PRONAR Sp. z o.o.

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

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

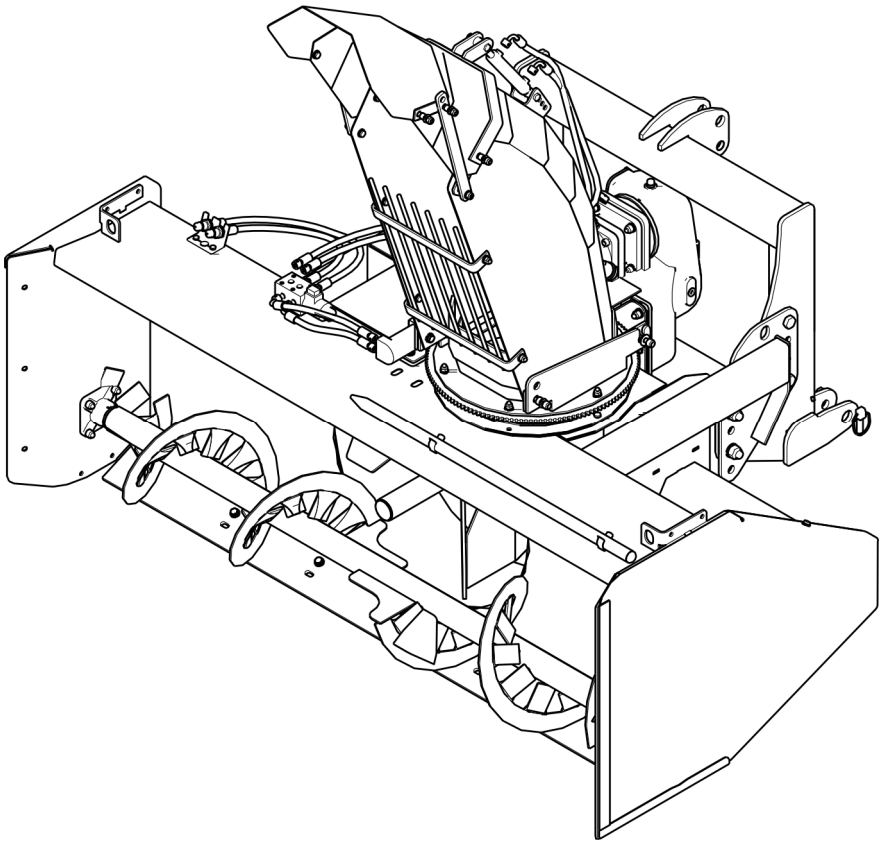
www.pronar.pl

OPERATOR'S MANUAL

SNOW BLOWER

PRONAR OW2.1M
PRONAR OW2.1H

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 1A-01-2013

PUBLICATION NO 336N-00000000-UM

EN

SNOW BLOWER

PRONAR OW2.1M

PRONAR OW2.1H

MACHINE IDENTIFICATION

TYPE: ……

SERIAL NUMBER: | | | | | | |

INTRODUCTION

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

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

The manual describes the basic safety rules and operation of the sand spreader. If the information stated in the Operator's Manual needs clarification then the user should refer for assistance to the sale point where the machine was purchased or to the Manufacturer.

MANUFACTURER'S ADDRESS:

PRONAR Sp. z o.o.
ul. Mickiewicza 101A
17-210 Narew

CONTACT TELEPHONES

+48 085 681 63 29 *+48 085 681 64 29*
+48 085 681 63 81 *+48 085 681 63 82*

SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

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

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

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

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

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

Additional tips and advice for machine operation are marked:

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

DIRECTIONS USED IN THIS OPERATOR'S MANUAL

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

PRONAR Sp. z o.o.
ul. Mickiewicza 101 A
17-210 Narew, Polska
tel./fax (+48 85) 681 63 29, 681 63 81, 681 63 82,
681 63 84, 681 64 29
fax (+48 85) 681 63 83
http://www.pronar.pl
e-mail: pronar@pronar.pl

EC DECLARATION OF CONFORMITY OF THE MACHINERY

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

Description and identification of the machinery		
Generic denomination and function:	**Snowblower**	
Type:	**OW2.1M**	**OW2.1H**
Model:	–	–
Serial number:		
Commercial name:	**Snowblower PRONAR OW2.1M** **Snowblower PRONAR OW2.1H**	

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 Omeljaniuk

Narew, the 10 MAJ 2012

Place and date

Full name of the empowered person position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

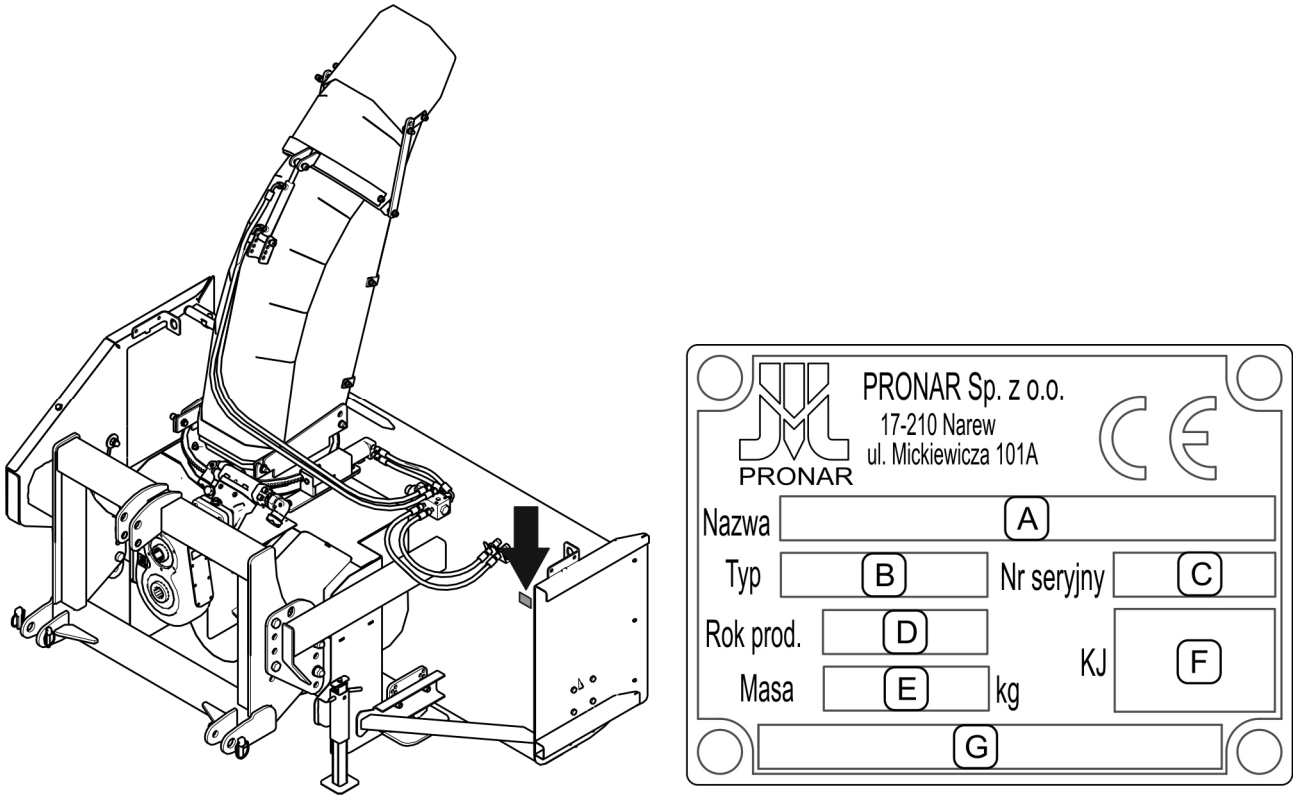


FIG. 1.1 Location of the data plate

Meaning of data plate items (FIG. 1.1):

A – machine name,

B – type,

C – serial number

D – year of manufacture

E – machine tare weight [kg],

F – quality Control stamp,

G – machine name, extension of name.

Serial number is stamped on the data plate. Data plate is located on the frame on the right side of the machine (FIG. 1.1). When buying the machine, confirm that the serial number on the machine corresponds to the number indicated in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*.

1.2 PROPER USE

Rotary snow blower is used for removing snow and ice blocks from flat surfaces by collecting and ejecting snow and ice on the road shoulder or on the trailer. It is designed for mounting on the front (driving forwards) or rear (driving backwards) three-point linkage of agricultural tractor or other carrying vehicle which meets the requirements set out in Table 1.1.

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

- carefully read the *OPERATOR'S MANUAL* and comply with its recommendations,
- understand the machine's operating principle and how to operate it safely and correctly,
- comply with general safety regulations while working,
- prevent accidents,
- comply with road traffic regulations.

The machine may only be used by persons, who:

- are familiar with the contents of this publication and with the contents of the tractor Operator's Manual,
- have been trained in machine operation and safe working conditions,
- have the required authorisation to drive the vehicle and are familiar with the road traffic regulations and transport regulations.

IMPORTANT!

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

- **snow clearing when the drive is disengaged**
- **for Transporting people and animals.**

Do not operate the rotary snow blower if bystanders, animals or buildings are in the snow discharge area.

TAB. 1.1 Carrying vehicle requirements, depending on the snow blower model

PRONAR OW2.1M snow blower with mechanical drive

	UNIT	REQUIREMENTS
Implement suspension system (TPL - three-point linkage)	-	category II and III according to ISO 730-1 front or rear with a floating position
Power take-off shaft (PTO)		
Required power of PTO shaft	hp (kW)	50 - 95 (36 - 69)
Rotation speed	RPM	540 or 1 000
Rotation direction and rotation speed depend on the method of mounting the snow blower on the carrying vehicle		
- front (left*) three point linkage	RPM	540 (A**)
- front (right*) three point linkage	RPM	1,000 (B**)
- rear	RPM	540 (A**)
- rear (right*) three point linkage - driving backwards	RPM	540 (C**)
PTO shaft profile	-	type 1 according to ISO 500 (Ø 35 mm, 6 splines)
Hydraulic system *(discharge chute control)*		
Hydraulic oil	-	HL 32
Nominal pressure in the system	MPa	18,5
Number of hydraulic sockets	item	2 sockets of one section with the possibility of changing the direction of oil circulation
Electrical system		
Solenoid supply	-	Cigarette lighter socket
Electrical system voltage	V	12
Other requirements		
Beacon light	-	orange light

** - rotation direction of PTO in carrying vehicle, looking at the shaft front*

*** - A, B, C - PTO shaft in the machine*

PRONAR OW2.1H snow blower with hydraulic drive

	UNIT	REQUIREMENTS
Implement suspension system (TPL - three-point linkage)	-	category II and III according to ISO 730-1 front or rear with a floating position
Hydraulic system *(machine drive)*		
Required oil flow	l/min	100 – 140
Nominal pressure in the system	MPa	25
Hydraulic oil	-	HL 32
Number of hydraulic sockets:		
- hydraulic motor supply	item	1
- return from hydraulic motor	item	1
- "free drain" return	item	1
Hydraulic system *(discharge chute control)*		
Hydraulic oil	-	HL 32
Nominal pressure in the system	MPa	18,5
Number of hydraulic sockets	item	2 sockets of one section with the possibility of changing the direction of oil circulation
Electrical system		
Solenoid supply	-	Cigarette lighter socket
Electrical system voltage	V	12
Other requirements		
Beacon light	-	orange light

1.3 EQUIPMENT

The equipment includes:

- Operator's Manual,
- Warranty Book.

Additional (optional) equipment:

- PTO shaft 7107071CE007N58,
- set of hydraulic lines *(for OW2.1H hydraulic drive)* catalogue No. 275N-99000000

PRONAR Sp. z o.o., Narew guarantees the reliable operation of the machine when it is used according to its intended purpose as described in the *OPERATOR'S MANUAL*. Defects discovered during the warranty period will be removed by the Warranty Service. The repair period is specified in the *WARRANTY BOOK*.

The warranty does not apply to 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:

- blade,
- bearings,
- skids.

The warranty service only applies to factory defects and mechanical damage that is not due to the user's fault.

In the event of damage arising from:

- mechanical damage which is the user's fault,
- caused by road accidents,
- by inappropriate use, adjustment or maintenance, use of the machine for purposes other than those for which it is intended,
- use of damaged or malfunctioning machine,
- repairs carried out by unauthorised persons, improperly carried out repairs,
- making unauthorised alterations to machine design,

the user will lose the right to warranty service.

TIP

Demand that the seller carefully and precisely 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 machine.

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

1.4 TRANSPORT

The machine is prepared for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation, electrical equipment elements and additional equipment elements.

Delivery is either by transport on a vehicle or independently, after being attached to a tractor. Transportation of the machine is connected to a permissible tractor provided the vehicle's driver familiarises himself with the machine's Operator's Manual and particularly with safety information and Concerning the Principles of connection and transportation on public roads.

During road transport the machine should be secured on the carrier platform by certified straps or chains fitted with pulley.

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

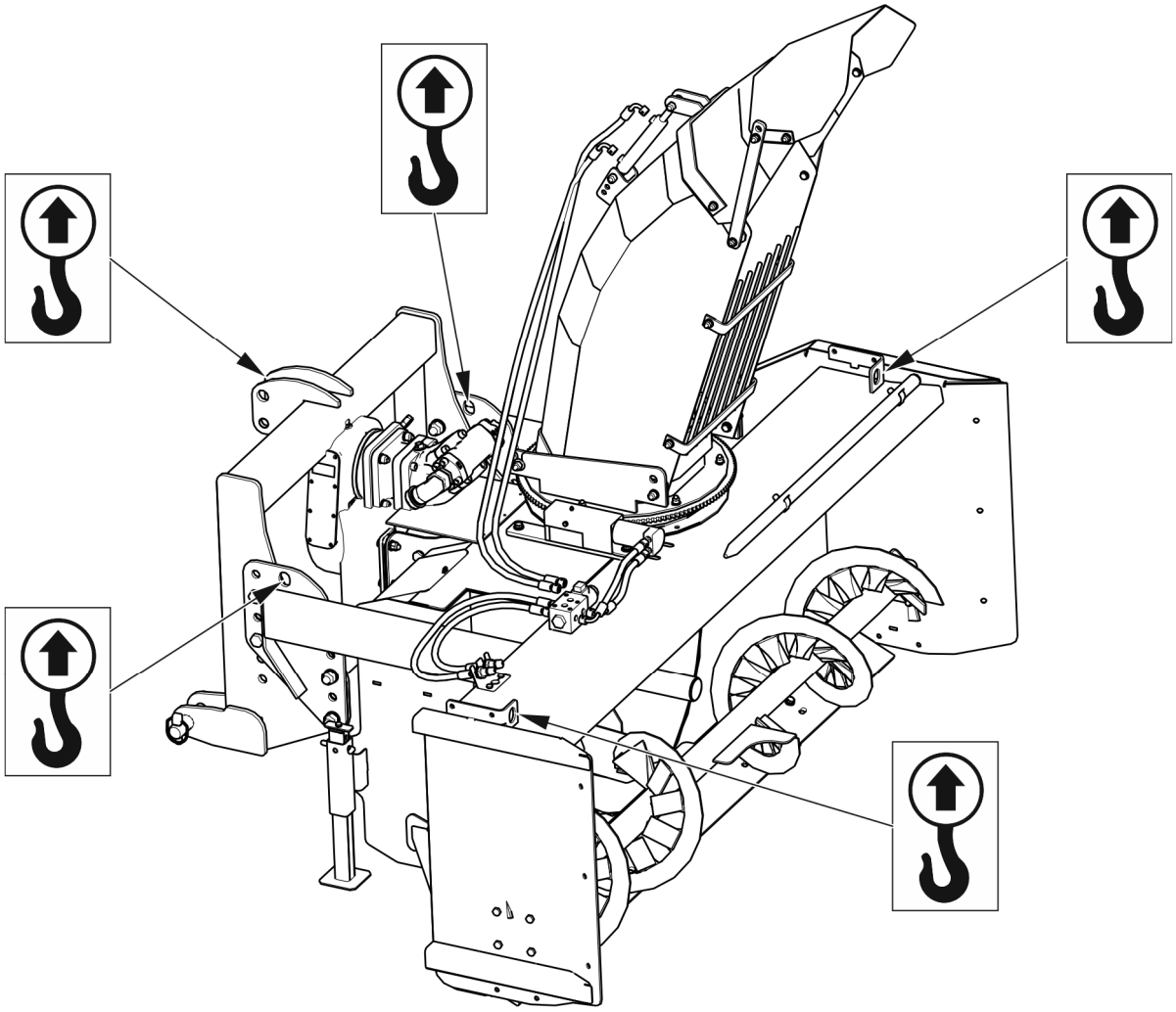


FIG. 1.2 Transport lugs

The machine should be attached to lifting equipment in places specially designed for this purpose (FIG. 1.2). Suspension points are identified with information decals. When lifting the machine be especially careful due to the possibility of tipping over the machine and the risk of injuries from protruding parts. To keep lifted machine in the correct direction it is recommended to apply additional guy cables. During the loading work particular care should be taken not to damage paint coating.

ATTENTION!

Do not attach slings and any kind of cargo fasteners to hydraulic system and electrical system components.

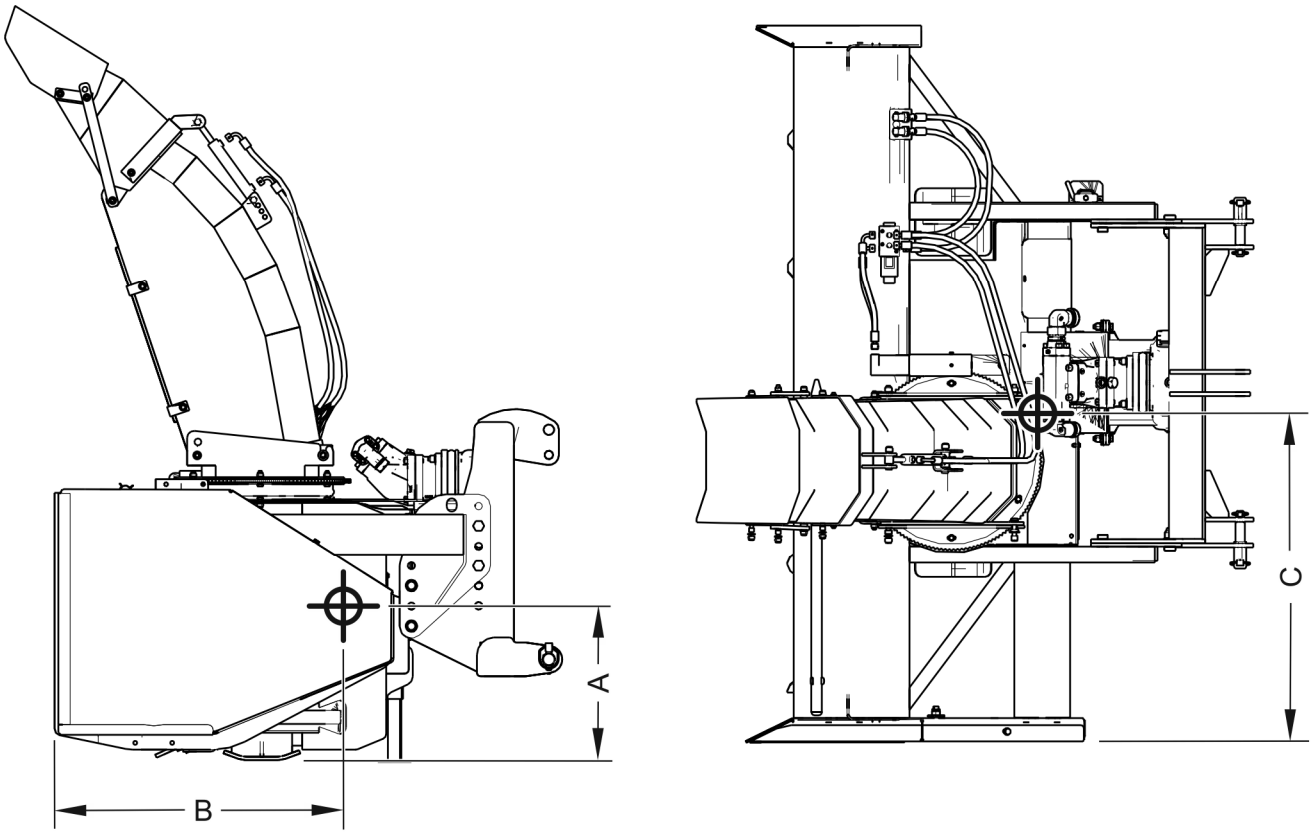


FIG. 1.3 Centre of gravity

OW2.1M: (A)- 500 mm; (B)- 690 mm; (C)- 970 mm; OW2.1H: (A)- 525 mm; (B)- 760 mm; (C)- 985 mm

ATTENTION!

Depending on the machine equipment and discharge chute setting, centre of gravity varies in the range of ± 100 mm

DANGER

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

1.5 ENVIRONMENTAL HAZARDS

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. Maintenance and repair work which involves the risk of an oil leak should be performed in the rooms with oil resistant 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 pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container, and then passed on to the appropriate oil waste recycling centre. The container should be kept away from heat sources, flammable materials and food.

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

1.6 WITHDRAWAL FROM USE

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

Remove the oil completely before dismantling the machine. Locations of drain plugs in the transmission and reducer 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. Waste oil and also rubber and plastic elements should be taken to establishments undertaking the utilisation of such waste.

IMPORTANT!

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

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

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 USE OF MACHINE

- Before using the machine, the user must carefully read this Operator's Manual and the *WARRANTY BOOK*. When operating the machine, the operator must comply with the recommendations.
- The machine may only be used and operated by persons qualified to drive carrying vehicles and trained in the use of the machine.
- If the information stated in the Operator's Manual is difficult to understand, contact a seller, who runs an authorised technical service on behalf of the manufacturer, or contact the manufacturer directly.
- Careless and improper use and operation of the machine, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- Be aware of the existence of a minimal risk, and for this reason the fundamental basis for using this machine should be the application of safety rules and sensible behaviour.
- The machine must never be used by persons, who are not authorised to drive carrying vehicle, 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.
- The machine must not be used for purposes other than those for which it is intended. Anyone who uses the machine other than the way intended takes full responsibility for himself for any consequences of this use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the warranty.
- The machine may only be used when all the safety guards and other protective elements are technically sound and correctly positioned. In the event of loss or destruction of the safety guards, they must be replaced with new ones.

- Before using the machine always check its technical condition, especially in terms of safety. In particular, check the technical condition of the linkage and drive.

2.1.2 HITCHING AND UNHITCHING FROM CARRYING VEHICLE

- Carefully read the carrying vehicle Operator's Manual.
- Do NOT link the machine to the carrying vehicle if the categories of the three point linkage systems of the machine and carrying vehicle are not compatible.
- To mount machine on tractor use only genuine pins and safeguard cotter pins.
- The carrying vehicle to which the machine will be coupled must be technically reliable and must fulfil the requirements specified by the machine Manufacturer.
- Be especially careful when linking and disconnecting the machine.
- After completion of coupling the machine, check the safeguards.
- When hitching, there must be nobody between the machine and the carrying vehicle.
- Machine unhitched from the carrying vehicle must be placed on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

2.1.3 HYDRAULIC SYSTEM

- The hydraulic system is under high pressure when operating.
- Regularly check technical condition of the hydraulic lines and connections. There must be no oil leaks.
- In the event of malfunction of the hydraulic system elements, do not use the machine until the malfunction is corrected.
- When connecting hydraulic lines to tractor, make sure that the hydraulic system is not under pressure. If necessary, reduce residual pressure in the system.
- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may find its way under the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. In the event of contact of oil with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).

- Use the oil recommended by the Manufacturer. Never mix two types of oil.
- Used oil or oil, which has lost its properties, should be stored in original containers or replacement containers resistant to action of hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Hydraulic lines must be changed every 4 years regardless of their technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

2.1.4 TRANSPORTING THE MACHINE

- When driving on public roads, comply with the road traffic regulations. in force in the country, in which the machine is used.
- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust travel speed to the prevailing road conditions and other limitations arising from road traffic regulations limits.
- Do NOT leave machine raised and unsecured while the carrying vehicle is parked. When parked, the machine should be lowered to the ground.
- People or animals or whatever materials must not be carried on the machine.
- During transport, the carrying vehicle's linkage should be locked in the up position to prevent its accidental lowering.
- 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 whatsoever, do not use the machine until the fault has been corrected.
- During work, use proper protective clothing, gloves and appropriate tools.

- Any modification to the machine frees PRONAR from any responsibility for damage or detriment to health which may arise as a result.
- Regularly check the technical condition of the safety devices and correct tightening of bolt connections.
- Regularly perform service inspections of machine as recommended by the Manufacturer.
- Do NOT perform service or repair work under raised and unsupported machine.
- Before beginning work on hydraulic system, 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 carrying vehicle's engine turned off and the ignition key removed. The vehicle shall be immobilized with the parking brake and secured against unauthorized access.
- 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.
- Do NOT weld, drill holes in, cut or heat the main structural elements, which have a direct impact on the machine operation safety.
- In the event of work requiring the machine 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 the machine, which has been raised only with the carrying vehicle's three point linkage.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease.
- In order to reduce the danger of fire the machine must be kept in a clean condition.

2.1.6 OPERATING SNOWBLOWER

- Before starting the carrying vehicle with the connected machine, make sure that the machine drive is not engaged, otherwise it can lead to uncontrolled operation of the machine.
- Before lowering or lifting the machine mounted on tractor make sure there are no bystanders, especially children, near the machine.
- Before starting the machine, 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.
- During snow removal, the driver should use personal protective equipment (protective ear guards).
- During machine operation do not occupy a different position than that of the operator in the vehicle's cab. Do NOT leave the cab, when the machine is in operation.
- Person must not stand in the snowblower operation area and also between the tractor and the machine.
- Do not direct discharge chute toward operator cabin.
- Exercise particular caution due to the limited field of view obstructed by the snow blower discharge chute.

2.1.7 OPERATION OF PTO SHAFT

(refers to the machine with PTO drive system)

- The machine may only be connected to the carrying vehicle by appropriately selected PTO shaft recommended by the Manufacturer.
- The PTO drive shaft has markings on the casing, indicating which end of the shaft shall be connected to the tractor.
- Never use a damaged PTO drive shaft, it may cause an accident. A damaged shaft must be repaired or replaced.
- Disconnect the PTO 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, the user should thoroughly acquaint himself with the PTO shaft Operator's Manual and adhere to the recommendations contained in it.
- PTO drive shaft must be equipped with shields. Do NOT use the shaft with damaged or missing guards.
- After connecting shaft, ensure that it is correctly and safely connected to the carrying vehicle and to the machine.
- Before starting PTO shaft, make sure that it is connected to proper gearbox connection (gearbox has three connections) and check whether PTO rotation direction is correct.
- Before disconnecting the shaft, turn off the carrying vehicle's 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 drive 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 DESCRIPTION OF MINIMAL RISK

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

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

- not maintaining safe distance from the danger zone or being within the zones while the machine is operating,
- operation of the machine by persons under the influence of alcohol,
- cleaning, maintenance and technical checks when tractor is connected and engine is running;

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

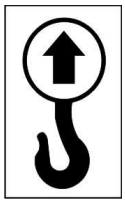
- prudent and unhurried operation of the machine,
- sensible application of the remarks and recommendations stated in the Operator's Manual,
- carrying out repair and maintenance work in line with operating safety rules,
- carrying out repair and maintenance work by persons trained to do so,
- using close fitting protective clothing,
- ensuring unauthorised persons have no access to the machine, especially children,
- maintaining safe distance from forbidden or dangerous places
- a ban on being on the machine when it is operating,

2.3 INFORMATION AND WARNING DECALS

All signs should always be legible and clean, visible to the operator and also to persons possibly being in the vicinity of the machine in operation. If any safety sign is lost or illegible, it should be replaced with a new one. All elements having safety signs replaced during repairs should be affixed with these signs. Safety signs and decals may be purchased from the Manufacturer or the Seller.

TAB. 2.1 Information and warning decals

ITEM	SYMBOL	DESCRIPTION
1		Before starting work, carefully read the Operator's Manual.
2		During machine operation objects and blocks of ice can be thrown, which pose a risk of injury for the whole body. The operator should keep a safe distance from people, animals and buildings.
3		Danger associated with the PTO shaft. Do not approach or touch the rotating elements.
4		Attention! Remove blocking snow only when the snowplough and blower are turned OFF. Use only wooden pegs or shovels enclosed with the snowplough.
5		Do not reach into the compression area. Danger of crushing hands or fingers.

ITEM	SYMBOL	DESCRIPTION
6		Manufacturer.
7		Transport suspension points.
8		Rotation speed and direction of gear shafts.
9		Machine model

Numbers in the item column correspond to decals (FIG. 2.1)

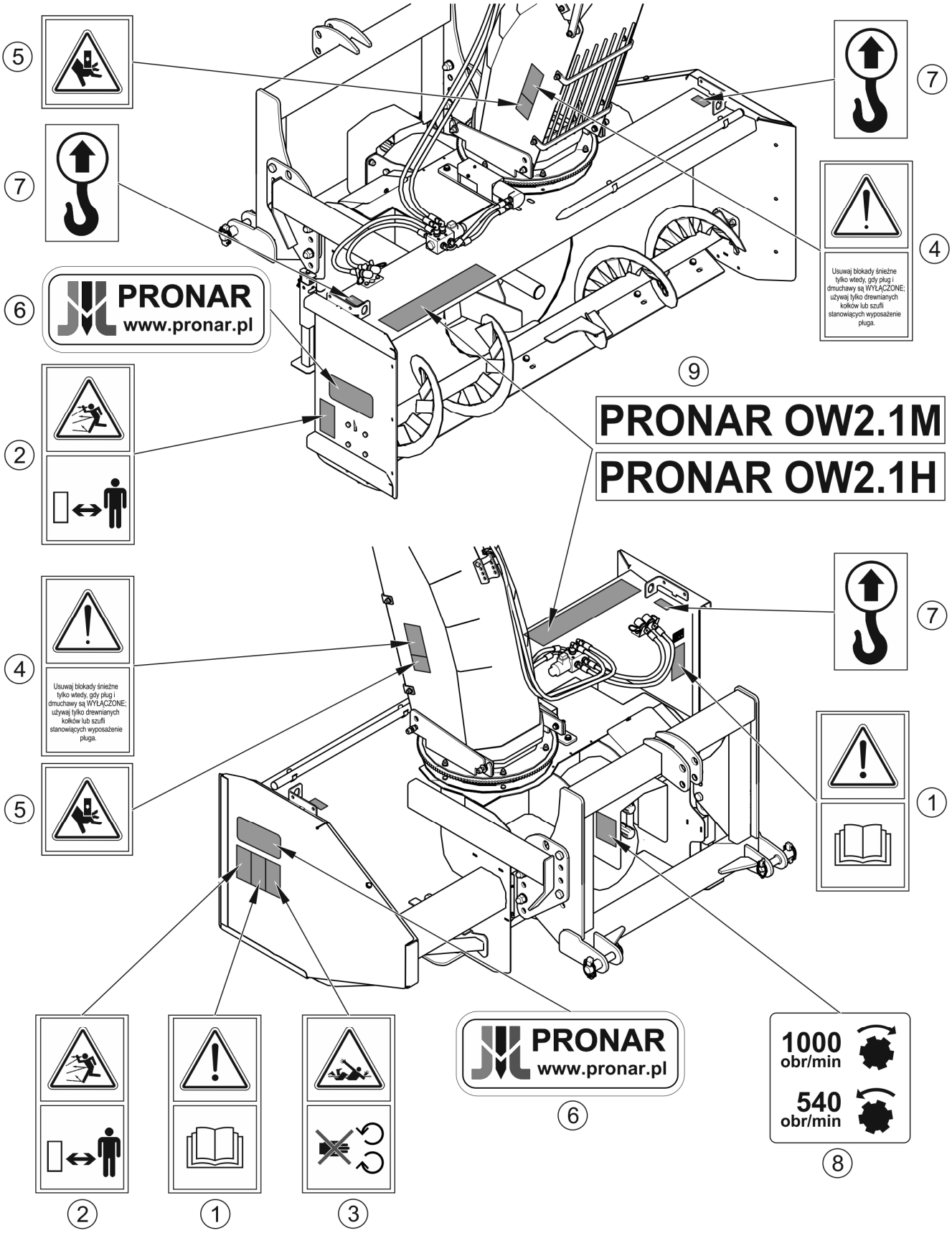


FIG. 2.1 Locations of information and warning decals.

Meaning of symbols used in the Figure is given in TAB. 2.1

SECTION

3

DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 BASIC SPECIFICATIONS OF ROTARY SNOW BLOWER

	Unit		
Model	-	PRONAR OW2.1M	PRONAR OW2.1H
Mounting method	-	Front or rear three-point linkage Cat I and II according to ISO 730-1	
Working width	mm	2,100	
Working height	mm	780	
Discharge distance	m	5 – 30	
Productivity	m^3/min	10 – 12	8 – 12
Auger diameter	mm	340	
Rotor diameter	mm	680	
Power transmission	-	power take-off shaft	hydraulic system
Weight	kg	650*	737*
External dimensions: - length - height - width	 mm mm mm	 1,500** 2,100** 2,140	
Acoustic power level L_{WA}	dB(A)	90,7	
Acoustic pressure level at working position L_{pA}	dB(A)	89,6	
Other information	-	Single person operation	

** – weight given for a machine without the linkage system and PTO shaft;*

*** – weight given for a machine with three-point linkage of category II and III and discharge chute set to the minimum height;*

3.2 GENERAL DESIGN

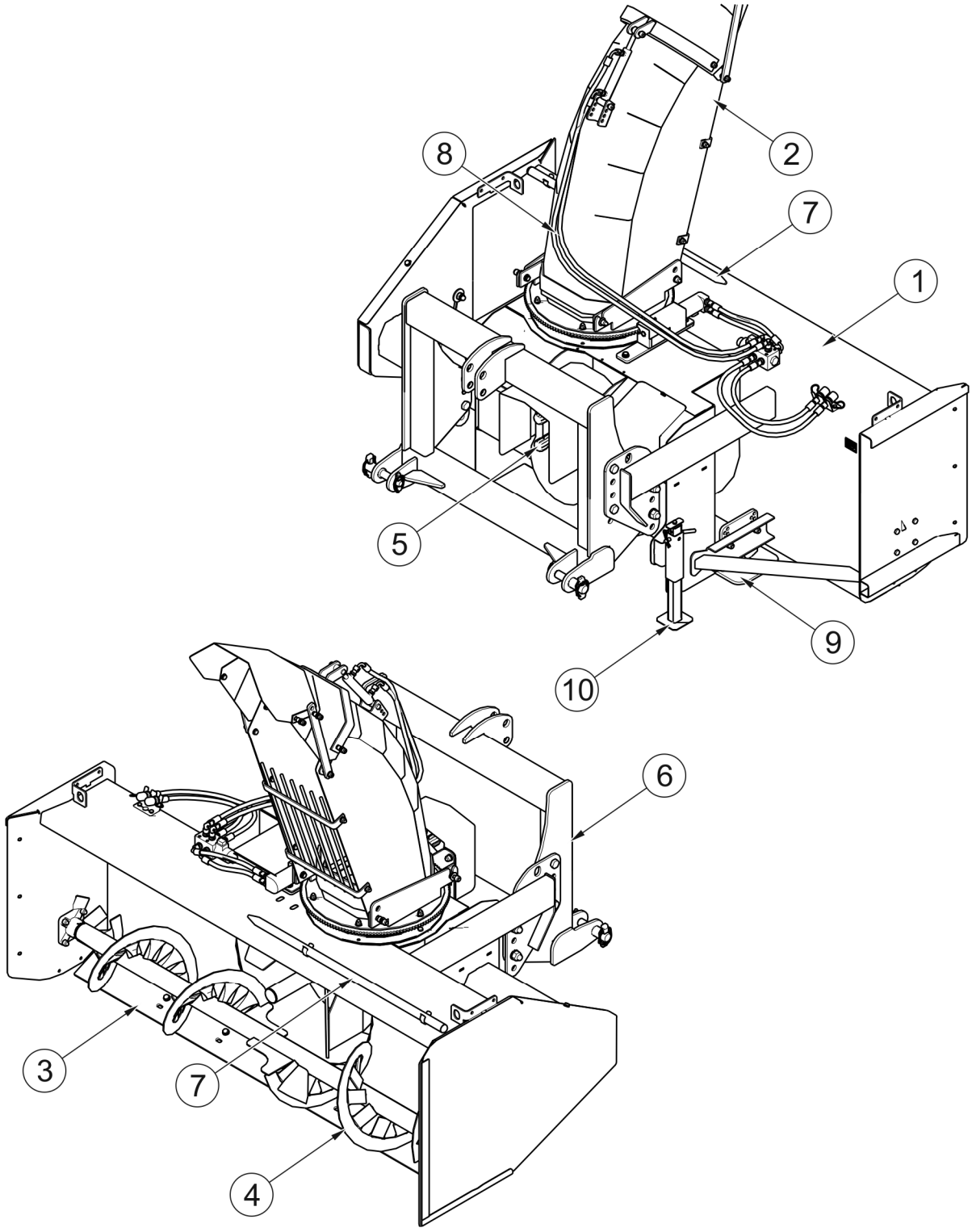


FIG. 3.1 General design

(1) - frame; (2) - discharge chute; (3) - collecting blade; (4) - auger; (5) - drive transmission; (6) - linkage; (7) - wooden dowel; (8) - discharge chute control hydraulic system; (9) - skids; (10) - parking stand

Rotary snow blower consists of rigid and lightweight frame (1) in which operating elements are embedded: blade (3) separating the layer of snow (ice) from the ground, auger (4), which cuts and transports snow inside the machine and rotor ejection the snow through discharge chute (2). Augers and rotor are driven by the tractor PTO shaft through the drive transmission system (5) (OW2.1M snow blower) or by hydraulic system (OW2.1H snow blower). Discharge chute (2) is controlled from the operator's cab using hydraulic system (8) connected to tractor's external hydraulic system. Using suitable linkage (6), the snow blower is connected to tractor or carrying vehicle. During operation, the machine moves on the ground on two adjustable skids (9). Parked machine is additionally supported on an adjustable parking stand (10).

3.3 DRIVE TRANSMISSION

In case of OW2.1M snow blower (A, FIG. 3.2), the drive is transmitted from the carrying vehicle's PTO shaft through PTO drive shaft (1) to main transmission (2). In case of OW2.1H snow blower (B, FIG. 3.2), main transmission (2) is driven by hydraulic motor (3) and reducer (4) supplied from the carrying vehicle's hydraulic system. Rotor is driven directly by transmission (2), whereas the augers are driven by PTO drive shaft and chain transmission consisting of a driving sprocket (6), chain (7), two driven sprockets (8) and tensioner (9).

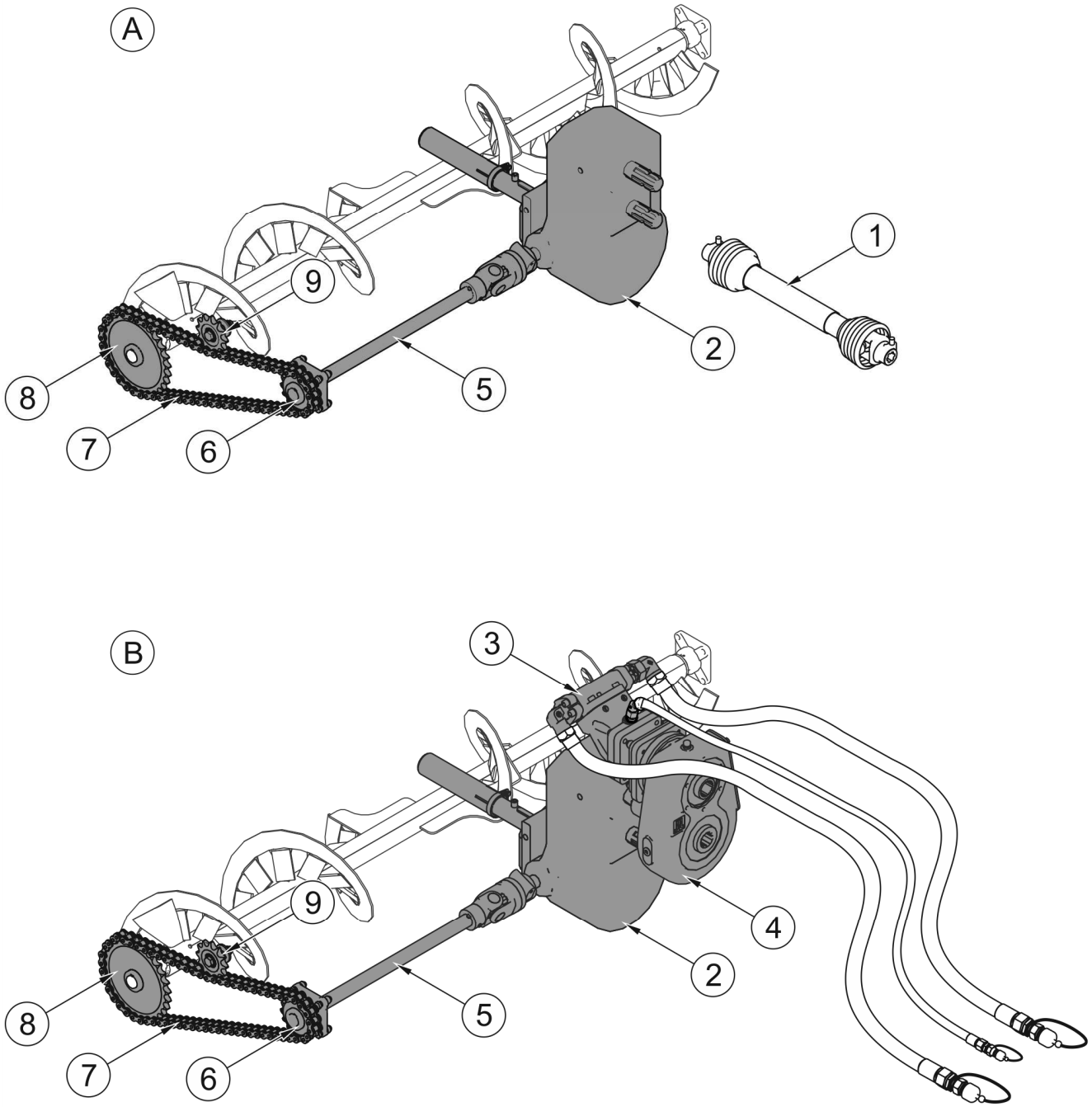


FIG. 3.2 Design of drive transmission system

(A) - OW2.1M snow blower; (B) - OW2.1H snow blower; (1) - PTO drive shaft (optional equipment); (2) - transmission; (3) - hydraulic motor (only OW2.1H); (4) - reducer (only OW2.1H); (5) - PTO drive shaft; (6) - driving sprocket; (7) - chain; (8) - driven sprocket; (9) - chain tensioner

3.4 DISCHARGE CHUTE CONTROL HYDRAULIC SYSTEM

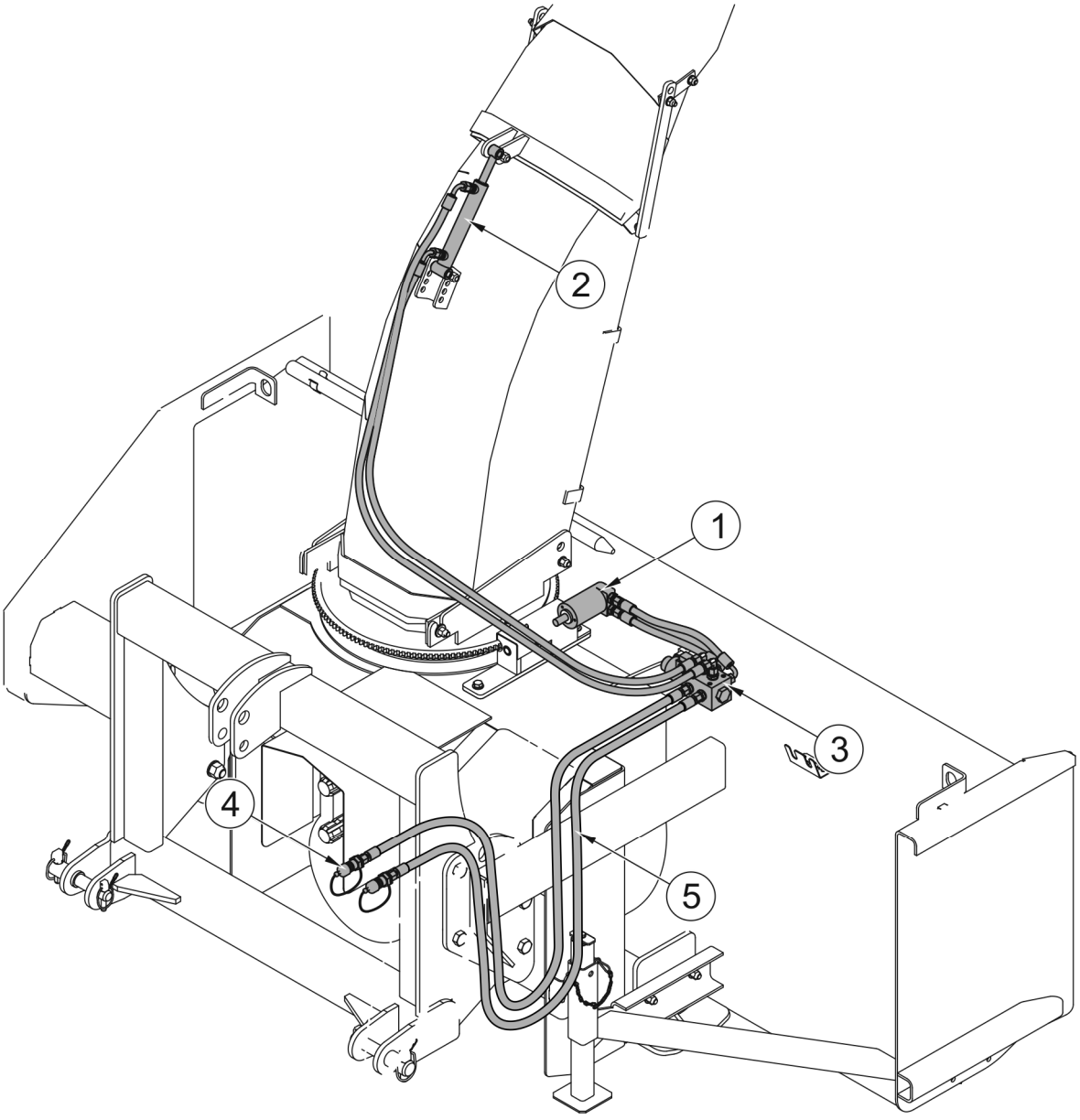


FIG. 3.3 Design of discharge chute control hydraulic system

(1) - hydraulic motor for discharge chute rotation; (2) - hydraulic cylinder; (3) - hydraulic solenoid valve; (4) - quick couplers; (5) - hydraulic lines

Discharge chute control hydraulic system is used for rotating the discharge chute and setting snow discharge range. Hydraulic motor (1) and hydraulic cylinder (2) are connected with hydraulic solenoid valve (3), which is connected to the tractor's external hydraulic system by means of hydraulic lines (5) terminated with quick couplers (4). Through solenoid valve (3), hydraulic system can alternately control hydraulic motor (1) or hydraulic cylinder (2).

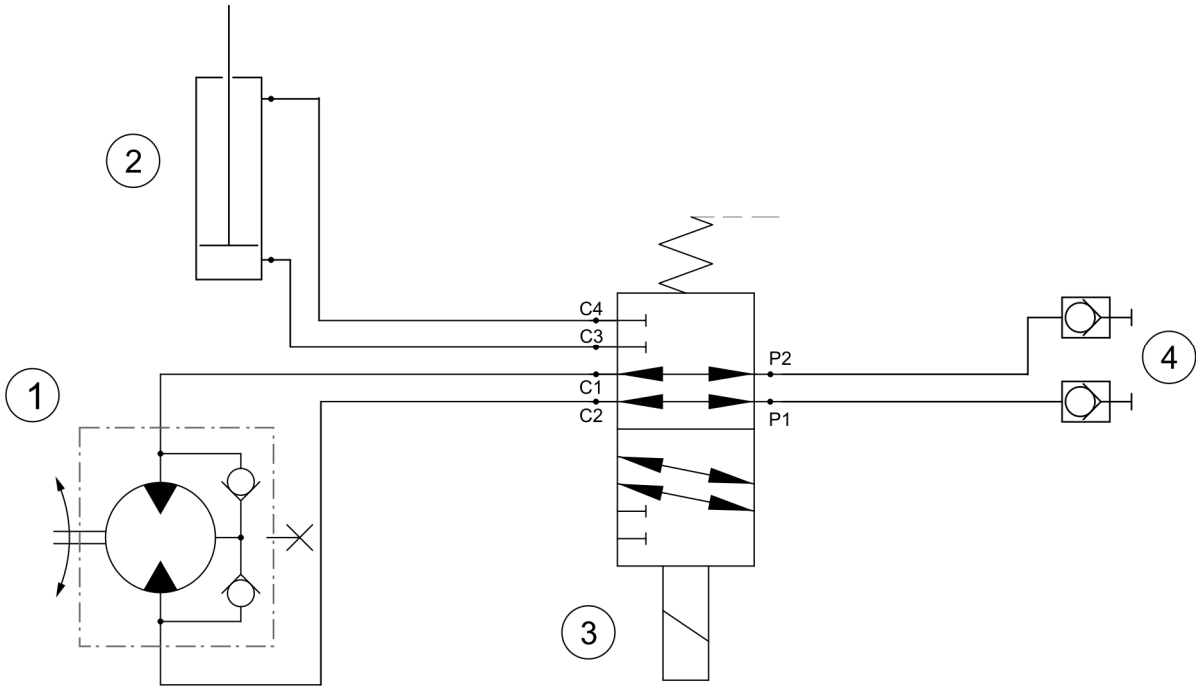


FIG. 3.4 Concept diagram of the discharge chute control hydraulic system

(1) - hydraulic motor for discharge chute rotation; (2) - hydraulic cylinder; (3) - hydraulic solenoid valve; (4) - quick couplers

3.5 ELECTRICAL SYSTEM DESIGN

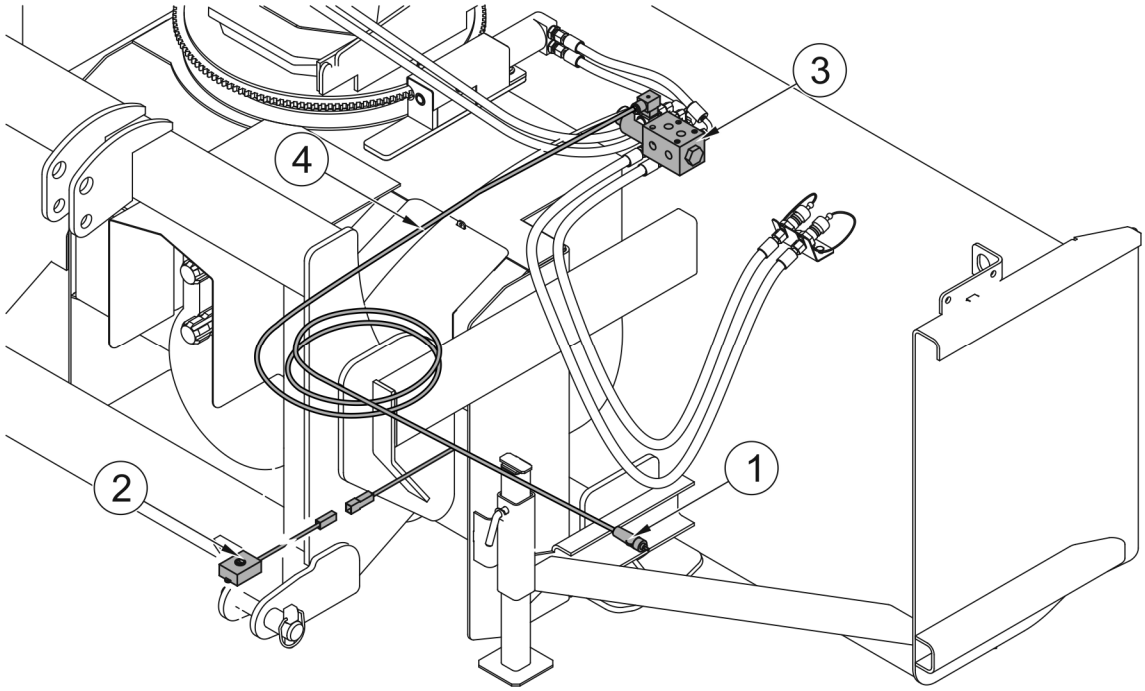


FIG. 3.5 Electrical system design

(1) - lighter socket plug; (2) - switch; (3) - solenoid valve; (4) - wiring harness

Snow blower electrical system (FIG. 3.5) consists of a lead (4) terminated with a plug (1) and a switch (2), which is used for switching on the discharge chute control hydraulic solenoid valve. After connecting plug (1) to cigarette lighter socket, switch (2) enables switching from hydraulic rotation control to raising and lowering of the discharge chute.

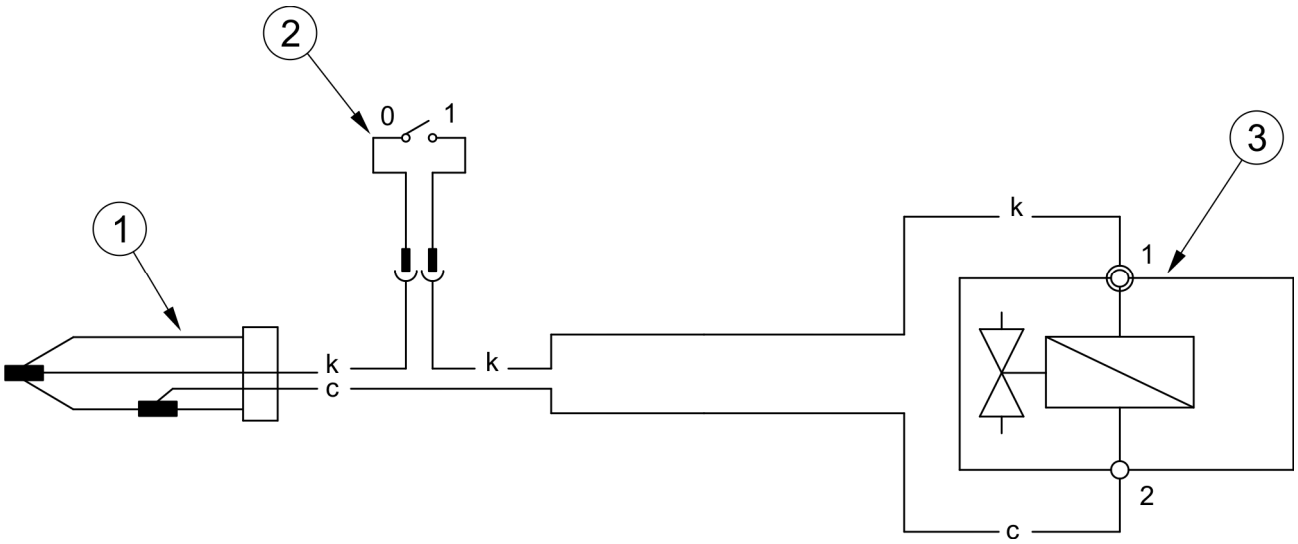


FIG. 3.6 Electrical system diagram

(1) - lighter socket plug; (2) - switch; (3) - solenoid valve;

Colour designations on electrical diagram: **c** - black; **k** – red

SECTION

4

CORRECT USE

4.1 PREPARING FOR WORK

DANGER

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

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

The machine must never be used by persons who are not authorised to drive carrying vehicle, 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, make sure that there are no bystanders in the danger zone.

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. Prior to connecting to the tractor, machine operator must verify the machine's technical condition. In order to do this:

- the user must carefully read this Operator's Manual and observe all recommendations, understand the design and the principle of machine operation
- check the condition of protective paint coat,
- Inspect machine's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components),
- check all the lubrication points, lubricate the machine as needed according to recommendations provided in section 5,
- check the compatibility of the snow blower's linkage with the carrying vehicle's linkage,
- check compliance of PTO shaft parameters, e.g. type of PTO shaft end, PTO shaft speed, rotation direction,
- check compatibility of the hydraulic system sockets and electrical system sockets,
- check technical condition of augers and rotor,
- check technical condition of protective guards and check if they are correctly installed,

- check technical condition of drive transmission and reducer (OW2.1H) and PTO drive shaft (optional equipment).

DANGER

Before starting the carrying vehicle with the connected machine make sure the machine drive is not engaged, otherwise it can lead to uncontrolled operation of the machine.

ATTENTION!

Non-adherence to the recommendations stated in the Operator's Manual or improper use may cause damage to the machine.

The technical condition before starting the machine must be no cause for concern.

If all the above checks have been performed and there is no doubt as to the machine's good technical condition, it can be connected to carrying vehicle, started and all its individual systems checked. In order to do this:

- hitch the machine to carrying vehicle (see 4.3 HITCHING TO CARRYING VEHICLE),
- connect hydraulic system and electrical system lines,
- connect PTO drive shaft,
- check operation of drive transmission system and tightness of transmission,
- check operation of discharge chute rotation and raising mechanism,
- check speed and rotation direction (if necessary transfer PTO drive shaft to the other end of transmission).

In the event of a disruption in the operation of the machine immediately discontinue its use, locate and remove the fault. If a fault cannot be rectified or the repair could void the warranty, please contact the Manufacturer for additional clarifications.

ATTENTION!

Before using the machine always check its technical condition.

4.2 CHECKING TECHNICAL CONDITION

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

TAB. 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	SERVICE OPERATION	FREQUENCY
Technical condition of safety guards	Check technical condition of safety guards, if complete and correctly mounted.	Before beginning work
Technical condition of auger, rotor and drive transmission system components	Check technical condition, if complete and correctly mounted.	
Technical condition of hydraulic lines and solenoid valve wiring harness	Visually inspect the technical condition	
Tightening of all main nut and bolt connections	Torque values should be according to table (*5.5*)	Once a week
Oil level in transmission and reducer (OW2.41H)	Check as outlined in chapter *DRIVE TRANSMISSION SYSTEM MAINTENANCE*	Once a year, before commencing the machine use season
Lubrication	Lubricate elements according to table *LUBRICATION*	According to table *5.4*

ATTENTION!

Do NOT use a malfunctioning or incomplete machine.

4.3 HITCHING TO VEHICLE

4.3.1 HITCHING TO FRONT THREE POINT LINKAGE

ATTENTION!

Before hitching the machine to carrying vehicle, read the carrying vehicle operator's manual.

DANGER

Exercise caution when hitching the machine to carrying vehicle.

No one is allowed between the carrying vehicle and the machine during hitching.

Snow blower can be hitched to a carrying vehicle that meets the requirements contained in Table 1.1 CARRYING VEHICLE REQUIREMENTS. Before mounting the machine on the carrying vehicle, check the linkage compatibility.

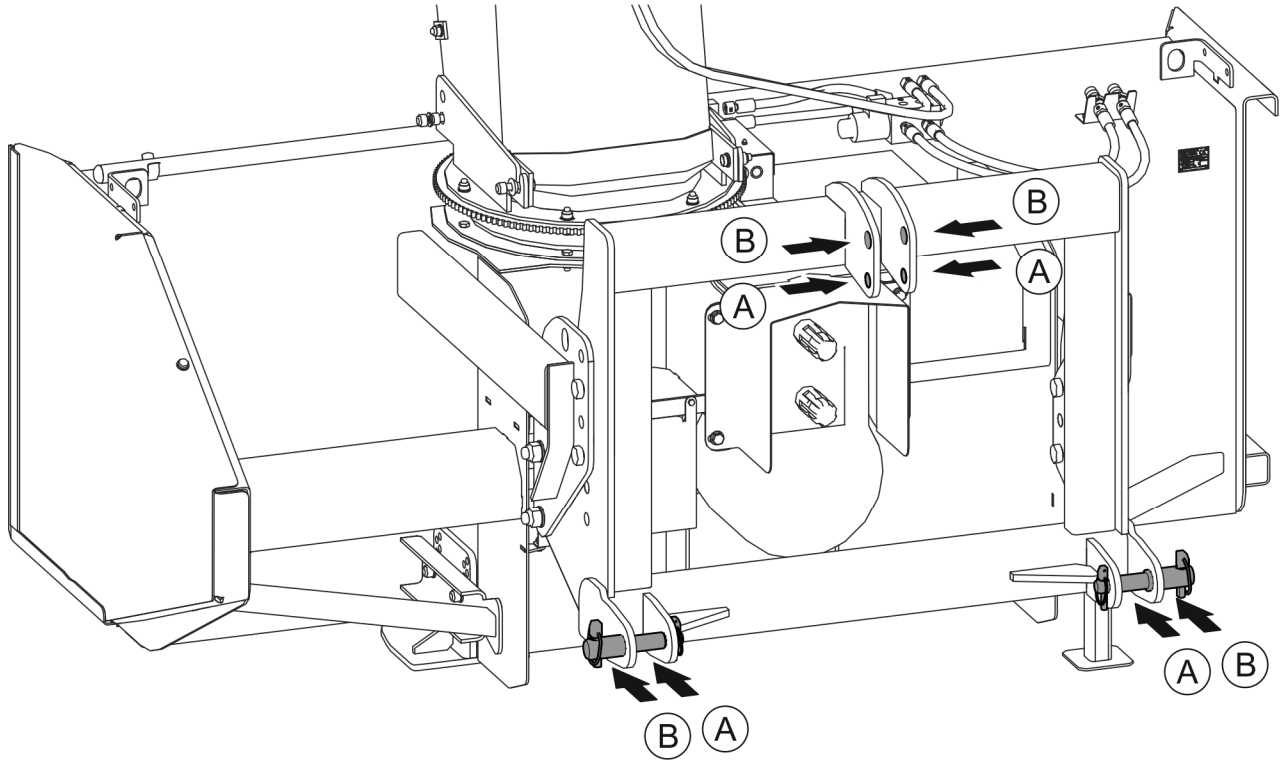


FIG. 4.1 Attachment points of three-point linkage cat II and III according to ISO

(A) - category II attachment points (B) - category III attachment points

Snow blower can be mounted on the carrying vehicle's front or rear three-point linkage.

To connect the snow blower to the carrying vehicle's three-point linkage:

- move the lower rods of tractor's (carrying vehicle's) three-point linkage to the lower linking points of the snow blower; set lower rods at an appropriate height,
- switch off vehicle's engine and prevent it from moving,
- connect the lower pins of the machine linkage with tractor's three-point linkage and secure with cotter pins,
- in the case of the linkage hook, place balls on machine linkage pins, secure with cotter pins and lift the pin until balls lock in hooks,
- connect upper link (central connector) to the upper attachment point of the snow blower's linkage using a pin and secure with a cotter pin,
- eliminate lateral movements of machine by appropriate adjustment of the lower arm stabilisers; both lower links of the three-point linkage are recommended to be set at the same height,
- lift machine using carrying vehicle's three point linkage.

DANGER

To mount machine on carrying vehicle use only genuine pins and safeguard cotter pins.

If three-point linkage frame height has to be changed in relation to the machine frame, the position of the three-point linkage frame in relation to the machine frame can be changed. In order to do this, change position of bolts in fixing holes (FIG. 4.2).

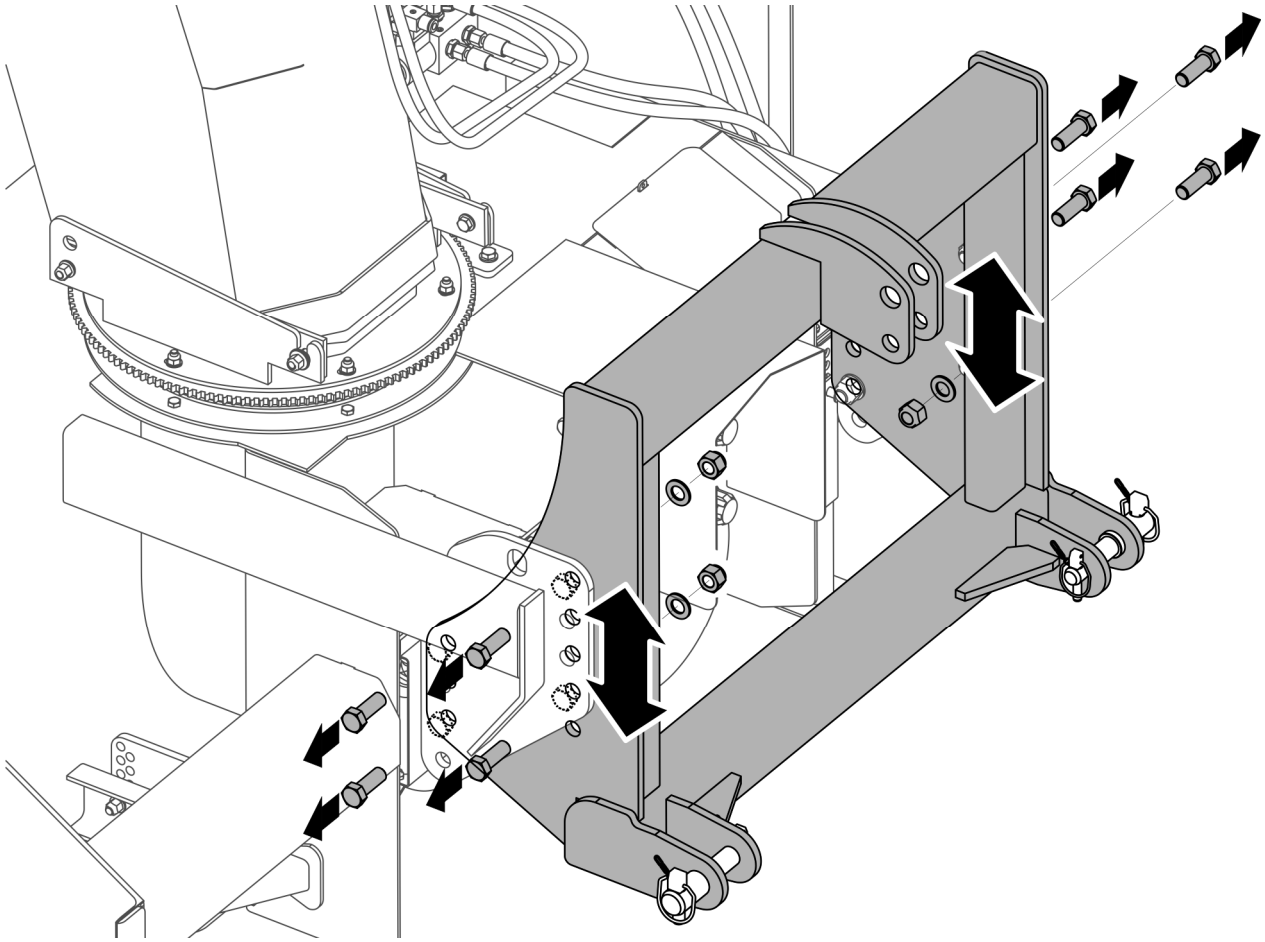


FIG. 4.2 Adjusting three-point linkage height

4.3.2 CONNECTING PTO SHAFT

(refers only to snow blower with mechanical drive)

DANGER

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

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

Before connecting the PTO shaft it is absolutely necessary to carefully read the Operator's Manual attached by the Manufacturer of the shaft and observe the instructions contained in it. Before connecting to the carrying vehicle, check technical condition of shaft guards, completeness and condition of protecting chains and general technical condition of the shaft. To connect the drive transmission of the machine to carrying vehicle PTO shaft, use a PTO shaft recommended by the Manufacturer.

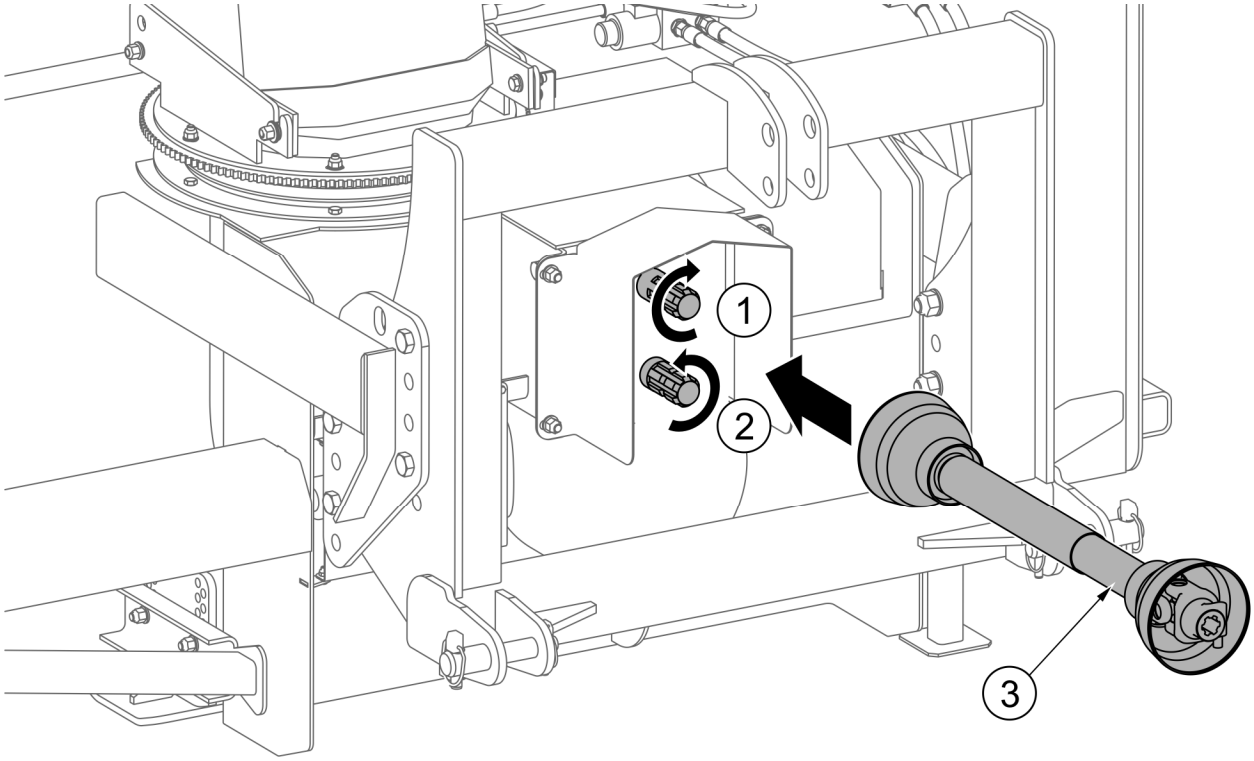


FIG. 4.3 Connecting PTO drive shaft

(1) - 1 000 rpm PTO shaft, rotation to the right; (2) - 540 rpm PTO shaft, rotation to the left; (3) - PTO drive shaft (optional equipment)

Depending on rotation direction and rotation speed of PTO□shaft and the method of connecting to the carrying vehicle, PTO drive shaft (3) should be connected to the appropriate PTO shaft (1) or (2) of the transmission (FIG. 4.3). PTO shaft (1) rotates to the right at the rotation speed of 1 000 rpm, whereas PTO shaft (2) rotates to the left at the rotation speed of 540 rpm (*looking at the shaft front*).

Shaft end terminated with a protective element (e.g. a clutch) should be connected to the machine.

Value of transmitted torque for PTO drive shaft is set in the factory by the PTO drive shaft Manufacturer and may not be changed by the user. Change of overload protection clutch setting may cause damage to the machine or carrying vehicle.

ATTENTION!

PTO drive shaft end terminated with a clutch should be connected to the machine' shaft.

4.3.3 CONNECTING HYDRAULIC DRIVE SUPPLY

(refers only to snow blower with hydraulic drive)

DANGER

Before connecting the hydraulic lines carefully read the tractor operator's manual and follow the manufacturer's recommendations.

DANGER

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

In the snow blower with hydraulic drive (PRONAR OW2.1H), it may be necessary to connect hydraulic lines to hydraulic motor (if they are not factory connected). The hydraulic motor is supplied through a set of hydraulic lines marked with catalogue number 275N-99000000 (FIG. 4.4). The list of elements included in the set of hydraulic supply lines and their catalogue numbers are shown in TAB. 4.2.

TAB. 4.2 ELEMENTS INCLUDED IN THE SET OF HYDRAULIC SUPPLY LINES (OW2.1H)

Marking FIG. 4.4	**Name / Catalogue No.**	**Number** of items
1	Hydraulic line / 275N-10010000	1
2	Hydraulic line / 275N-10020000	1
3	Hydraulic line / 275N-10030000	1
4	Connector body / GE35LR1EDOMDCF	1
5	Connector body / GE25SR3/4EDOMDCF	1
6	Quick coupler plug / T7520	1
7	Quick coupler plug / T10020	1
8	Quick coupler plug / CNV 08 2/2215 M	1
9	Plug stopper / T10026	1
10	Plug stopper / T7526	1
11	Plug stopper / TF12	1

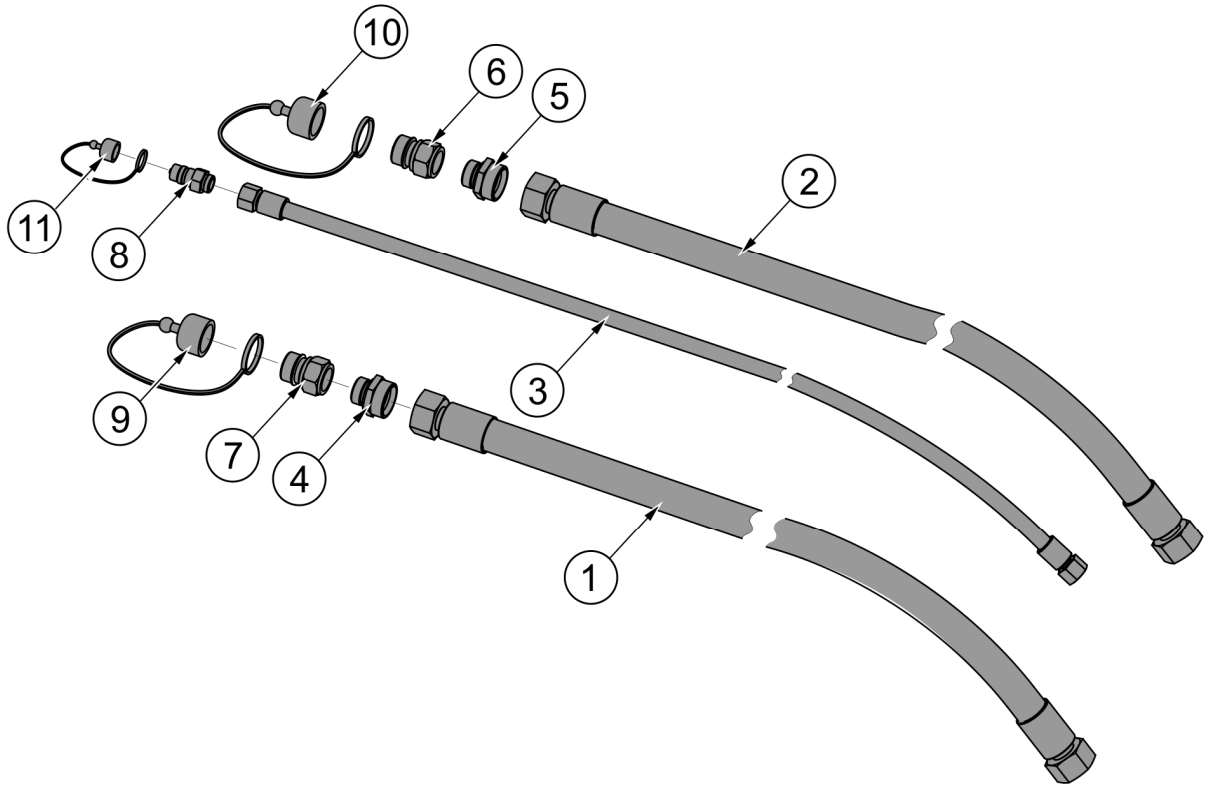


FIG. 4.4 Hydraulic motor supply lines

(1) - hydraulic line; (2) - hydraulic line (3) - hydraulic line; (4) - connector body; (5) - connector body;

(6) - quick coupler plug; (7) - quick coupler plug; (8) - quick coupler plug; (9) - plug stopper; (10) - plug stopper; (11) - plug stopper

Snow blower with hydraulic drive (OW2.1H) is connected to suitable external hydraulic system of the carrying vehicle by means of hydraulic lines (FIG. 4.5) (3), (2) and (3) terminated with quick couplers. Before installing hydraulic lines, remove securing plugs from hydraulic motor. Requirements for carrying vehicle cooperating with snow blower with hydraulic drive are presented in TABLE 1.1 in section 1.2 PROPER USE.

Check required lengths of hydraulic lines. If necessary, order hydraulic lines of a different length and with other ends suitable for carrying vehicle.

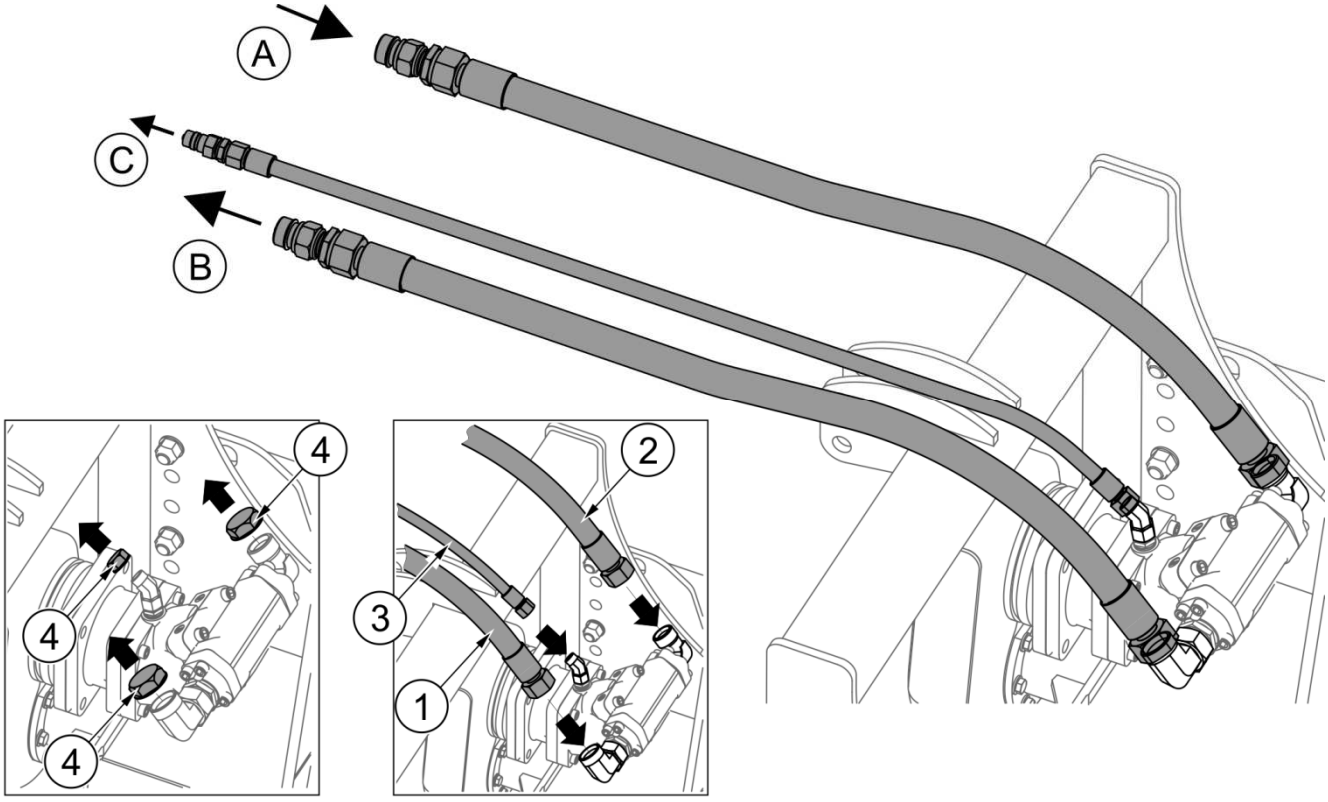


FIG. 4.5 Connecting supply to carrying vehicle's hydraulic system

(A) - hydraulic motor supply; (B) - oil return from hydraulic motor; (C) - oil return (so-called "free drain"; (1) (2) (3) - lines; (4) - plug

4.3.4 CONNECTING DISCHARGE CHUTE CONTROL SYSTEM

DANGER

Before connecting hydraulic and electrical lines, carefully read the carrying vehicle operator's manual and follow the manufacturer's recommendations.

DANGER

When connecting hydraulic system lines, make sure that the hydraulic system of the carrying vehicle is not under pressure.

The snow blower discharge chute enables adjustment of the range and direction of snow discharge. Hydraulic lines terminated with quick couplers (1) should be connected to one section of the carrying vehicle's hydraulic system which allows changing the hydraulic oil flow direction.

Connect power cable (2) of hydraulic solenoid valve (3) to 12V cigarette lighter socket of the carrying vehicle. Connect switch (5) to power cable (2) and place it in the operator cab in an easily accessible place.

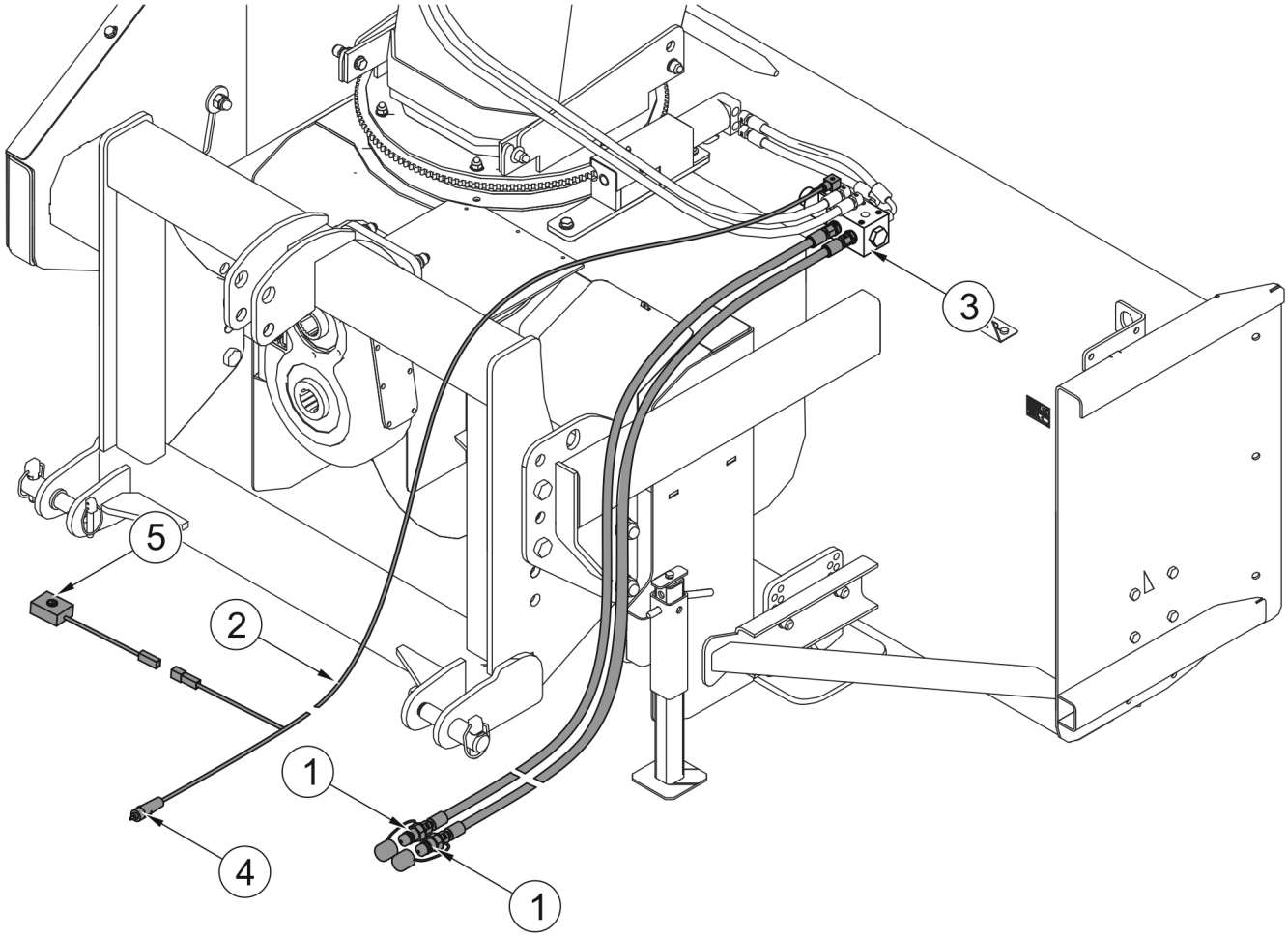


FIG. 4.6 Connecting discharge chute control system

(1) - hydraulic line connectors; (2) - power cable of hydraulic solenoid valve; (3) - hydraulic solenoid valve;(4) - cigarette lighter plug; (5) - switch

ATTENTION!

The hydraulic lines and power cable should be so arranged as to prevent their damage during operation.

4.3.5 RAISING PARKING STAND

After mounting the snow blower on the carrying vehicle, raise parking stand. In order to do this (FIG. 4.7):

- lift the machine using carrying vehicle's three point linkage so as to relieve the parking stand,
- remove cotter pin (3) and pin (2),
- slide parking stand (1) into the guide and lock it with pin (2) in upper position,
- secure pin (2) with cotter pin (3).

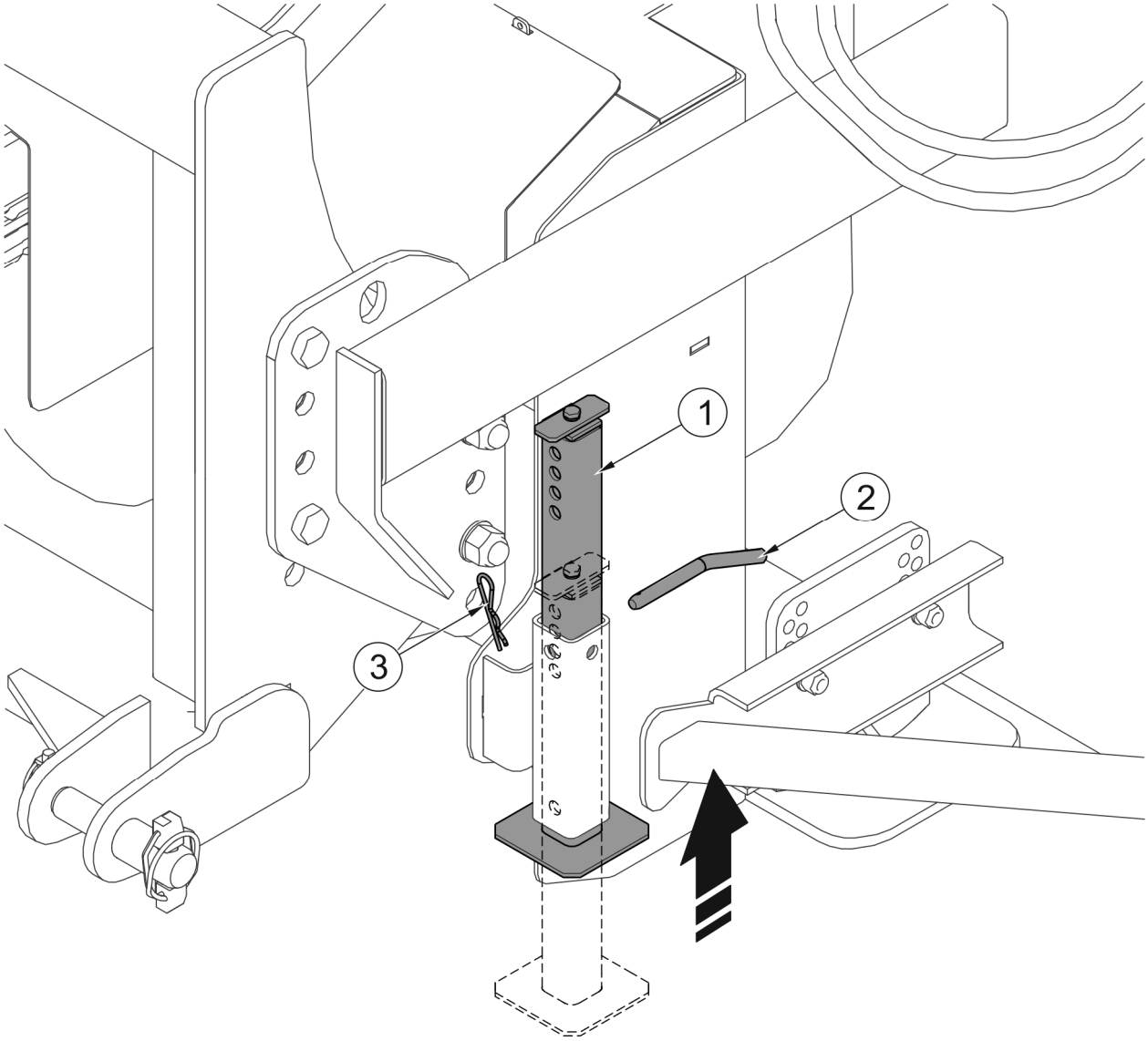


FIG. 4.7 Parking stand

(1) - parking stand; (2) - pin; (3) - securing cotter pin

4.4 OPERATING SNOWBLOWER

4.4.1 SETTING WORKING HEIGHT

The working height is adjusted within a certain range by the length of the central link (FIG. 4.8). By reducing the length of the central link, the snow blower is tilted in the direction of the tractor, blade rises and increases the working height. It is recommended to operate the snow blower horizontally. Tilting the machine too much in the driving direction causes faster blade wear. Working height should be increased when there is a risk of hitting or collecting debris, stones, pieces of wood, etc. Working height can be affected by wear and tear of the blade and skids.

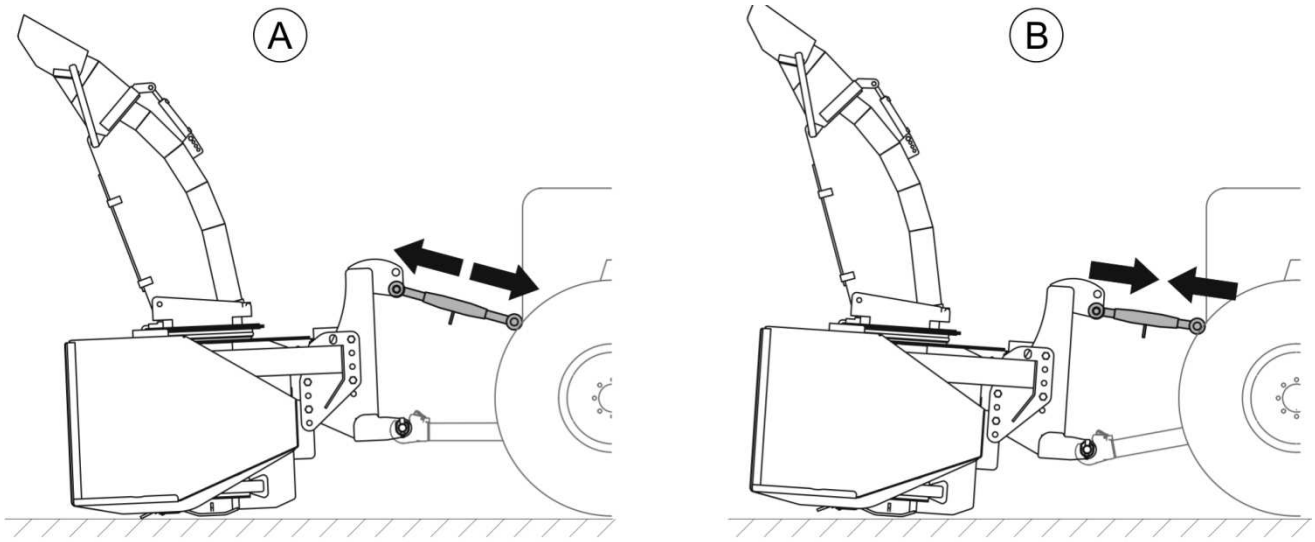


FIG. 4.8 Adjusting the working height by means of the central link

(A) - reducing the working height, (B) - increasing the working height

If adjustment of the working height by means of the central link is insufficient, the skid height adjustment may be carried out (FIG. 4.9). Such adjustment is carried out within the range of 88 mm by changing position of bolts (2) in skid fixing holes arranged every 11 mm (A). In order to do this raise the snowblower and support with sufficiently stable and strong supports. If the machine is hitched and raised on the three-point linkage, protect it additionally against falling and immobilise the carrying vehicle (turn off the engine and engage the parking brake.) Undo nuts (3), take out bolts (1) and insert them again in suitable holes in the skid. Fix both skids at the same height, tighten nuts (3).

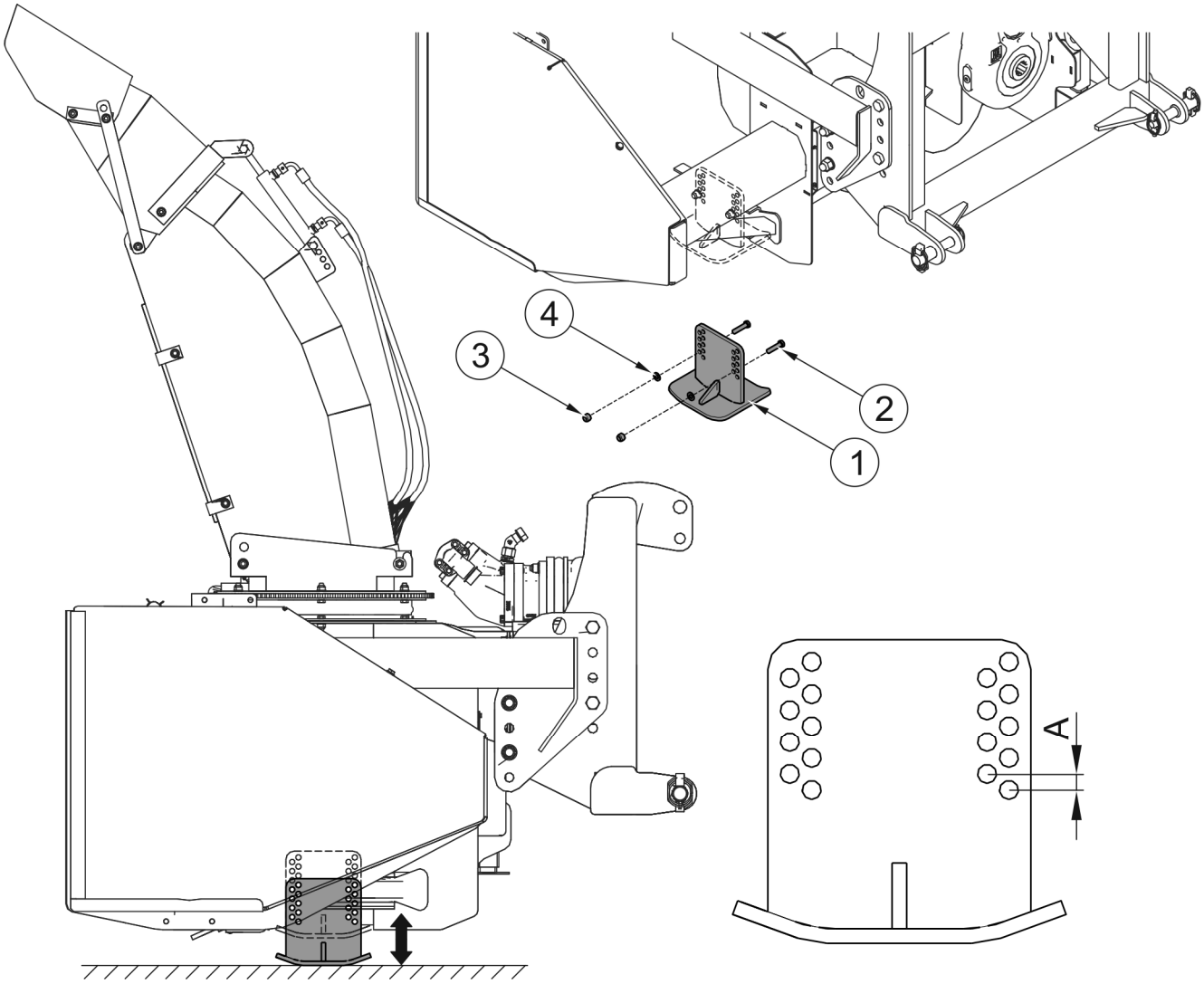


FIG. 4.9 Adjusting the working height by means of skids

(1) - skid; (2) - bolt; (3) - nut; (4) - washer; (A) = 11 mm - distance between fixing holes

4.4.2 ADJUSTING THE RANGE AND DIRECTION OF SNOW DISCHARGE

DANGER

Heavy objects in the snow, i.e. stones, blocks of ice can be thrown out through the discharge chute to a much greater distance than snow.

Snow discharge distance can range from 5 to 30 m, depending on the discharge chute settings, properties of snow and the rotor speed.

The range and direction of snow discharge (FIG. 4.10) are adjusted from operator cab by actuating the appropriate external hydraulic circuit. Thanks to the use of switch-operated hydraulic solenoid valve, one hydraulic section can control hydraulic motor (rotor) for discharge chute rotation or hydraulic cylinder for discharge chute raising.

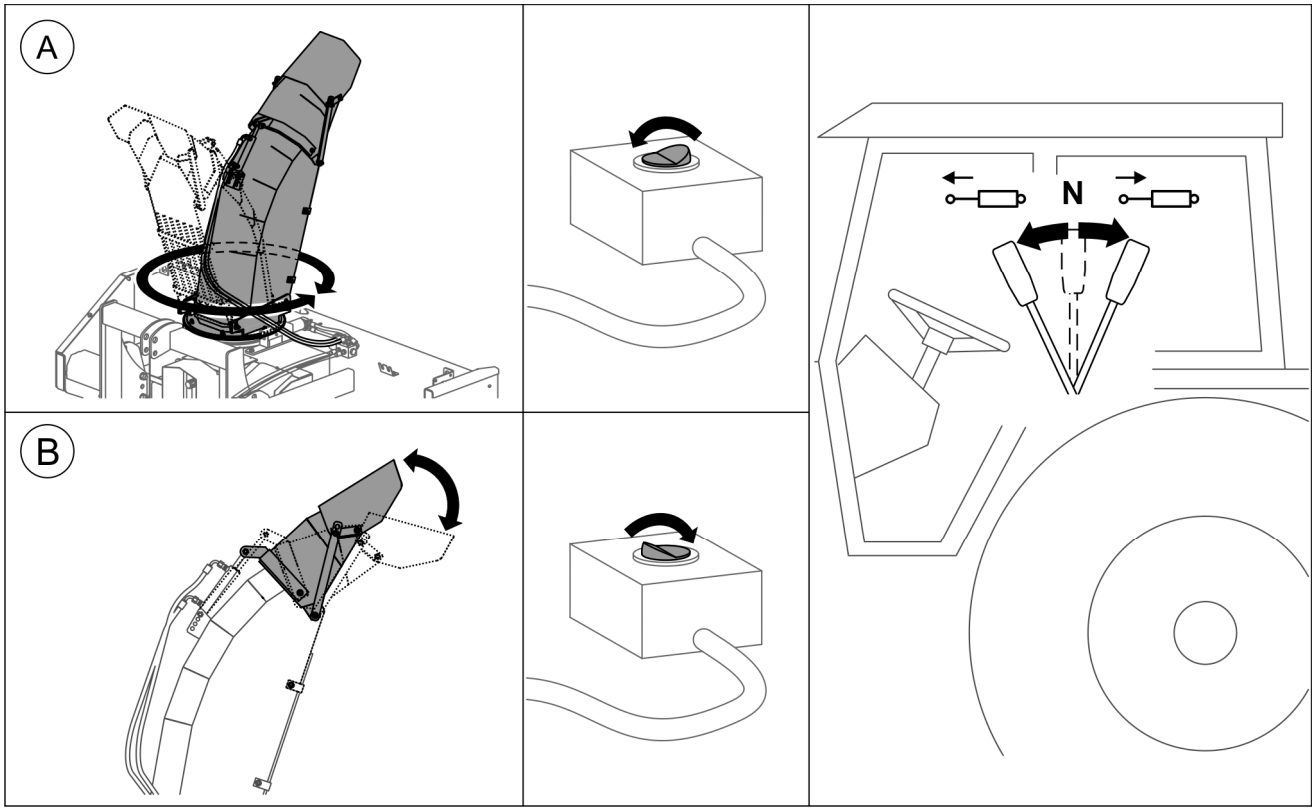


FIG. 4.10 Adjusting the range and direction of snow discharge

(A) - adjusting the direction of snow discharge; (B) - adjusting the range of snow discharge

Rotation of discharge chute is limited by hydraulic lines of hydraulic cylinder for discharge chute raising. The discharge chute rotation direction is changed from the operator's position by changing the hydraulic oil flow direction in hydraulic section of the carrying vehicle's external hydraulics selective control valve.

IMPORTANT!

When rotating the discharge chute, pay attention to position of hydraulic lines of the hydraulic cylinder for discharge chute raising.

4.4.3 CLEARING SNOW

DANGER

Before you start clearing snow, check the work area and, if possible, remove any objects which might get into the machine and any obstacles the snow blower might strike. They can cause an accident or damage the machine.

DANGER

During work, pay attention to persons, vehicles and buildings that may be within the snow discharge range. Appropriately set the range and direction of snow discharge.

Having made sure that all the protective elements and all the connections are properly installed, one may commence working with the machine. Drive to the place of work, lower the machine until it fully rests on the ground. Set carrying vehicle's linkage to "floating position" to allow ground surface tracking when clearing the snow. Initially set the discharge range and direction. Engage the machine drive at an appropriately low engine speed and gradually increase the speed and then start driving. Driving speed should be adjusted to the amount and properties of snow. Maintain constant speed of the machine drive when clearing snow.

If there is a risk that snow contains stones, gravel, rubble or other items and they could be collected by the machine blade, increase working height (see 4.4.1 SETTING WORKING HEIGHT)

HIGH NOISE LEVEL WARNING

During machine operation, the driver should use personal protective equipment (protective ear guards).

In order to reduce the level of noise during work the tractor cab window and door should be closed.

ATTENTION!

During work, set the carrying vehicle's linkage to floating position to allow ground surface tracking. Tractor (carrying vehicle) weight must not be transferred to the machine, as it could result in damaging it.

IMPORTANT!

Do not start clearing the snow until the machine drive reaches the appropriate speed.

4.4.4 REMOVING BLOCKAGES

DANGER

If the machine drive transmission or discharge chute is jammed disengage the PTO shaft before leaving the cab, stop the tractor prevent unauthorised access to tractor cab.

If the blockage is caused by the accumulation of snow, use wood pin (1) the supplied with the machine (FIG. 4.11). Pin (1) is mounted in brackets (2) on the machine casing.

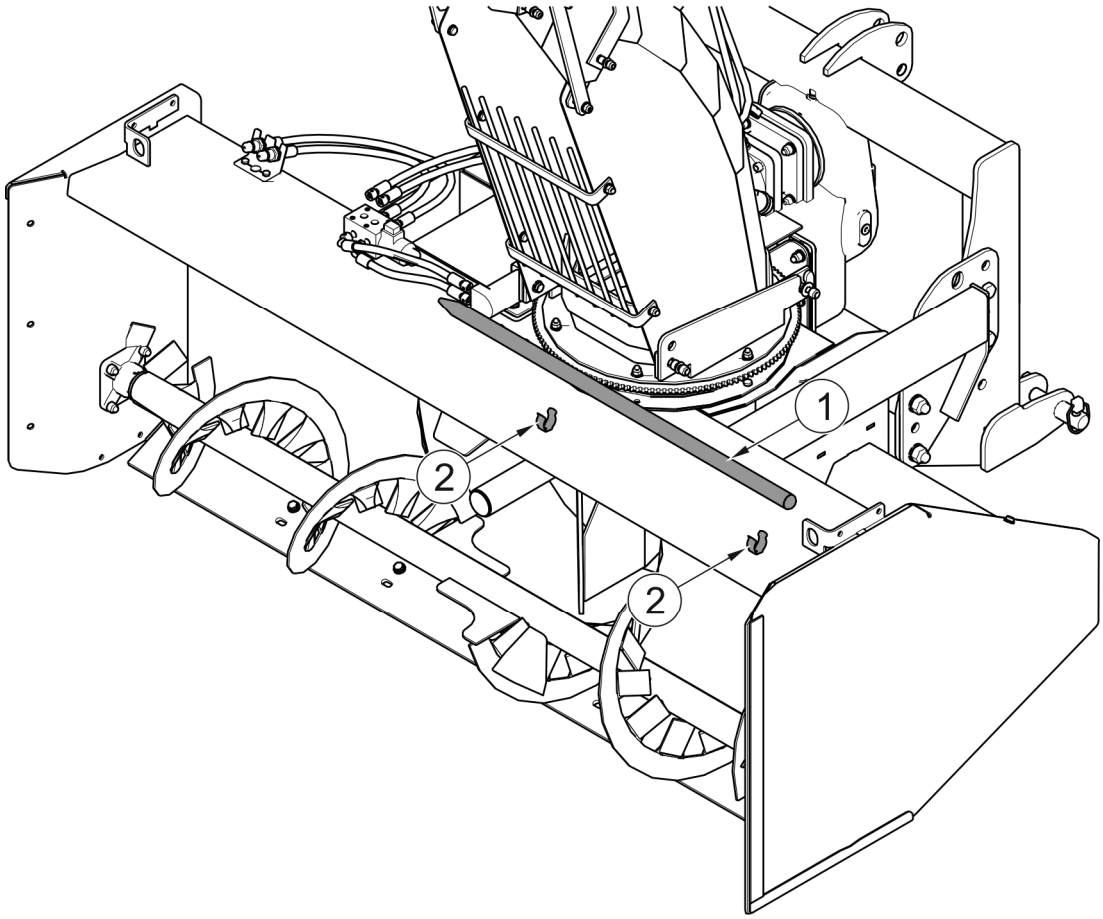


FIG. 4.11 Removing blockages

(1) - a wood pin, (2) - brackets

If the machine drive was disconnected due to slipping of the overload release clutch on the machine PTO shaft or PTO drive shaft, check and remove the cause of machine blockage and replace the safety bolt (see 5.2.4 REPLACING THE SAFETY BOLT).

4.5 TRANSPORTING THE MACHINE

When driving on public or private roads, respect the road traffic regulations, exercise caution and prudence. Listed below are the key guidelines.

- Make sure that the machine is correctly attached to the carrying vehicle, and linkage is properly secured.
- When driving with the raised snow blower, disengage the drive.
- Do not exceed maximum speed allowed by road traffic law. Speed of travel should be adjusted to prevailing road conditions, pavement condition and other conditions.
- When driving with raised snow blower set it so as not to obscure the lights or restrict the visibility of the operator.
- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the machine or the tractor to suddenly tilt. Driving near ditches or canals is dangerous as there is a risk of the slope collapsing.
- Speed must be sufficiently reduced before making a turn or driving on an uneven road or a slope.
- When driving on uneven terrain with the machine raised reduce speed due to dynamic loads and the risk of damaging the machine or carrying vehicle.
- When driving with raised machine, secure the carrying vehicle's linkage against falling or accidental lowering.

4.6 DISCONNECTING THE MACHINE FROM THE CARRYING VEHICLE

DANGER

Before unhitching the machine from the carrying vehicle, turn off the carrying vehicle's engine, engage parking brake and secure cab against access of third persons.

Be especially careful when disconnecting machine.

In order to disconnect the snow blower from the carrying vehicle, proceed as follows:

- Lower the parking stand and lock it in the appropriate position.
- Lower the machine until it fully rests on the ground.
- Switch off engine, remove key from ignition and engage parking brake.
- Reduce residual pressure in the hydraulic system by moving appropriate lever controlling the carrying vehicle's hydraulic circuit.
- Disconnect discharge chute control hydraulic connectors, secure them with caps and put in special bracket on the snow blower chassis (FIG. 4.13)
- Disconnect hydraulic motor supply connectors and secure them with caps (refers to OW2.1H)
- Disconnect power cable of solenoid valve.
- Disconnect PTO drive shaft (refers to OW2.1M).
- Disconnect top link (so-called central connector), dismount lower arms from pins (refers to the three-point linkage) and drive carrying vehicle away from the machine.

ATTENTION!

Do NOT use the securing chains to support the shaft while machine is parked or when transporting the machine.

Machine unhitched from the carrying vehicle must be placed on level, sufficiently hard surface in such a manner as to ensure that it is possible to connect it again.

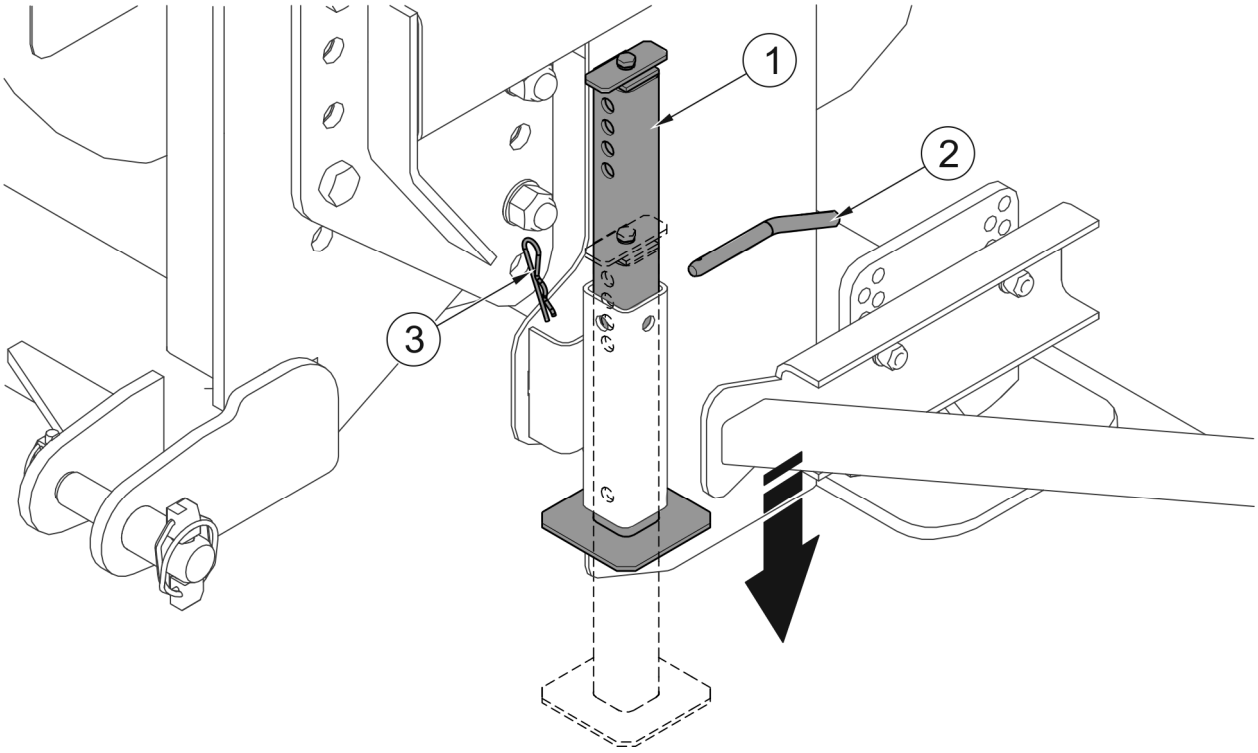


FIG. 4.12 Parking stand

(1) - parking stand; (2) - pin; (3) - securing cotter pin

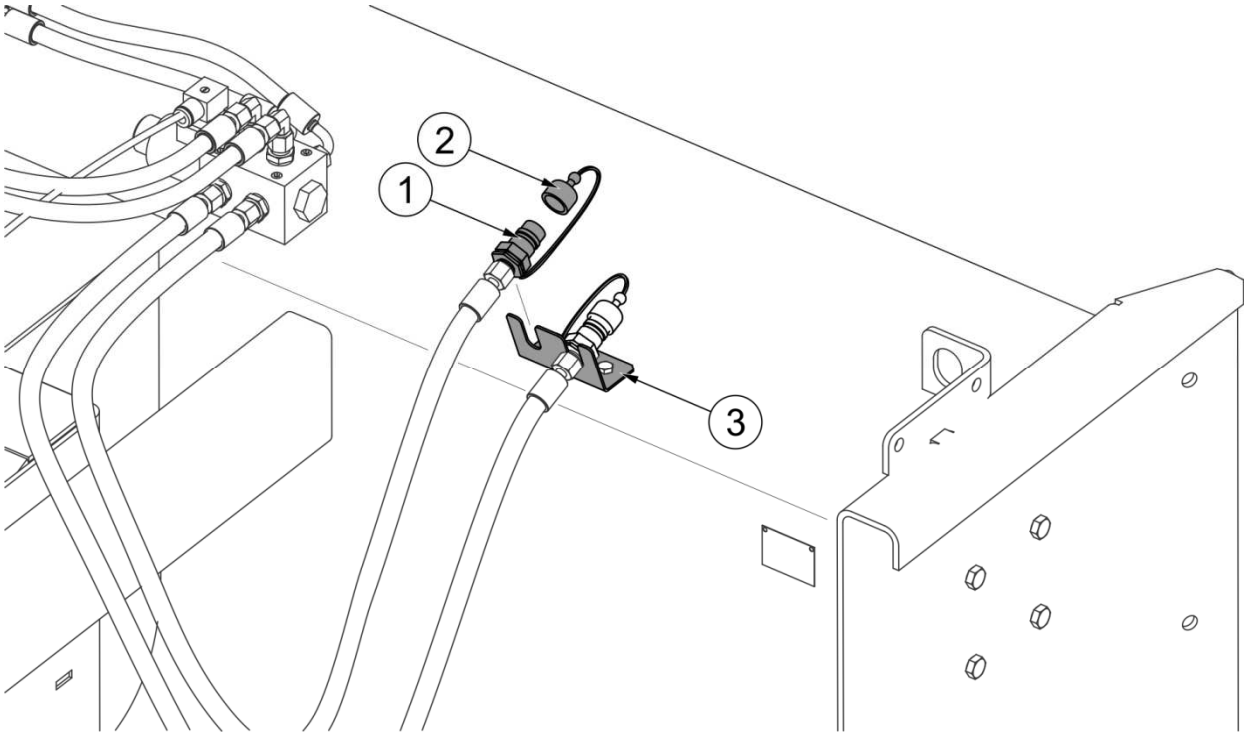


FIG. 4.13 Protection of hydraulic quick coupling plugs

(1) - hydraulic quick-couplers, (2) - protective caps; (3) - line bracket

SECTION

5

MAINTENANCE

5.1 HYDRAULIC SYSTEM OPERATION

The duties of the operator connected with the hydraulic system include:

- checking tightness of hydraulic connections,
- checking technical condition of hydraulic lines, quick couplers and hydraulic cylinder,
- checking leaktightness of hydraulic motor (refers only to OW2.1H).

DANGER

Do not repair hydraulic system on your own. All hydraulic system repairs must be performed only by suitably qualified personnel.

ATTENTION!

Before you begin, visually inspect the hydraulic system components.

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

The hydraulic system of new machine is factory filled with HL32 hydraulic oil. Because of its composition the oil applied is not classified as a dangerous substance, however long-term action on the skin or eyes may cause irritation. In the event of contact of oil with skin wash the place of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene). Contaminated clothing should be changed to prevent access of oil to skin. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. Hydraulic oil in normal conditions is not harmful to the respiratory tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released.

DANGER

Oil fires should be quenched with carbon dioxide (CO_2), foam or extinguisher steam. Do NOT use water for fire extinguishing!

TAB. 5.1 HL32 hydraulic oil characteristics

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at 40℃	28.8 – 35.2 mm^2/s
3	ISO 6743/99 quality classification	HL
4	DIN 51502 quality classification	HL
5	Flash point, ^0C	Above 210℃
6	Maximum operating temperature, ^0C	80

Spilt oil should be immediately collected and placed in marked tight container. Used oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

The hydraulic system should be completely tight sealed. 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.

The hydraulic system is vented automatically during machine operation.

DANGER

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

DANGER

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

Hydraulic lines should be replaced after 4 years of machine use.

5.2 DRIVE TRANSMISSION SYSTEM MAINTENANCE

5.2.1 CHECKING AND CHANGE OF OIL IN MAIN TRANSMISSION

In the new machine, main transmission (FIG. 5.1) is pre-filled with gear oil of 80W/90 API GL-4 class. Transmission gear maintenance involves periodical checking of oil level and changing oil. To check the oil level in main transmission:

- set the machine horizontally,
- unscrew inspection plug (1) (FIG. 5.1),
- oil level should reach the lower edge of the plug opening (1),
- if necessary, add oil through the filler plug (2)

It is recommended to check oil level in transmission once a year, before working season (provided that there are no oil leaks).

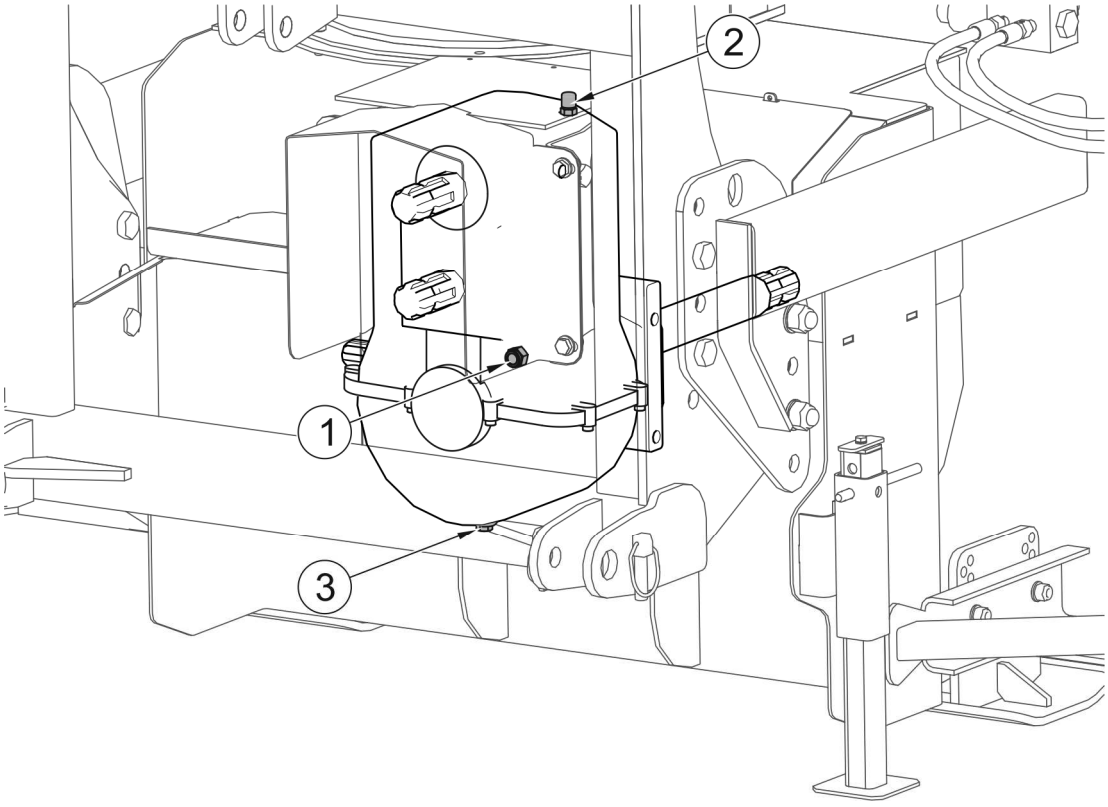


FIG. 5.1 Checking and change of oil in main transmission

(1) - inspection plug (2) - filler plug with air vent, (3) - drain plug

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.

It is best to change oil immediately after completing work when transmission gear is still hot and impurities are suspended in oil. Before changing oil in the intersecting axis gear (FIG. 5.1):

- prepare the vessel for oil, unscrew the inspection plug (1), inlet plus (2) and drain plug (3) at the bottom of the transmission gearbox,
- drain oil into the previously prepared vessel and tighten drain plug (3),
- 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),
- position the machine horizontally and pour the required quantity of oil through the inlet (1),
- tighten inspection plug (1) and filler plug (2).

Oil in the transmission must be replaced every 2000 hours of work.

TIP

To lubricate the transmission, use gear oil of SAE 80W/90 API GL-4 class in quantity of 5,5 [L] litres.

The procedure concerning gear oil is the same as the procedure for hydraulic oil (see 5.1 Hydraulic system operation). Used oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

If a leak is noticed, carefully inspect seals and check oil level. Operating the main transmission and reducer with insufficient amount of oil or without oil may cause permanent damage to these mechanisms.

Repair of transmission and reducer during warranty period may only be performed at authorised mechanical workshops.

5.2.2 CHECKING AND CHANGE OF OIL IN REDUCER

(refers only to snow blower with hydraulic drive)

Snow blower with hydraulic drive (OW2.1H) is also equipped with a reducer (FIG. 5.2), which is pre-filled with oil of 80W/90 API GL-4 class. Reducer maintenance involves periodical checking of oil level and changing oil. To check the oil level in reducer:

- set the machine horizontally,
- unscrew inspection plug (1),
- oil level should reach the lower edge of the plug opening (1),
- if necessary, add oil through the filler plug (2)

It is recommended to check oil level in the reducer once a year, before working season (provided that there are no oil leaks).

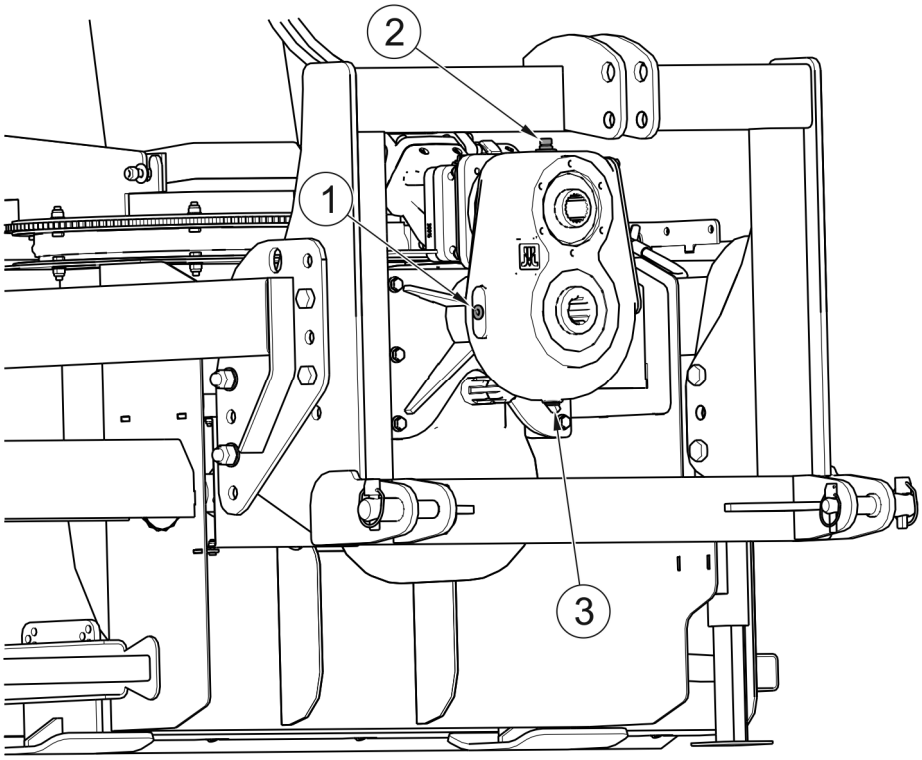


FIG. 5.2 Checking and change of oil in reducer (only OW2.1H)

(1) - inspection plug (2) - filler plug with air vent, (3) - drain plug

Before changing oil in the reducer (FIG. 5.2):

- prepare a vessel for oil, unscrew inspection plug (1), filler plug (2) and drain plug (3) at the bottom of the reducer,
- drain oil into the previously prepared vessel and tighten drain plug (3),
- 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),
- position the machine horizontally and pour the required quantity of oil through the inlet (1),
- tighten inspection plug (1) and filler plug (2).

Oil in the reducer must be replaced every 2000 hours of work.

TIP

To lubricate the reducer, use gear oil of SAE 80W/90 API GL-4 class in quantity of 1.1 [L] litres.

5.2.3 CHECKING AND ADJUSTMENT OF CHAIN TRANSMISSION

DANGER

Before you begin the adjustment, turn off the machine drive and ensure that unauthorised persons have no access to the vehicle cab.

In order to check condition of the chain, unscrew bolt (4) and remove cover (3). A correctly tensioned chain must deflect about 7 mm. To adjust the chain tension, loosen the nut (1), move the pin with the tensioner wheel (2). Tighten the nut (1), replace and secure the cover (3).

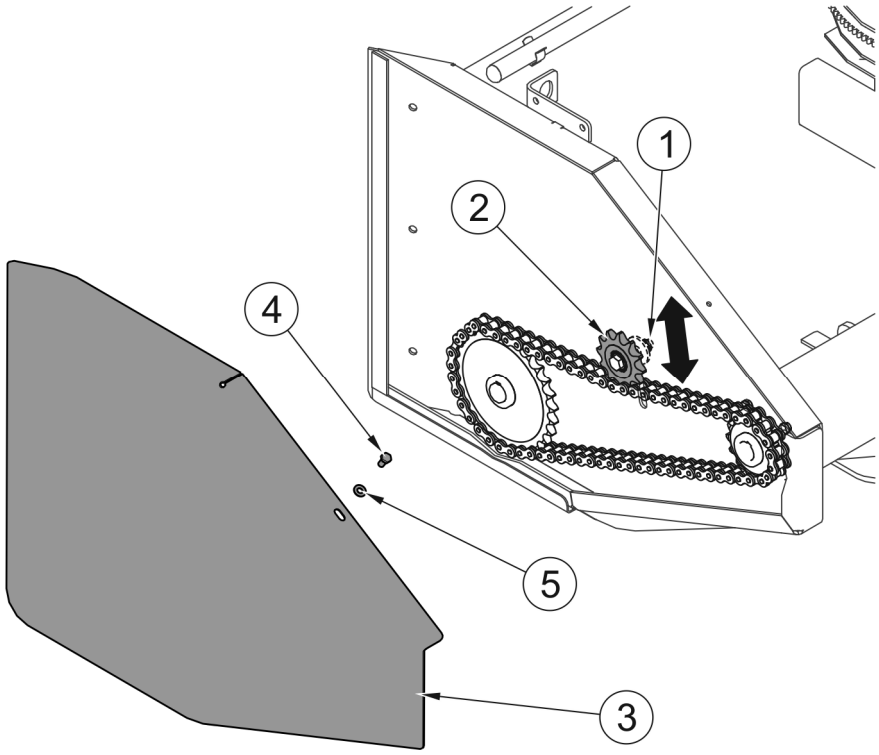


FIG. 5.3 Adjusting the chain transmission

(1) - nut; (2) - tensioner wheel; (3) - cover; (4) - M10x20 bolt; (5) - washer 10

Lubricate chain after every 40 hours. For lubrication use 10W/40 grade gear oil.

5.2.4 REPLACING THE SAFETY BOLT

DANGER

If the machine is connected to the carrying vehicle, then before replacing the safety bolt, turn off the machine drive and ensure that unauthorised persons have no access to the vehicle cab.

The snow blower's PTO shaft has a special bolt (4), which can be damaged by excessive overloading of the machine (FIG. 5.4). Before replacing bolt, check the blade, augers, discharge chute and remove the cause of machine overloading (e.g., pieces of ice, wood, stone, jammed chute, etc.) To remove blockage, use a wooden pin supplied with the machine (see 4.4.4 REMOVING BLOCKAGES).

To replace the safety bolt (FIG. 5.4), unscrew bolt (1) and open cover (3). Damaged bolt (4) should be replaced with a new one (M8x50-8.8).

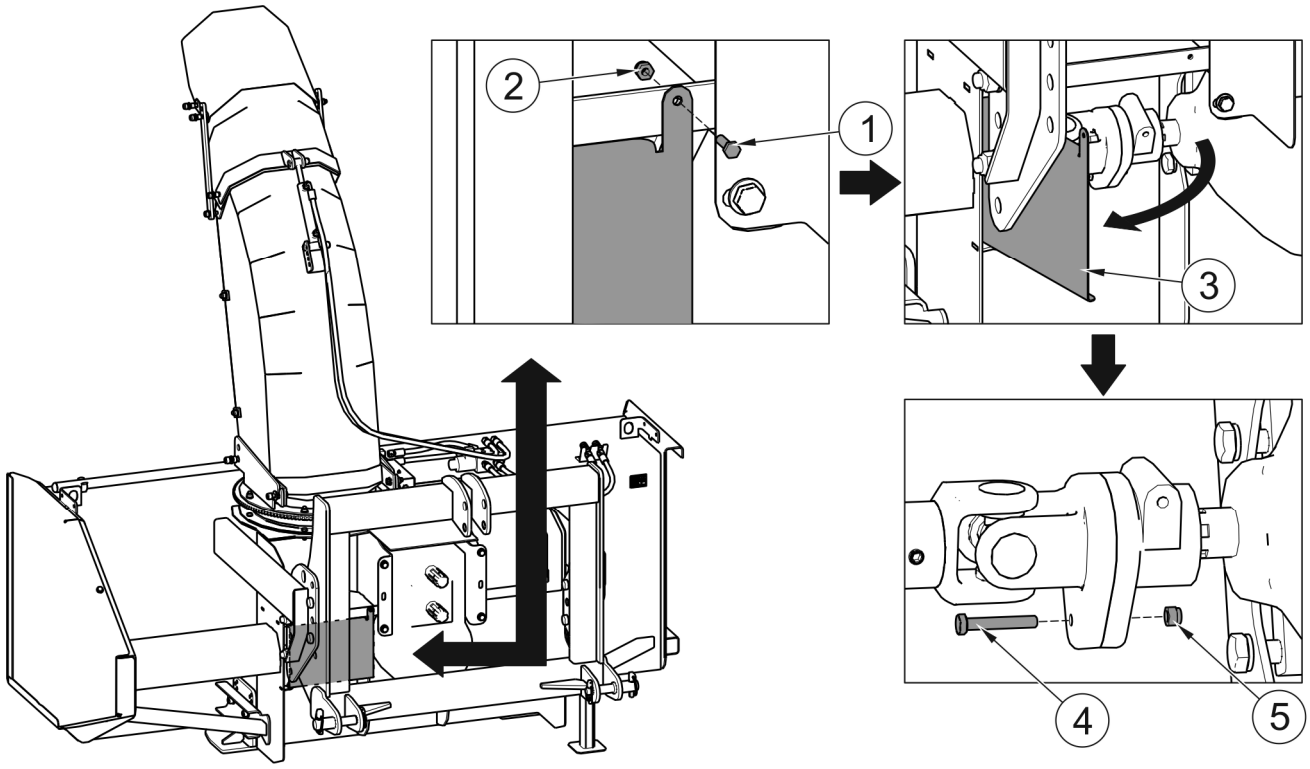


FIG. 5.4 Replacing the bolts securing the drive transmission

(1) - bolt M6x20; (2) - nut M6; (3) - cover; (4) - safety bolt M8x50-8.8; (5) - nut M8

5.3 REPLACING THE BLADE

DANGER

If the machine is connected to the carrying vehicle, then before checking and replacing the blade, turn off the machine drive and ensure that unauthorised persons have no access to the vehicle cab.

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

Snowblower is equipped with two-sided blade. If the edge of the blade is excessively worn, remove the blade, reverse it and re-install. If the blade is worn or damaged on both sides it should be replaced. The list of blade elements TAB. 5.2.

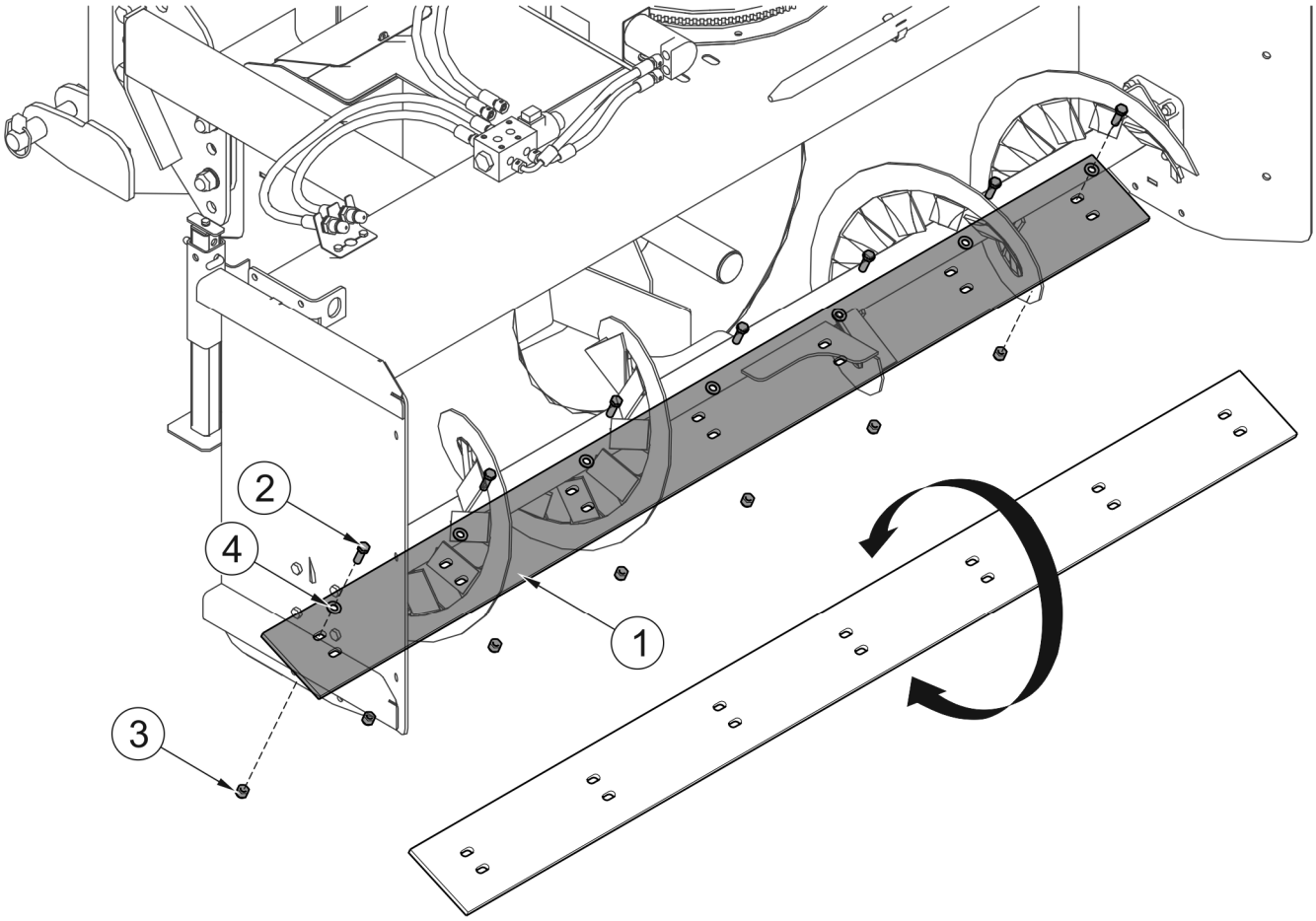


FIG. 5.5 Replacing the blade

(1) - blade, (2) - bolt M12x35-8.8, (3) - nut M12-8, (4) - washer 12-100HV

Technical condition of the blade should be inspected periodically and attention should be paid to mechanical damage, excessive wear and any missing securing elements. Tightening torques for nut and bolt connections are given in TAB. 5.5

TAB. 5.2 THE LIST OF BLADE ELEMENTS

Marking FIG. 5.5	**Name / Catalogue No.**	**Number** of items
1	Blade / 336N-00000001	1
2	Bolt M12x35-8.8-A2J PN-EN ISO 4017	7
3	Self locking nut. M12-8 PN-EN ISO 7040	7
4	Washer 12-100HV PN-EN ISO 7091	7

5.4 SKID REPLACEMENT

DANGER

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

In the event of work requiring the machine 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 the machine, which has been raised only with the carrying vehicle's three point linkage.

Excessively worn or damaged skids must be replaced. In order to do this raise the snowblower and support with sufficiently stable and strong supports. If the machine is hitched and raised on the linkage, protect it from falling and immobilise the carrying vehicle (turn off the engine and engage the parking brake.) Remove the nuts (4), remove the bolts (3) mounting skid (1) to the frame (FIG. 5.6). The list of skid elements with catalogue numbers is shown in TAB. 5.3.

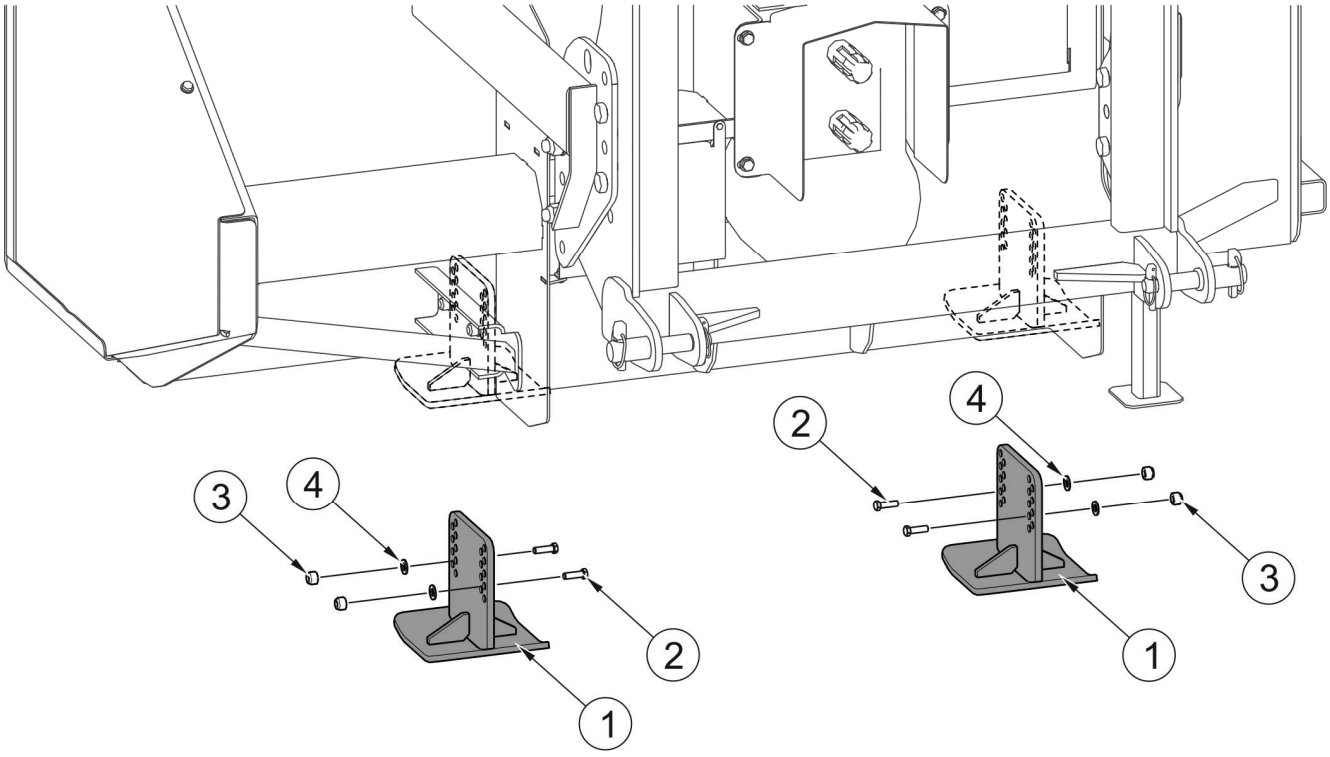


FIG. 5.6 Skid replacement

(1) - skid; (2) - bolt; (3) - nut; (4) - washer

TAB. 5.3 THE LIST OF SKID ELEMENTS

Marking FIG. 5.6	**Name / Catalogue No.**	**Number** of items
1	Skid /275N-35000000	2
2	Bolt M12x40-8.8-A2J PN-EN ISO 4017	4
3	Self locking nut. M12-8-A2J PN-EN ISO 7040	4
4	Washer 12-100HV PN-EN ISO 7091	4

When mounting skids, pay attention to install bolts in suitable holes in the skid, because proper position of bolts has influence on the height of blade above the surface being cleared. Both skids should be attached at the same height. Arrangement of holes in the skid enables gradual skid adjustment, every 11 mm. Tightening torques for nut and bolt connections are given in TAB. 5.5

5.5 LUBRICATION

Before commencing lubrication insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease The following grease is recommended for lubrication: ŁT-43-PN/C-96134.

DANGER

Lubrication may only be performed when the machine is disconnected from the tractor.

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

TAB. 5.4 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
A	Discharge chute	1	grease	40 hours
B	Chain transmission roller bearing	1	grease	20 hours
C	Auger bearings	2	grease	20 hours
D	PTO shaft cross	1	grease	20 hours
E	Surface of multi-splined transmission shafts	2	grease	20 hours
F	Surface of front multi-splined transmission shaft	1	grease	20 hours
G	Chain	1	engine oil	40 hours
H	Gear:	1	gear oil	2,000 hours
I	Reducer (only OW2.1H)	1	gear oil	2,000 hours
J	PTO shaft *	*	*	*

** For detailed information on maintenance please refer to operator's manual attached to the shaft.*

Marking description in Item column (TAB. 5.4) conforms with numbering shown (FIG. 5.7)

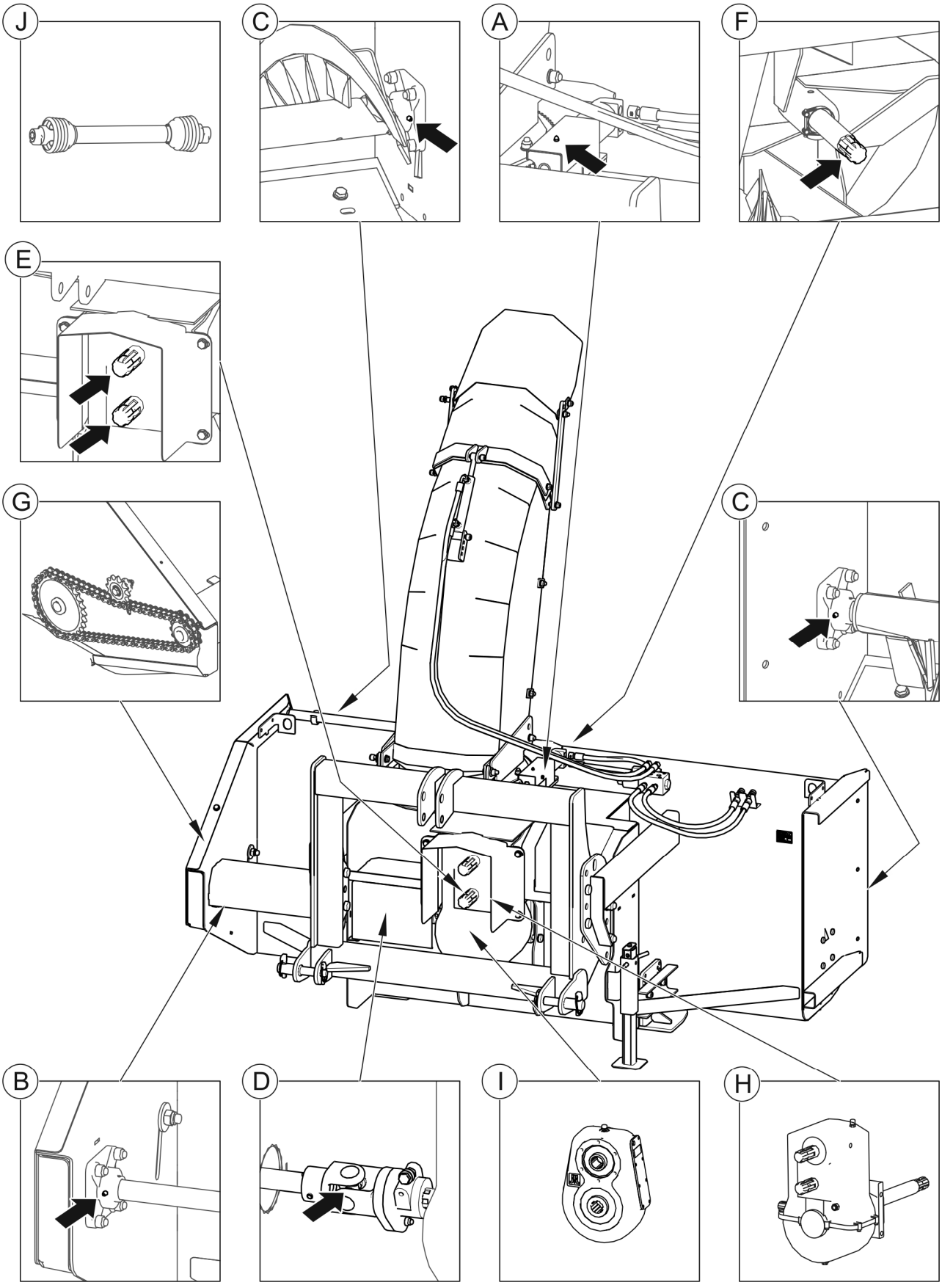


FIG. 5.7 Lubrication

Lubrication points described in table 5.4

5.6 STORAGE

After finishing work, machine should be thoroughly cleaned and washed with water jet. While washing, do not direct a strong water or steam jet at information and warning decals or hydraulic lines and electrical wires. 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. Used or damaged elements should be repaired or replaced.

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

If the machine shall not be used for a long period of time, protect it against adverse weather conditions. When the machine is parked, PTO shaft and electrical system lead should be disconnected.

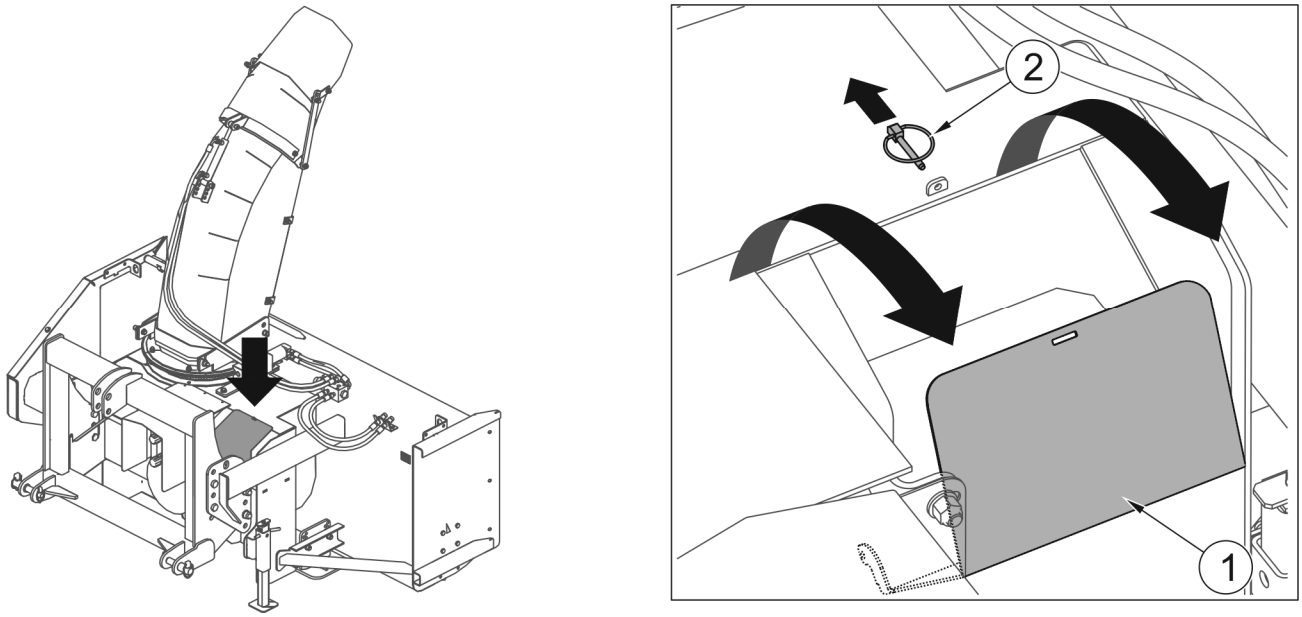


FIG. 5.8 Locker

(1) - locker cover; (2) - cotter pin

Small equipment elements (pins, cotter pins etc.), spare bolts securing PTO shaft and spare electrical system lead may be stored in a special locker located on the snow blower chassis (FIG. 5.8). To open locker cover (1), take out securing cotter pin (2).

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

5.7 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

During maintenance and replacement of individual parts, use appropriate tightening torques for nut and bolt connections (unless other parameters are specified for a particular connection). Recommended torque values apply to non-greased steel bolts (TAB. 5.5).

ATTENTION!

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

TAB. 5.5 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

5.8 TROUBLESHOOTING

TAB. 5.6 TROUBLESHOOTING

TYPE OF FAULT	CAUSE	REMEDY
Rotor and auger do not rotate	PTO drive shaft is not connected (OW2.1M)	Connect PTO shaft
	Carrying vehicle's PTO is disconnected or faulty (OW2.1M)	Check the PTO on the tractor
	Hydraulic drive system is not connected (OW2.1H)	Connect quick couplers of the snow blower's hydraulic motor to supply source
	Damaged securing bolt on PTO drive shaft	Check the cause, if necessary, replace the bolt
	Damaged transmission or reducer	Check for damage, refer repair to service, if necessary
Rotor and auger rotate in wrong direction	Incorrect connection of PTO drive shaft	If necessary, transfer the shaft to the other end of the gear
Only the rotor rotates	Damaged securing bolt on the PTO drive shaft of the snow blower	Check the joint, if necessary, replace the bolt
Discharge chute control mechanism does not work	Snow blower hydraulic lines not connected	Connect hydraulic lines to corresponding outlets of the carrying vehicle's external hydraulic system
	Solenoid valve electrical system is not connected	Connect electric lead to solenoid valve and to carrying vehicle, change switch position
Incorrect discharge	Incorrect machine settings	Set the range and direction if discharge, test operation and adjust the settings
	Engine RPM is too low	Increase engine RPM
	Discharge chute partially jammed	Check and clean if necessary
Snow blower drive stops too frequently	Wet, dense snow, driving too fast	Increase the engine speed, reduce driving
	Frozen snow on snow blower working elements	Check and clean if necessary
Layer of snow is not collected	Skids set too high	Check and adjust, if necessary
	Incorrectly positioned central connector of linkage	Adjust by changing the length of the central link
	Excessively worn or damaged blade	Reverse it or replace

NOTES