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OPERATOR MANUAL

SNOW PLOUGH

PRONAR PUL-S45

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



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EDITION 1A-06-2017

SNOW PLOUGH

PRONAR PUL-S45

MACHINE IDENTIFICATION

SERIAL NUMBER:

TYPE:

.....

INTRODUCTION

Information in this document 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 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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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:	Snow plough PRONAR	
Туре:	PUL-S45	
Model:	-	
Serial number:		
Commercial name:	Snow plough PRONAR PUL-S45	

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.

> CADY TORA distanter człon Roman mej zywak

Narew, the <u>2017-06-07</u>

Full name of the empowered person position, signature

Place and date

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SECTION



BASIC INFORMATION

1.1 IDENTIFICATION



FIG. 1.1 Location of the nameplate

Meaning of nameplate 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 additional information

The factory number is stamped into the nameplate and on the frame under the nameplate. nameplate is located on the frame on the left side of the machine. When purchasing the machine, check that the serial number corresponds with that indicated in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR MANUAL*.

1.2 INTENDED USE

The PRONAR PUL-S45 snowplough is designed for removing loose snow and snowdrift from roads, squares and other hard road surfaces such as asphalt, concrete paving blocks, paving and concrete. Using the machine for other purposes will be regarded as contrary to intended use.

It is not recommended to remove icy, compacted or compressed and considerably thick layer of snow frozen to road surface.

Depending on the equipment, the snowploughs can be mounted on trucks and special vehicles that are equipped with the front mounting plate and meet 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 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 this publication and with the carrier vehicle's Operator 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 plough must not be used for purposes other than those for which it is intended, in particular:



- remove icy, compacted or compressed and considerably thick layer of snow frozen to road surface,
- clear snow from unpaved surfaces,
- level roads, terrain;
- transport people, animals or any items on the machine

TAB. 1.1Carrier vehicle requirement

	UNIT	REQUIREMENTS
Mounting method	_	front mounting plate according to DIN 76060 standard
		TYPE A , TYPE B or SETRA
Electrical system		
Electrical system voltage	V	24
Connection type	_	High current socket on the front of the vehicle (<i>included in the snowplough equipment</i>)
Carrier vehicle load capacity	t	up to 8 (with 2 or more driven axles) or more than 8
Other requirements		
Equipment of carrier vehicle	_	beacon light <i>(orange light)</i>

1.3 EQUIPMENT

The snow plough equipment includes:

- Operator Manual
- Warranty Book
- control panel with a connection lead,
- high current socket with electrical supply lead

Equipment versions:

- Type of snowplough blades:
- rubber snowplough blades with shock absorbers or
- ceramic steel rubber with shock absorption.
- Location of the side wing:
- on the right side of the plough or
- on the left side of the plough.
- Mounting system (with securing bolts):
- DIN 76060 Type A or
- DIN 76060 Type B or
- SETRA.

Additional equipment

• Additional lighting (work lights).

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:

- collecting blades, fenders
- light bulbs, fuses, decals,
- wheels.

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

In the event of damage arising from:

- mechanical damage which is the user's fault,
- caused by road accidents,
- 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, 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.

For detailed Terms & Conditions of Warranty, please refer to the Warranty Book attached to each newly purchased machine.

Modification of the machine without the written consent of the Manufacturer is prohibited. 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.

1.5 TRANSPORT

The machine is prepared for sale completely assembled and does not require packing. Packing is only required for the machine Operator Manual and electrical system components.



FIG. 1.2 Transport lugs

Delivery is either by transport on a vehicle or independently, after being attached to a tractor. Transport of the machine is permissible connected to a carrier vehicle provided the vehicle's driver familiarises himself with the machine's Operator Manual and particularly with information concerning safety and principles of connection and transport 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, follow the general health and safety regulations for reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines.

The machine should be attached to lifting equipment in places specially designed for this purpose (FIG. 1.2), i.e. by the holes in the mouldboard frame brackets. Suspension points are identified with information decals. When lifting the machine take special care to avoid 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 reloading work, special care should be taken not to damage the paint coating.



FIG. 1.3 Centre of gravity

All dimensions given in millimetres [mm]

NOTE

Depending on the version, centre of gravity varies in the ±50 mm range.



NOTE

Do NOT secure lifting slings or any types of load securing elements to hydraulic and electrical system components and fragile elements of the machine.

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.



IMPORTANT

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.

Before proceeding to dismantle machine, oil shall be completely removed from hydraulic system.

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.

SECTION



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 machine may only be used and operated by persons qualified to drive carrier vehicle and trained in the use of the machine.
- 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 carrier 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 guarantee.
- The machine may only be used when all the protective elements (i.e. safety guards, bolts, cotter pins) are technically sound and correctly positioned. In the event of loss or damage to the protective features, they must be replaced with new ones.

2.1.2 HITCHING AND UNHITCHING THE MACHINE

- Carefully read the carrier vehicle Operator Manual.
- Do NOT hitch the machine to a carrier vehicle, if the linkage system of the machine is not compatible with the linkage system of the carrier vehicle.
- Be especially careful when linking and unhitching the machine from the carrier vehicle.
- When hitching, there must be nobody between the machine and the carrier vehicle.
- To hitch the machine to the carrier vehicle use only linking elements recommended by the Manufacturer.
- The carrier vehicle to which the machine will be coupled must be technically reliable and must meet all manufacturer's requirements.
- After completion of hitching the machine, check the safeguards.
- The machine disconnected from the carrier vehicle must be supported on the parking stands and 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 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.
- 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.

- 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 changed every 4 years regardless of technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

2.1.4 TRANSPORTING THE MACHINE

- When driving on public roads, observe all road traffic regulations in force in the country, in which the machine is used.
- Do not exceed the maximum speed resulting from road conditions and design restrictions. Adjust speed to the prevailing road conditions and other limitations arising from road traffic regulations.
- Do NOT leave the machine raised and unsecured while the carrier vehicle is parked. When parked, the machine should be lowered.
- 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 technical condition of linkage, shields and components of hydraulic system and electrical system.
- When driving with raised machine, use transport lock.
- 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 machine until the fault has been corrected.

- During work, use proper, close fitting protective clothing, gloves and appropriate tools. When working on hydraulic system it is recommended to use oil resistant gloves and protective goggles.
- Any modification to the machine frees the manufacturer 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.
- In the event of work requiring the machine to be raised, use properly certified hydraulic or mechanical lifts for this purpose. After raising the machine, proper supports should be placed. Do NOT perform maintenance or repair work under raised and unsupported machine.
- The machine must not be supported using fragile elements (bricks or concrete blocks).
- 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 carrier vehicle engine turned off and the ignition key removed. Immobilise the carrier vehicle with parking brake and ensure that unauthorised persons do not have access to the vehicle's cab.
- Should it be necessary to change individual parts, use only original parts. Nonadherence 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.
- 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 MACHINE OPERATION

- Before lowering or lifting the machine mounted on carrier vehicle 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 carrier vehicle operator is obliged to ensure proper visibility of the machine and the working area.
- During machine operation do not occupy a different position than that of the operator in the tractor cab. Do NOT leave the cab, when the machine is in operation.
- Person must not stand in the machine operation area and also between the carrier vehicle and the machine.
- Do NOT operate the machine while reversing. Raise the machine while reversing.
- Do NOT use the snow plough with additional ballast.

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 carrier vehicle 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 machine with removed or faulty safety guards,
- not maintaining 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 carrier vehicle 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 forbidden or dangerous places
- do not climb 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

ITE M	SYMBOL	DESCRIPTION
1		Before starting work, carefully read the Operator Manual.

ITE M	SYMBOL	DESCRIPTION
2		When implement is in use there must be no bystanders in designated areas. If any work is required in these areas, make sure the carrier vehicle is stationary, and whether the implement is disconnected from the power source.
3		Risk of injury to foot or leg. Keep a safe distance.
4		Do not reach into crushing space because elements may move. Danger of crushing hands or fingers.
5	PRONAR PUL-S45	Machine model
6		Lifting equipment attachment points while loading the machine
7		Outline marking.

ITE M	SYMBOL	DESCRIPTION
8	700 kPa	Tyre pressure

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





Meaning of symbols (TAB. 2.1)

SECTION



DESIGN AND OPERATION

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 BASIC TECHNICAL DATA

	Unit	
Working width		3 030
– angle of 30°	mm	3,930
Transport width		3 360
 – angle of 30° and folded side wing 		3,300
Height of the working part	mm	1,090
Total width <i>(with a fender)</i>		
– angle of 30°		2,250
- straight	mm	2,330
T (11) 14		2;090
l otal height (with parking stands, warning signs	mm	1,550
and flags)		
Total length:		
 the plough is perpendicular to the 		1,560
driving direction	mm	
Number of working positions	-	2 fixed - left and right snow removal and the option of obtaining intermediate positions
Supply	-	Power-Pack electro-hydraulic power supply with floating position
Control	-	with the aid of the control panel, from the operator cab
Electrical system voltage	V	24
The second section is the state of		- rubber plough blades with shock absorbers or
Types of collecting blades	-	 – ceramic – steel – rubber with shock absorption.
		2 - mouldboard turn,
		1 - raise / lower,
Number of hydraulic cylinders	pc.	1 - tilt lock,
		1 - side wing turn,
		1 - fold the wing extension.
Weight	kg	1,325
Maximum working speed	km/h	60
Other information	-	single person operation

Level of noise emitted by the machine does not exceed 70 dB(A)

3.2 GENERAL DESIGN



FIG. 3.1 General design

(1)- linkage system; (2)- mouldboard; (3)- side wing; (4)- wing extension; (5)- blades;
(6)- hydraulic system; (7) - parking stands; (8) - flags; (9) - wheels; (10)- electrical system;
(11)- additional lighting (option)

3.3 HYDRAULIC SYSTEM





FIG. 3.2 Hydraulic system

(1)- Power-Pack electro-hydraulic power unit; (2)- plough lifting cylinder, (3)- mouldboard turning cylinder; (4)- lock cylinder; (5) - wing turning cylinder; (6) - wing extension cylinder

3.4 ELECTRICAL SYSTEM DESIGN



FIG. 3.3 Electrical system design

(1) - a harness with a control panel; (2)- executive module; (3)- harness with control panel power socket; (4)- clearance lamps; (5)- work lights (option); (6)- high-current plug;
(7) - high-current power socket; (8) - inductive sensor

The snowplough's electrical system controls the electro-hydraulic power supply and the lighting system using the control panel (1). The lighting system consists of clearance lamps (4) on the plough's mouldboard and optional working lights (5) placed on brackets. The supply plug (6) of the snowplough electrical system is connected to the high current socket (7) with a wiring harness connected to the vehicle's battery.



FIG. 3.4 Electrical system diagram

(1) - executive module ; (2) - control panel; (3) - clearance lamps; (4) - work lights

SECTION



CORRECT USE

4.1 GET READY FOR OPERATION

DANGER

Before using the machine, the user must 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 life and health.

The machine must never be used by persons, who are not authorised to drive carrier vehicles, 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.

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 (unless otherwise agreed with the customer). Prior to connecting to the carrier vehicle, machine operator must verify the machine technical condition. 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,
- make sure that the machine's linkage is compatible with that of the carrier vehicle.
- make sure that electrical system parameters as well as connection sockets are compatible,
- 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",
- check technical condition of the hydraulic and electrical system;
- check technical condition of mouldboard, collecting blades,
- check technical condition of the linkage components,
- check and possibly adjust the tension of springs of snowplough blades with shock absorbers (see 5.3 ADJUSTMENT OF SPRINGS OF SNOWPLOUGH BLADES WITH SHOCK ABSORBERS



NOTE

Failure to follow instructions in this Operator Manual or starting the machine incorrectly 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 carrier vehicle, started and all its individual systems checked. In order to do this:

- connect the machine to carrier vehicle (see "4.3 HITCHING TO VEHICLE"),
- after connection of electrical system wiring, check the correct operation of individual plough functions and operation of lighting system and inspect tightness of the system and hydraulic cylinders,

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.



NOTE

Before using the machine always check its technical condition. In particular, check the technical condition of the linkage as well as the hydraulic system and the electrical system.



NOTE

After mounting the snowplough on the carrier vehicle, set working lights so they do not dazzle oncoming drivers.

4.2 TECHNICAL INSPECTION

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

TAB. 4.1 Technical inspection schedule

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Technical condition of the collecting blades	Visually inspect and, if necessary, replace according to point <i>5.1 Check</i> and replace collecting blades	
Technical condition of support wheels	Assess the technical condition, if complete and correctly mounted, and check tire pressure	
Technical condition of the linkage, locking bolts and pins.	Assess the technical condition, if complete and correctly mounted.	Before
Technical condition of the hydraulic system.	Visually inspect the technical condition	starting work
Technical condition of the electrical system and lighting system components	Visually inspect the technical condition, check the operation	
Check if all main nut and bolt connections are properly tightened	According to point 5.8 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS	Once a week
Lubrication	Lubricate the elements according to point 5.6 LUBRICATION.	According to table 5.2



NOTE

Do NOT use a malfunctioning or incomplete machine.

4.3 HITCHING TO VEHICLE

The snowplough can be hitched to a carrier vehicle that meets the requirements presented in Table 1.1 "REQUIREMENTS FOR CARRIER VEHICLE".

DANGER



Before hitching the machine to carrier vehicle, read the carrier vehicle Operator Manual.

When hitching, there must be nobody between the machine and the carrier vehicle. Exercise extra caution.

4.3.1 INSTALL THE MOUNTING ELEMENTS OF THE LINKAGE SYSTEM



FIG. 4.1 Fixing elements of the linkage

(A) – DIN 76060 type A linkage; (B) - DIN 76060 type B linkage (option); (C) - SETRA linkage (option).

As standard, the snowplough linkage (FIGURE 4.1) complies with DIN 76060 standard (type A). Optionally, the snowploughs can be equipped with the linkage in compliance with DIN 76060 standard (type B) or SETRA linkage.

NOTE

The work connected with mounting the linkage's front plate on the carrier vehicle must be performed only by suitably qualified personnel.

Before mounting the snowplough on the carrier vehicle, make sure that the linkage and the electrical system parameters are compatible.



FIG. 4.2 Mounting the front plate.

(1) - front plate of linkage; (A) - height from the top edge of the plate to the ground; (B),
 (C) - distance between the side edge of the plate and the carrier vehicle edge.

The carrier vehicle's front plate should be mounted at the vehicle's front, vertically in the vehicle's axis of symmetry. The height (A) (FIGURE 4.2) from the top edge of the plate to the ground should be:

- 980 ±60 mm, A type plate acc. to DIN 76060
- 900 ±60 mm, B type plate acc. to DIN 76060
- 1000 ± 60 , Setra type plate



Before hitching the snowplough to carrier vehicle, dismantle the transport protection (FIG. 4.3).



FIG. 4.3 Transport protection

(A) - mounted transport protection; (B) - dismantled transport protection

The procedure of dismantling the transport protection is described in detail in point "4.4.1 DISMANTLING TRANSPORT PROTECTION"

4.3.2 INSTALL THE POWER SUPPLY WIRING HARNESS ON THE CARRIER VEHICLE

NOTE

It is recommended that the works related to connecting electrical system be performed by suitably qualified persons.

Before installing the machine on a carrier, make sure that electrical system is compatible.

To work with the plough, high-current power sockets must be installed at the front of the carrier vehicle (FIG. 4.4). If the carrier vehicle is not equipped with such a socket or is equipped with a different type of socket, install the power supply wiring harness included in the snowplough equipment.



FIG. 4.4 Installation diagram of the power supply wiring harness on the (1) - high-current socket; (2) - power harness; (3) - battery; (4) - MEGAVAL 175A fuse

4.3.3 MOUNTING THE PLOUGH ON THE CARRIER VEHICLE



DANGER

To hitch the machine to the carrier vehicle use only linking elements recommended by the Manufacturer.

Check the linkage compatibility before mounting the plough on the carrier vehicle.

To mount the snowplough on the carrier vehicle (FIG. 4.5):

- Bring the snowplough set on the parking stands with wheels close to the carrier vehicle's mounting plate to a distance of 30 cm. Connect Power-Pack electric power supply and control panel (FIG. 4.6). Dismantle the transport lock, if fitted. Activate the control panel with the switch (1) - the green LED will light indicating that the panel (5) is on, and activate the linking function (FIG. 4.7) using button (2) - the green LED (3) next to the button will light.
- 2) Using the joystick (4) on the control panel (FIG. 4.7), raise the snowplough linkage to position the hooks of the snowplough linkage plate above the seats of the carrier vehicle' mounting plate. The control panel should be placed in the carrier cabin.
- 3) Bring the plough closer to the carrier vehicle until the plough linkage plate comes into contact with the mounting plate or drive the carrier vehicle carefully to the plough linkage plate, immobilize the vehicle.

4) If the hooks and the carrier vehicle's mounting plate are correctly aligned, lower the snowplough's linkage using joystick button until the hooks are set in the seats of the carrier vehicle's mounting plate. Deactivate "linking" function using button (2) (FIG. 4.7) – yellow indicator light (3) located next to the button will go out. Secure the mounting plate and the plough linkage (FIG. 4.8) against disconnecting using the securing elements supplied with the plough.



FIG. 4.5 Mounting the plough on the carrier vehicle

(1,2,3,4) - successive stages of mounting the plough on the carrier vehicle

Linking function is used during mounting and disconnecting the snowplough from the carrier vehicle.

- When the linking function is on, it is possible to use the joystick button (4) for control (FIG. 4.7). Irrespective of pressing the buttons, the indicator LED (3) lights constantly. Joystick buttons when the linking function is enabled:
- move up button lift the linkage system,
- move down button lower the linkage system,

- move right button turn the linkage system right,
- move left button turn the linkage system left.
- When the linking function is deactivated using switch (2), green indicator light (3) will go out.
- Turning on the linking function deactivates the float function, if it was active. It is not possible to turn on the float feature while linking is active.





(1) - power lead plug;
(2) - high current socket;
(3) - control lead plug;
(4) - control panel;
(5) - control lead socket

The plough is equipped with a 24V electrical system. Connect power lead plug (1) of Power-Pack unit to high current socket (2) in the carrier vehicle (FIG. 4.6). Control lead plug (3) should be connected to socket (5) under the Power-Pack housing and the other end of the lead should be connected to control panel (4).



NOTE

The connecting cables should be routed so that they do not get entangled in machine parts.



FIG. 4.7 Linking the plough

(1) – main control panel switch ; (2) – linking function switch; (3) – linking function ON indicator light; (4) – joystick buttons; (5) – control panel ON LED; (6) – Power-Pack ON indicator LED; (A) – raise the linkage; (B) – lower the linkage; (C), (D) – turn linkage.

TIP

Depending on type of the carrier vehicle's head plate (FIG. 4.8), tighten the securing bolts using the following tightening torques:

- bolts (A) (DIN 76060-A plate) 600 Nm
- bolts (B) (DIN 76060-B plate) 500 Nm

After mounting the snowplough on the carrier vehicle, connect the snowplough linkage to the carrier vehicle's head plate using bolts (FIG. 4.8)



FIG. 4.8 Protection of the linkage plate

(A) - linkage system DIN 76060 type A; (B) - linkage system DIN 76060 type B;
(C) - SETRA linkage system; (1) - M30x70 bolts; (2) - M24x60 bolts, (3) - M24x60 bolts;
(4) - bolts 416N-21010000

The plough is equipped with two parking stands (FIG. 4.9). To dismantle the parking stands:

- lift the plough mounted on a carrier vehicle,
- take out locking cotter pin (2) and dismantle parking stand (1) from the guide,
- dismantle the second parking stand in the same way.



FIG. 4.9 Dismantling the parking stands

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



FIG. 4.10 Ballasting the carrier vehicle

A - distance between the front plate and the front axle of the carrier; (B) - carrier wheelbase;

C - distance between the plough centre of gravity and the linkage; (P) - plough weight ; (T) - additional ballast

The ballast of the carrier vehicle's rear axle should be checked after the snowplough is mounted. Amount of additional ballast can be calculated using the following formula (FIG. 4.10). Additional ballast should be placed above the rear axle of the carrier vehicle.

4.4 SNOW PLOUGH OPERATION

4.4.1 INSTALL AND REMOVE THE TRANSPORT LOCK

In order to secure the plough in the transport position against inadvertent or accidental lowering (FIG. 4.11):

- raise the plough to the extreme upper position, immobilise the vehicle with parking brake,
- connect the snowplough linkage frame to cylinder frame using cable (1) and pin (2),
- secure the bolt with a washer (4) and a cotter pin (3).



FIG. 4.11 Installing transport lock

(1) - securing cable; (2) - pin; (3) - cotter pin; (3) - washer

In order to remove the lock:

- raise the snowplough mounted on the carrier vehicle to the extreme upper position and immobilise the vehicle with parking brake,
- take out cotter pin (3) securing lower pin (2),



FIG. 4.12 Release the transport lock

(1) - securing cable; (2) - pin; (3) - cotter pin; (4) - washer: (5) - removed cable

- remove the washer (4) and pin (2) securing the cable (1),
- hang the end of the cable on the upper pin in position (5) (FIG. 4.12),
- secure the pins with cotter pins.

4.4.2 SETTING WORKING HEIGHT



DANGER

Setting the working height should be performed only when the engine is stopped, and the plough is raised and secured.

Wheels are used to maintain clearance between the ground and the blades, to reduce the thickness of the scraped layer or to reduce the pressure of the blade on the surface. Working height is set (FIG. 4.13) by proper setting of the wheel height.

In order to adjust the height of the wheel (1), unlock the knob by removing the lock (2). Turn the handle to set an appropriate snowplough working height and secure the handle (3) with the lock (2). It is recommended to set the height of the wheels so that the blade slightly touches the cleared surface and that both wheels are set at the same height.



FIG. 4.13 Working height adjustment

(1) - wheel ; (2) - lock; (3) - knob

4.4.3 CONTROL PANEL

The snowplough's functions are controlled from the control panel. Control panel (FIG. 4.14) is protected against accidental use by the main switch (1).



DANGER

When the machine is in use there must be no bystanders near the machine.



FIG. 4.14 Control panel

(1) - main switch ; (2) - joystick buttons; (3) - linking switch; (4) - float position switch; (5) - dipped beam switch; (6) - high beam switch (option); (7) - wing control, (8) - panel activation LED

4.4.4 CONTROL OF THE PLOUGH MOULDBOARD



IMPORTANT

Do NOT operate the snow plough while reversing. While reversing raise the machine.

The plough's mouldboard is controlled using the joystick buttons (2). The snowplough's mouldboard can be raised, lowered and turned to the right/left within the range of $\pm 30^{\circ}$. The individual functions of the joystick buttons are presented in FIG. 4.15. Pressing the button in position A, B, C causes the green LED (2) to light up for the duration of the Power-Pack electrohydraulic power supply operation. The snowplough's mouldboard can be lowered only by switching on the floating function by means of switch (3).



FIG. 4.15 Controlling the mouldboard

(A) - lift the mouldboard; (B) - turn the mouldboard to the left; (C) - turn the mouldboard to the right; (1) - joystick buttons; (2) - Power-Pack operation LED; (3) - float function switch;
(4) - float function indicator LED

IMPORTANT

The use of floating function during snow clearing is recommended in order to protect the snowplough against damage. Carrier vehicle weight must not be transferred to the plough.

Floating function enables ground surface tracking during snow clearing i.e. the plough linkage system can adjust to uneven surface. Floating function protects the snowplough against damage during operation.

The floating function (FIG. 4.16) is switched on with button (1). The activation of the float function is indicated by the green LED (2). When button (1) is pressed again, floating function and indicator LED (2) are switched off.



FIG. 4.16 Floating function

(1) - float function button ; (2) - float function indicator LED

IMPORTANT



With the float function turned on, you can turn right or left, provided that the sensors allow it.

When the float function is on, pressing the joystick up button turns off the float function (the LED is off).

Two sensors mounted on the plough (one indicating the unfolding of the side wing, the other - the maximum turning of the main mouldboard) protect against collision of the side wing with the carrier by:

- preventing folding of the side wing in the position of the mouldboard other than the maximum turn to the right - for the left wing, and to the left - for the right wing,
- preventing the main mouldboard turning left with left wing folded, and turning right with right wing folded.

In order to compensate for the plough tilt resulting from the use of the side wing, a hydraulic tilt lock was used on one side. This mechanism automatically locks the plough in the transport position, facilitating the passage between the stretches of road cleared of snow.



FIG. 4.17 Tilt lock

(1) - tilt lock ; (2) - lock cylinder

4.4.5 SIDE WING CONTROL



FIG. 4.18 Wing control function

(1) - switch for wing control functions; (2) - two-colour indicator LED - green and red; (3) - joystick buttons

To activate the wing control function (FIG. 4.18) press the button (1) and the green LED (2) lights up. Press the button (1) again to deactivate the function.

When folding / unfolding the side wing, the wing extension is simultaneously folded / unfolded. In the absence of a signal from the mouldboard sensor, the attempt to press the button causes the red LED to blink three times.

IMPORTANT



The plough can clear snow to the left or right with the side wing folded out.

With the side wing folded on the right side, the plough can only clear snow on the left side.

With the side wing folded on the left side, the plough can only clear snow on the right side.



TIP

Working speed of the snowplough should be adapted to the type and quantity of collected snow and the type of terrain.

4.4.6 PLOUGH LIGHTING CONTROL

The snow plough is equipped with clearance lights and, as an option, can be equipped with work lights (FIG. 4.19). Clearance lights (6) light up when the control panel is switched on by means of main switch (1). The working lights have high beams and low beams. The switch (2) is used for switching on and off the low beams. Activation of the low beams is indicated by the green LED (4).

High beams are switched on/off using the button (3). Activation of high beams is indicated by the green LED (5) lighting up. When high beams are switched on the dipped beams are switched off and vice versa. The low beams and the high beams can be switched on only when the control panel is switched on (the main switch should be set in "I" position - ON).



FIG. 4.19 Switching the lights on

(1) - main panel and clearance lighting switch ; (2) - dipped beam button;
(3) - high beam button ; (4) - dipped beam LED; (5) - dipped beam LED; (6) - clearance lamp; (7) - work lights

4.5 DRIVING ON PUBLIC ROADS



IMPORTANT

When driving on roads, the plough should be set to the transport position (FIG. 4.20) - i.e. the side wing should be folded to reduce the transport width.

When driving on public roads, respect the road traffic regulations, exercise caution and prudence. Pay special attention to bystanders who may be in the vicinity of the working machine. Listed below are the key guidelines.

- Before moving off make sure that there are no bystanders, especially children, near the machine and the carrier vehicle. Ensure that the driver has sufficient visibility.
- Make sure that the machine is correctly attached to the carrier vehicle, and linkage is properly secured.
- Do not exceed the design speed and maximum speed allowed by road traffic regulations. Ground speed should be adjusted to prevailing road conditions and other conditions.
- While driving on public roads turn on the lights.
- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the machine and the carrier vehicle to suddenly tilt. Driving near ditches or canals is dangerous as there is a risk of the wheels sliding down the slope or 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 snowplough raised reduce speed due to dynamic loads and the risk of damaging the machine or carrier vehicle.
- When driving with raised snow plough, the mouldboard and side wing should be folded (FIG. 4.20) and the linkage system should be locked with transport lock (FIG. 4.11).





4.6 UNHITCHING THE MACHINE FROM CARRIER VEHICLE

DANGER

Before leaving the vehicle's cab, turn off the engine and immobilise the vehicle with parking brake.

IMPORTANT



Before disconnecting the plough from the carrier vehicle, the side wing must be folded in to enable the installation of the parking stand.

Unhitching the snowplough from the carrier vehicle should be performed on level, even and sufficiently hard surface in such a manner as to ensure that it is possible to hitch it again.



FIG. 4.21 Installing the parking stands

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

Before dismounting the snowplough from the carrier vehicle, install both parking stands (FIG. 4.21) in the following manner:

- lift the plough mounted on a carrier vehicle,
- insert parking stand (1) into the guide on the frame and secure it with cotter pin (2),
- install the second parking stand in the same way



NOTE

The snowplough disconnected from the carrier vehicle should be placed on parking stands. Brake the wheels.



FIG. 4.22 Disconnecting the plough from the carrier vehicle (1,2,3,4) - successive stages of disconnecting the snowplough from the carrier vehicle

In order to disconnect the machine from the carrier vehicle, proceed as follows (FIG. 4.22):

- Switch on the floating function on the control panel and lower the snowplough until parking stands fully rest on the ground. Unscrew two bolts that fix the linkage plate with the carrier vehicle's front plate (FIG. 4.8). Keep the bolts for the next mounting of the snowplough.
- 2) Switch on the linking function on the control panel (FIG. 4.7). Using the joystick buttons on the control panel, raise the snowplough linkage to position the hooks of the linkage plate above the seats of the carrier vehicle' front plate.
- 3) Drive the carrier vehicle carefully to a distance of about 30 cm from the snowplough.
- 4) Lower the frame of the snowplough linkage to the lower position, switch the control panel off and immobilize the vehicle. Disconnect the power lead of the Power-Pack unit and the control panel's lead. Secure the electric sockets with plugs.

SECTION



MAINTENANCE

5.1 CHECK AND REPLACEMENT OF COLLECTING BLADES

Excessively worn or damaged blades must be replaced.



NOTE

Each time the machine hits an obstacle, technical condition of blades and their mounting should be checked.

In order to remove the rubber blade (FIG. 5.1) or the ceramic -metal-rubber blade (FIG. 5.2), unscrew the nuts (3) of the appropriate segment, remove the bolts (2). Used or damaged snowplough blade should be replaced with a new blade suitable for a given model of the snowplough. Install in reverse order. Bolt and nut connections should be tightened using proper tightening torque (TAB. 5.3).

DANGER



Immobilise the carrier vehicle with parking brake, turn off the carrier vehicle's engine and secure the vehicle's cab against access of unauthorised persons. The plough should be supported with the parking stands.

Do NOT perform maintenance or repair work under raised and unsupported machine. Secure the snowplough linkage system against lowering.



FIG. 5.1 Replacement of rubber blades

(1) - rubber blade 499N-0000002; (2) - bolt; (3) - nut; (4) - washer

Optionally, the plough can be equipped with ceramic metal rubber blades (FIG. 5.2). Excessively worn or damaged blades must be replaced.



FIG. 5.2 Replace the ceramic steel rubber blades

^{(1) -} ceramic metal rubber blade 499N-00000027; (2)- bolt; (3) - nut; (4) - washer

5.2 REPLACEMENT OF FENDERS

The plough is equipped with fenders (1) located on the left and right sides of the plough to protect the edges of blades while working at near kerbs.

Fenders (FIG. 5.3) are mounted to the mouldboard with bolts (2), washers (4) and nuts (3). The right and left fenders are replaced the same way. Bolt and nut connections should be tightened using proper tightening torque (TAB. 5.3).



FIG. 5.3 Install fenders

(1) - fender 499N-0000020; (2) - M16x65 bolt; (3) - M16 nut; (4) - washer 16

5.3 ADJUSTMENT OF SPRINGS OF SNOWPLOUGH BLADES WITH SHOCK ABSORBERS

DANGER

The springs should be adjusted after mounting and raising the snowplough on the carrier vehicle. Immobilise the carrier vehicle with parking brake, turn off the carrier vehicle's engine and secure the vehicle's cab against access of unauthorised persons. Secure the plough against lowering. Do NOT perform maintenance or repair work under raised and unsupported machine.

In the snowploughs equipped with rubber or ceramic steel rubber blades with shock absorbers, the tension of shock absorbing springs (FIG. 5.4) can be adjusted. Before starting the adjustment, the snowplough should be mounted on the carrier vehicle, raised and secured against falling by means of the transport lock or proper supports.

To tighten the snowplough blades' springs (FIG. 5.4):

- A) Insert rod (3) into proper opening of tightening sleeve (1).
- B) Turn the tightening sleeve using rod (3) to enable removal of locking pin (2).
- C) Turn the sleeve (1) downwards and hold it in this position using the other rod (3).
- D) Insert the locking pin (2) into proper opening of the sleeve (1) and turn the tightening sleeve (1) so that the locking pin (2) is supported on the frame, and its collar prevents it from sliding out.



FIG. 5.4 Adjustment of springs of snowplough blades with shock absorbers (*A*),(*B*),(*C*),(*D*) - sequence of actions; (1) - tightening sleeve; (2) - locking pin; (3) - rod; (4) - spring

Repeat actions (A), (B), (C), (D) until proper spring tension is obtained. The adjustment should be performed individually, in the same way, for each spring. The pin (2) should be relocated by the same number of openings in each sleeve (maximally by 5 openings from the loose, untightened position). To reduce the spring tension, turn the sleeve in the opposite direction.



TIP

Make the adjustment using two steel rods with diameter of d=15 mm and approximate length of L= 400 mm.

5.4 HYDRAULIC SYSTEM MAINTENANCE

Hydraulic system maintenance duties:

- check oil level and change oil in the tank of the Power-Pack electro-hydraulic power supply;
- check tightness of cylinders and hydraulic connections,
- check technical condition of hydraulic lines;
- check technical condition and leak tightness of hydraulic quick couplers.



DANGER

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



DANGER

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



NOTE

Before starting work, visually inspect the hydraulic system components.



FIG. 5.5 Check oil level

(1) - oil tank ; (2) - oil filler cap; (3) - housing

The oil tank of the electro-hydraulic power supply (FIG. 5.5) is located under the housing (3). Before checking oil level, set the snowplough in such a manner as to ensure that the oil tank (1) is positioned horizontally,

- remove the housing (3),
- after unscrewing the filler plug (2), check the correct oil level in the tank (4). The level should be 140-150 mm above the bottom of the tank.
- if necessary, supplement oil to the required level, tighten the plug (2) and install the housing (3).

TIP

The hydraulic system and the oil tank of the snowplough with the electro-hydraulic control system is factory filled with HL32 hydraulic oil in the amount of approximately 15 litres [L].

The oil level in the tank should be 140 ÷ 150 mm



The oil in the tank of the electro-hydraulic power supply should be changed once a year (after the working season).

Because of its composition, the oil in the hydraulic system 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.



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

DANGER

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

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.

TAB. 5.1	HL32 hydraulic oil specification
----------	----------------------------------

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at 40°C	28.8 - 35.2 mm²/s
3	ISO 6743/99 quality classification	HL
4	DIN 51502 quality classification	HL
5	Flash point, [°C]	Above 210°C
6	Maximum operating temperature, [°C]	80

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.

The machine's hydraulic system should be completely tight sealed. Inspect the seals when the hydraulic cylinder is completely extended. If oil is found on hydraulic cylinder body, check origin of leak.

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.



NOTE

The hydraulic system is vented automatically during machine operation.



Rubber hydraulic lines should be replaced after 4 years of machine use.

5.5 ELECTRICAL SYSTEM MAINTENANCE



DANGER

Do not independently repair electrical system, except items described in chapter ELECTRICAL SYSTEM MAINTENANCE. All electrical system repairs must be performed only by suitably qualified personnel.

Maintenance of electrical system involves periodical checking of individual functions of the snowplough and operation of the lighting system.



FIG. 5.6 Lighting operation

(A) - clearance lamp; (B) - auxiliary lighting; (1) - bulb H4 75/70W 24V; (2) - reflector lens;
(3) - screw
Light-emitting diodes (LED) are used as the source of light in clearance lights (A) (FIG. 5.6) Thanks to this, the lamps are maintenance-free because there is no need to change bulbs. The H475/70W 24V bulb is used in the work light. To replace the work light bulb (FIG. 5.6), unscrew the screws (3) and remove the light lens (2).



IMPORTANT

Before driving off, make certain that all lamps and reflectors are operational and clean. Do NOT travel with out of order lighting system.



FIG. 5.7 Replacing the fuse of Power-Pack power supply

(1) - high current power lead; (2) - fuse holder; (3) - MEGAVAL 175A fuse

There is a 175A MEGAVAL fuse (3) on the supply conduit (+) of the electrical system of Power-Pack power supply (FIG. 5.7). In order to replace the fuse, open the housing (2) and undo the nuts fixing the leads inside the housing.



FIG. 5.8Replace the Power-Pack solenoid fuse(1) - UNIVAL 25A fuse; (2) - fuse holder; (3) - protective cover

To replace the fuse of solenoid valves (FIG. 5.8), remove the housing of the electro-hydraulic power supply, remove the protective cover (3) and take out the fuse (1) from the housing (2).



FIG. 5.9 Check the inductive sensors

(1) - side wing position sensor ; (2) - mouldboard position sensor

Check the sensors by checking their operation.

The sensor works properly if the diodes on the sensor light up when the sensor is placed near a metal part. The detection range of the machine inductive sensors is 8 mm, i.e. the sensors do not work if they are placed outside this range.



5.6 LUBRICATION

Machine lubrication should be performed with the aid of a manually or foot operated grease gun, filled with generally available grease. Before starting lubrication, remove old grease and other contamination from the grease nipples. Remove and wipe off excess oil or grease ŁT-43-PN/C-96134 grease is recommended for lubrication.



DANGER

Lubricate only when the plough is lowered and resting on the ground. Before lubricating, turn off engine, remove key from ignition and engage carrier vehicle brake.



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.



FIG. 5.10Lubrication pointsLubrication points are detailed in TAB. 5.2

TAB. 5.2 Lubrication points

ITE M	NAME	NUMBER OF LUBRICATI ON POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
А	Eye of mouldboard turning cylinder	4	drosco	50 hours
В	Eye of side wing cylinder	2		50 hours
С	Eye of the side wing extension cylinder	2		50 hours
D	Eye of lock cylinder	1		50 hours
Е	Eye of raising cylinder	2	grease	50 hours
F	Jockey wheel bearing	2		50 hours
G	Mouldboard pivot pin	2		50 hours
Н	Wing pivot pin	1		50 hours

Marking description in Item column (TAB. 5.2) conforms with numbering shown (FIG. 5.10)

5.7 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 or hydraulic lines and electrical components. 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. Machine 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 machine 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.

The snowplough disconnected from the carrier vehicle should be placed on parking stands *(included in the machine equipment).*

Disconnect the control panel and protect it against adverse weather conditions. Secure the electric sockets with plugs.

5.8 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

During maintenance and repairs use appropriate torque for bolt connections (unless other is specified for a particular connection). The recommended bolt tightening torques are shown in TAB. 5.3. The tightening torque values given in the table 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.

TAB. 5.3TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

	RESISTANCE CLASS		
	8.8	10.9	
[]	TIGHTENING TORQUE [Nm]		
M6	10	15	
M8	25	36	
M10	49	72	
M12	85	125	
M14	135	200	
M16	210	310	
M20	425	610	
M24	730	1,050	

	RESISTANCE CLASS		
THREAD DIAMETER	8.8	10.9	
[]	TIGHTENING TORQUE [Nm]		
M27	1,150	1,650	
M30	1,450	2,100	

The above-mentioned parameters do not apply to places featuring special engineering solutions (FIG. 5.11)



FIG. 5.11 Special engineering solutions



TIP

The fasteners in the places featuring special engineering solutions (FIG. 5.11) should be tightened only to eliminate axial clearance.

5.9 TROUBLESHOOTING

TAB. 5.4 TROUBLESHOOTING

TYPE OF FAULT	POSSIBLE CAUSE	REMEDY
	The electrical system is not connected to the carrier vehicle	Connect to electrical system
	Main switch of control panel is off	Set main switch of control panel in "I" position
Mouldboard position	Damaged fuse on power lead	Check and, if necessary, replace the fuse on the power lead.
cannot be changed	The machine hydraulic system is damaged	Repair at an authorised service point
	Electro-hydraulic power supply is damaged	Repair at an authorised service point
	Faulty sensor	Check the operation of the sensor according to section 5.5
Machine removes	Excessively worn collecting blades	Check and replace if necessary
snow unevenly	Incorrectly positioned wheels	Check and adjust according to Operator Manual
	Electrical system is not connected.	Connect electrical system to carrier vehicle. Check connections on electric leads.
	Lights on the control panel are not switched on	Turn on the lights
No lighting	Main switch of control panel is off	Set main switch of control panel in "I" position
	Damaged fuse on power lead	Check and replace fuse if necessary
	Burned-out light bulb	Replace light bulb
	Damaged lamps or conductors	Repair at an authorised service point

