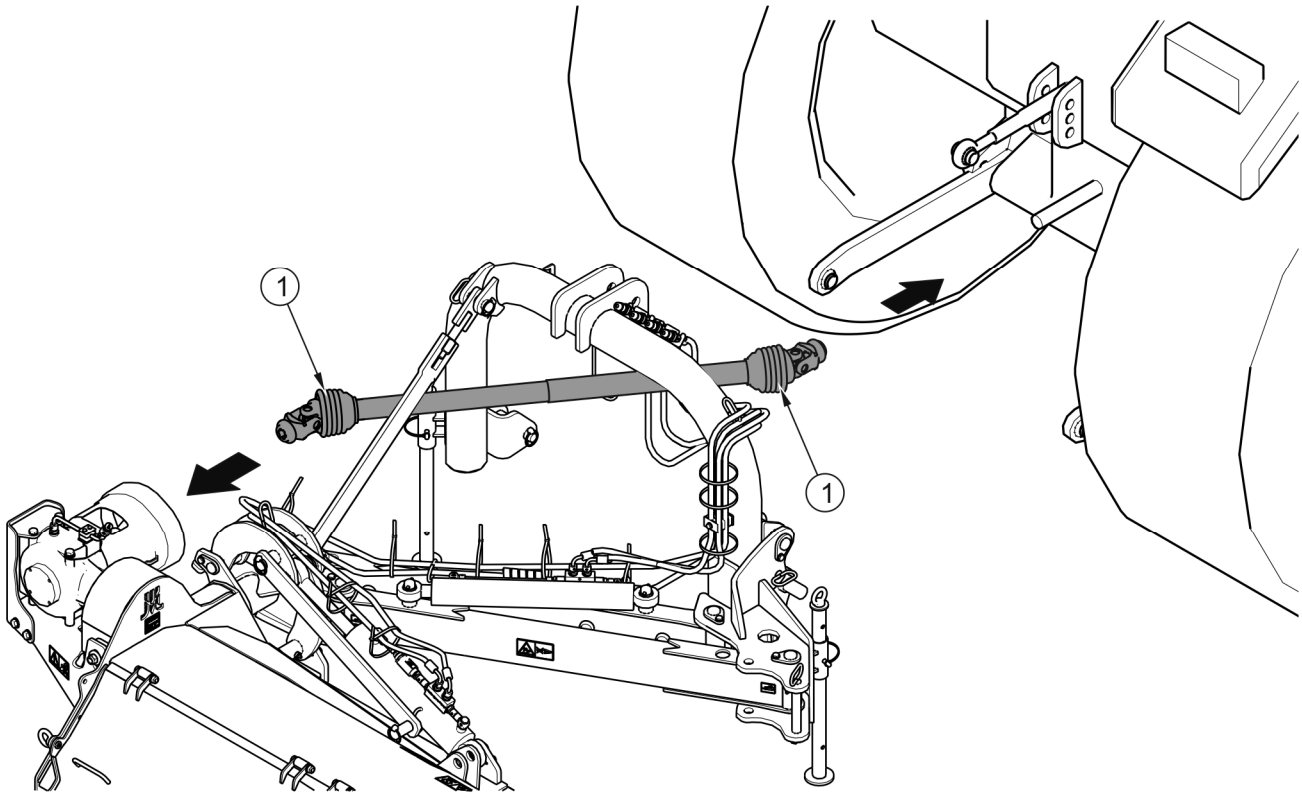


FIGURE 4.7 FIGURE 4.7 Connecting the PTO shaft

(1)- PTO shaft shields

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 540 rpm is reached.

NOTE

During mowing, the lever controlling the inclination adjustment cylinder should be set in "floating" position, whereas the lever controlling the tipping cylinder should be set in neutral position.

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.

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.

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

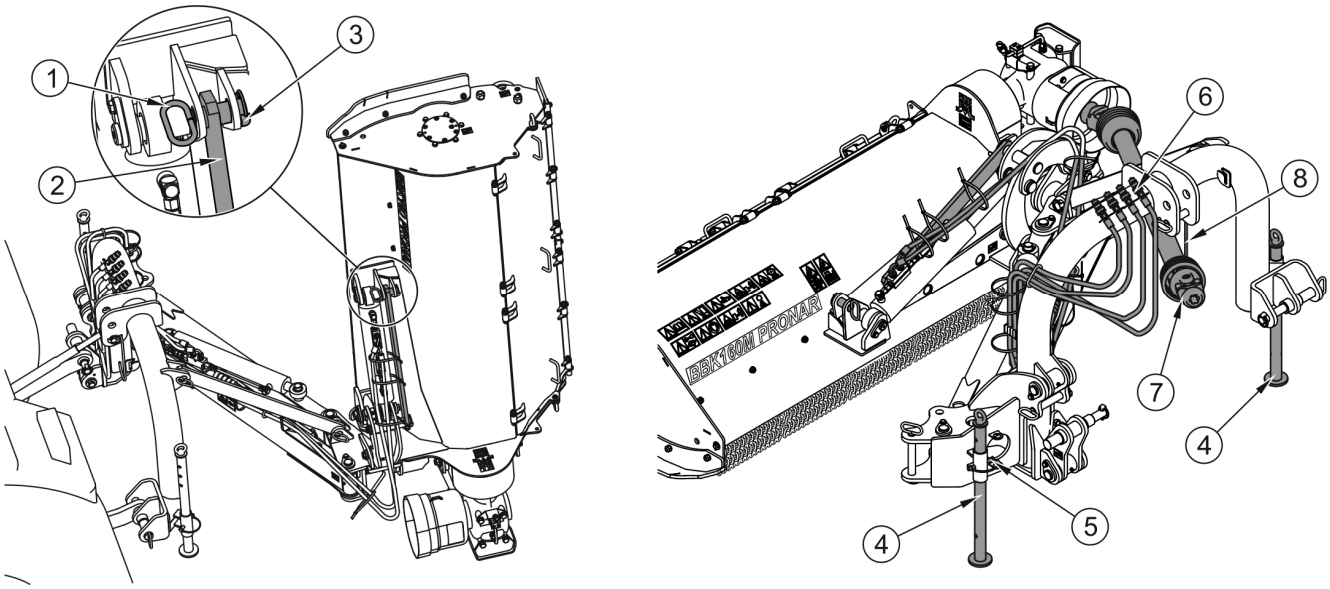


FIGURE 4.8 Disconnecting mower from tractor

(1)- lock pin; (2)- lock II; (3)- linchpin; (4)-support; (5)- securing linchpin; (6)- conduit plugs; (7)- PTO shaft; (8)- PTO shaft bracket

DANGER

Reduce pressure prior to disconnecting the hydraulic system.

In order to disconnect the mower from the tracto (FIGURE 4.8) proceed as follows:

- remove the locking pin (1), release the cylinder lock (2), and unfold the mower to a horizontal position.
- lower mower using three-point linkage to rest position,
- turn off the tractor engine and remove the key from the ignition,
- take out securing linchpins (5), lower parking stands (4) and lock it again with securing linchpins (5),

- reduce residual pressure in the hydraulic system using the appropriate hydraulic circuit control lever,
- disconnect hydraulic line connectors (6) from tractor and place in special brackets on mower frame,
- disconnect PTO shaft (7) from tractor PTO drive and place on support (8),
- disconnect top link of three-point linkage,
- disconnect lower pins and drive tractor away.

After disconnecting from tractor, mower should be supported on parking stands (4) (FIGURE 4.8) 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.

Rear-side flail mowers are equipped with a liftable cover that allows for efficient removal of accumulated cut material.

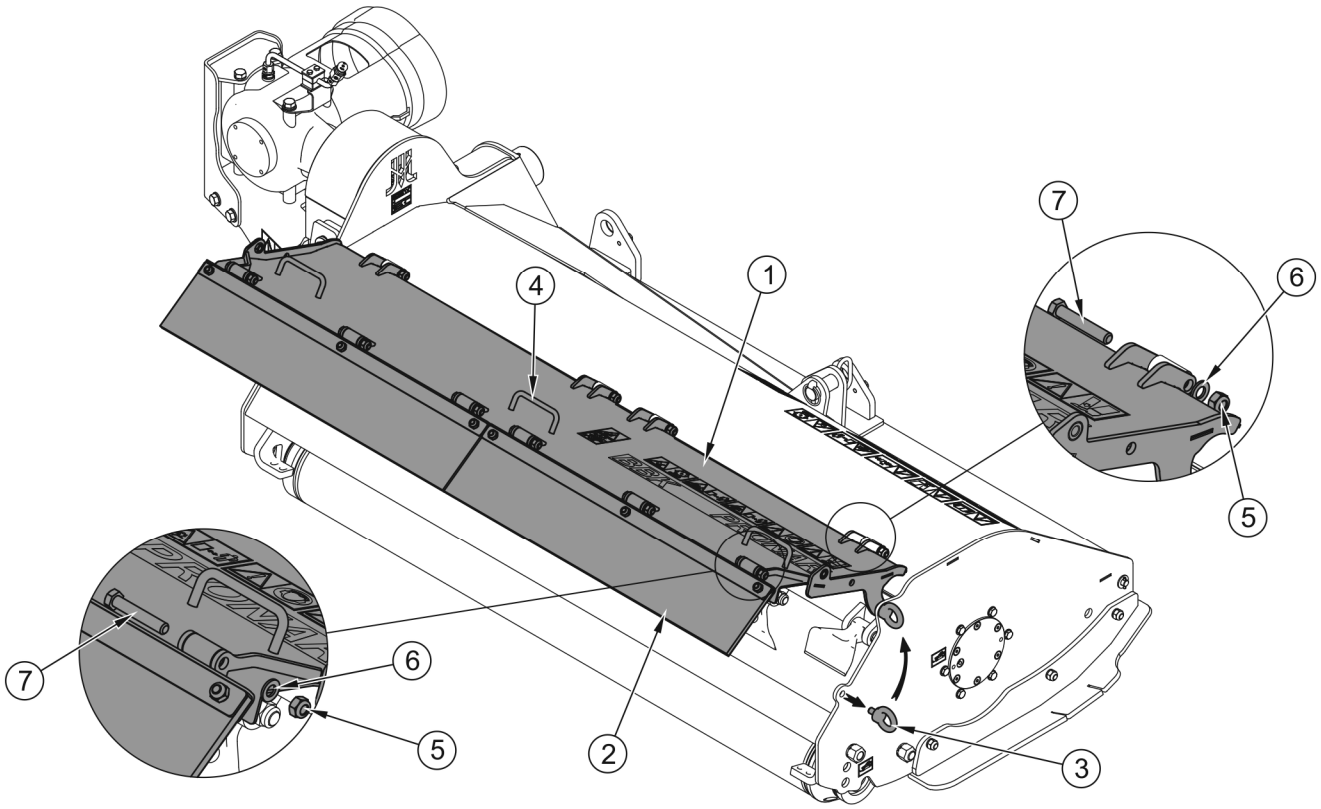


FIGURE 5.1 Opening and removal of liftable shield

(1)- liftable shield; (2)- rubber shield; (3)- eye bolt; (4)- handle; (5)- nut; (6)- washer; (7)- bolt

In the case of high crop residue after mowing, opening the liftable cover is permissible during operation in areas away from buildings (e.g., fields, meadows). This favorably affects mowing efficiency.

To open the liftable shield:

- unscrew eye bolts (3) on both sides of the cutting unit (3),
- raise the shield using handles (4),
- tighten eye bolts (3) as shown in FIGURE 5.1.

When disassembling liftable shield (1) together with complete rubber shields (2), unscrew eye bolts (3), undo nuts (5) and pull out bolts (7). Next, the shields can be removed.

ATTENTION

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

During the dismantling of the rubber guards (1) (FIGURE 5.2 – W1 – BBK160M, BBK180M, BBK200M), you must:

- undo the nuts (3) that secure the clamping strips (2).
- remove the strips (2) and rubber guards (1) from the mounting bolts (5).

To disassemble the rubber guards (1) (FIGURE 5.2 – W2 – BBK120M, BBK140M), you must:

- take the chains (11) supporting the rubber guards off the lugs (12).
- unscrew the nuts (3) that secure the clamping strips (2).
- remove the strips (2) and rubber guards (1) from the mounting bolts (5).

To dismantle the protective chain (6), you must:

- remove the spring pin (10) and take off the washer (9).
- undo nut (3) and pull out bolt (8) that fixes rod (7) on which safety chain (6) is suspended.
- slide out rod (7) so as to enable disassembly and replacement of a damaged element.

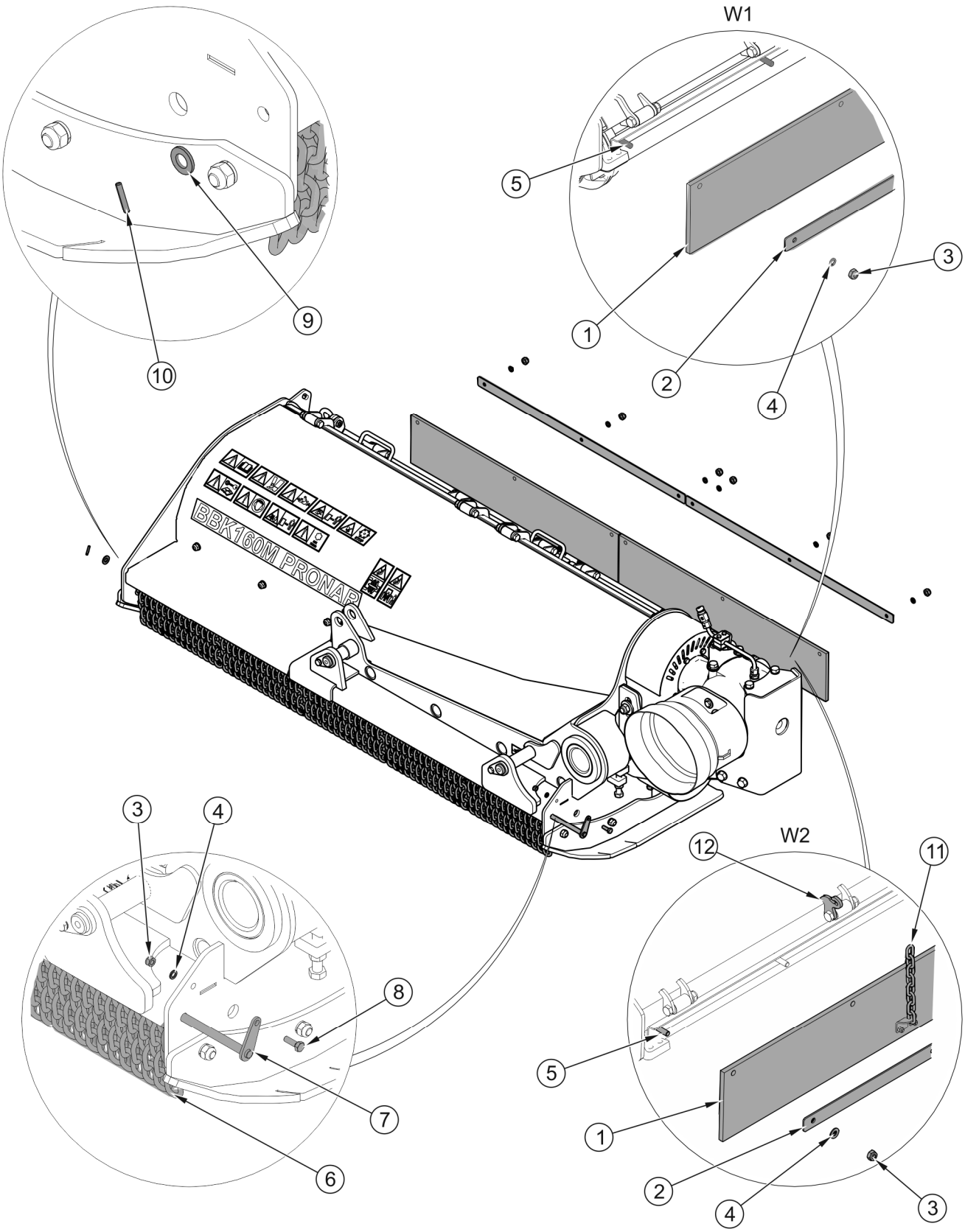


FIGURE 5.2 Disassemble safety guards

(1)- rubber shield; (2)- clamping strip; (3)- nut; (4)- washer; (5)- shield retaining bolt; (6)- safety chain; (7)- rod; (8)- bolt; (9)- washer; (10)- spring pin; (11)- chain; (12)- chain fastening eye;

Pay special attention to correct mounting of shields and chain. Bolts should be tightened using appropriate tightening torque according to table *„5.3. TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS".*

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.

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.

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.

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.

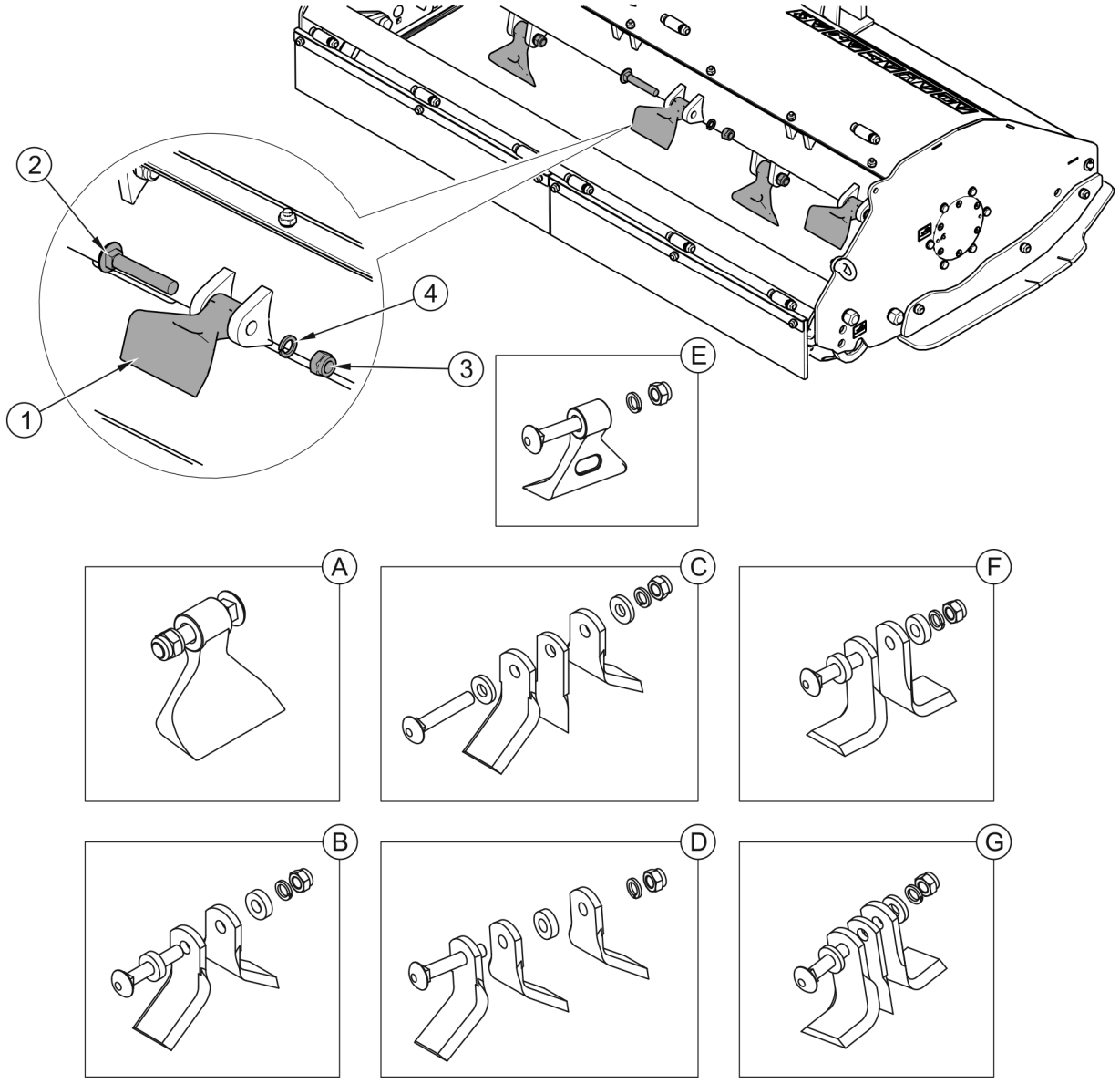


FIGURE 5.3 Replacement of cutting blades

Sets of blades: (A)- 110D; (B)- 110A; (C)- 110B; (D)- 110C; (E)- 110E; (F)- 110F; (G)- 110G; (1)- flail blade; (2)- blade fixing bolt; (3)- nut; (4)- spring washer

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 (1) (FIGURE 5.4) involves checking of the belt tension. Deflection of vee-belts measured between transmission's pulleys after application of 7.5 kG force should not exceed 8 mm (BBK120M, BBK140M, BBK160M) and 9 mm (BBK180M, BBK200M).

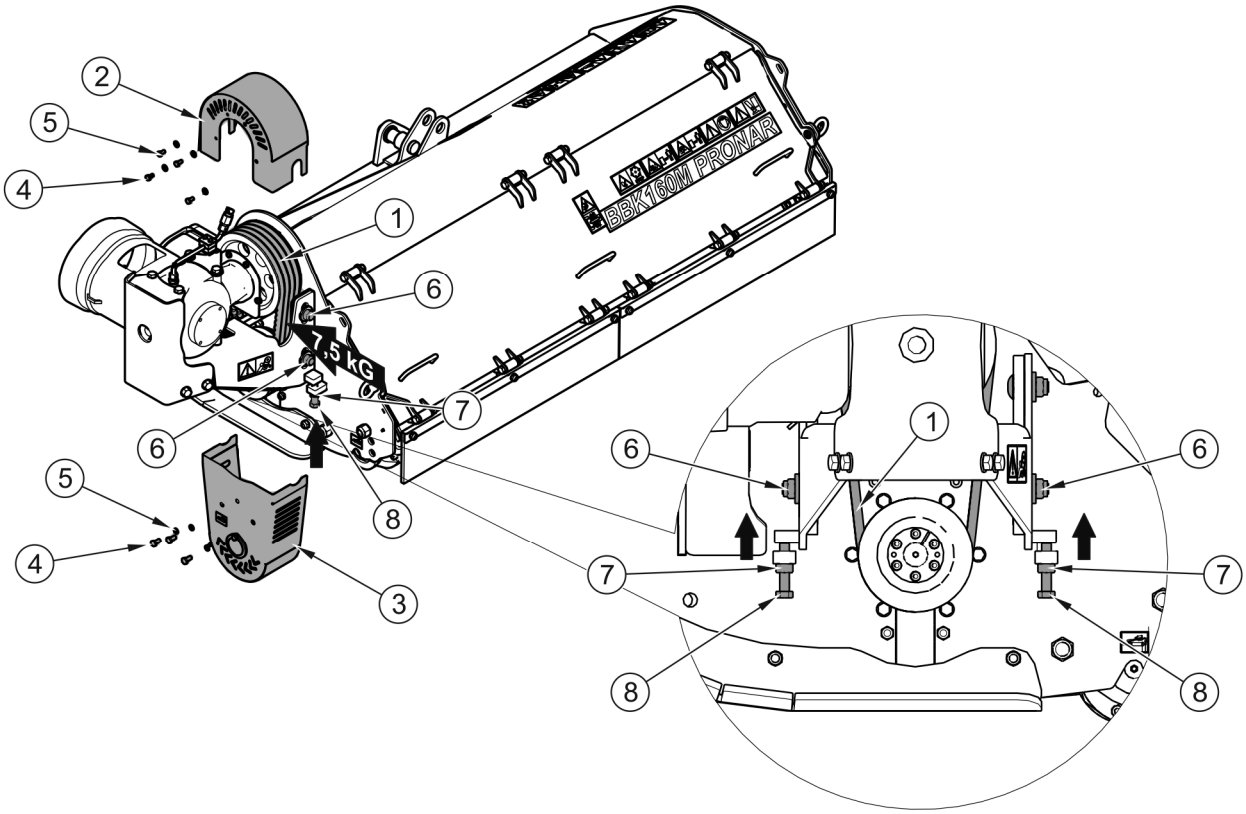


FIGURE 5.4 Checking and adjusting the tension of the serpentine belts

(1)- vee-belts; (2)- vee-belt shield I; (3)- vee-belt shield II; (4)- bolt; (5)- washer; (6)- nut; (7)- securing nut; (8)- adjustment bolt

In order to inspect:

- remove vee-belt shields (2, 3) by unscrewing bolts (4),
- check tension of vee-belts (1),
- loosen nuts (6) and securing nuts (7) if you want to adjust tension of vee-belts,
- set required tension of vee-belts by means of adjustment bolts (8),
- tighten securing nuts (7) and nuts (6) of the transmission base,

- install vee-belt shields (2, 3) and tighten bolts (4).

If one of the belts is damaged the complete belt set should be changed.

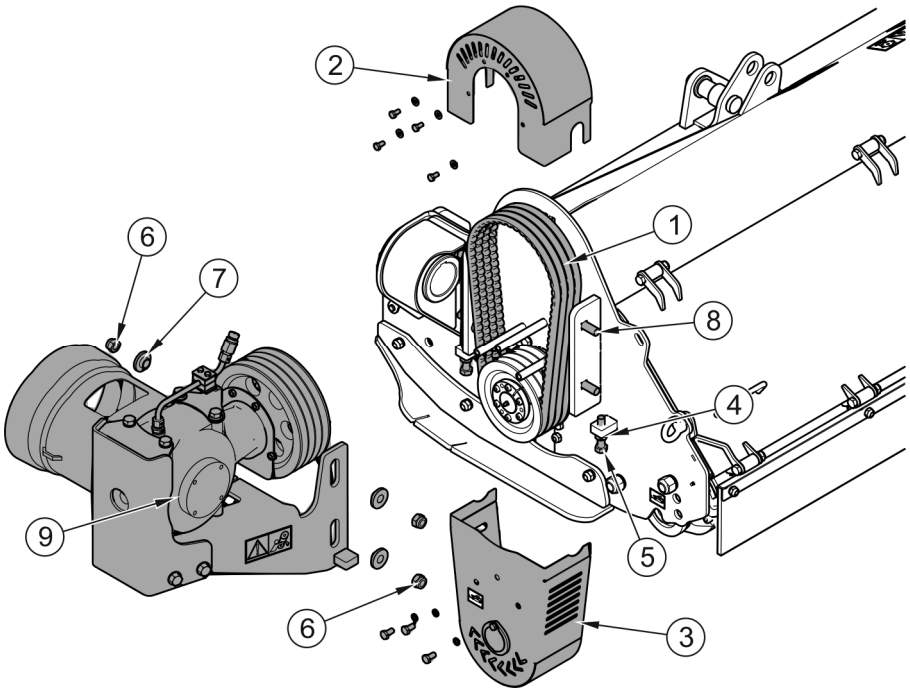


FIGURE 5.5 Replacement of vee-belts

(1)- vee-belts; (2)- vee-belt shield I; (3)- vee-belt shield II; (4)- securing nut; (5)- adjustment bolt; (6)- nut; (7)- retaining ring; (8)- bolt; (9)- complete transmission with base and pulley

To replace the vee-belts (FIGURE 5.5):

- remove vee-belt shields (2, 3),
- loosen nuts (6) and securing nuts (4),
- unscrew the bolts (5) so that the complete gearbox (9) is in its lowest position.
- remove vee-belts and replace them with new ones,
- adjust vee-belt tension,
- tighten securing nuts (4) and nuts (6) of the transmission base,
- install vee-belt shields (2, 3) and tighten bolt.

During replacement of vee-belts (1), the complete transmission (9) may be disassembled by undoing nuts (6) and removing bolts (8).

DANGER

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

Check oil level in bevel gear daily.

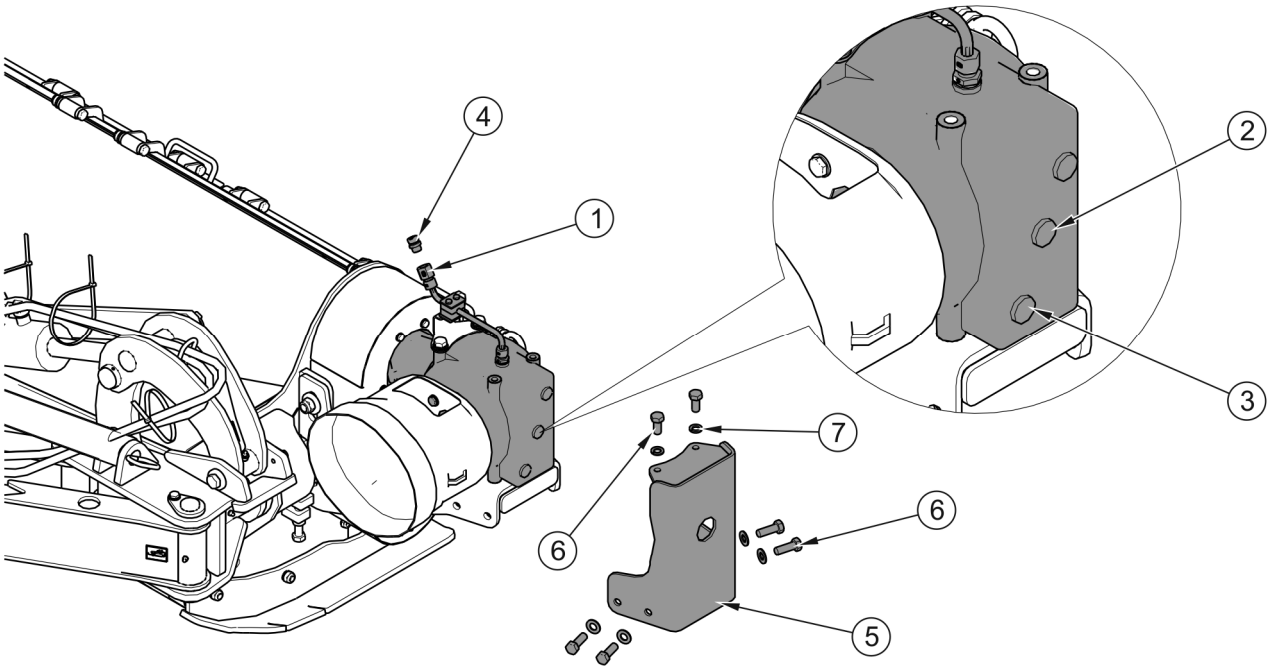


FIGURE 5.6 Check and change of oil in bevel gear

(1)- oil filler; (2)- inspection plug; (3)- drain plug; (4)- air vent of bevel gear; (5)- shield; (6)- bolt; (7)- washer

To check the oil level in bevel gear (FIGURE 5.6):

- set the mower horizontally,
- unscrew inspection plug (2),
- 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 appropriate personal protection equipment i.e. protective clothing, safety shoes, gloves, safety goggles. 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 air vent of bevel gear (4) 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 air vent of bevel gear (4) 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 2 L.

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 2.0 L of 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 an oil leak is found on hydraulic connections, tighten the connections. If this does not remedy the problem, replace the lines and 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 machine 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 winter, 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 ŁT-43 generally available grease. 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 shown in FIGURE 5.7 and 5.8 are described in Table „*5.2 LUBRICATION POINTS AND LUBRICATION FREQUENCY*".

TABLE 5.2 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
1	Rotary mount carrying shaft	1	grease	20 hours
2	Bevel gear	1	oil	500 hours
3	Rocker arm pin	1	grease	20 hours
4	Linkage link pin	4	grease	20 hours
5	Linkage pin	2	grease	20 hours
6	Tracking shaft bearing	2	grease	daily
7	Flail shaft bearing	2	grease	daily
8	Link pin	2	grease	20 hours
9	Cylinder eye	2	grease	20 hours
10	PTO shaft *	*	*	*

Marking description in Item column (TABLE 5.2) conforms with numbering shown on (FIGURE 5.7 and 5.8)

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

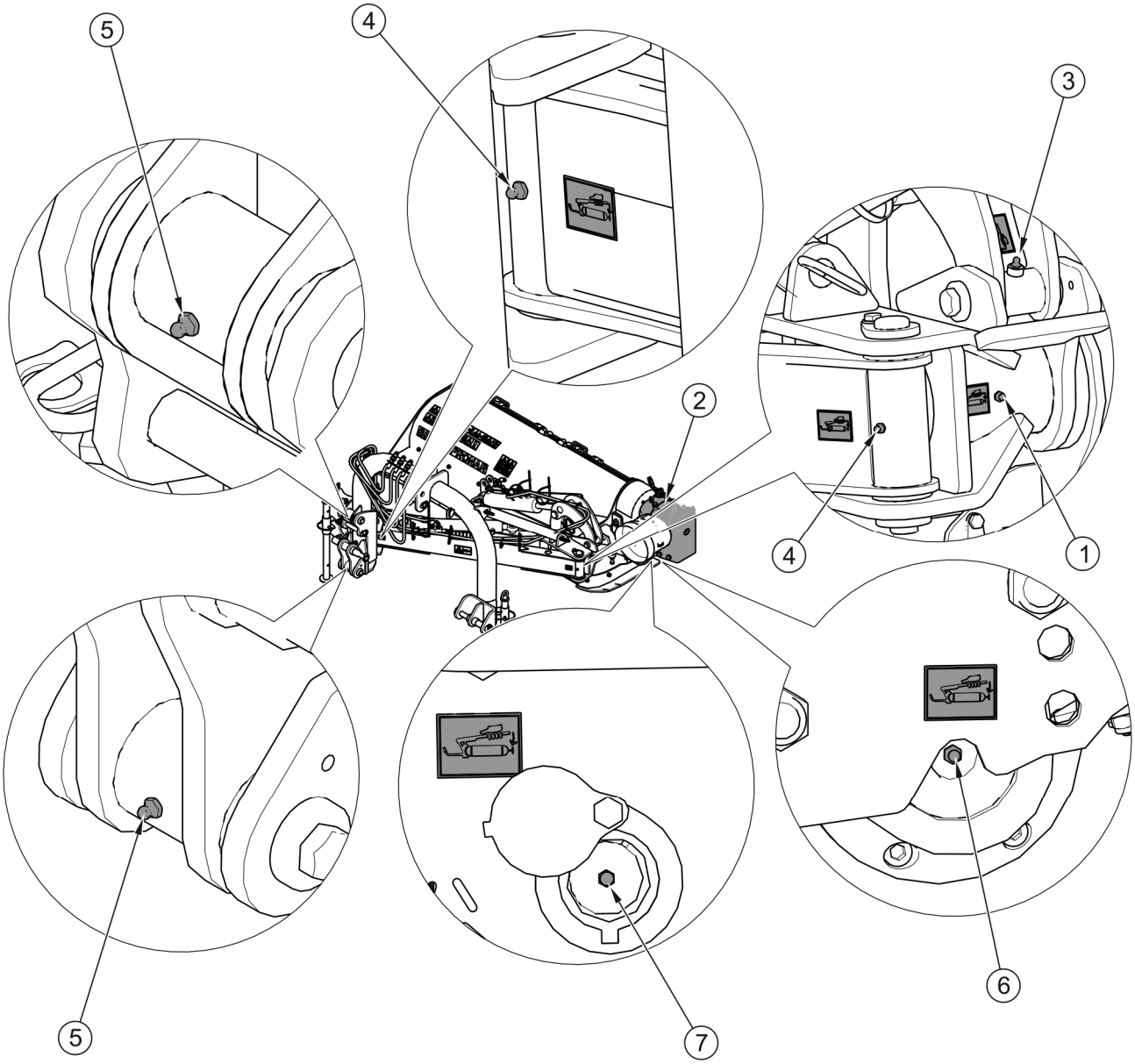


FIGURE 5.7 Lubrication points (view A)

Lubrication points are described in Table 5.2

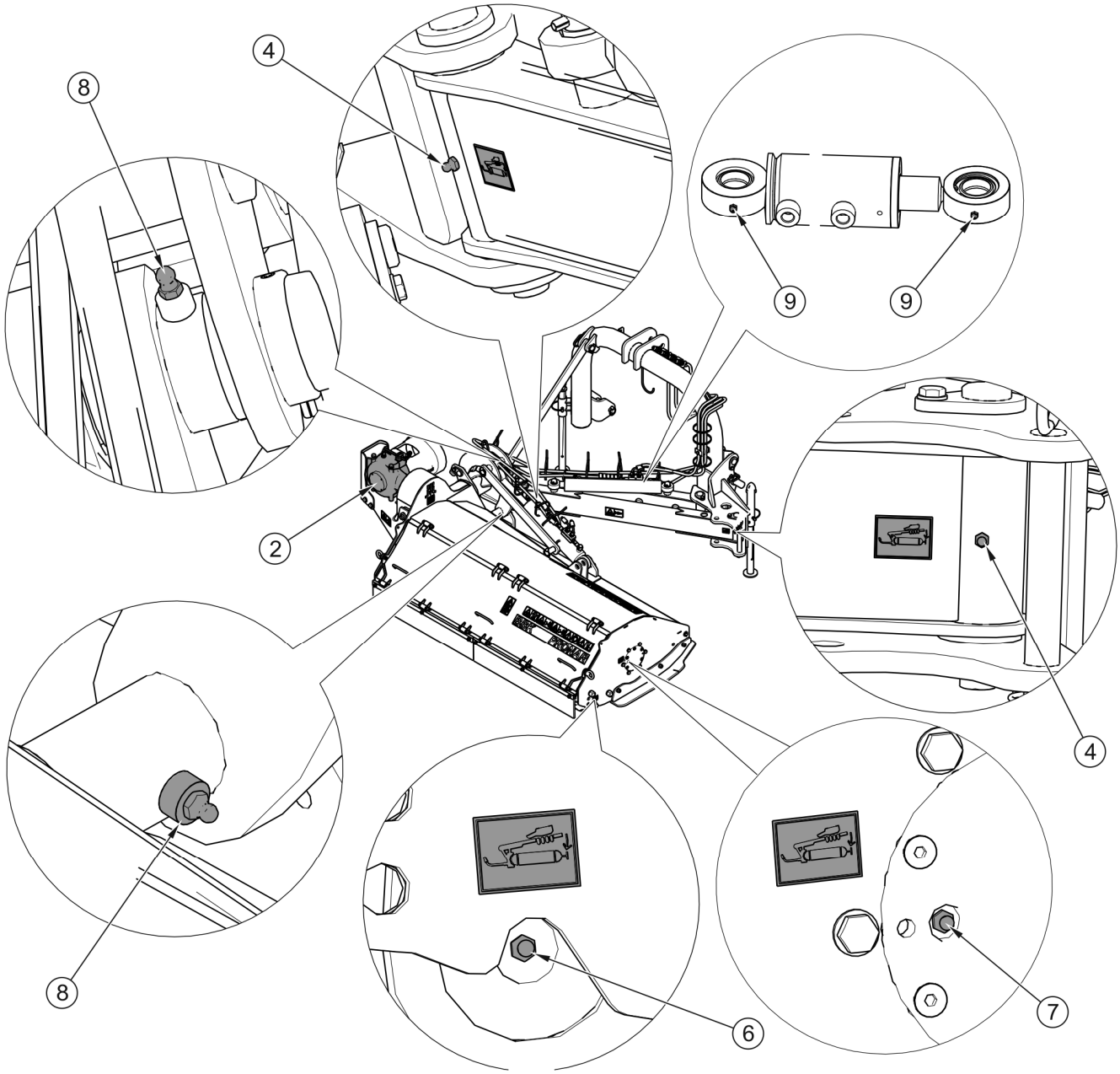


FIGURE 5.8 Lubrication points (view B)

Lubrication points are described in Table 5.2

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	1050
M27	820	1150	1650
M30	1050	1450	2100
M32	1050	1450	2100

5.8 TROUBLESHOOTING

TABLE 5.4 Troubleshooting

TYPE OF FAULT	POSSIBLE CAUSE	REMEDY
It is impossible to set lateral tilt or inclination of the mower's cutting unit by means of hydraulic cylinders	Hydraulic cylinder locks are installed	Disconnect hydraulic cylinder locks, place them in appropriate place and secure (FIGURE 4.5)
	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	Turn off the mower, remove collected grass or foreign body from cutting unit and check condition and tension of belts
	Damaged bevel gear	Repair at an authorised service point

NOTES