



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

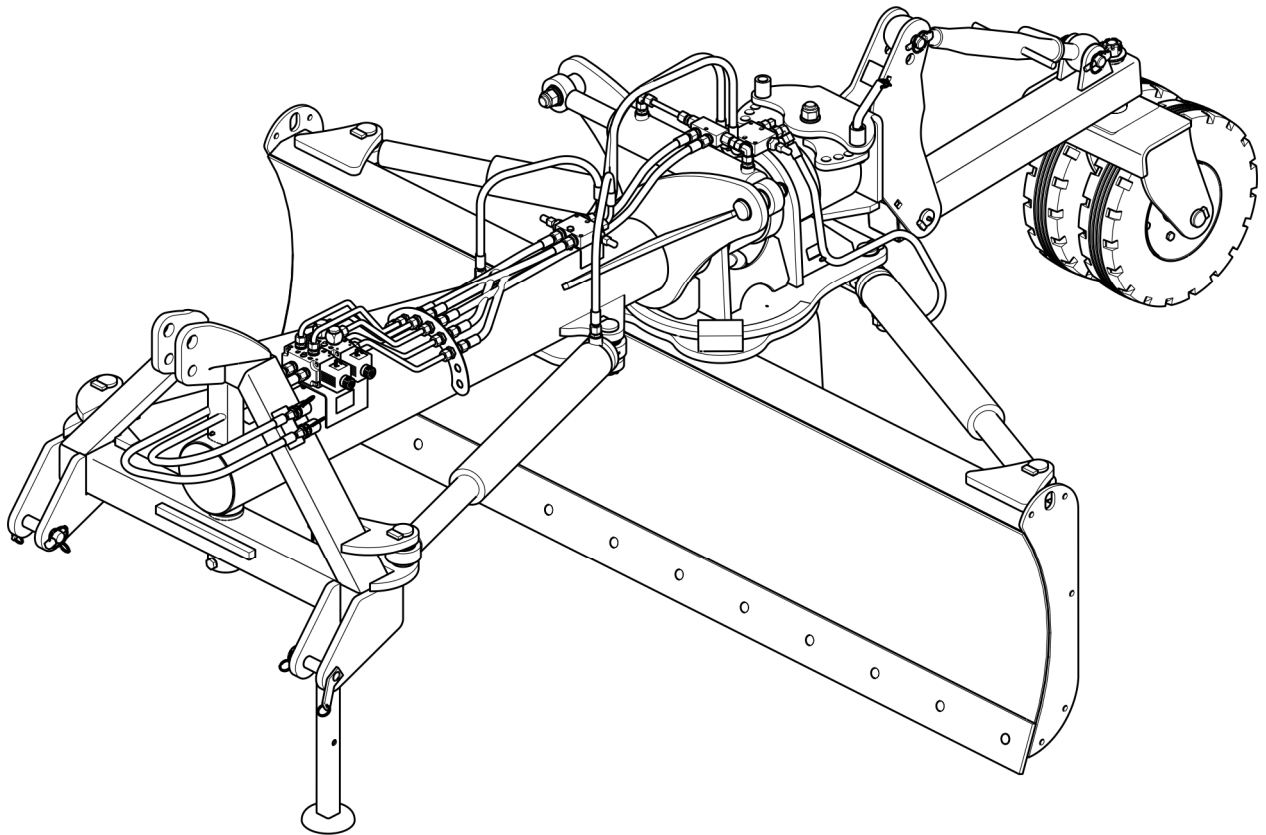
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OPERATOR MANUAL

ROAD GRADER

PRONAR RD-Z24

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 1A-11-2012

PUBLICATION NO 337N-0000000-UM



ROAD GRADER

PRONAR RD-Z24

MACHINE IDENTIFICATION

TYPE: *RD-Z24*

SERIAL NUMBER:

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INTRODUCTION

Information contained herein is current at date of publication. As a result of improvements, some numerical values and illustrations contained in this publication may not correspond to the factual specification of the machine supplied to the user. The manufacturer reserves the right to introduce design changes in machines produced that facilitate operation and improve the quality of their work, without making minor amendments to this Operator's Manual. This Operator's Manual is an integral part of the machine's documentation. Before using the machine, the user must carefully read this Operator's Manual and observe all recommendations. This guarantees safe operation and ensures failure-free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety rules and operation of the road grader RD-Z24. 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

<i>+48 085 681 63 29</i>	<i>+48 085 681 64 29</i>
<i>+48 085 681 63 81</i>	<i>+48 085 681 63 82</i>

SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

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



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

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



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

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



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



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

DIRECTIONS USED IN THIS OPERATOR'S MANUAL

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

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



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:	Grader
Type:	RD-Z24
Model:	—
Serial number:	
Commercial name:	Grader PRONAR RD-Z24

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.

PRONAR Spółka z o.o.
17-210 Narew ul. Mickiewicza 101A
Tel. (85) 681 63 29, 682 72 54
Fax: (85) 681 63 83
NIP 543-02-00-939, KRS 0000139188
REGON 000014169

**Z-CIA DYREKTORA
d/s technicznych
członek zarządu**

Roman Cielianuk

Narew, the 2022-06-24

Place and date

Full name of the empowered person
position, signature

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SECTION

1

**BASIC
INFORMATION**

1.1 IDENTIFICATION

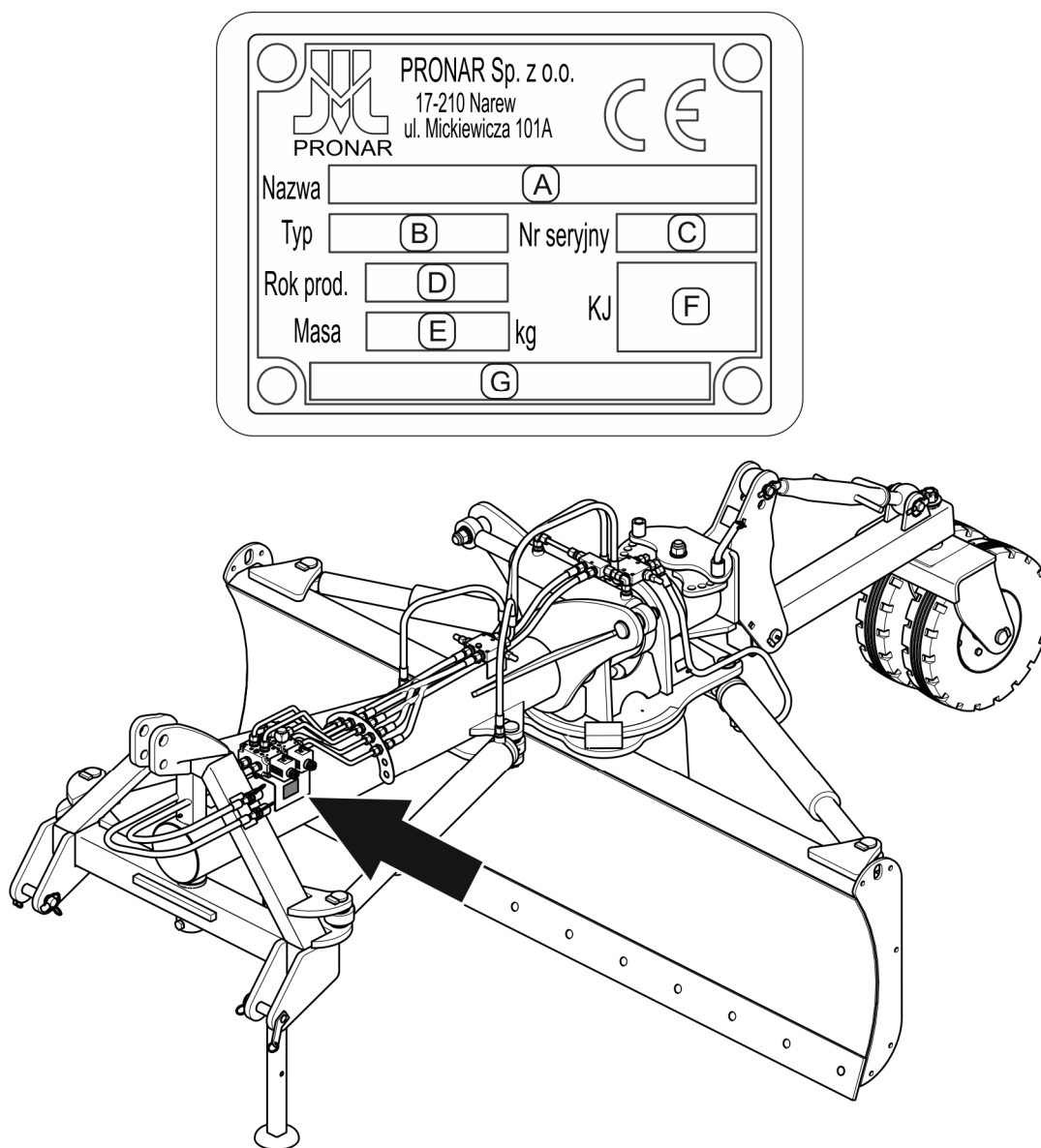


FIGURE 1.1 Location of the nameplate

Meaning of nameplate items (FIGURE 1.1):

- A - machine name
- B – type
- C – serial number
- D – year of manufacture
- E – machine tare weight [kg]
- F – Quality Control stamp
- G – unfilled box

Serial number is stamped on the nameplate. Nameplate is located in the front part of the main frame on the valve bracket(FIGURE 1.1). 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 road grader is used for grading and profiling unpaved roads (forest, field, access roads), and for removing snow from roads, squares and parking lots. Using the machine for other purposes will be regarded as contrary to intended use.

The road grader can be mounted on the rear of a tractor or another carrier vehicle that meets the requirements presented 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 machine must not be used for purposes other than those for which it is intended, in particular for:

- transport people, animals or any items on the machine

TABLE 1.1 Tractor requirements

	UNIT	REQUIREMENTS
Linkage		
Rear three-point linkage	-	Category II according to ISO 730-1
Hydraulic system		
Hydraulic oil	-	HL32
Pressure in the system	MPa	16 ÷ 20
Hydraulic sockets	-	2 sockets of one hydraulic section (standard version)
	-	4 sockets of two sections (version with hydraulically controlled working depth)
Electrical system		
Solenoid supply	-	3-pin socket
Electrical system voltage	V	12
Other requirements		
Maximum tractor power	HP (kW)	180 (132.4)

1.3 EQUIPMENT

The road grader equipment includes:

- Operator Manual
- Warranty Book

Equipment versions:

- conditioner unit,
- hydraulic control of the working depth

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:

- steel collecting blades,
- conditioners,
- jockey 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,
- incorrect 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.

Do NOT attempt to modify the machine without the written consent of the Manufacturer. In particular, do NOT weld, drill holes in, cut or heat the main structural elements, 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's technical documentation. 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.

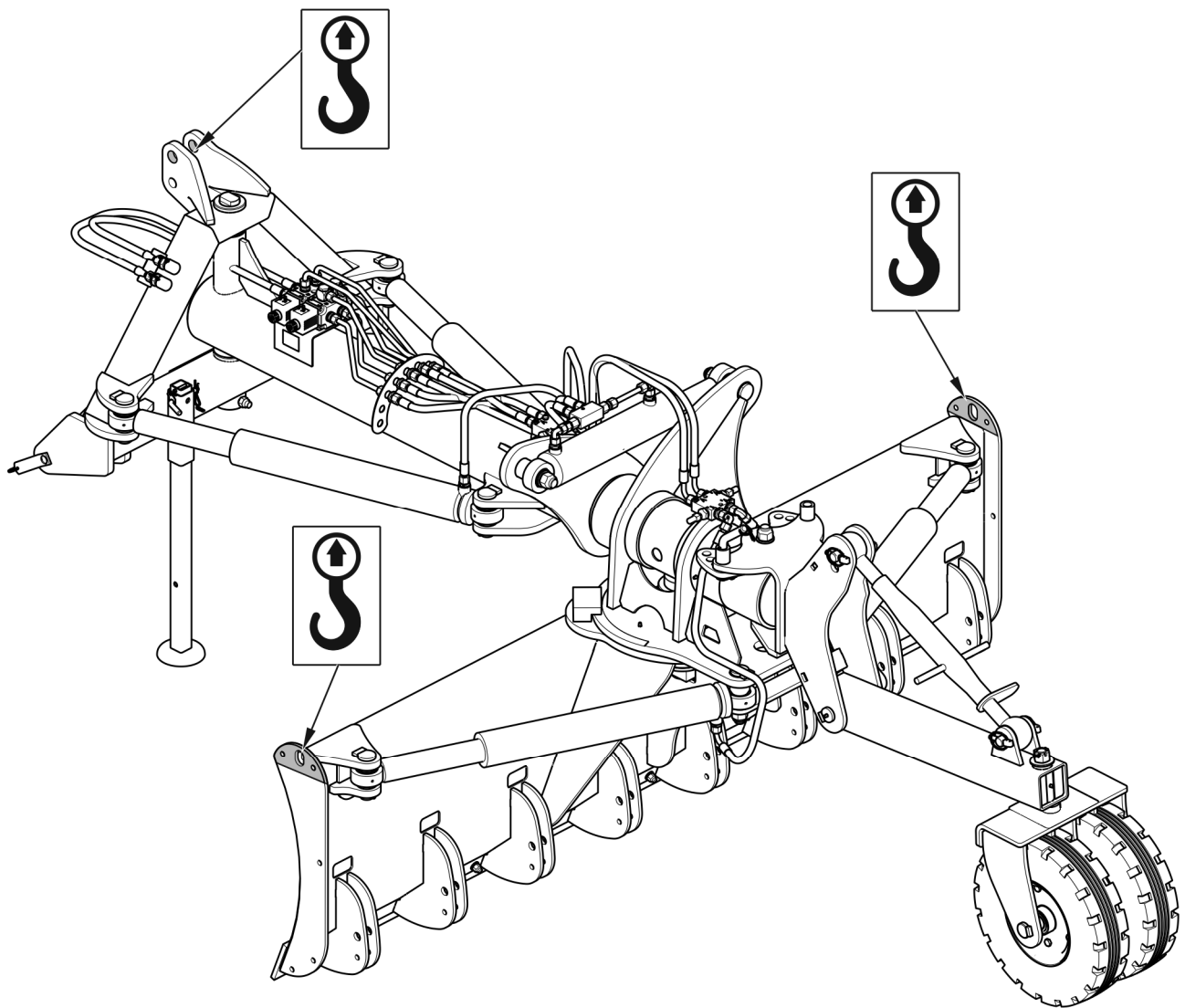


FIGURE 1.2 Transport lugs

The machine should be attached to lifting equipment in places specially designed for this purpose (FIGURE 1.2), i.e. by the holes in the mouldboard ends and by the central link securing hole. 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.

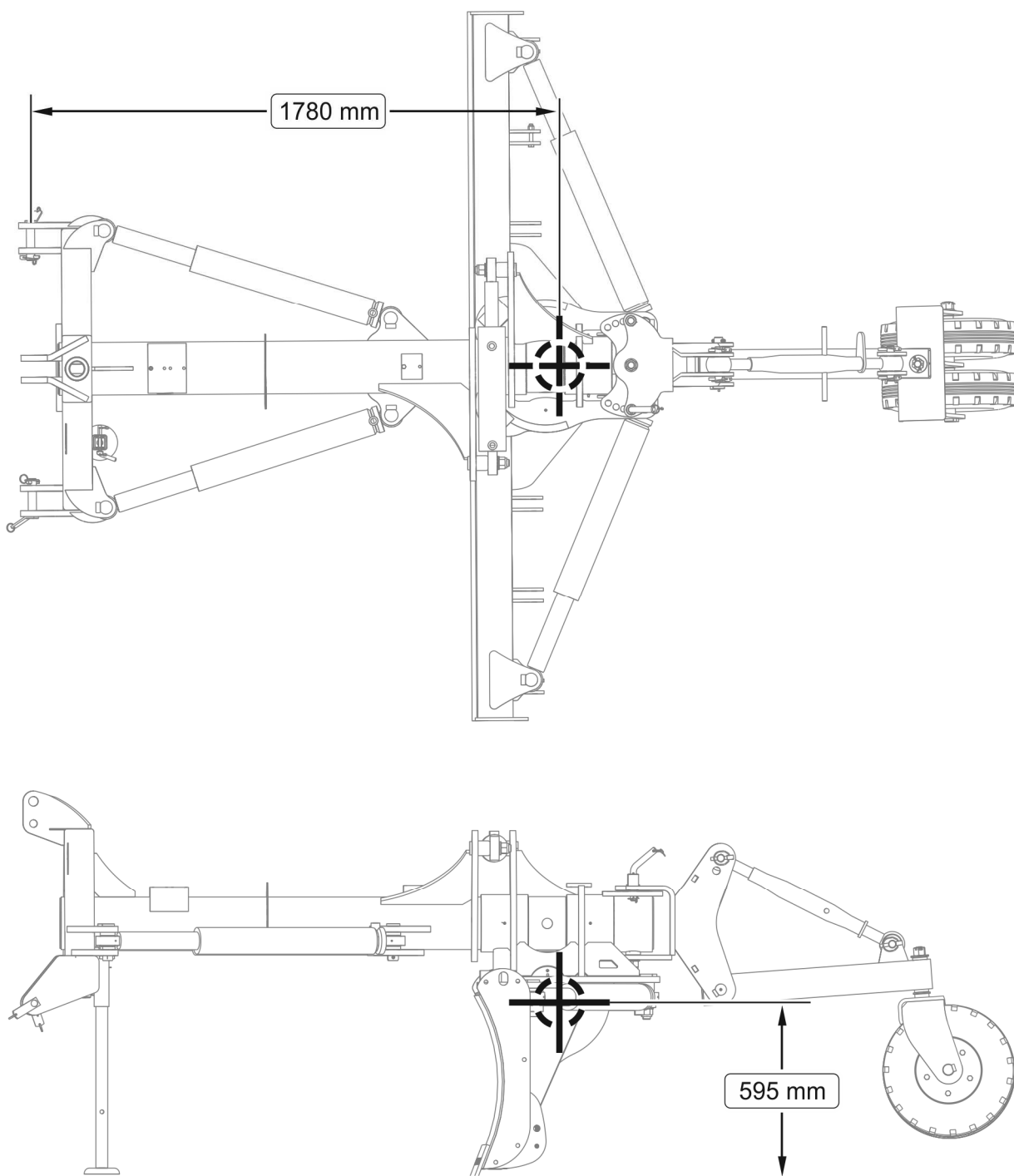


FIGURE 1.3 Centre of gravity



NOTE

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

**NOTE**

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

**DANGER**

When transporting independently, the user must carefully read this Operator Manual and observe all its instructions. 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 use extreme caution while transporting the machine. This is due to the vehicle's centre of gravity shifting upwards when the machine is loaded.

1.6 ENVIRONMENTAL RISK

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. While carrying out maintenance and repair work which involves the risk of an oil leak, this work should take place on an oil resistant floor or surface. In the event of oil leaking into the environment, first of all contain the source of the leak, and then collect the leaked oil using available means. Remaining oil should be collected using sorbents, or by mixing the oil with sand, sawdust or other absorbent materials. The oil contaminations, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container, and then passed on to the appropriate oil waste recycling centre. The container should be kept away from heat sources, flammable materials and food.

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

1.7 WITHDRAWAL FROM USE

Should you decide to withdraw the machine from use, comply with the regulations in force in the given country regarding withdrawal from use and recycling of machines withdrawn from use.

Before proceeding to dismantle 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.



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.

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 MACHINE USE

- Before use, the user must carefully read this Operator Manual and the *WARRANTY BOOK*. When operating the machine, follow all instructions in these documents.
- The 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. 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 tractor Operator Manual.

- Do not link the machine to the tractor when the linkage systems of machine and tractor are not compatible.
- After completion of hitching the machine, check the safeguards. Carefully read the carrier vehicle Operator Manual.
- 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.
- Be especially careful when hitching and unhitching the machine.
- When hitching, there must be nobody between the machine and the tractor.
- The machine disconnected from the carrier vehicle must be supported on the blade and the parking stand 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

- When connecting the hydraulic lines to the tractor, make sure that the tractor hydraulic system and machine are not under pressure. If necessary, reduce residual pressure in the 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 replaced every 4 years regardless of their technical condition.
- Repair and replacement of hydraulic system elements should be entrusted to the appropriately qualified persons.

2.1.4 TRANSPORTING THE MACHINE

- When driving on public roads, observe all road traffic regulations in force in the country, in which the machine is used.
- Do not exceed the maximum speed resulting from road conditions and design restrictions. Adjust speed to the prevailing road conditions and other limitations arising from road traffic regulations.
- Do NOT leave machine raised and unsecured while the tractor is parked. When parked, the machine should be lowered.
- Do NOT ride on the machine or transport any materials on it.
- When driving with raised implement, the tractor three-point 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, 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 of the machine releases the manufacturer (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.
- 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 tractor three point linkage.
- 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 tractor engine turned off and the ignition key removed. Immobilise tractor with parking brake. Ensure that unauthorised persons do not have access to the vehicle.
- 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.
- Before beginning repairs on hydraulic systems, reduce oil pressure.
- 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 ROAD GRADER OPERATION

- Before lifting or lowering the machine mounted on the tractor, make sure there are no bystanders near the machine.
- Before starting the machine make sure that there are no bystanders (especially children) or animals in the danger zone. The tractor (carrier vehicle) operator is obliged to ensure proper visibility of the machine and the working area.
- While operating the road grader turn on the orange beacon light (the tractor equipment)
- 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.
- Machine can be operated by a single person only.

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,
- failure to maintain a safe distance from the danger zone or being within the zones while the machine is operating,
- operation of the machine by unauthorised persons or persons under the influence of alcohol or other intoxicating substances,

- cleaning, maintenance and technical checks when carrier vehicle is connected and engine is running.


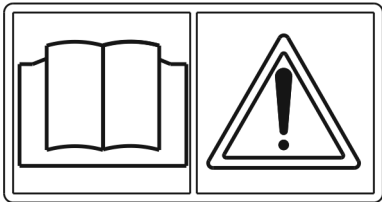
The residual risk may be kept to a minimum by following the recommendations below:


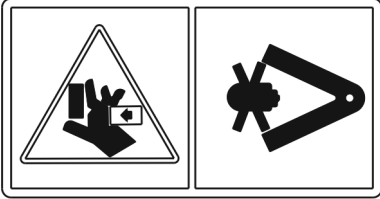


- operate the machine in prudent and unhurried manner,
- reasonably apply all the remarks and recommendations stated in the Operator Manual,
- carry out repairs and maintenance work in line with operating safety rules,
- repair and maintenance work should be carried out by persons trained to do so,
- 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.

TABLE 2.1 Information and warning decals

ITEM	SYMBOL	DESCRIPTION
1		Machine model
2		Before starting work, carefully read the Operator Manual.

ITEM	SYMBOL	DESCRIPTION
3		<p>Pressurised liquid. Keep a safe distance.</p>
4		<p>Do not reach into crushing space because elements may move. Danger of crushing hands or fingers.</p>
5		<p>Manufacturer.</p>
6		<p>Lifting equipment attachment points while loading the machine.</p>

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

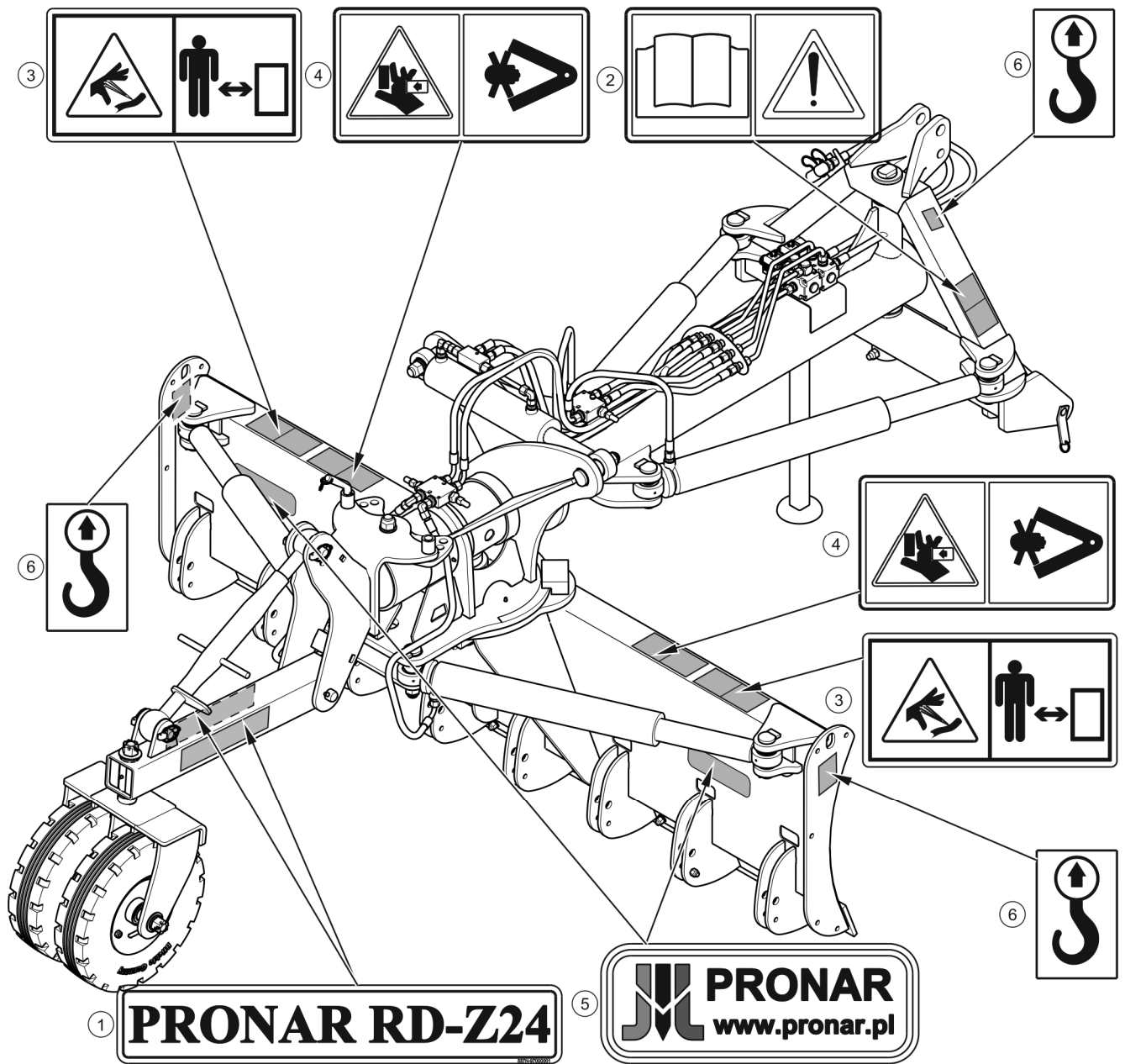


FIGURE 2.1 Locations of information and warning decals

Meaning of symbols (TABLE 2.1)

SECTION

3

**DESIGN AND
OPERATION**

3.1 TECHNICAL SPECIFICATION

TABLE 3.1 BASIC TECHNICAL DATA

	Unit	
Model of the road grader	-	RD-Z24
Mounting method	-	rear three-point linkage of cat. II according to ISO 730-1
Working width depending on the operating position A, B, C, (FIGURE 3.1)		
A - straight	mm	2,400
B, C - at an angle of 45°	mm	1,700
Horizontal angle of mouldboard turning	°	± 45
Vertical angle of mouldboard turning	°	± 30
Horizontal angle of frame turning		± 30
Mouldboard working height	mm	610
Type of collecting blades	-	smooth, made of hard-wearing steel
Control	-	hydraulic using solenoid
Supply	-	external hydraulic system and electrical system (12V) of the tractor
Number of hydraulic cylinders	pc.	5
Weight of machine ready for operation:	kg	930
Power demand	HP(kW)	100÷180 (73 ÷ 132)
Maximum working speed	km/h	10
Other information	-	single person operation

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

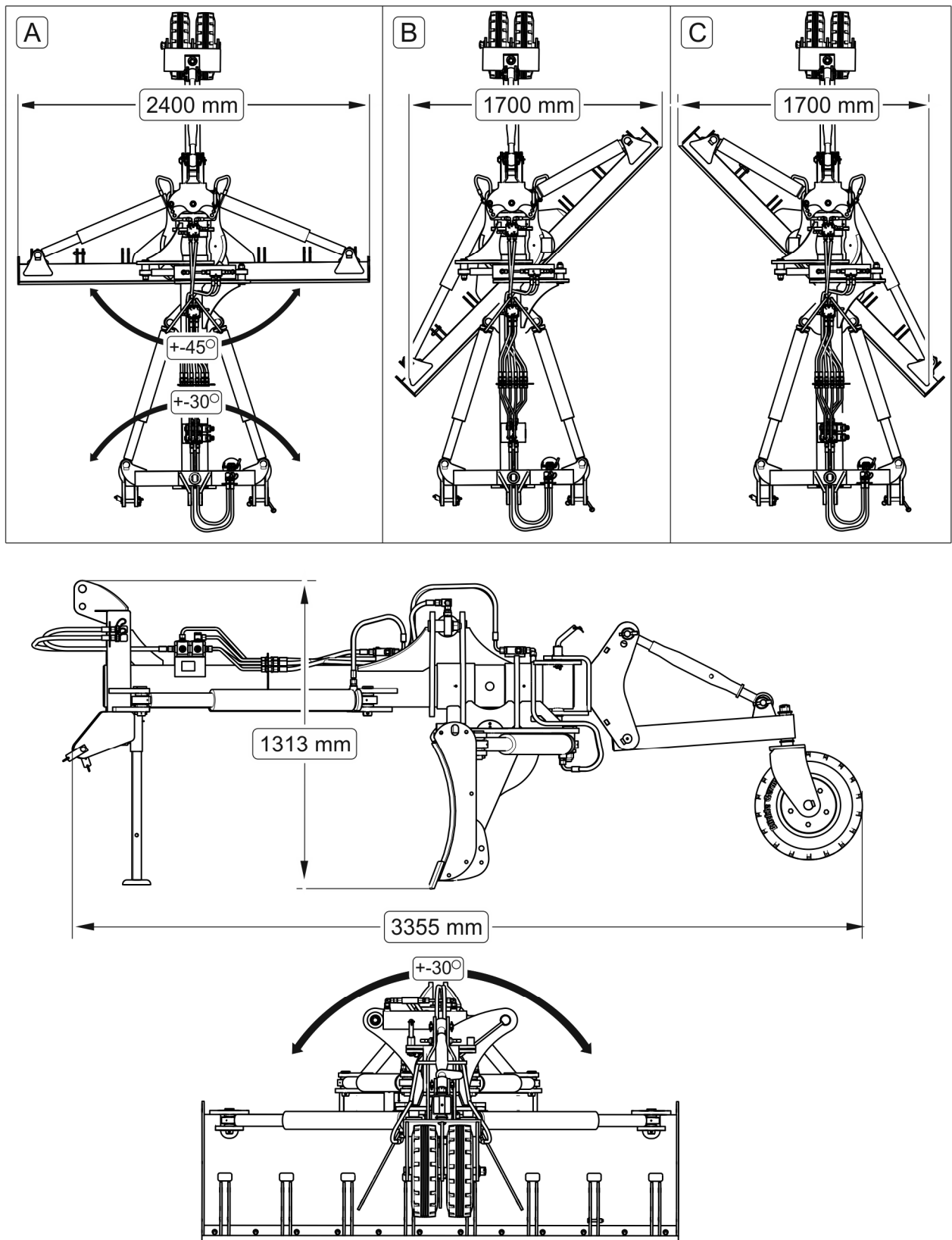


FIGURE 3.1 Dimensions and parameters of the RD-Z24 road grader

A, B, C - Working positions

3.2 GENERAL DESIGN

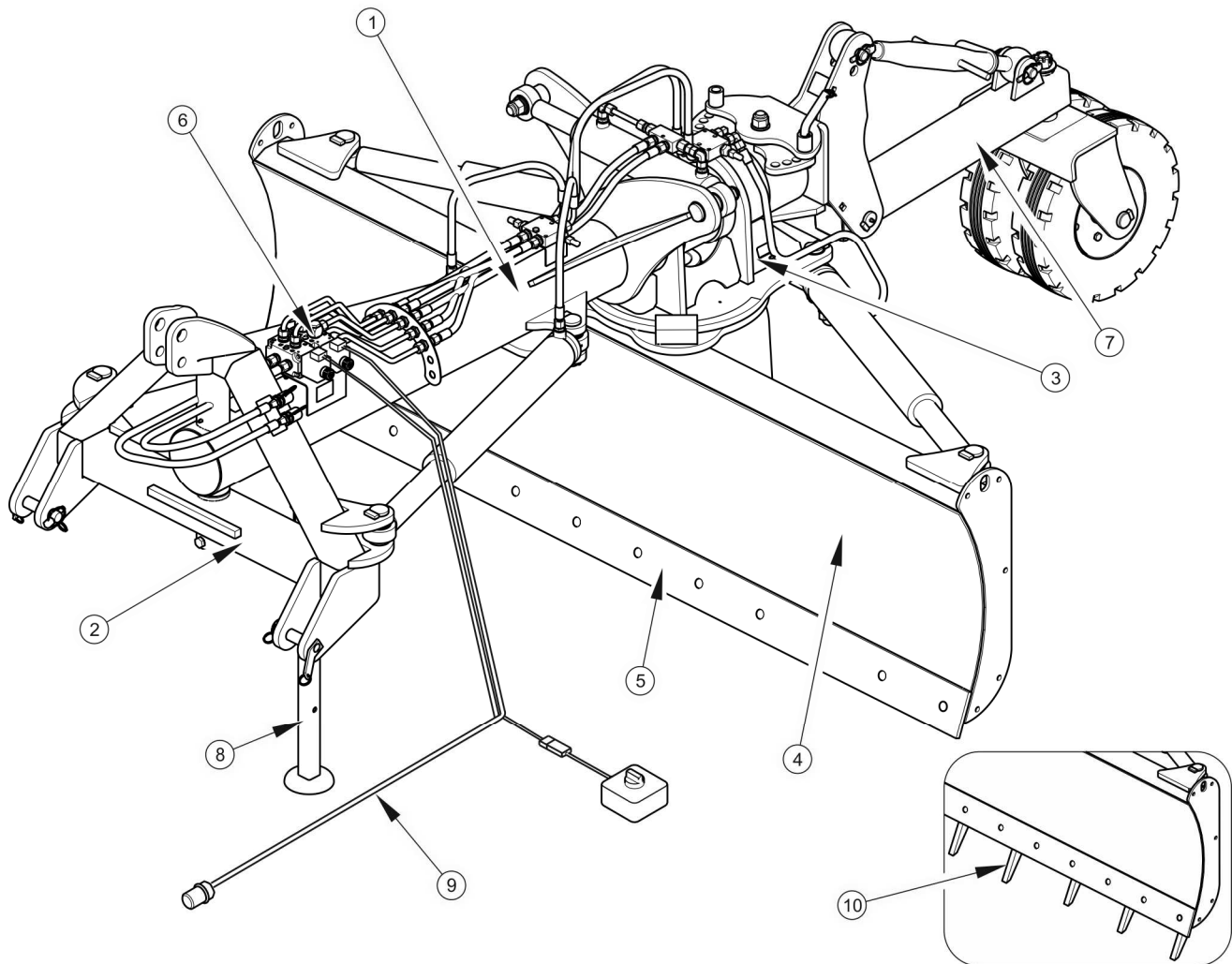


FIGURE 3.2 General design

(1) – main frame; (2) – three-point linkage; (3) – rotation body; (4) – mouldboard; (5) – blade; (6) – hydraulic system; (7) – jockey wheels; (8) – parking stand; (9) – electrical system, (10) – conditioner

The RD-Z24 road grader consists of the main frame (1) mounted on the 3-point linkage (2). The mouldboard (4) is attached to the frame on the rotation body (3). The mouldboard swing angle changes in two planes. The machine is controlled by the hydraulic system (6) and the electrical system (9). The mouldboard is equipped with the steel blade (5) made of wear-resistant steel. Jockey wheels (7) are installed at the rear of the machine. Parking stand (8) is used to support the machine unhitched from the tractor.

The road grader can be additionally equipped with conditioners (10) to loosen the soil and pick up tightly packed materials.

3.3 HYDRAULIC SYSTEM

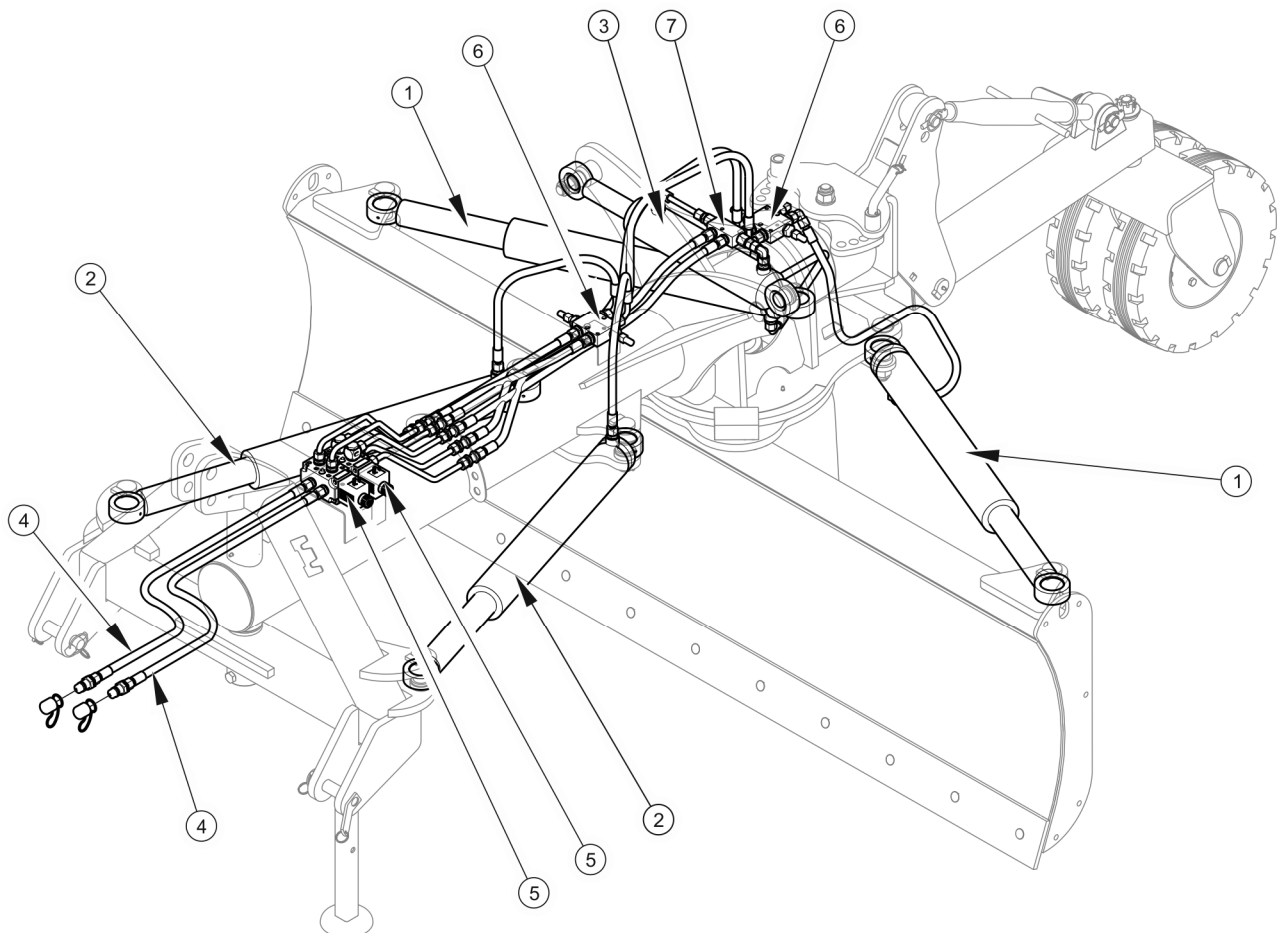


FIGURE 3.3 Hydraulic system design

(1) – hydraulic cylinder for mouldboard tilting; (2) – hydraulic cylinder for three-point linkage turning; (3) – hydraulic cylinder for mouldboard rotation; (4) – conduits; (5) – solenoid valve; (6) – cross overflow valve; (7) – hydraulic lock

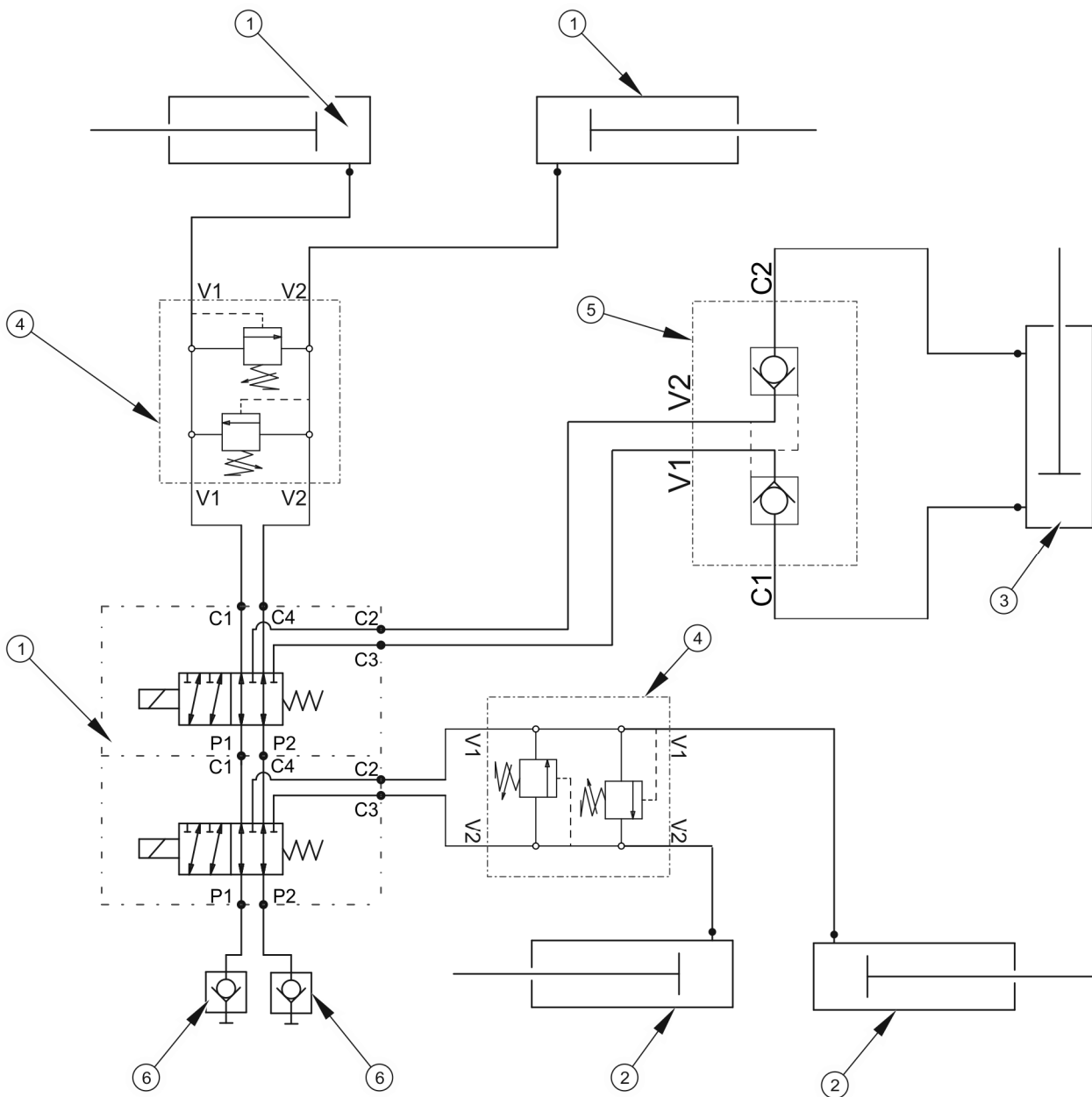


FIGURE 3.4 Hydraulic system concept diagram

(1) – hydraulic cylinder for mouldboard tilting; (2) – hydraulic cylinder for three-point linkage turning; (3) – hydraulic cylinder for mouldboard rotation; (4) – cross overflow valve; (5) – hydraulic lock, (6) – hydraulic connector

3.4 ELECTRICAL SYSTEM

Electrical control system of the road grader is designed for 12 V DC power supply. The electrical system is connected using a wire with a 3-pin plug. The standard equipment includes a 3-pin socket for installing in the tractor. In order to change the road grader mouldboard position, use one selective control valve lever in the tractor and the electric 4-position switch.

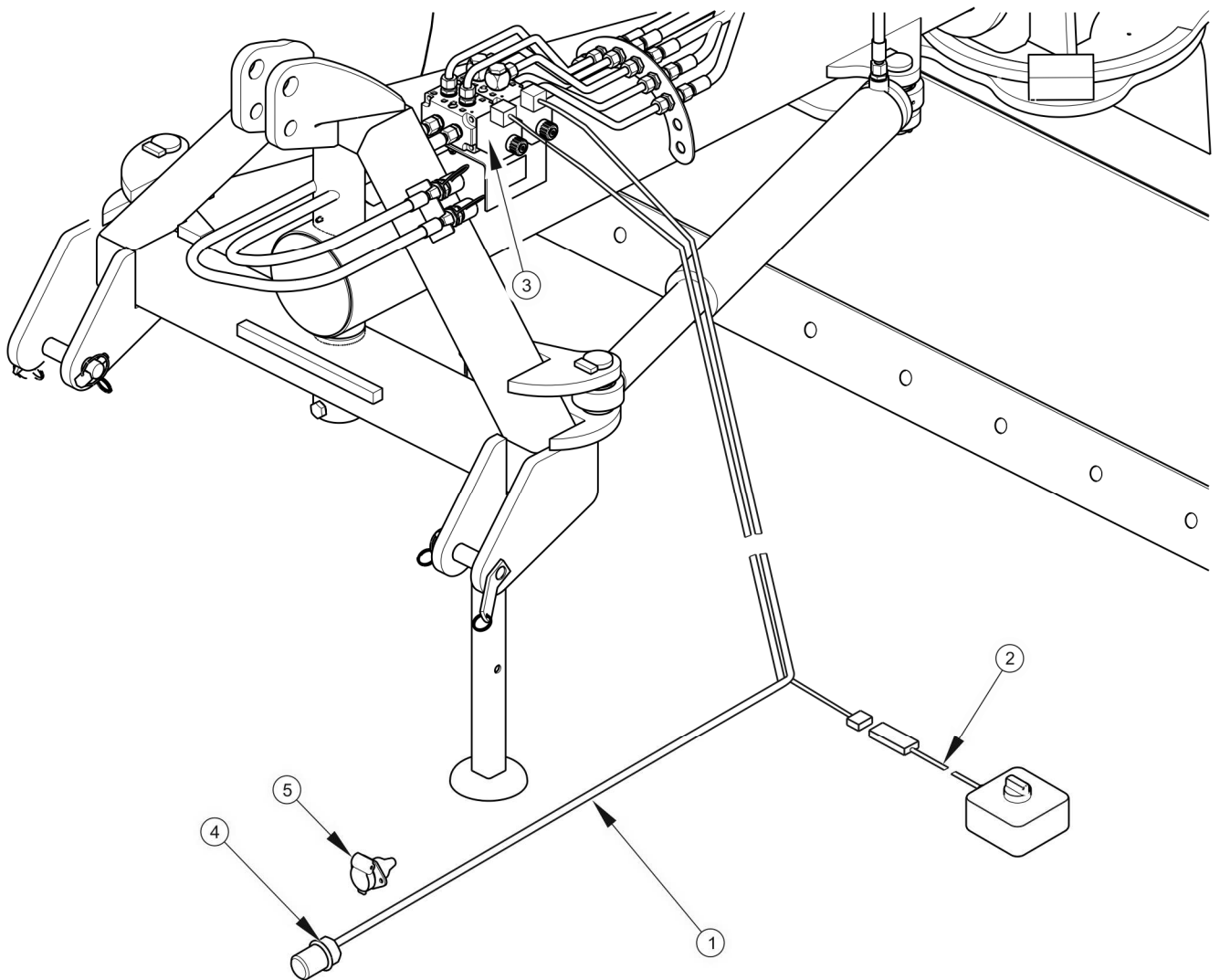


FIGURE 3.5 Electrical system design

(1) – solenoid valves wiring harness; (2) – control wiring harness; (3) – solenoid valve;
(4) – 3-pin plug; (5) – 3-pin socket

SECTION

4

**CORRECT
USE**

4.1 GET READY FOR OPERATION

DANGER



Before starting the road grader operation, 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 health.

The machine must never be used by persons, who are not authorised to drive tractors, including children and people under the influence of alcohol or other drugs.

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

Before starting the machine, ensure that there are no bystanders in the danger zone.

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 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,
- check the compatibility of the machine linkage with the tractor's linkage,
- check the compatibility of the hydraulic system connection sockets,
- check if the tractor is equipped with a 3-pin 12V electric socket for connecting the electrical system. Otherwise, install in the tractor the socket delivered additionally in the standard equipment of the road grader.
- 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 „MAINTENANCE“,
- check technical condition of the hydraulic and electrical system;
- check technical condition of the mouldboard and the collecting blade,

- check technical condition of the linkage components,

**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 tractor, started and all its individual systems checked. In order to do this:

- connect the machine to the tractor (see HITCHING TO TRACTOR),
- after connection of hydraulic system lines, confirm correctness of operation and check tightness of the system and cylinder,

In the event of a disruption in the operation of the machine immediately discontinue its use, find 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.

4.2 TECHNICAL INSPECTION

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

TABLE 4.1 TECHNICAL INSPECTION SCHEDULE

DESCRIPTION	MAINTENANCE ACTIVITIES	FREQUENCY
Technical condition of mouldboard and collecting blades	Visually inspect and if necessary replace according to section 5.1 CHECK AND REPLACE COLLECTING BLADES	Before starting work
Technical condition of linkage components	Assess the technical condition, if complete and correctly mounted.	
Technical condition of the hydraulic system.	Visually inspect the technical condition, check tightness and confirm correctness of operation	
Technical condition of the electrical control system	Visually inspect the technical condition, check the operation	
Check if all main nut and bolt connections are properly tightened	Tightening torque should be according to table 5.4	Once a week
Lubrication	Lubricate elements according to section „5.3 LUBRICATION.	According to table 5.3



NOTE

Do NOT use a malfunctioning or incomplete machine.

4.3 HITCHING TO TRACTOR

The RD-Z24 road grader may only be mounted on a tractor fulfilling the requirements presented in Table 1.1 „TRACTOR REQUIREMENTS”.



DANGER

Exercise caution when hitching the machine to tractor.

Do NOT hitch the machine to the tractor when the tractor engine is running.



NOTE

Before hitching the machine to tractor, the user must carefully read the tractor Operator Manual.

In order to hitch the machine to the tractor:

- Reverse the tractor and bring the lower links of the tractor three point linkage close to mounting points (A) on the road grader frame - (FIGURE 4.1).
- Set lower links of the tractor three-point linkage at appropriate height.
- Switch off tractor engine and prevent tractor from unintentional moving.
- Connect the lower mounting points (A) with the lower links of the tractor three point linkage using pins (1) and secure them with cotter pins (2).
- Connect top link (B) of the tractor three point linkage with upper mounting point (B) and secure it.
- Connect quick couplers (3) of hydraulic lines to the tractor external hydraulic system.
- Connect the 3-pin plug (4) of the electrical system to the 3-pin socket in the tractor.
- Connect the switch (5) to the main wiring harness and place it in the operator's cab in an accessible place ().
- Lift the machine using tractor three point linkage.
- Raise the parking stand (1), lock it in its position with the linchpin (2) and secure it with the cotter pin (3) - (FIGURE 4.2).

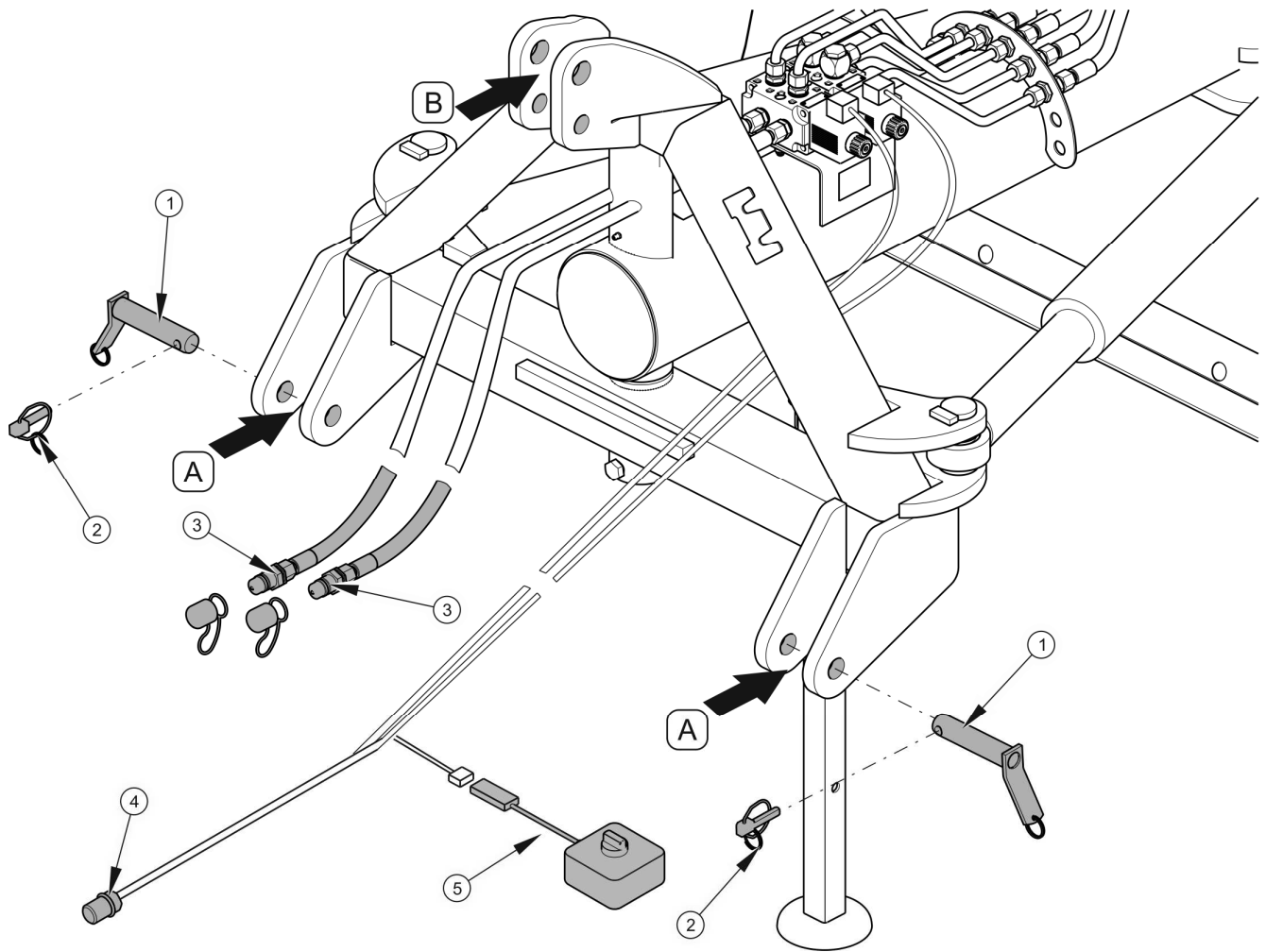


FIGURE 4.1 Hitching to tractor

(A) – mounting points for the lower links of the tractor three point linkage; (B) – mounting point for the top link (central link), (1) – pins of lower links; (2) – securing cotter pin; (3) – hydraulic quick couplers; (4) – 3-pin plug; (5) – 4-position switch

DANGER



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

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

Prior to connecting appropriate system leads, carefully read the Operator Manual of the tractor and observe all manufacturer’s recommendations.

**NOTE**

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

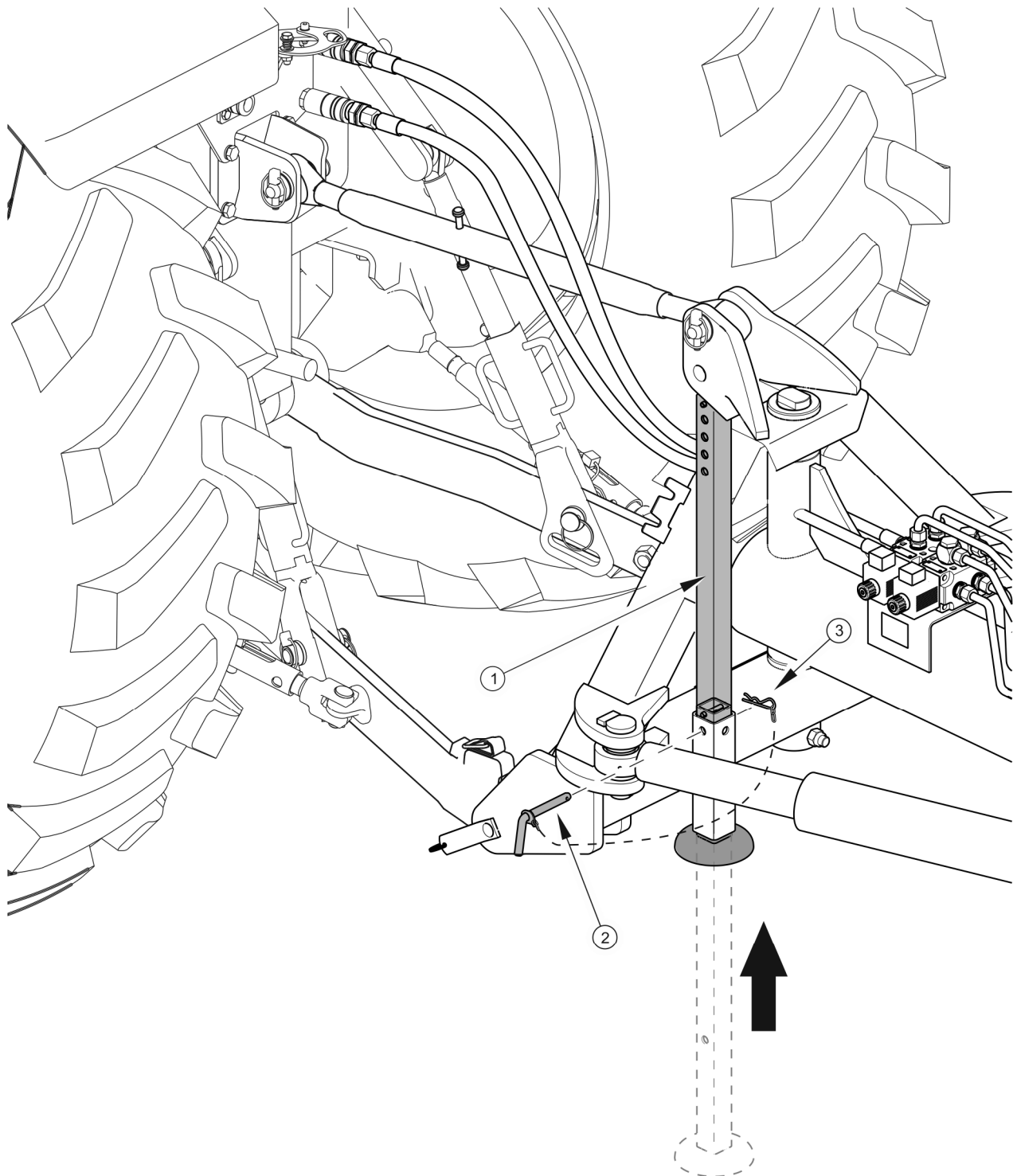


FIGURE 4.2 Parking stand

(1) – parking stand; (2) – linchpin; (3) – securing cotter pin

4.4 ROAD GRADER OPERATION

4.4.1 SETTING THE WORKING DEPTH

To set the road grader working depth, adjust the height of the jockey wheels (1) by means of the bottle screw (2) - (FIGURE 4.3). Tighten the screw to raise the jockey wheels and increase the road grader working depth. Unscrew the bottle screw to reduce the working depth.

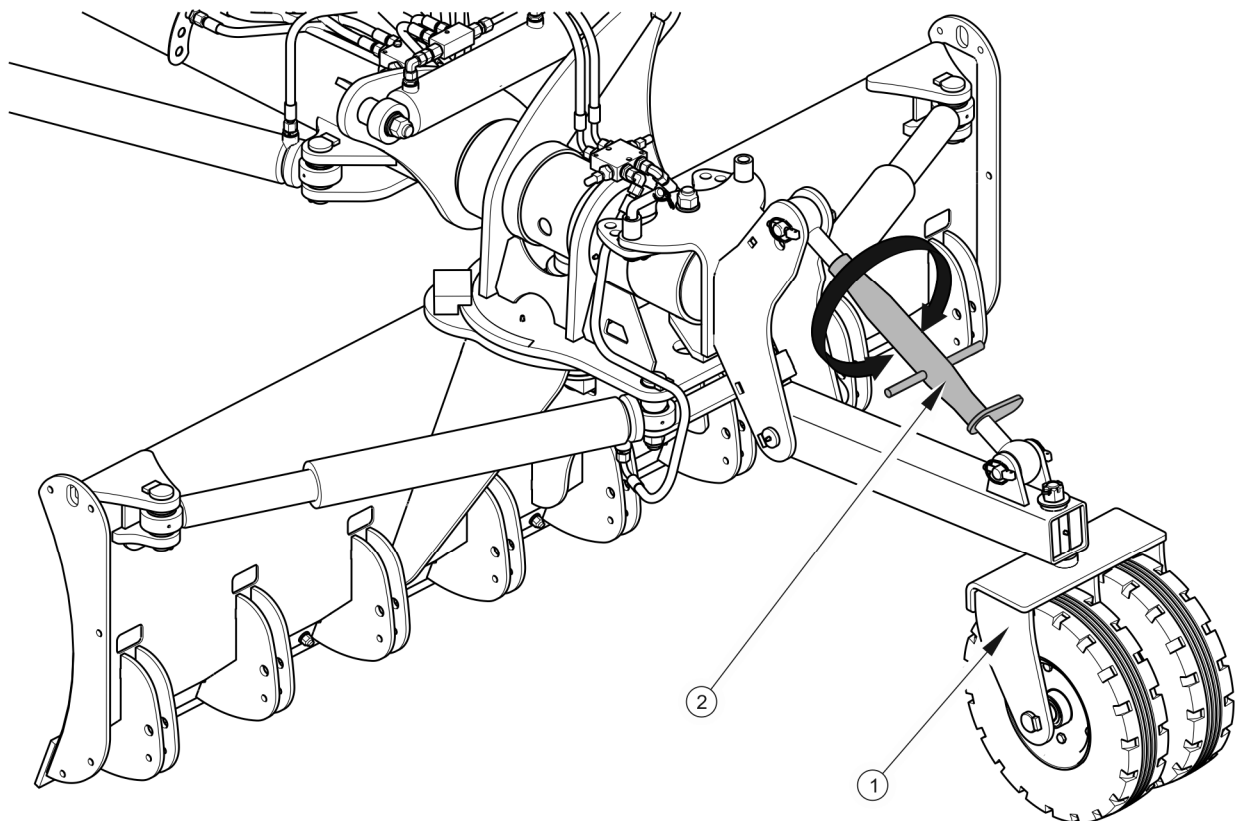


FIGURE 4.3 Setting the working depth

(1) – jockey wheels; (2) – bottle screw

4.4.2 CONTROLLING THE MOULDBOARD POSITION

In order to set the mouldboard position, select one of the four positions on the switch, and then use the manifold lever controlling the appropriate section of the tractor's external hydraulic system.

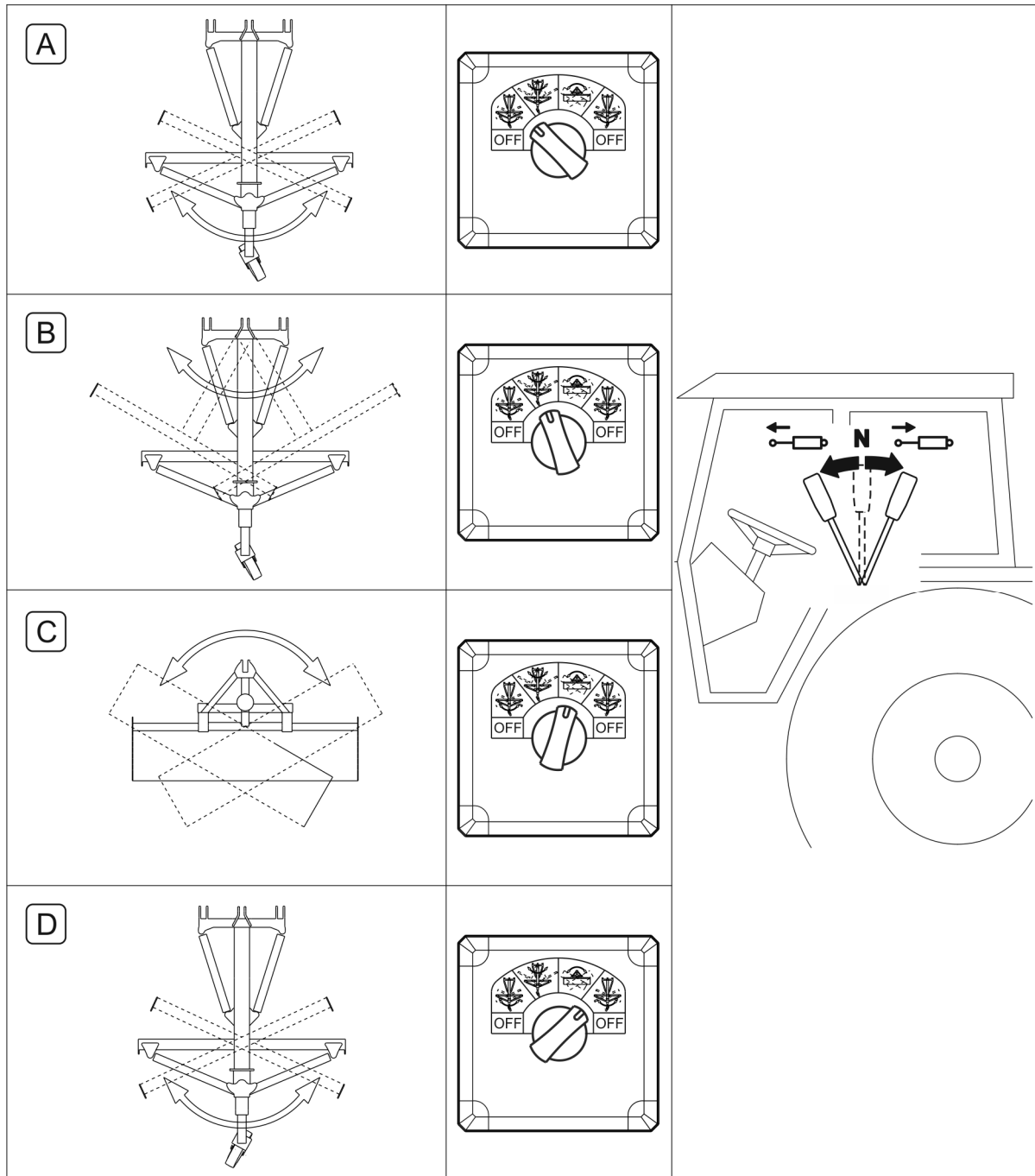


FIGURE 4.4 Changing the mouldboard position

A, B, C, D – electric switch functions

With the switch in the "A" or "D" position, the solenoid valve remains turned off, then you can control the mouldboard swing angle in the horizontal position. After setting the knob to the "B" position, the solenoid valve switches power to the system of cylinders that control the three-point linkage frame tilt. After setting the knob to the "C" position, the solenoid valve switches power to the cylinder that controls the mouldboard swing angles in the horizontal position.

**DANGER**

When controlling the machine there must be nobody within the mouldboard working area.

4.4.3 SETTING THE JOCKEY WHEEL BRACKET

The road grader design allows the main frame to be turned to the left or right at an angle of 30° in relation to the three-point linkage. The main frame turning is carried out using two hydraulic cylinders located on both sides of the road grader, connecting the main frame with the three-point linkage. Turning the frame causes the mouldboard to be shifted to the right or left in relation to the tractor travel direction, thanks to which the operator can easily set the machine in such a position as to work close to walls, fences or on the road edge.

After appropriate setting of the frame angle in relation to the three-point linkage with the use of hydraulic cylinders, set the angle of displacement of the jockey wheel bracket so that jockey wheels always follow the road grader mouldboard on a levelled surface.

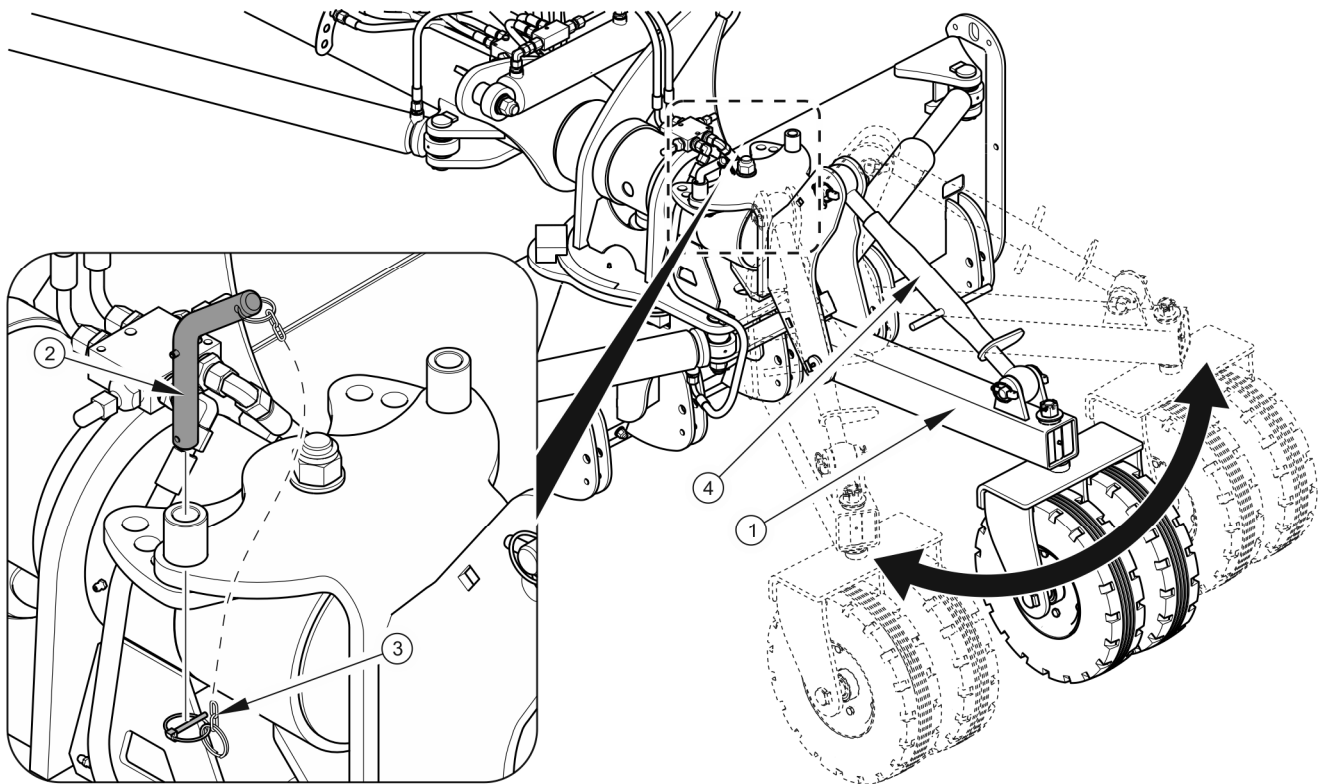


FIGURE 4.5 Setting the jockey wheels

(1) – jockey wheel bracket; (2) – pin; (3) – linchpin, (4) – bottle screw

Successive stages of setting the jockey wheels - (FIGURE 4.5).

- 1) Lower the road grader until the blade completely rests on the ground
- 2) Use the bottle screw (4) to raise the jockey wheels.
- 3) Unlock the linchpin (3) and remove the lock pin (2).
- 4) Move the jockey wheel bracket by turning it to the left or right. Moving the bracket by one hole changes its position angle by 10°. The bracket rotation range is $\pm 30^\circ$.
- 5) Insert the pin (2) in a properly selected hole and secure it with the linchpin (3).
- 6) Lower the jockey wheels by means of the bottle screw until they rest on the ground.



IMPORTANT

The use of floating function is recommended in order to protect the machine against damage. The tractor weight must not be transferred to the road grader.

4.5 TRANSPORTING THE MACHINE

When driving on public 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 tractor, 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, pavement condition and other conditions.
- When driving with raised machine 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 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 machine raised, reduce speed due to dynamic loads and the risk of damaging the machine or tractor.
- When driving with raised implement, secure the tractor linkage against falling or accidental dropping.

4.6 UNHITCHING THE MACHINE FROM THE TRACTOR



DANGER

Before unhitching the machine from the tractor, turn off the tractor engine, engage the parking brake and secure cab against access of unauthorised persons.

Be especially careful when unhitching the machine from the tractor.



DANGER

Reduce pressure prior to disconnecting the hydraulic system.

To disconnect machine from the tractor:

- with the road grader lifted, unlock the cotter pin (3) and remove the linchpin (2) - (FIGURE 4.6),
- lower the parking stand (1) and secure it with the linchpin (2) and the cotter pin (3),
- lower the road grader until it fully rests on the ground,
- turn off the engine in the tractor, engage the parking brake,
- reduce residual pressure in the hydraulic system using the appropriate hydraulic circuit control lever,
- disconnect the plugs (4) of hydraulic conduits and the electrical system cable with a 3-pin plug,
- secure the plugs (4) with the stoppers (5) and place them in the bracket (6),
- disconnect the top link (B) (central connector) and the lower links of the tractor three point linkage (A) and drive tractor away from the machine.

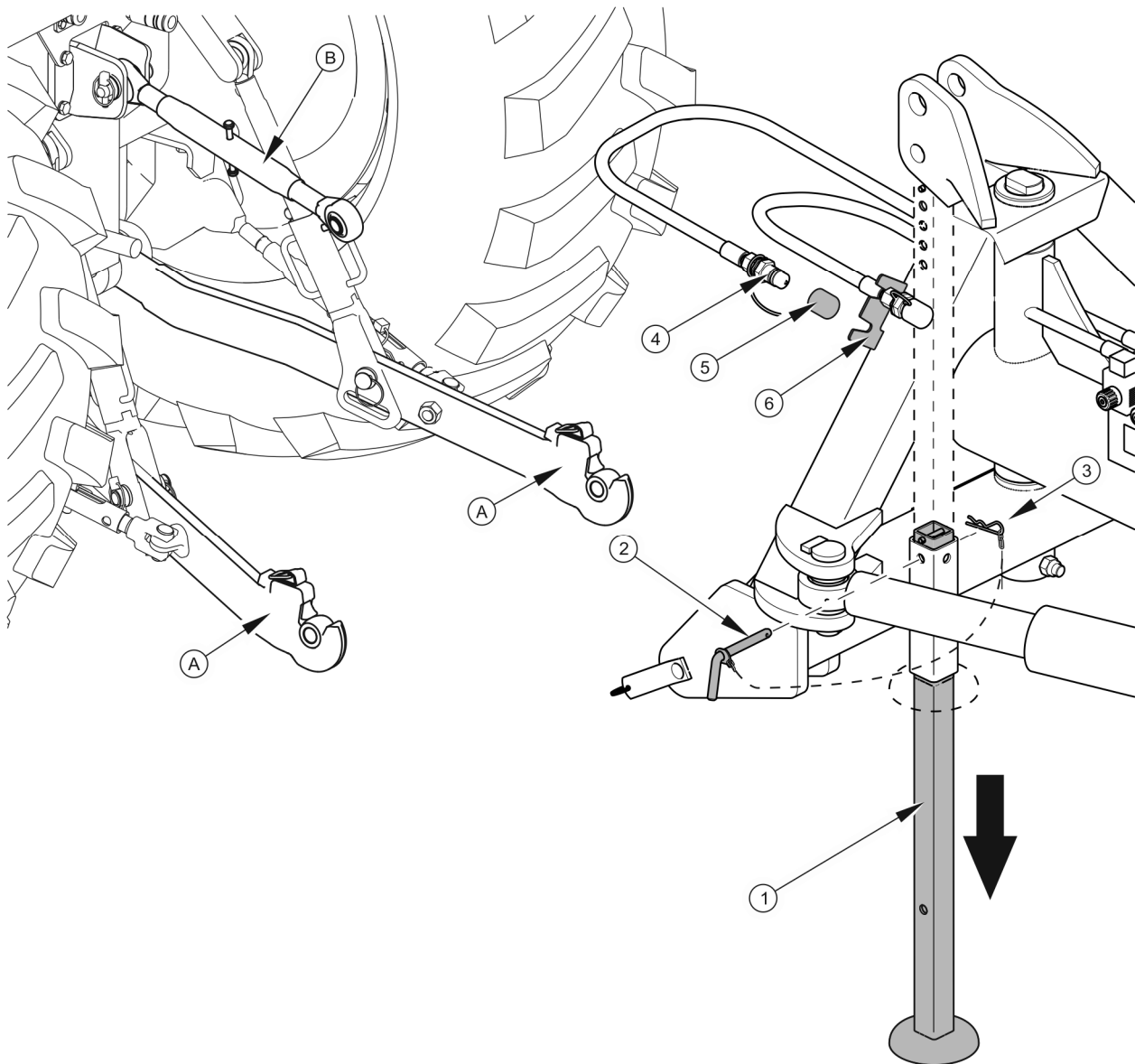


FIGURE 4.6 Lowering of parking stand

(1) - parking stand; (2) - linchpin; (3) - securing cotter pin; (4) - hydraulic conduit connector; (5) - stopper; (6) - bracket; (A) – lower links of the tractor three point linkage; (B) – top link (central connector)

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

SECTION

5

MAINTENANCE

5.1 CHECK AND REPLACEMENT OF COLLECTING BLADES



DANGER

During inspection and replacement of blade, turn off tractor engine and remove the key from the ignition.



DANGER

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

If the blade is excessively worn or damaged, it should be replaced with a new one. Raise the road grader and support with sufficiently stable and strong supports. If the road grader is hitched and raised on the rear three-point linkage, protect it from falling and immobilise the tractor (turn off the engine and engage the parking brake.)

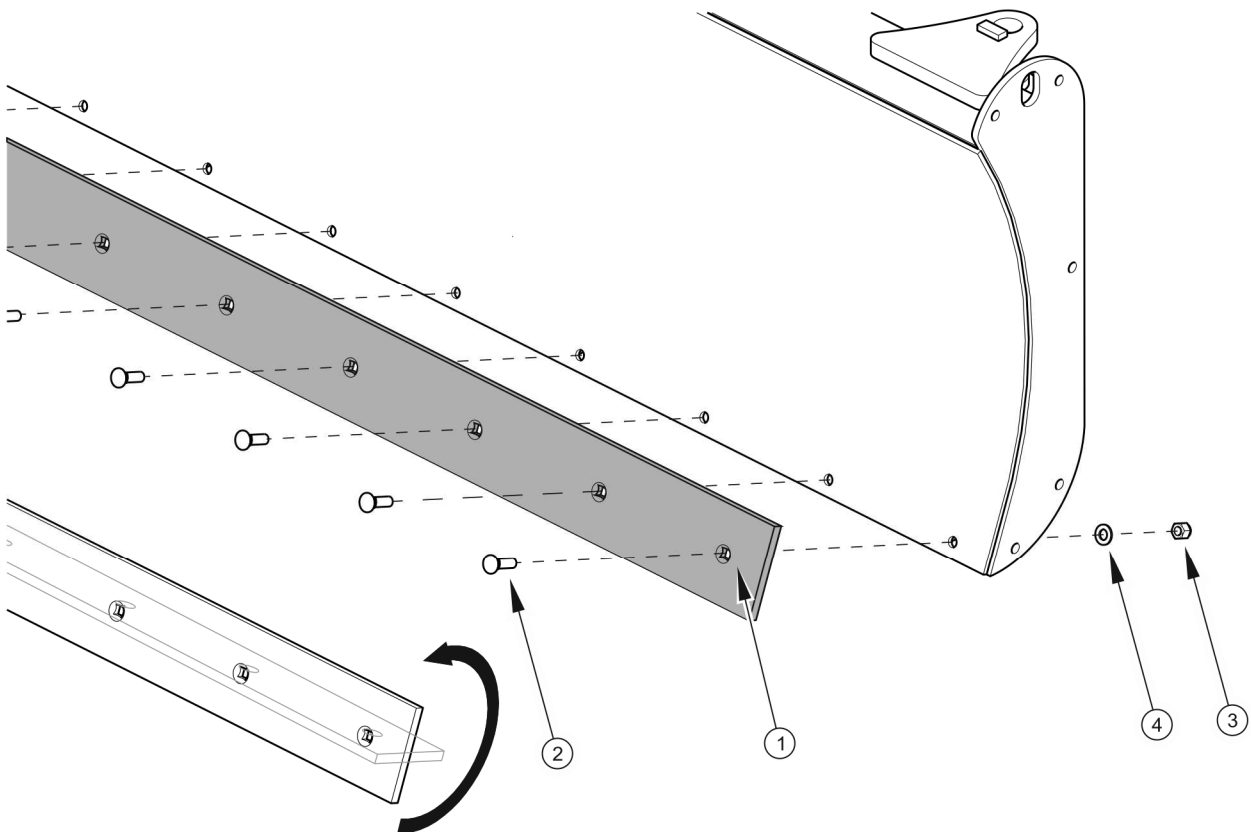


FIGURE 5.1 Blade replacement

(1) - steel blade; (2) - bolt Z M12x40; (3) - self-locking nut M12; (4) - washer 12

To remove a steel blade, (*FIGURE 5.1*) undo nuts (3), remove washers (4) and take out bolts (2). The steel blade is reversible and can be turned by 180°. Excessively worn or damaged blade must be replaced with a new one- (*TABLE 5.1*).

TABLE 5.1 Type of collecting blade

Name / Part No.	Figure number	Quantity [pcs]
Steel blade/ 337N-00000002	5.1	1



NOTE

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

5.2 HYDRAULIC SYSTEM MAINTENANCE

Hydraulic system maintenance duties:

- check tightness of cylinders hydraulic connections,
- check technical condition of hydraulic lines;



DANGER

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



NOTE

Before starting work, visually inspect the hydraulic system components.

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

tract. A hazard only occurs when oil is strongly atomised (oil vapour), or in the case of fire during which toxic compounds may be released.



	<p>DANGER</p> <p>Oil fires should be quenched with carbon dioxide (CO₂), foam or extinguisher steam. Do NOT use water for fire extinguishing!</p>
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TABLE 5.2 HL32 HYDRAULIC OIL SPECIFICATION

ITEM	NAME	VALUE
1	ISO 3448VG viscosity classification	32
2	Kinematic viscosity at 40°C	28.8 – 35.2 mm ² /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 hydraulic system must be tight. Inspect the seals when hydraulic cylinders are completely extended. In the event of confirmation of oil on hydraulic cylinder bodies ascertain origin of leak. Minimum leaks are permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the machine until faults are remedied.

	<p>The condition of hydraulic system should be inspected regularly while using the machine.</p>
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	<p>DANGER</p> <p>Before commencing whatever work on hydraulic system reduce the residual pressure in the system.</p> <p>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.</p>
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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.

5.3 LUBRICATION

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

**DANGER**

Lubricate the machine when it is lowered on its supports 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.

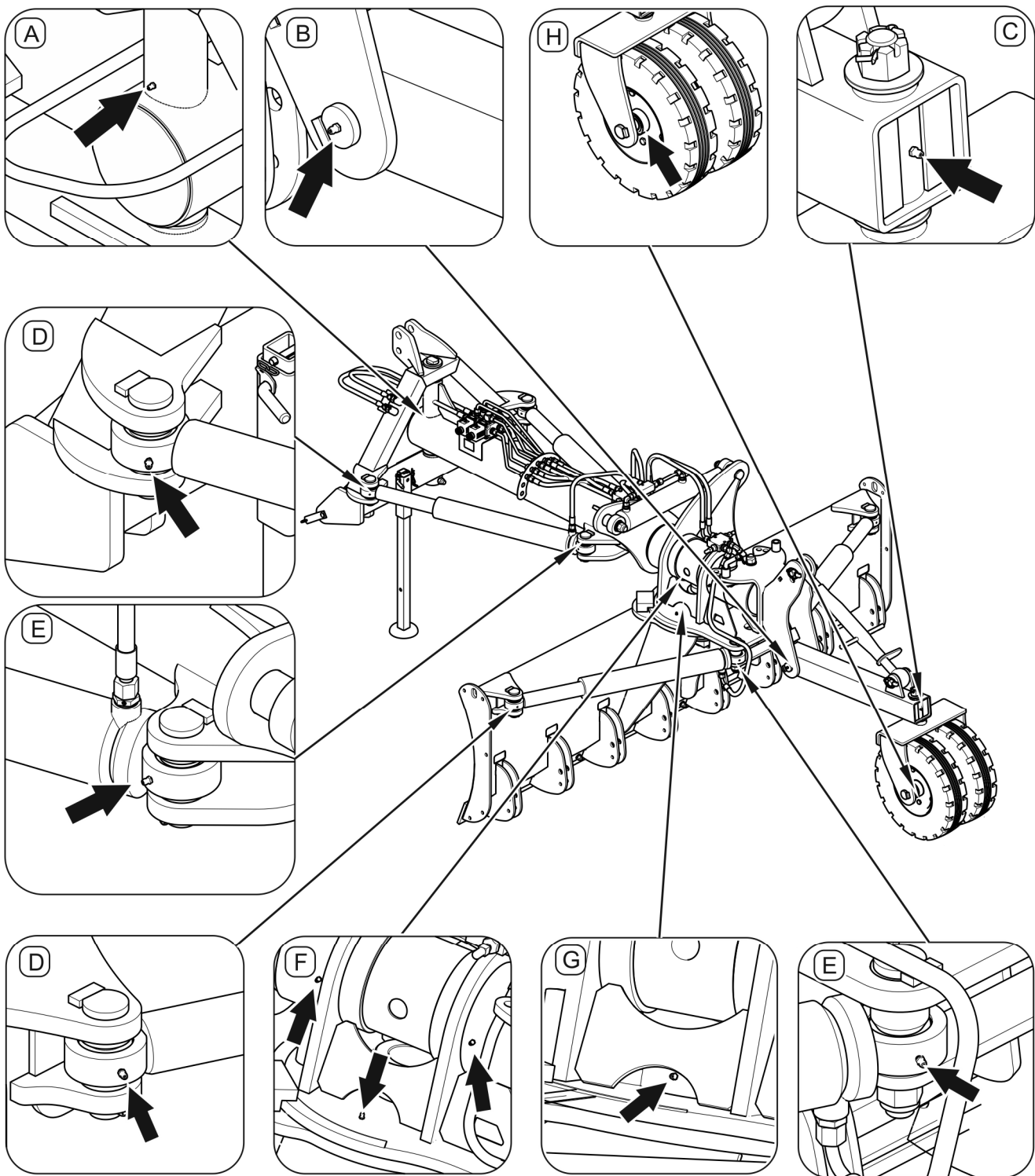


FIGURE 5.2 Lubrication points
Lubrication points described in table 5.3

TABLE 5.3 LUBRICATION POINTS AND LUBRICATION FREQUENCY

ITEM	NAME	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	LUBRICATION FREQUENCY
A	Main frame rotation sleeve	1	grease	50 hours
B	Wheel arm pin	1		50 hours
C	Fork pin	1		50 hours
D	Cylinder rod eye	6		50 hours
E	Hydraulic cylinder eye	6		50 hours
F	Swivel body sleeve Swivel body surface	6		50 hours
G	Mouldboard pivot pin	2		50 hours
H	Wheel bearing	2		10 hours

Marking description in Item column (TABLE 5.3) conforms with numbering shown (FIGURE 5.2)

5.4 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 conduits 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 road grader should be placed on a parking stand.

5.5 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). Recommended tightening torque values for non-greased steel bolts are given in TABLE 5.4


	<p>NOTE</p> <p>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.</p>
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TABLE 5.4 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

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

5.6 TROUBLESHOOTING

TABLE 5.5 TROUBLESHOOTING

TYPE OF FAULT	POSSIBLE CAUSE	REMEDY
It is impossible to position the mouldboard	Hydraulic or electric system not connected	Connect the hydraulic quick coupling plugs and the electric plug to the tractor's systems
	Tractor's hydraulic system is switched off or inoperative	Check the tractor hydraulic system
	Damaged hydraulic quick couplers	Check quick couplers for damage, refer repair to service, if necessary
	The machine hydraulic system is damaged	Repair at an authorised service point
	Damaged electrical system of the machine or tractor (carrier vehicle)	Repair at an authorised service point
	4 -position switch control wire not connected	Connect the switch control wire
Uneven scraping	Excessively worn or damaged blade	Check and replace if necessary
	Incorrect machine settings	Check and adjust
	Too high working speed	Reduce the working speed

NOTES

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