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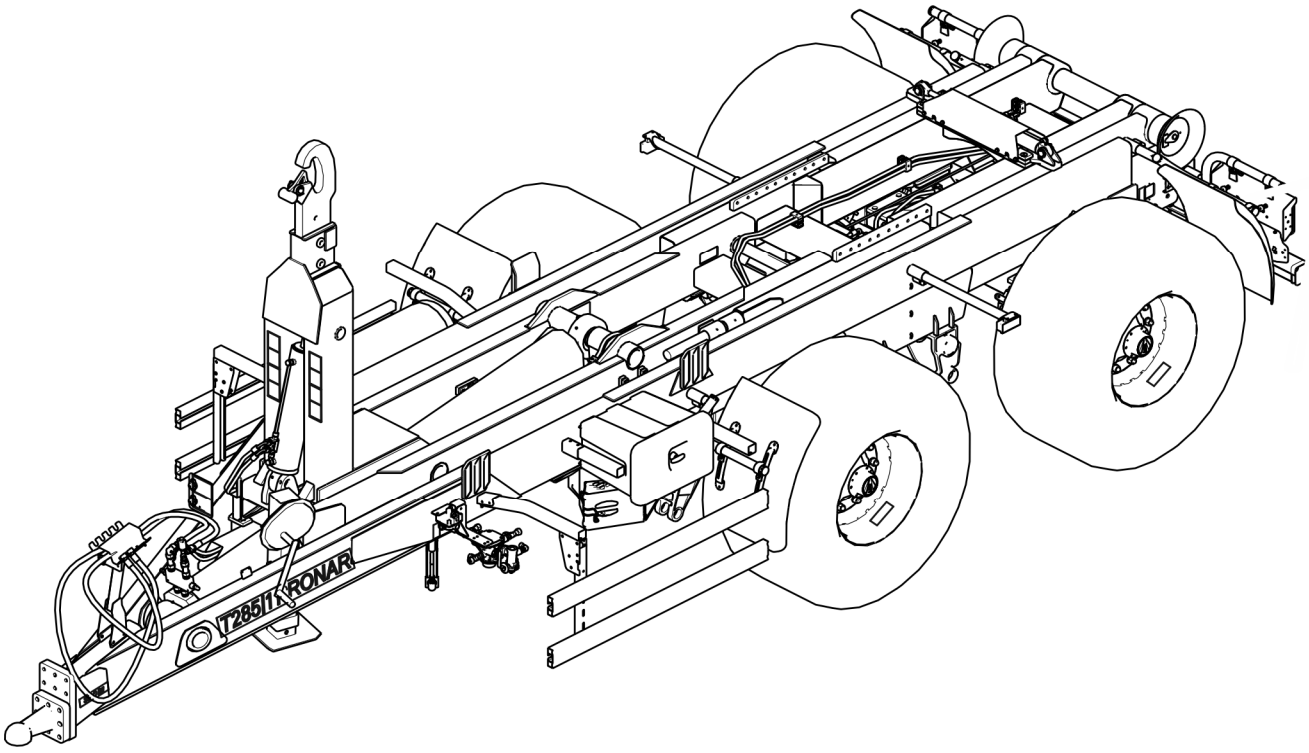
OPERATOR'S MANUAL

AGRICULTURAL TRAILER

PRONAR T285/1

TRANSLATION OF THE ORIGINAL COPY OF THE MANUAL



EDITION 2A-10-2014

PUBLICATION NO 385N-00000000-UM

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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 malfunction free work of the machine. The machine is designed to meet obligatory standards, documents and legal regulations currently in force.

The manual describes the basic safety rules and operation of agricultural trailer Pronar T285/1.

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:

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SYMBOLS APPEARING IN THIS OPERATOR'S MANUAL

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

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

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

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

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

Additional tips and advice for machine operation are marked:

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

DIRECTIONS USED IN THIS OPERATOR'S MANUAL

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

REQUIRED SERVICE ACTIONS

Service actions described in the manual are marked: ➡

Result of service/adjustment actions or comments concerning the performance of actions are marked: ⇨

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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:	**AGRICULTURAL TRAILER**
Type:	**T285/1**
Model:	–
Serial number:	
Commercial name:	**AGRICULTURAL TRAILER PRONAR T285/1**

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.

Narew, the 2014 -08- 28

Place and date

Full name of the empowered person
position, signature

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SECTION

1

BASIC INFORMATION

1.1 IDENTIFICATION

1.1.1 TRAILER IDENTIFICATION

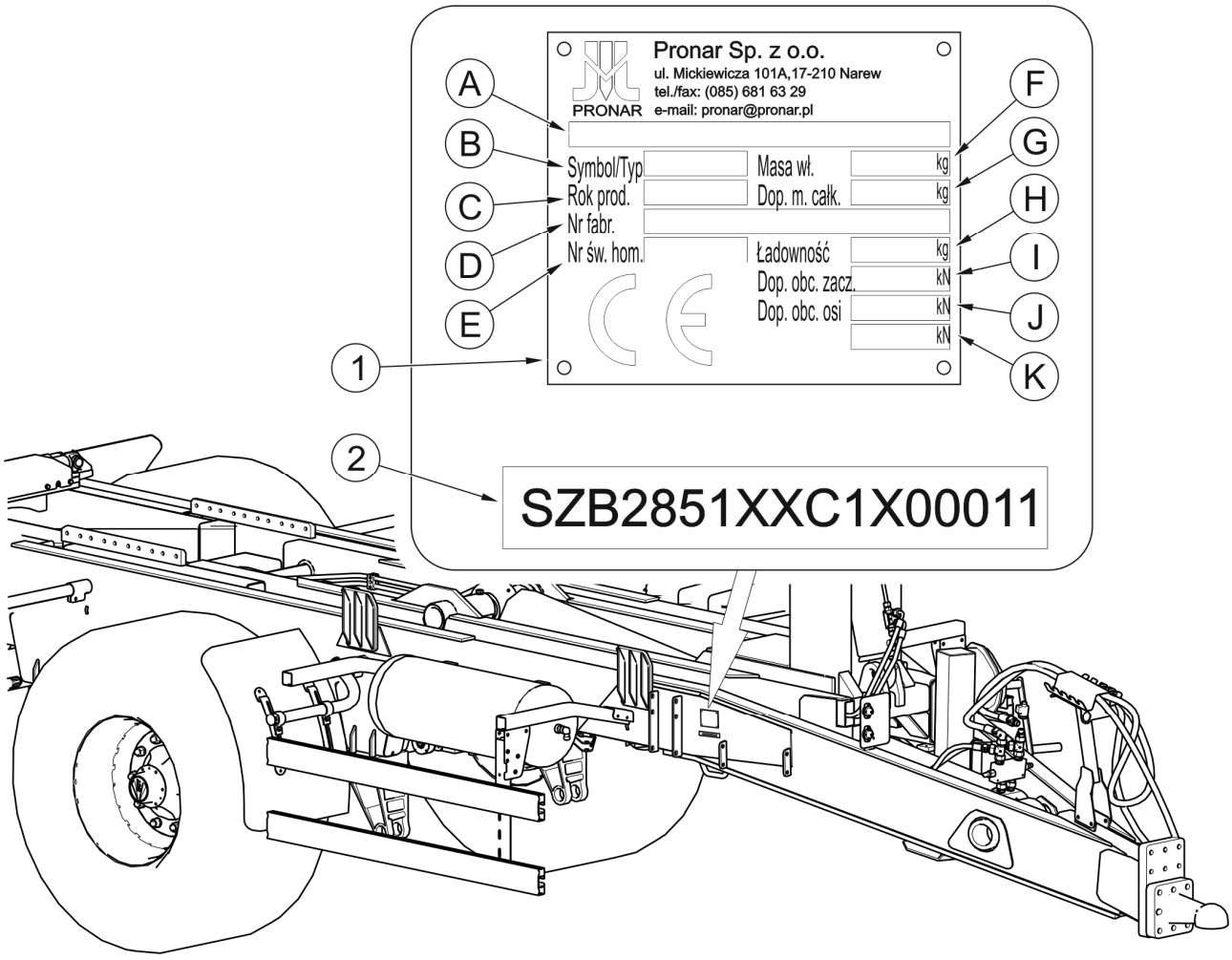


FIG. 1.1 Location of the data plate and serial number

(1) data plate, (2) serial number

PRONAR T285/1 agricultural trailer is marked with the data plate (1) located on the reinforcement of the right longitudinal member of the lower frame and with serial number (2). The serial number is stamped into the data plate and into the reinforcement of the right longitudinal member of the lower frame – figure (*1.1*). When buying the trailer check that the serial numbers on the machine agree with the number written in the *WARRANTY BOOK*, in the sales documents and in the *OPERATOR'S MANUAL*. The meanings of the individual fields found on the data plate are presented in the table below:

TAB. 1.1 Markings on data plate

ITEM	MARKING
A	General description and purpose
B	Symbol /Type
C	Year of manufacture
D	Seventeen digit vehicle identification number (VIN)
E	Official certificate number
F	Tare weight
G	Maximum gross weight
H	Carrying capacity
I	Permissible hitching system loading
J	Permissible axle 1 load
K	Permissible axle 2 load

1.1.2 AXLE IDENTIFICATION

The factory number of the axle and its type are stamped onto the data plate secured to the axle profile.

1.1.3 LIST OF FACTORY NUMBERS

VIN

S	**Z**	**B**	**2**	**8**	**5**	**1**					**X**					

FRONT AXLE FACTORY NUMBER

REAR AXLE FACTORY NUMBER

TIP

In the event of ordering a replacement part or in the case of the appearance of problems it is often essential to give the factory numbers of parts or the VIN number of the trailer, therefore it is recommended that these numbers are inscribed in the spaces below.

1.2 PROPER USE

The hook trailer is designated for use with various types of load boxes (agricultural, building, communal, special and transport platforms etc.), fulfilling the requirements described in table (*1.2*), at the maximum design speed of 40 km/h. Trailer design enables connection and disconnection of load boxes and their unloading by tipping to the rear. Type of load carried depends on load box use. The trailer must not be used in any way other than that described above.

DANGER

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

- **for transporting people and animals,**
- **for transporting loose unsecured toxic materials, if there is a possibility of causing environmental damage,**
- **for transporting machines and equipment, with high centre of gravity affecting trailer stability,**
- **for transporting loads with uneven loading and overloading of axles,**
- **for transporting unsecured loads, which may move in the load box.**
- **with load boxes not complying with the Manufacturer's requirements.**

The trailer is constructed according to current safety requirements and engineering standards. The brake system and the light and indicator system meet the requirements of road traffic regulations. The maximum speed of the trailer on public roads in Poland is 30 km/h (pursuant to Traffic Law Act of June 20th 1997, article 20). In the countries where the trailer is used, the limits stipulated by the road traffic legislation in force in a given country must be observed. The trailer speed must not, however, be greater than the maximum design speed of 40 km/h.

The trailer is not intended or designed for transporting people or animals.

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

- carefully read the *OPERATOR'S MANUAL* of the trailer and the *WARRANTY BOOK* and conform with the recommendations contained in these documents,
- understand the trailer's operating principle and how to operate it safely and correctly,
- adhere to the established maintenance and adjustment plans,
- comply with general safety regulations while working,
- prevent accidents,
- comply with the road traffic regulations and transport regulations in force in a given country, in which the trailer is used,
- carefully read the Operator's Manual and comply with its recommendations,
- only hitch the trailer to an agricultural tractor, which fulfils all the requirements made by the trailer's Manufacturer.

The trailer may only be used by persons, who:

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

TAB. 1.2 Load box requirements

DATA	UNIT	VALUE
Minimum length★	[mm]	5,400
Maximum length★	[mm]	6,400
Maximum width	[mm]	2,550
Maximum height (with rollers)	[mm]	2,500
Maximum gross weight	[kg]	16,360

★ *the length from hook axis to trailer rear edge*

The hook trailer is designed for work with load boxes made according to DIN 30722-1 standard. The trailer may be used with load boxes of total length not less than 5 650 mm and not greater than 6 150 mm. Width and height of load box may not exceed dimensions given in table (*1.2*). The trailer is also designed for work with load boxes made by Pronar, the technical parameters of which are detailed in table (*1.3*).

TAB. 1.3 Technical data of Pronar K04 load box

DATA	UNIT	VALUE
Maximum gross weight	kg	16,000
Carrying capacity	kg	13,500
Tare weight	kg	2,500
Length★	mm	6,150
Maximum height (with rollers)	mm	2,235
Load space length	mm	5,750
Width of load space	mm	2,300
Height of load space	mm	2,000
Dimensions (length/width/height)	mm	6,198 / 2,512 / 2,341
Height of hook mounting	mm	1,570

★ *the length from hook axis to trailer rear edge*

Requirements concerning trailer operation with agricultural tractor are presented in the table below.

TAB. 1.4 Agricultural tractor's requirements

CONTENTS	UNIT	REQUIREMENTS
Brake system		
Pneumatic system 2 - line	-	sockets compliant with PN-ISO 1728
Nominal pressure of the pneumatic system	bar / kPa	6.5 / 650
Hydraulic brake system		
Nominal pressure of the hydraulic system	-	socket compliant with ISO 7241-1
	bar / MPa	160 / 16
Hydraulic system		
Hydraulic oil	-	HL 32
Pressure rating of the system	bar / MPa	200 / 20
Oil demand:	L	25
Sockets	-	according to ISO 7241-1
Electrical system		
Electrical system voltage	V	12
Connection socket	-	7 polar compliant with ISO 1724
Connection socket	-	3 polar
Tractor hitches		
Minimum vertical load capacity of hitch	kN / kg	29.43 / 3,000
Other requirements		
Minimum power demand	kW / HP	92 / 125

Axle system (axles, wheels and tyres), meet the requirements of agricultural trailers. These requirements can be fulfilled only if the trailer is operated in a proper manner and the principles of operation specified in this operator's manual are adhered to.

1.3 EQUIPMENT

TAB. 1.5 Hook trailer equipment

EQUIPMENT	STANDARD	ADDITIONAL	OPTIONS
Operator's Manual	•		
Warranty Book	•		
Connection lead for the electrical system	•		
Double line pneumatic system without rear connector	•		
Double line pneumatic system with rear connector			•
Double line pneumatic system with ALB			•
Hydraulic brake system			•
Rear connectors hydraulic system			•
Hand brake	•		
Set of plastic mudguards	•		
Straight hydraulic support	•		
Mechanical support			•
Telescopic support			•
Rotating drawbar eye ∅50 mm	•		
Standard drawbar eye ∅40 mm			•
Standard drawbar eye ∅50 mm			•
Ball drawbar eye K80.			•
Wheel chocks	•		
Automatic rear hitch		•	

EQUIPMENT	STANDARD	ADDITIONAL	OPTIONS
Manual rear hitch		•	
Slow-moving vehicle warning sign		•	
Warning reflective triangle		•	
Lateral shields		•	
Toolbox		•	
Wheels 445/65R22.5reg. (18R22.5)	•		
Wheels: 445/65R22.5, 500/60R22.5, 550/60-22.5, 560/60R22.5, 600/50R22.5, 600/55-22.5, 620/50R22.5			•
Rear protection 2410	•		
Rear protection 2460			•

Some standard equipment elements, which were listed in table (*1.5*), may not be present in the delivered trailer. This allows the possibility of ordering new machines with a different set of optional equipment, replacing standard equipment.

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'S MANUAL*. The repair period is specified in the *WARRANTY BOOK*.

The warranty does not apply to those parts and sub-assemblies of the machine, which are subject to wear in normal usage conditions, regardless of the warranty period. Consumables include the following parts/sub-assemblies:

- drawbar hitching eye,
- pneumatic system connector filters,
- tyres,

- brake shoes,
- bulbs and LED lamps,
- seals,
- bearings.

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

In the event of damage arising from:

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

the user will lose the right to warranty service.

TIP

Demand that the seller carefully and precisely fills out the Warranty Book and warranty repair coupons. A missing date of purchase or sale point stamp, may make the user ineligible for any warranty repair or refund.

The user is obliged to report immediately on noticing any wear in the paint coating or traces of corrosion, and to have the faults rectified whether they are covered by the warranty or not. For detailed Terms & Conditions of Warranty, please refer to the *WARRANTY BOOK* attached to each machine.

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

1.5 TRANSPORT

The hook trailer is ready for sale completely assembled and does not require packing. Packing is only required for the machine's technical documentation and any extra fittings. The trailer is delivered to the user either transported on a vehicle or, after being attached to a tractor, independently (trailer towed with a tractor).

1.5.1 TRANSPORT ON VEHICLE.

Loading and unloading of hook trailer from vehicle shall be conducted using loading ramp with the aid of an agricultural tractor. During work adhere to the general principles of Health and Safety at Work applicable to reloading work. Persons operating reloading equipment must have the qualifications required to operate these machines. The trailer must be properly connected with the tractor according to the requirements in this Operators Manual. The trailer brake system must be started in checked before driving off or onto ramp.

The hook trailer should be attached firmly to the platform of the vehicle using straps or chains fitted with a tightening mechanism. Securing elements should be attached to the transport catches designed for this purpose (1) – figure *(1.2)*. Transport lugs are welded to the longitudinal members of the drawbar (2) and to the crossbar (3) of the lower frame. Use certified and technically reliable securing measures. Worn straps, cracked securing catches, bent or corroded hooks as well as other damage may disqualify use of the given element from use. Carefully read the information stated in the Operator's Manual for the given securing measure. Chocks or other objects without sharp edges should be placed under the wheels of the trailer to prevent it from rolling. Trailer wheel blocks must be secured to the load platform of the vehicle in a manner preventing their movement. The number of securing elements (cables, straps, chains and stay etc.) and the force necessary for their tensioning depends on a number of things, including weight of the trailer, the construction of vehicle carrying trailer, speed of travel and other conditions. To secure the trailer optimally on the load platform, support the drawbar with wooden blocks. For this reason it is impossible to define the securing plan precisely. A correctly secured trailer does not change its position with regard to the transport vehicle. The securing elements must be selected according to the guidelines of the Manufacturer of these elements. In case of doubt apply a greater number of securing straps in order to immobilise the trailer. If necessary, sharp edges of trailer should be protected at the same time protecting the securing straps from breaking during transport.

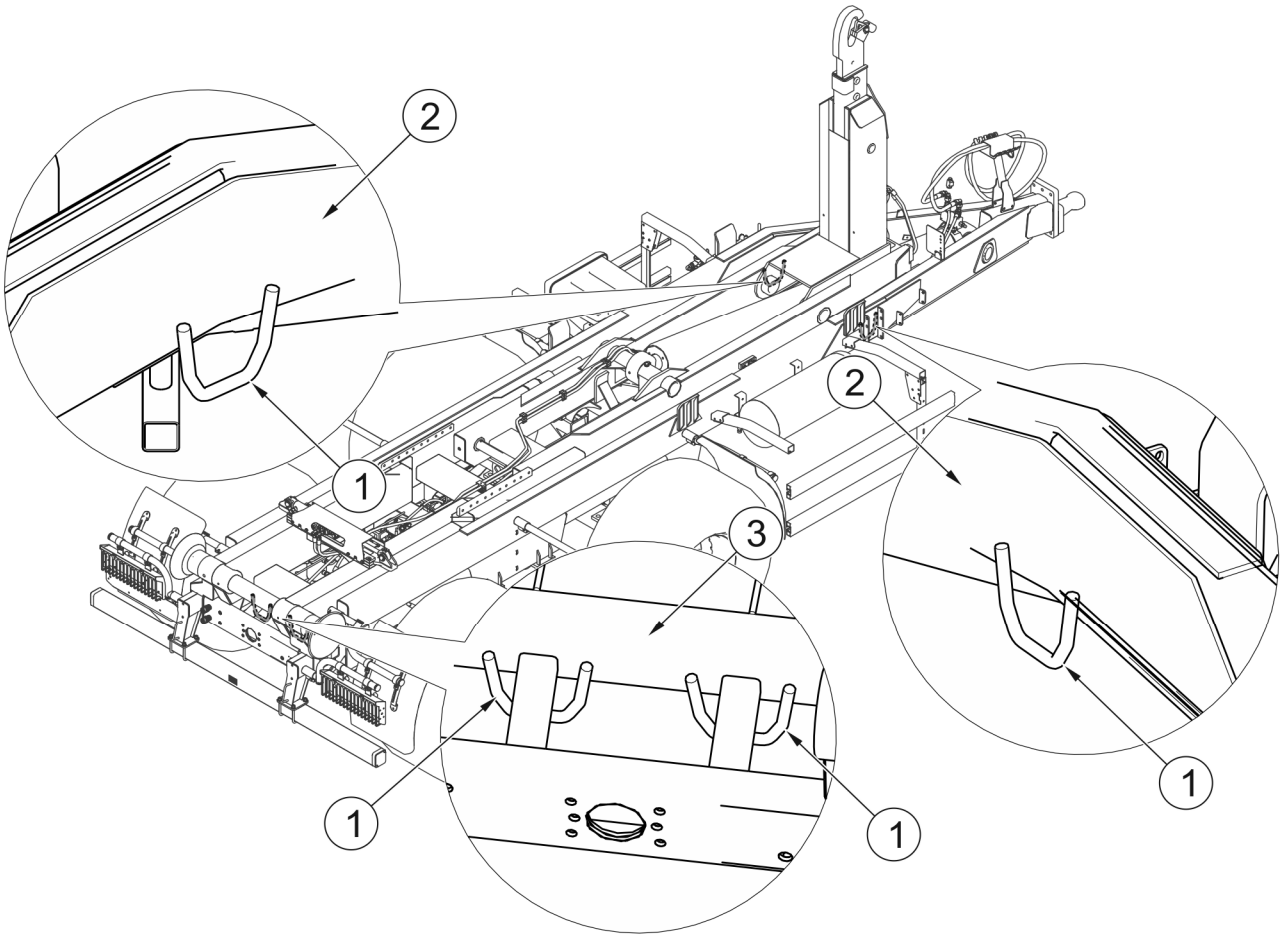


FIG. 1.2 Positioning of transport lugs

(1) transport lug, (2) longitudinal member of the lower frame's drawbar, (3) cross-bar of the lower frame

DANGER

Incorrect application of securing measures may cause an accident.

IMPORTANT!

When being road transported on a motor vehicle the trailer must be mounted on the vehicle's platform in accordance with the transport safety requirements and the regulations.

Driver of the vehicle should be particularly careful during travel. This is due to the vehicle's centre of gravity shifting upwards when loaded with the machine.

Use only certified and technically reliable securing measures. Carefully read the manufacturer's instructions for the securing measures.

During reloading work, particular care should be taken not to damage parts of the machine's fittings or the lacquer coating. The tare weight of the trailer in condition ready for travel is given in table *(3.1).*

1.5.2 INDEPENDENT TRANSPORT BY THE USER.

In the event of independent transport by the user after purchase of the hook trailer, the user must read the trailer Operator's Manual and adhere to the recommendations contained therein. Independent transport involves towing the trailer with own agricultural tractor to destination. During transport adjust travel speed to the prevailing road conditions, but do not exceed the maximum design speed.

IMPORTANT!

Before transporting independently, the tractor driver must carefully read this operator's manual and observe its recommendations.

1.6 ENVIRONMENTAL HAZARDS

A hydraulic oil leak constitutes a direct threat to the natural environment owing to its limited biodegradability. Because of the low solubility of oil in water, it is not highly toxic to living organisms. An oil leak into water reservoirs may however lead to a reduction of the oxygen content.

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 pollution, once gathered up, should be kept in a sealed, marked, hydrocarbon resistant container. The container should be kept away from heat sources, flammable materials and food.

DANGER

Used hydraulic oil or gathered remains mixed with absorbent material should be stored in a precisely marked container. Do not use food packaging for this purpose.

Oil, which has been used up or is unsuitable for further use owing to a loss of its properties should be stored in its original packaging in the conditions described above. Waste oil should be taken to the appropriate facility dealing with the re-use of this type of waste. Waste code: 13 01 10. Detailed information concerning hydraulic oil may be found on the product's Material Safety Data Sheet.

TIP

The hydraulic system of the trailer is filled with L-HL32 Lotos hydraulic oil.

IMPORTANT!

Waste oil should only be taken to the appropriate facility dealing with the re-use of this type of waste. Do NOT throw or pour oil into sewerage or water tanks.

1.7 WITHDRAWAL FROM USE

In the event of decision by the user to withdraw the trailer from use, comply with the regulations in force in the given country concerning withdrawal from use and recycling of machines withdrawn from use. Before commencing dismantling, totally remove the oil from the hydraulic system and reduce air pressure completely in the pneumatic brake system (e.g. using air tank drain valve).

Worn out or damaged parts that cannot be reclaimed should be taken to a collection point for recyclable raw materials. Hydraulic oil should be taken to the appropriate facility dealing with the re-use of this type of waste.

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

DANGER

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

SECTION

2

SAFETY ADVICE

2.1 BASIC SAFETY RULES

2.1.1 USE OF TRAILER

- Before using the trailer, the user must carefully read this Operator's Manual and the *WARRANTY BOOK*. When operating the machine, the operator must comply with the recommendations.
- The trailer may only be used and operated by persons qualified to drive agricultural tractors with a trailer.
- If the information stated in the Operator's Manual is difficult to understand, contact a seller, who runs an authorised technical service on behalf of the manufacturer, or contact the manufacturer directly.
- Careless and improper use and operation of the hook trailer, and non-compliance with the recommendations given in this operator's manual is dangerous to your health.
- The user is obliged to acquaint himself with the construction, action and the principles of safe usage of the trailer.
- Be aware of the existence of a minimal risk, and for this reason the fundamental basis for using this hook trailer should be the application of safety rules and sensible behaviour.
- The machine must never be used by persons, who are not authorised to drive agricultural tractors, including children and people under the influence of alcohol 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 trailer must not be used for purposes other than those for which it is intended. Anyone who uses the trailer for purposes other than those for which it is intended takes full responsibility for any consequences of this potentially improper use. Use of the machine for purposes other than those for which it is intended by the Manufacturer may invalidate the warranty.

2.1.2 HITCHING AND DISCONNECTING FROM TRACTOR

- Do NOT hitch trailer to tractor, if it does not fulfil the requirements made by the Manufacturer (minimal tractor power requirement, lack of required tractor hitch etc. - compare table *1.4 AGRICULTURAL TRACTOR'S REQUIREMENTS* Before hitching trailer make certain that oil in external hydraulic system of tractor may be mixed with the hydraulic oil of the trailer.
- Before hitching trailer to tractor check that both machines are in good technical condition.
- While connecting the trailer to the tractor, use the appropriate hitch. After completing the coupling of the machines check the safety of the hitch Carefully read the tractor Operator's Manual. If the tractor is equipped with an automatic hitch, make certain that the coupling operation is completed.
- Be especially careful when hitching the machine to tractor.
- When hitching, there must be nobody between the trailer and the tractor.
- Do NOT proceed with disconnecting trailer from the tractor when tipping frame is raised.
- Coupling and uncoupling the trailer may only take place when the machine is immobilised by use of the parking brake. If the trailer is positioned on a slope or elevation it shall be additionally secured by the placing under the wheels of trailer equipment chocks or other objects without sharp edges.
- The trailer must not be moved when the parking stand is extended and rests on the ground. If moved there is a risk of damage to the hydraulic parking stand.
- The trailer may not be unhitched from the tractor, if the tipping frame or central frame are not fully retracted and when hydraulic cylinder suspension blocks are extended.

2.1.3 PULLING THE LOAD BOX ON AND REMOVING THE LOAD BOX FROM THE TRAILER

- Before pulling the load box on the trailer one must take off the slow-moving vehicle plate.

- Set the trailer to "hook trailer" function (the indicator light must be switched on).
- While connecting load box arrange it in such a way that the longitudinal axis of the trailer is aligned with the longitudinal axis of the load box. If not, the load box longitudinal members of the frame may not fit on the trailer rollers lengthwise. While pulling in the load box is necessary to observe whether its length is properly supported on the trailer guide rollers. If necessary, manoeuvre the trailer to connect the load box properly.
- Lock the load box on the trailer using the hydraulic lock. After locking, when the indicator light of the "tipper" function is switched on, keep the hydraulic system under pressure for about 5 seconds in order to lock the load box completely.
- Other persons must NOT be in the immediate vicinity of the trailer and especially behind the connected or disconnected load box.
- Take particular care while working near electric power lines.
- While pulling the load box on and removing the load box from the trailer, do NOT operate the central frame interlock if the frame is extended. Selection of trailer's working mode is only possible when the tipping frame is retracted in rest position.

2.1.4 HYDRAULIC AND PNEUMATIC SYSTEMS

- When operating, the hydraulic and pneumatic systems are under high pressure.
- Regularly check the technical condition of the connections and the hydraulic and pneumatic leads. There must no oil or air leaks.
- In the event of malfunction of the hydraulic or pneumatic system, do not use the trailer until the malfunction is corrected.
- When connecting the hydraulic lines to the tractor, make sure that the tractor hydraulic system and trailer are not under pressure. If necessary reduce residual pressure in the system.
- In the event of injuries being caused by pressurised hydraulic oil, contact a doctor immediately. Hydraulic oil may find its way under the skin and cause infections. In the event of contact of oil with eye, rinse with large quantity of water and in the event of the occurrence of irritation consult a doctor. In the event of contact of oil

with skin wash the area of contact with water and soap. Do NOT apply organic solvents (petrol, kerosene).

- Use the hydraulic oil recommended by the Manufacturer.
- After changing the hydraulic oil, the used oil should be properly disposed of. Used oil or oil, which has lost its properties, should be stored in original containers or replacement containers resistant to action of hydrocarbons. Replacement containers must be clearly marked and appropriately stored.
- Do not store hydraulic oil in packaging designed for storing food or foodstuffs.
- Rubber hydraulic lines must be replaced every 4 years regardless of their technical condition.

2.1.5 LOADING AND UNLOADING LOAD BOX

- Loading and unloading work should be carried out by someone experienced in this type of work.
- Do NOT exceed permissible load weight of trailer because this may cause danger to road traffic and cause damage to the machine.
- Do not carry people or animals either on the trailer chassis or in load boxes. The trailer is not intended for transporting people or animals.
- Individual types of load boxes are adapted to carrying various groups of materials, therefore the user is obligated to carefully read the load box operator's manual and comply with its recommendations.
- The load must be arranged in load box in such a way that it does not threaten the stability of the trailer, and does not hinder driving.
- The arrangement of the load in load box may not cause an overload on the axle and drawbar of the trailer.
- Loading and unloading work may be carried out only when the trailer is positioned on level and hard surface. Tractor and trailer must be placed to drive forwards.
- When unloading the load box, do NOT operate the middle frame interlock lever if the frame is raised.
- Ensure that there are no bystanders in the unloading or loading zone.

- Do NOT move off or drive when load box is raised.
- Take particular care while working near electric power lines.
- When opening load box closure take particular care, because of the pressure of the load on the wall.
- When closing load box wall take particular care to avoid crushing fingers.
- Do NOT tip the load box in windy conditions.
- If the load does not pour from the raised load box immediately cease unloading. The trailer may only be tipped again after removing the object, which prevented the load from pouring.
- Do NOT jerk the trailer forwards if load is bulky or reluctant to pour and does not unload.
- After completing unloading, ensure that the load box is empty.
- Do NOT move with raised load box.

2.1.6 TRANSPORTING THE MACHINE

- During travel on public roads comply with the road traffic regulations and transport regulations in force in a given country, in which the trailer is used.
- Do not exceed the permitted speed arising from road conditions and design limitations. Adjust travel speed to the prevailing road conditions, load and road traffic regulations limits.
- Chocks should be placed only under one wheel (one in front of the wheel, the second behind the wheel).
- The machine must NOT be left unsecured. When not connected to the tractor, the trailer must be immobilised with parking brake and protected against rolling with chocks or other objects without sharp edges placed under the front and back wheels.
- Before driving make sure that the trailer is properly hitched to the tractor, especially if coupling bolts are secure.

- Vertical load borne by the trailer drawbar eye affects the steering of the agricultural tractor.
- If the journey takes place without load box, a slow-moving vehicle sign should be placed on the rear beam of the trailer, if the machine is the last vehicle in the group. If the journey takes place with load box then slow-moving vehicle sign should be placed on the rear wall of the load box.
- Do NOT drive when load box is raised.
- Before using the trailer always check its technical condition, especially in terms of safety. In particular, check the technical condition of the hitch system, the axle system, the brake system, indicator lights and the connective elements of the hydraulic, pneumatic and electrical systems.
- Before driving off check that the parking brake is released, the braking force regulator is positioned in the proper position (applies to pneumatic systems with a manual three position regulator).
- The trailer is designed to operate on slopes up to 8° . Driving trailer across ground with steeper slopes may cause the trailer to tip over as a result of loss of stability.
- While driving on public roads the trailer must be fitted with a certified or authorised reflective warning triangle.
- Periodically drain water from the air tanks in pneumatic system. During frosts, freezing water may cause damage to pneumatic system components.
- Reckless driving and excessive speed may cause accidents.
- A load protruding beyond the edge of the trailer should be indicated according to the road traffic regulations. Do NOT transport loads forbidden by the Manufacturer.

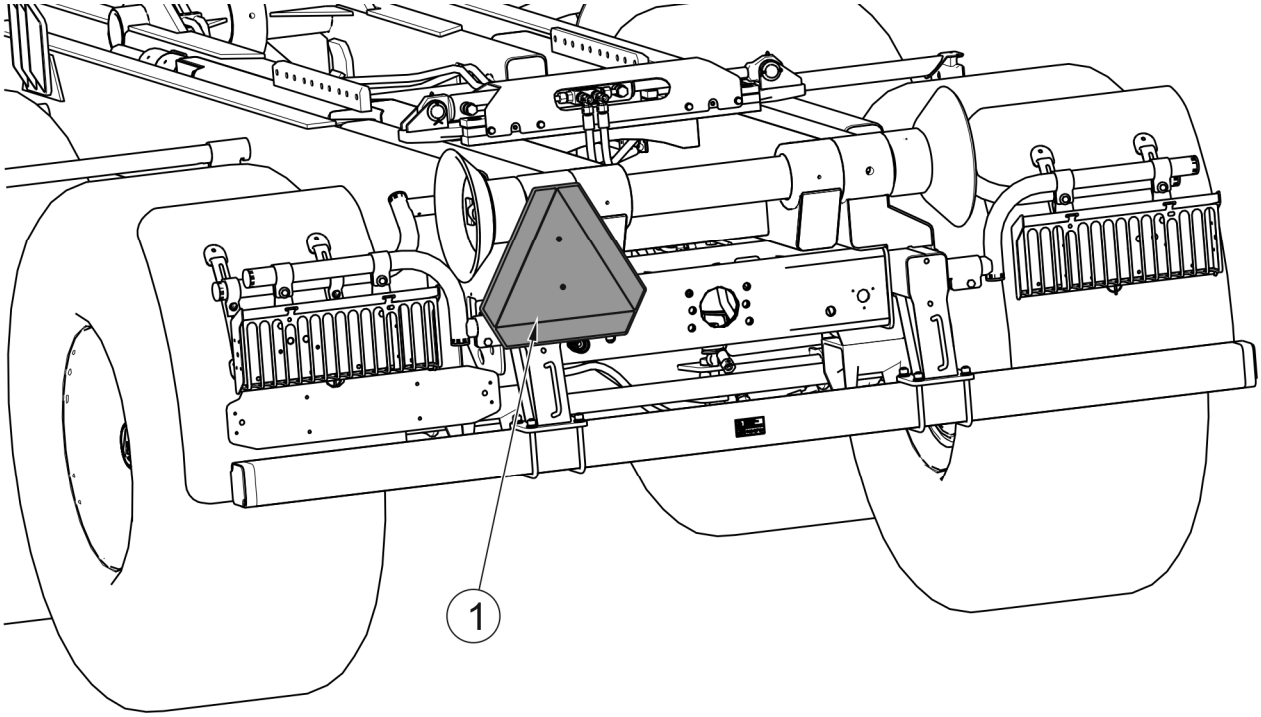


FIG. 2.1 Positioning the warning sign

(1) slow-moving vehicle sign

- Do NOT exceed the trailer's maximum carrying capacity. Exceeding the carrying capacity may lead to damage to the machine, loss of stability and danger while driving. The brake system is adjusted to the gross weight of the trailer, exceeding the weight limit causes drastic reduction of basic braking effectiveness.
- Prolonged driving across steep ground may lead to loss of braking efficiency.
- During reversing one should use the assistance of another person. During manoeuvring the person helping must stay at a safe distance from the danger zone and be visible all the time to the tractor driver.
- Do NOT attempt to board trailer while travelling.
- During travel, guards protecting rear light assemblies must be taken from the light beam profiles and secured on the other side of the profiles using star nuts.
- Do NOT park trailer on slope.

2.1.7 TYRES

- When working with tyres, the trailer should be immobilised with parking brake and secured against rolling by placing chocks under wheel. Wheels can be taken off the trailer axle only when there is no load box on the trailer.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriate tools.
- Inspect tightness of nuts before the first use of trailer, after the first travel under load and then every 6 months of use or every 25,000 km. In the event of intensive work, check the nut tightening at least every 100 km. The inspection should be repeated individually if a wheel has been removed from the wheel axle.
- Avoid potholes, sudden manoeuvres or high speeds when turning.
- Check the tyre pressure regularly. Pressure and tyres should be also checked after the whole day of intensive work. Please note that higher temperatures could raise tyre pressure by as much as 1 bar. At high temperatures and pressure, reduce load or speed. Do not release air from warm tyres to adjust the pressure or the tyres will be underinflated when temperatures return to normal.
- Protect tyre valves using suitable caps to avoid soiling.

2.1.8 MAINTENANCE

- During the warranty period, any repairs may only be carried out by Warranty Service authorised by the manufacturer. After the expiry of the warranty period it is recommended that possible repairs to the hook trailer be performed by specialised workshops.
- In the event of any fault or damage whatsoever, do not use the trailer until the fault has been fixed.
- During work use the proper, close-fitting protective clothing, gloves, protective goggles and appropriate tools.
- Any modification to the trailer frees the manufacturer from any responsibility for damage or detriment to health, which may arise as a result.

- The trailer can only be stood on when it is absolutely motionless and the tractor engine is switched off. Tractor and trailer should be secured using parking brake and in addition chocks should be placed beneath trailer wheel. Ensure that unauthorised persons do not have access to the tractor cab.
- Regularly check the condition of nut and bolt connections, in particular connections of drawbar eye and wheel nuts.
- Service inspections should be carried out according to the frequency specified in this Operator's Manual.
- Before beginning repair works on hydraulic or pneumatic systems reduce oil or air pressure completely.
- 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's engine turned off and the ignition key removed. Tractor and trailer should be secured using parking brake and in addition chocks should be placed beneath trailer wheel. Ensure that unauthorised persons do not have access to the tractor cab.
- During maintenance or repair work trailer may be unhitched from tractor, but secured with chocks and parking brake.
- Should it be necessary to change individual parts, use only those parts indicated by the Manufacturer. Non-adherence to these requirements may put the user and other people's health and life at risk, and also damage the machine and invalidate the warranty.
- Before welding or electrical work, the trailer should be disconnected from the power supply. The paint coating should be cleaned. Burning paint fumes are poisonous for people and animals. Welding work should be carried out in a well lit and well ventilated space.
- During welding work pay attention to flammable or fusible elements (parts of the pneumatic, electric and hydraulic systems, plastic parts). If there is a risk that they

will catch fire or be damaged, they should be removed or covered with non-flammable material before commencing welding work. Before beginning work prepare a CO_2 or foam extinguisher.

- In the event of work requiring the trailer 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. Work must not be carried out under a trailer, which has only been raised with a lift or jack.
- The trailer must not be supported using fragile elements (bricks or concrete blocks).
- After completing work associated with lubrication, remove excess oil or grease. The trailer should be kept clean and tidy.
- The user must not repair by himself the components of the hydraulic or pneumatic system i.e. control valves, cylinders and regulators. In the event of damage to these elements, repair should be entrusted to authorised service point or replace elements with new parts.
- Do NOT install additional appliances or fittings not according to the specifications defined by the Manufacturer.
- The trailer may only be towed when axles and wheels, lighting system and brakes are reliable.

2.2 DESCRIPTION OF MINIMAL RISK

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

- using the hook trailer for purposes other than those for which it is intended,
- being between the tractor and the trailer while the engine is running and when the machine is being attached or hitched to second trailer
- being on the machine when it operates,
- failure to keep a safe distance from dangerous areas during loading, disconnecting, connecting or unloading the load box,

- operation of the trailer by unauthorised persons or persons under the influence of alcohol or other intoxicating substances,
- making modifications to the machine without the consent of the Manufacturer,
- presence of persons or animals in areas invisible from the driver's position.

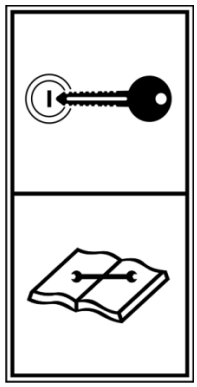
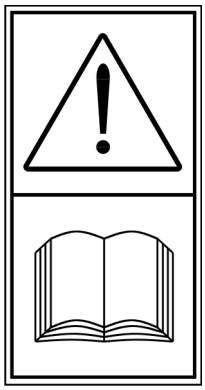
The minimal risk may be kept to a minimum by following the recommendations below:

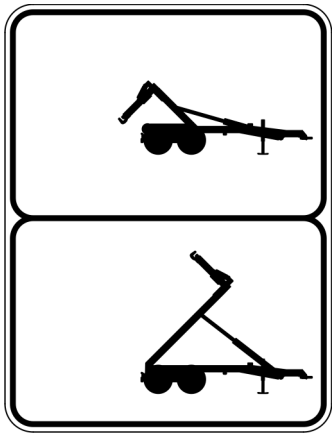
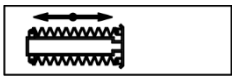
- prudent and unhurried operation of the machine,
- sensible application of the remarks and recommendations stated in the Operator's Manual,
- maintaining safe distance from forbidden or dangerous places
- carrying out repair and maintenance work in line with operating safety rules,
- carrying out repair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

2.3 INFORMATION AND WARNING DECALS

The hook trailer is labelled with the information and warning decals mentioned in table (*2.1*). The symbols are positioned as presented in figure (*2.2*). Throughout the time it is in use, the user of the machine is obliged to take care that notices and warning and information symbols located on the hook trailer are clear and legible. In the event of their destruction, they must be replaced with new ones. Safety decals are available from your PRONAR dealer or directly from PRONAR customer service. New assemblies, changed during repair, must be labelled once again with the appropriate safety signs. During trailer cleaning do not use solvents which may damage the coating of information label stickers and do not subject them to strong water jets.

TAB. 2.1 Information and warning decals

ITEM	DECAL	MEANING
1		Before beginning servicing or repairs, switch off tractor's engine and remove key from ignition Ensure that unauthorised persons do not have access to the tractor cab.
2		Caution! Before starting work, carefully read the Operator's Manual.
3		Caution! Danger of electric shock. Keep a safe distance from electric power lines during tipping or connecting and disconnecting load box
4		Regularly check if the nuts and bolts fixing the wheels and other components are properly tightened.
5		Grease the trailer according to the recommendations in the Operator's Manual

ITEM	DECAL	MEANING
6	T285/1 PRONAR	Machine type
7	600 kPa	Air pressure in the tyres *
8	3000 kg	Maximum vertical drawbar load
9		Information about the current trailer function: - „hook trailer” - „tipper”
10		Transport suspension points
11	O Z	Position of the hydraulic support leg control valve
12		Extension/withdrawal of the hydraulic support
13	40	Maximum design speed

** – pressure value should be adapted to tyres*

Decals – items (6), (7), (8) and (10) are placed on both sides of the trailer.

Decal – position (12) – is placed on hydraulic conduit.

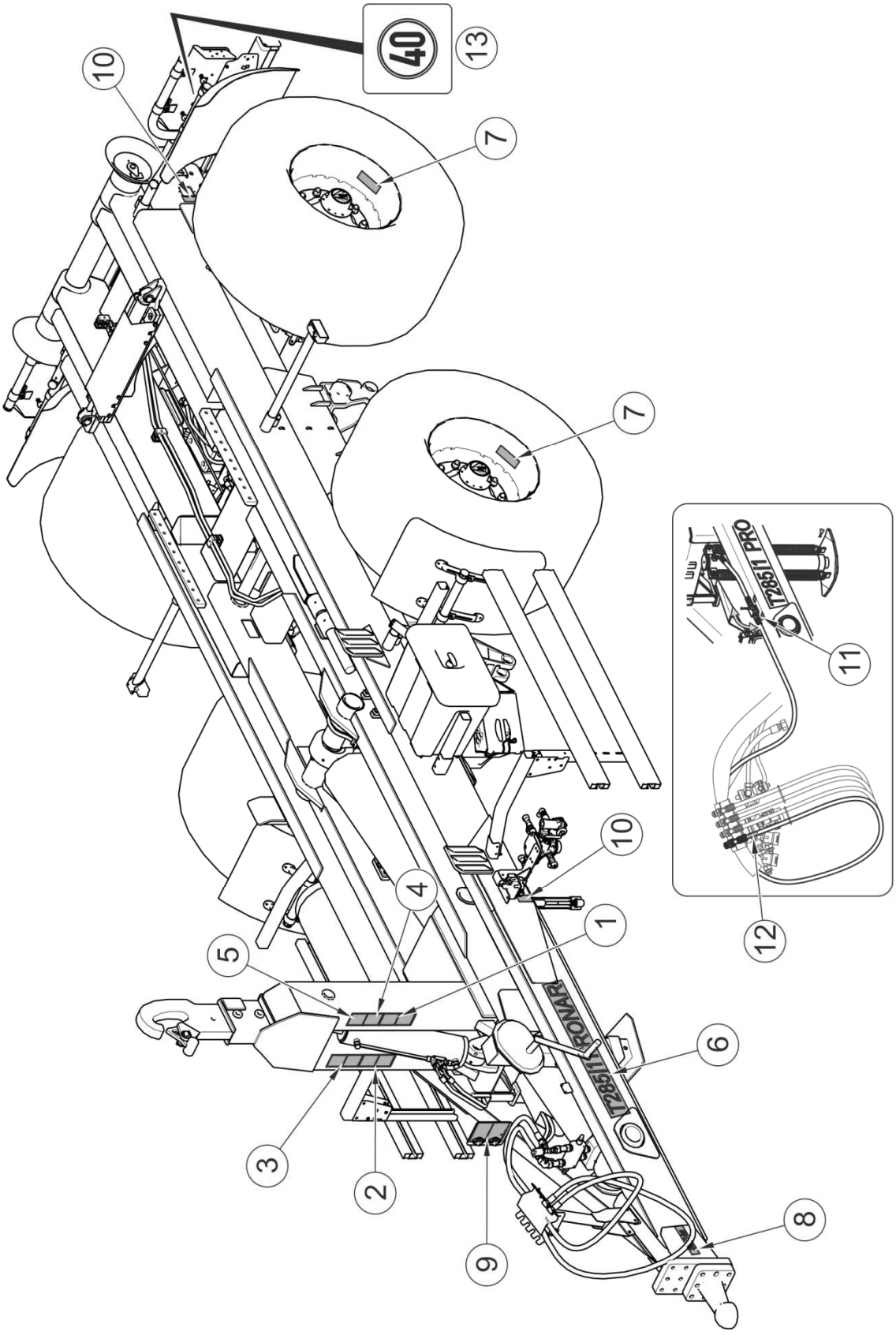


FIG. 2.2 Locations of information and warning decals

Markings on the figure according to table 2.1

SECTION

3

DESIGN AND OPERATING PRINCIPLE

3.1 TECHNICAL SPECIFICATION

TAB. 3.1 Technical specification of hook trailer in standard version

CONTENTS	UNIT	T285/1
Dimensions		
Total length without load box	mm	7,313
Total width *	mm	2,550
Height (without load box / with load box)	mm	2,981 – 3,650 **
Length with shortest load box	mm	7,413
Length with longest load box	mm	8,413
Height of mounting hook (2 positions) ***	mm/mm	1,450 / 1,570
Technical specification		
Carrying capacity ****	kg	17,760
Tare weight of hook trailer	kg	5,240
Maximum gross weight	kg	23,000
Permitted load box dimensions		
Total length (min / max)	mm/mm	5,400 / 6,400
Maximum width	mm	to 2,550
Maximum height	mm	to 2,500
Standard Tyres		
Size	-	445/65 R22.5 REG 170F
Pressure *****	kPa	600
Other information		
Maximum load box tipping angle	deg	53
Axle track	mm	2,000
Maximum design speed	km/h	40
Maximum drawbar eye load	kg	3,000
Oil demand ******	l	25
Pressure rating of the hydraulic system	Mpa	20
Minimum tractor power demand	kW / Horsepower	92 / 125

** - the trailer width exceeds 2 550 mm if tyres 600/55-22.5, 600/50R22.5, 620/50R22.5 are used,*

*** - dimension with a 2500 mm-high load box,*

**** - height from load box base to hook axis*

***** - load capacity combined with load box weight,*

****** - maintain air pressure in tyres according to the value specified on the decal,*

******* - without hydraulic braking system.*

Dimensions of the hook trailer, i.e. width, height and axle track, may differ depending on the tyres used (option).

3.2 TRAILER CONSTRUCTION

3.2.1 CHASSIS

The main bearing element of the hook trailer is the lower frame (1) – figure (*3.1*), which is of welded steel section structure. To the front of the frame is the drawbar beam, to which the drawbar (2) is secured. Depending on the version, the trailer may be fitted with another type of drawbar, shown in section 1.

Straight hydraulic support (3) or mechanical support with gear (4) (optional equipment) is bolted to the left longitudinal member of the drawbar. On the left side of the frame the parking brake is mounted to a bracket (5). Rollers guiding the brake cable and the brake lever are mounted to the lower part of the frame.

In the rear part of the frame there is mechanical suspension which consists of tandem suspension (8), rigid axle (7) and steering axle (6) with hydraulic turning interlock system. Tandem mechanical suspension is equipped with drum brakes. Executive elements activating the brakes are pneumatic or hydraulic ram cylinders depending on the brake system mounted. The mudguards (9) are bolted to brackets. The trailer suspension may be blocked using hydraulic rams.

On the left and right side, light groups (10) are secured to the rear beam holders – rear position lights and rear clearance lights. Light groups are protected against damage by guard shields. While driving on public roads these guard shields must be secured on the other side of the light beam profiles using star nuts (11).

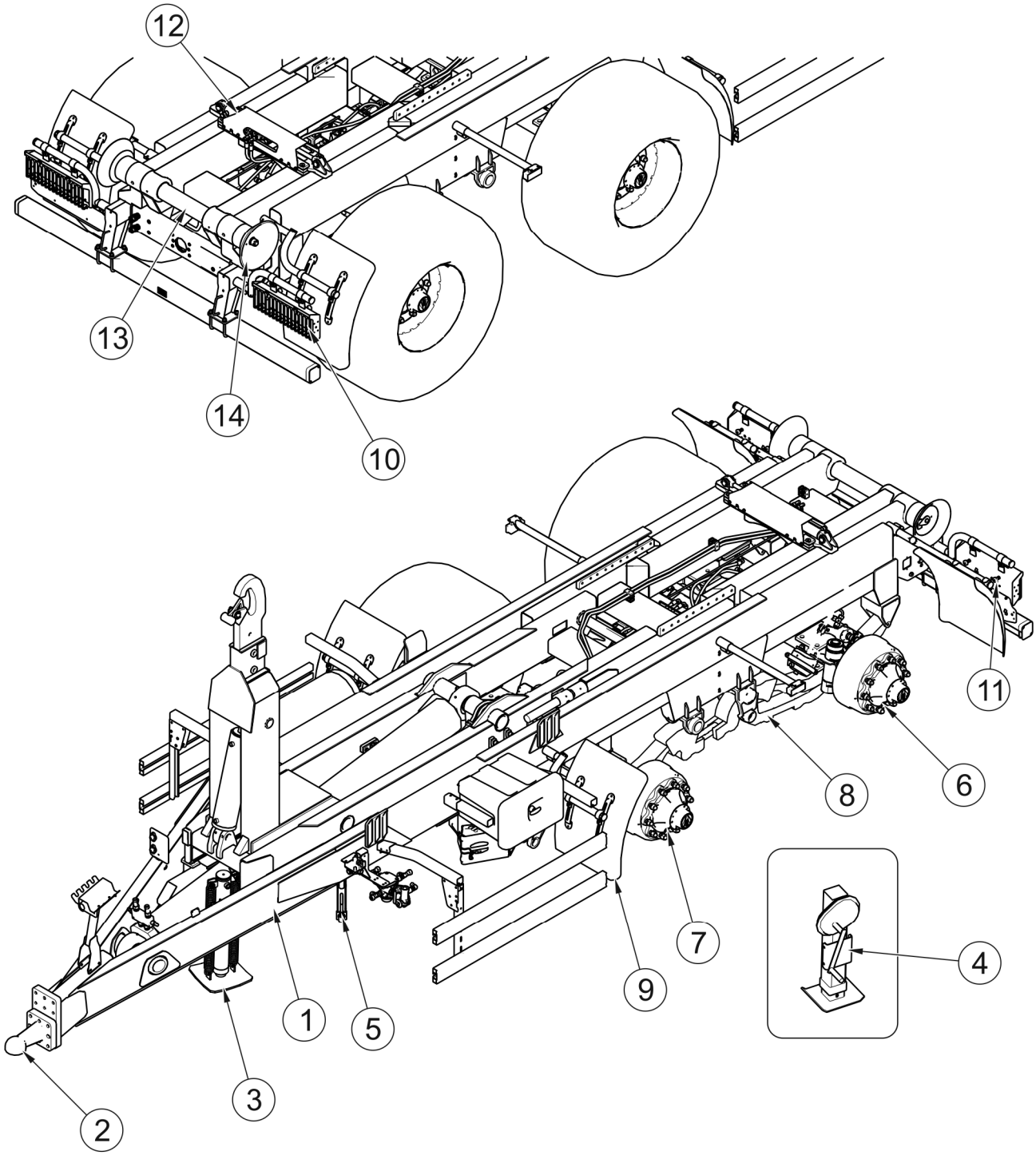


FIG. 3.1 Trailer chassis

(1) lower frame, (2) drawbar eye, (3) straight hydraulic support, (4) straight support with mechanical gear, (5) handbrake mechanism, (6) steering axle, (7) rigid axle, (8) tandem suspension, (9) mudguard, (10) lamp assembly, (11) star nut, (12) load box interlock, (13) tipping axle, (14) guide roller

3.2.2 TIPPING FRAME

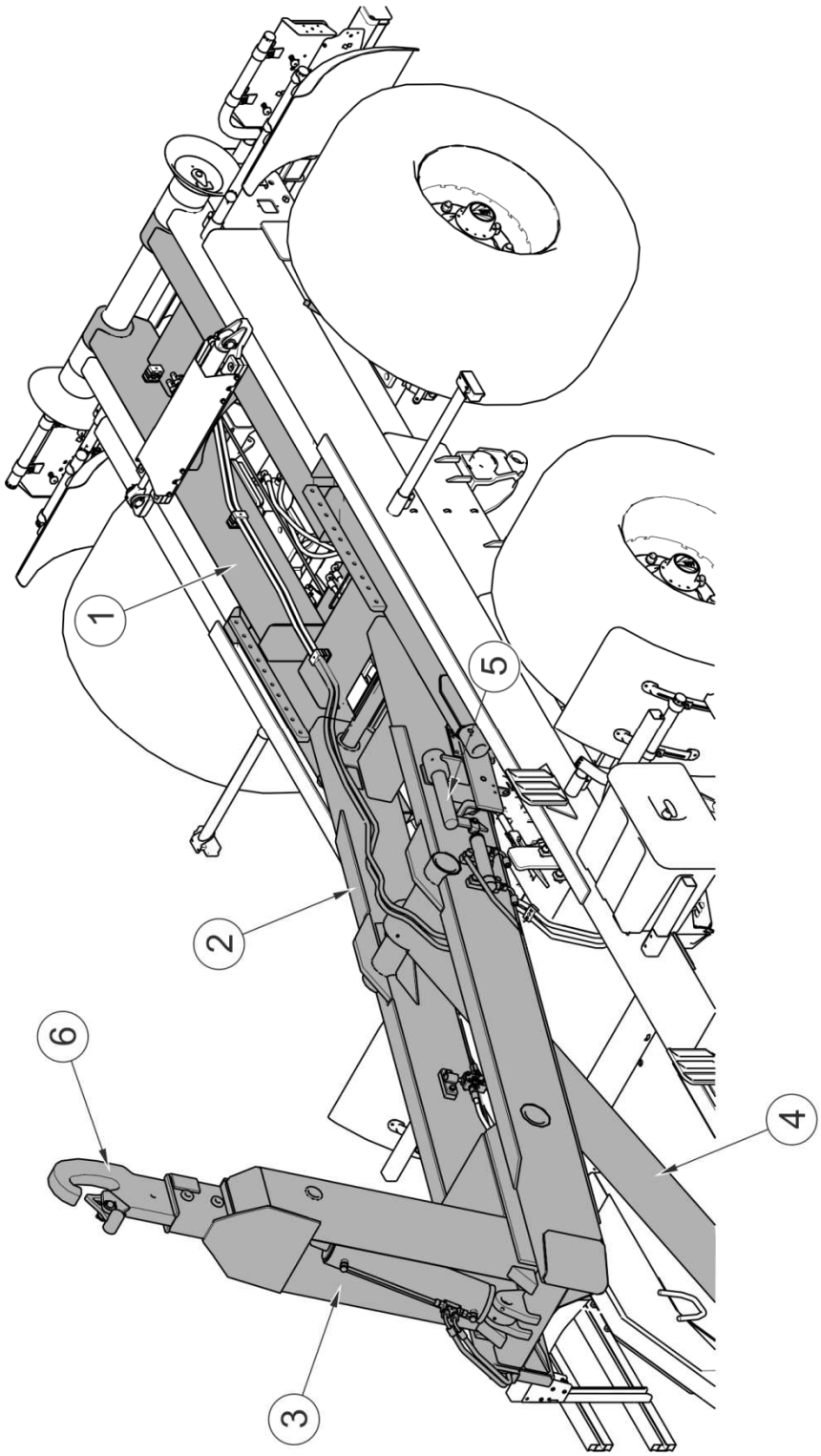


FIG. 3.2 Tipping frame

(1) rear frame, (2) central frame, (3) hook frame, (4) tipping cylinder, (5) tipping frame lock mechanism, (6) hook with lock

Complete tipping frame comprises rear frame (1) - figure *3.2*, central frame (2) and hook frame (3) to which is screwed the hook (6). Tipping frame is secured to lower frame with the aid of tipping axle and tipping cylinder (4). Hook lock automatically falls or rises depending on position of frame. Individual frames are connected with the aid of pins seated in sleeves. Tipping frame lock mechanism (5) is secured to the left longitudinal member of the central frame.

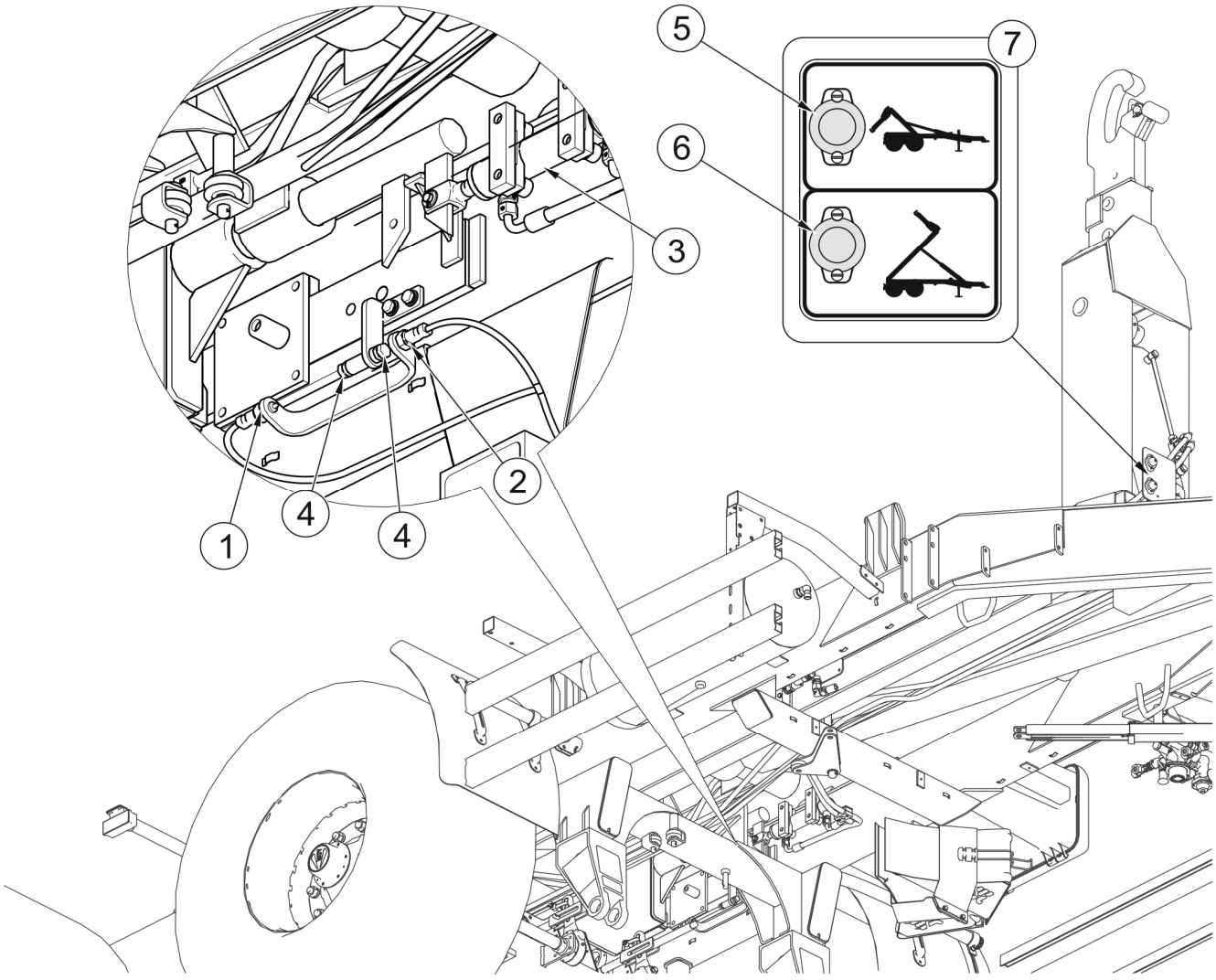


FIG. 3.3 Tipping frame locking

(1) left limit switch, (2) right limit switch, (3) switching cylinder, (4) bolt with nut, (5) clearance light I, (6) clearance light II, (7) indicator plate

Tipping frame lock mechanism is operated from the tractor driver's cab with the aid of the tractor external hydraulic system manifold lever (by proper activation of limit switches (1, 2) of switching cylinder (3) – figure *3.3*). During tipping the load box to the rear, the central frame must be immobilised together with the rear frame (switching cylinder (3) is maximally extended). Left limit switch (1) must be pressed when the hook trailer is set to "tipper" position – in this position, clearance light II (6) located on indicator plate (7) must be switched on. The whole tipping frame is raised by the tipping ram.

Tipping the central frame enables connection or disconnection of load box. To do this, unlock the central frame by proper operation of switching cylinder (3). Right limit switch (2) must be pressed when the hook trailer is set to "hook trailer" position – in this position, clearance light I (5) located on indicator plate (7) must be switched on. In this position, the rear frame remains on the lower trailer frame, the central frame is raised by the tipping cylinder. Hook frame (3) is operated only when the load box is unlocked. The hook has an automatic safety lock for the load box and is adjustable in two positions (for load boxes made according to DIN 30722 and load boxes made according to SS 3021).

3.2.3 MAIN BRAKE

The hook trailer is equipped with one of three types of working brake:

- double line pneumatic system with three position regulator, figure (*3.4*),
- double conduit pneumatic brake system with automatic regulator (optional equipment), figure (*3.5*),
- hydraulic brake system (optional equipment), figure (*3.7*).

In standard configuration, the trailer is equipped with double conduit pneumatic system with manual three position regulator.

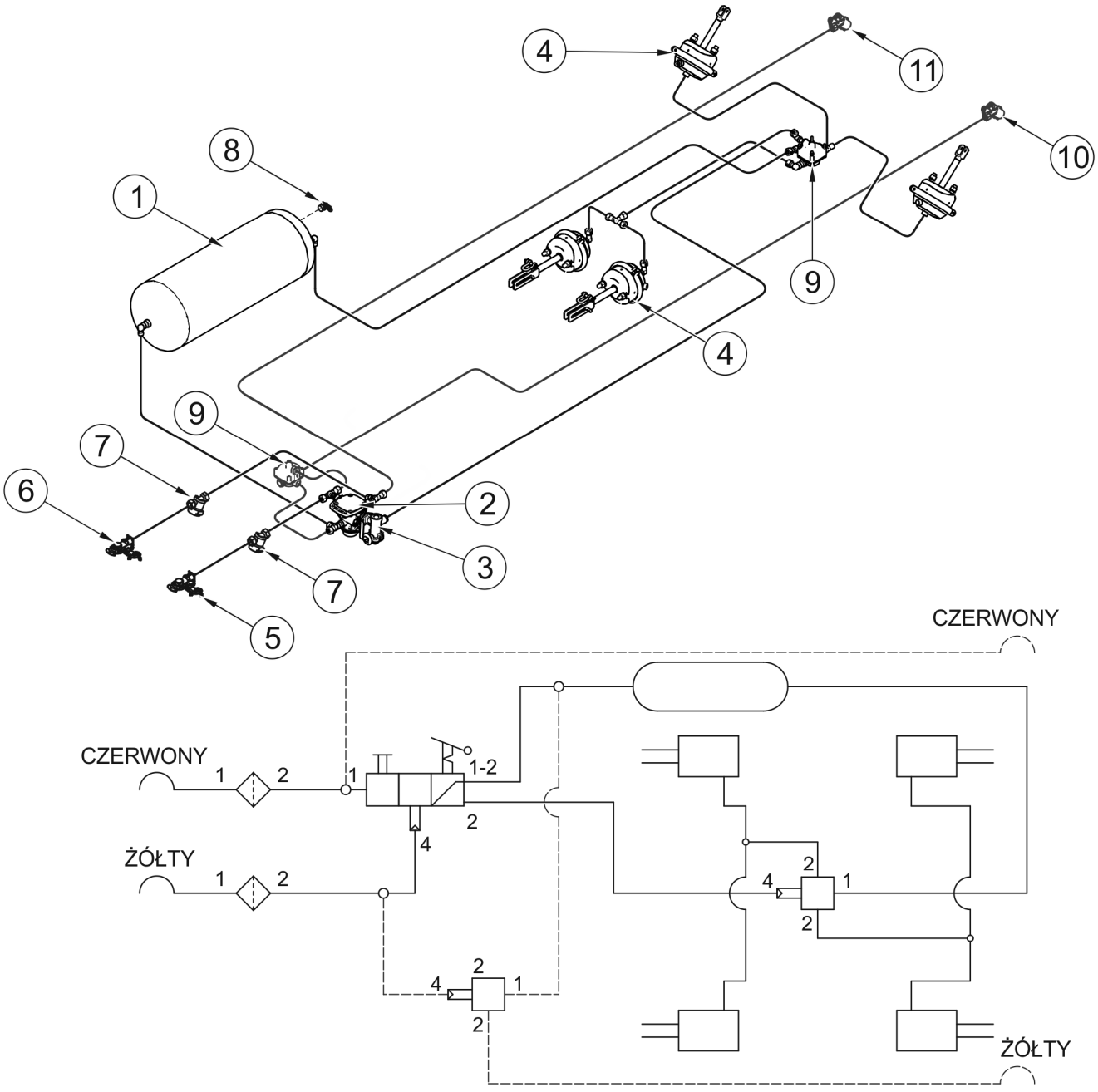


FIG. 3.4 Design and diagram of double line pneumatic braking system with manual braking force regulator

(1) air tank, (2) control valve, (3) braking force regulator, (4) pneumatic cylinder, (5) line connector (yellow), (6) line connector (red), (7) air filter, (8) air tank control connector, (9) relay valve, (10) socket (yellow), (11) socket (red)

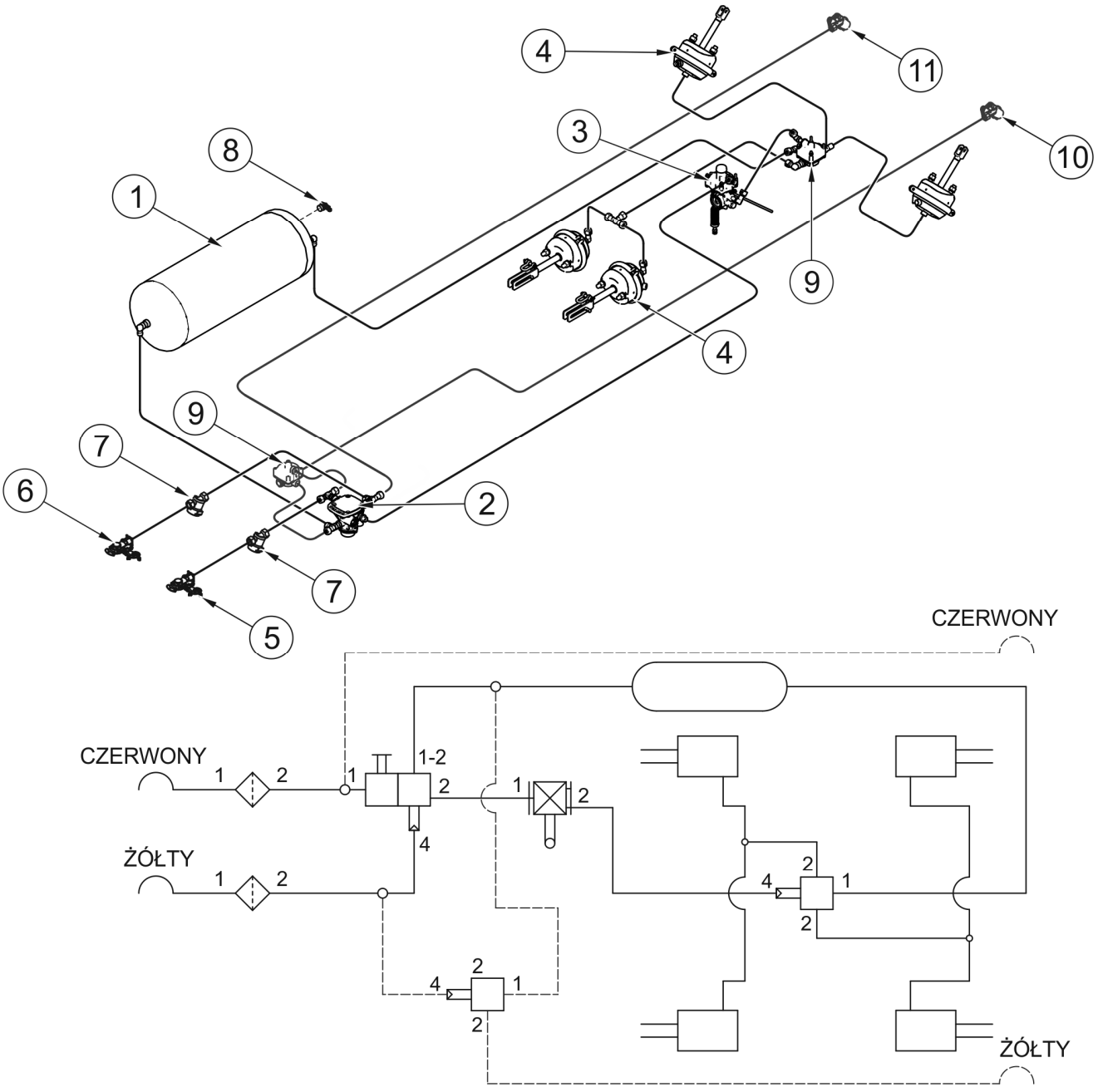


FIG. 3.5 Design and diagram of double line pneumatic braking system with automatic braking force regulator

(1) air tank, (2) control valve, (3) braking force regulator, (4) pneumatic cylinder, (5) line connector (yellow), (6) line connector (red), (7) air filter, (8) air tank control connector, (9) relay valve, (10) socket (yellow), (11) socket (red)

The pneumatic brakes are activated from the tractor driver's cab by pressing on the brake pedal. The function of the control valve (2) - figure (*3.4*) and (*3.5*) is the operation of the trailer's brakes simultaneously when tractor's brakes are applied Furthermore, in case of an

inadvertent disconnection of the line between the trailer and the tractor, the control valve will automatically activate trailer's brakes. Valve used in the system is equipped with a circuit causing the brakes to be applied when trailer is disconnected from the tractor. When compressed air line is connected to the tractor, the device automatically applying the brakes now changes its position to allow normal brake operation.

Three-step brake force regulator (2)- figure *(3.6)*, adjusts braking force depending on setting. Switching to a suitable working mode is done manually by machine operator using the lever (4) prior to moving off. Three working positions are available: A - "no load", B - "half load" and C - "full load".

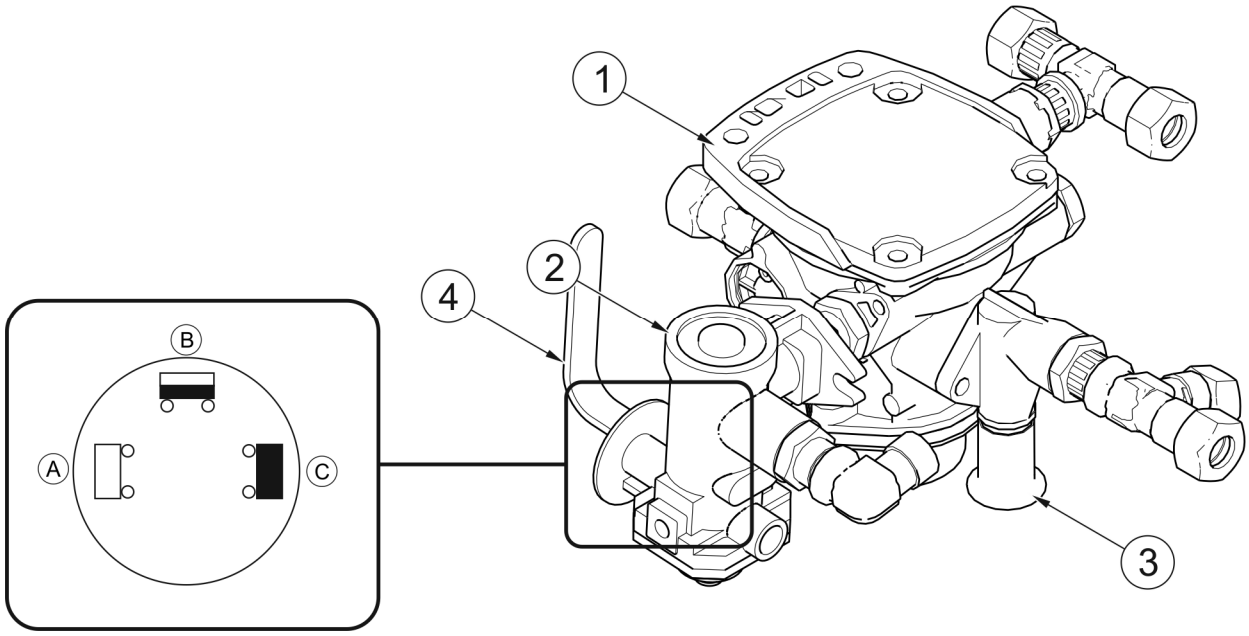


FIG. 3.6 Control valve and brake force regulator

(1) control valve, (2) brake force regulator, (3) trailer parking brake release button, (4) work selection regulator lever, (A) position "NO LOAD", (B) position "HALF LOAD", (C) position "FULL LOAD"

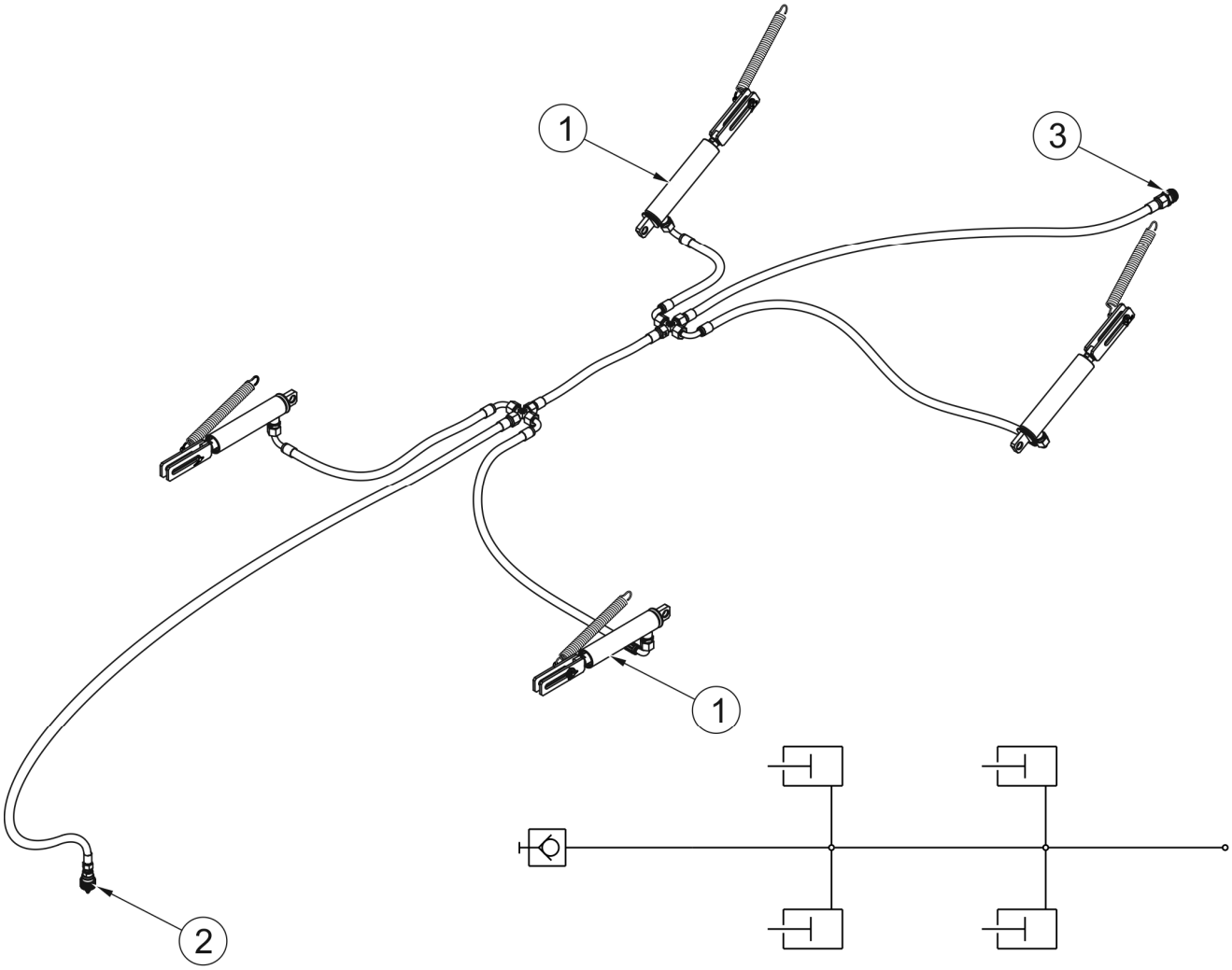


FIG. 3.7 Design and diagram of hydraulic braking system

(1) hydraulic cylinder, (2) hydraulic quick coupler, (3) socket

The main hydraulic brake (available as optional equipment) is activated from the tractor driver's cab by pressing on the brake pedal. Agricultural tractor equipped with suitable hydraulic system is required to operate the hydraulic braking system.

3.2.4 PARKING BRAKE

The parking brake is for immobilising trailer while standing motionless. The brake crank mechanism is mounted on the bracket placed on the left longitudinal member of the lower frame. The steel cable is connected with the axle expander lever through the handbrake release with the crank mechanism. Tightening the cable causes tilting of the expander lever, which parts the jaws of the brake shoes immobilising the trailer.

3.2.5 HYDRAULIC SYSTEM

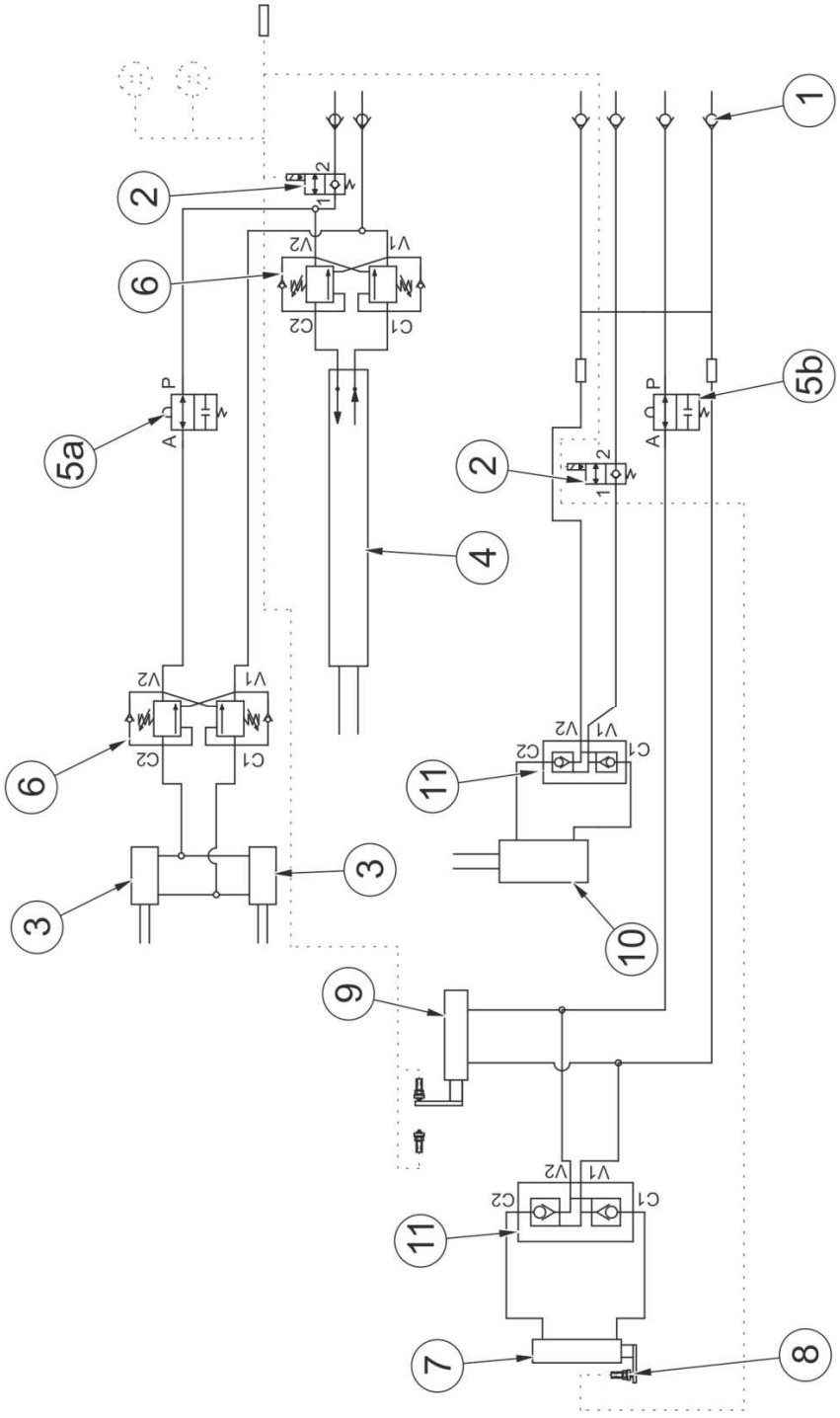


FIG. 3.8 Hydraulic system diagram

(1) quick coupler - plug, (2) electro-hydraulic valve, (3) suspension cylinder, (4) raising cylinder, (5a) limit valve, (5b) limit valve, (6) anti-shock valve, (7) load box interlock cylinder, (8) sensor - limit switch, (9) switching cylinder, (10) hook frame cylinder, (11) hydraulic lock

The hook trailer is equipped with the central hydraulic system with the system of electro-hydraulic protections. The hydraulic system is supplied with oil from the tractor external hydraulic system and controlled by the tractor hydraulic manifold and it performs the following functions:

- hydraulic interlock of suspension,
- hydraulic interlock of load box,
- hydraulic tipping and hydraulic switching between "hook trailer" and "tipper" functions,
- hydraulic hook frame.

The hydraulic interlock of suspension blocks the rocker arms while unloading the load box. During operation of the hydraulic system manifold lever, the suspension interlock levers (3) – figure (*3.8*) are extended first and then, when a proper pressure is reached, raising cylinder (4) can be extended. When extending the raising cylinder, the limit valve (5a) is activated to prevent unlocking the suspension. The suspension will be unlocked when the raising cylinder is completely withdrawn (the rest position of the tipping frame). Anti-shock valves (6) protect the system against sudden pressure jumps and ensure smoother operation of cylinders.

Hydraulic interlock of load box ensures that the load box is secured to the trailer chassis during transport as well as during material unloading. The interlock is operated from the tractor cab using hydraulic system manifold lever. When the load box interlock cylinder (7) is being extended, limit switch (8) is disconnected and hook frame cylinder (10) can not be operated. When extending the raising cylinder (4), the limit valve (5b) is activated to prevent unlocking the load box. Hook frame is operated only when the load box is unlocked.

The system is equipped with a hydraulic locks (11) located on the cylinders (7.10). Application of hydraulic lock improves safety of trailer operation. In the event of damage to hydraulic system conduits (rupture, loss of tightness), the hydraulic lock will lock the cylinder in a fixed position.

Control of hydraulic tipping with hydraulic switching between "hook trailer" and "tipper" functions and control of the hook frame are described in chapter 3.2.2 (TIPPING FRAME).

TIP

The hydraulic system of the trailer is filled with L-HL32 Lotos hydraulic oil.

3.2.6 TURNING INTERLOCK HYDRAULIC SYSTEM

The hook trailer is equipped with a passively steered rear steering axle. Axle design enables easier cornering and easier manoeuvring on marshy terrain. The wear of tyres and mechanical components, such as bearings and trailer suspension components, is consequently reduced.

While reversing, axle hub must be blocked, otherwise the trailer will have a tendency to turn uncontrollably to the left or the right during reversing.

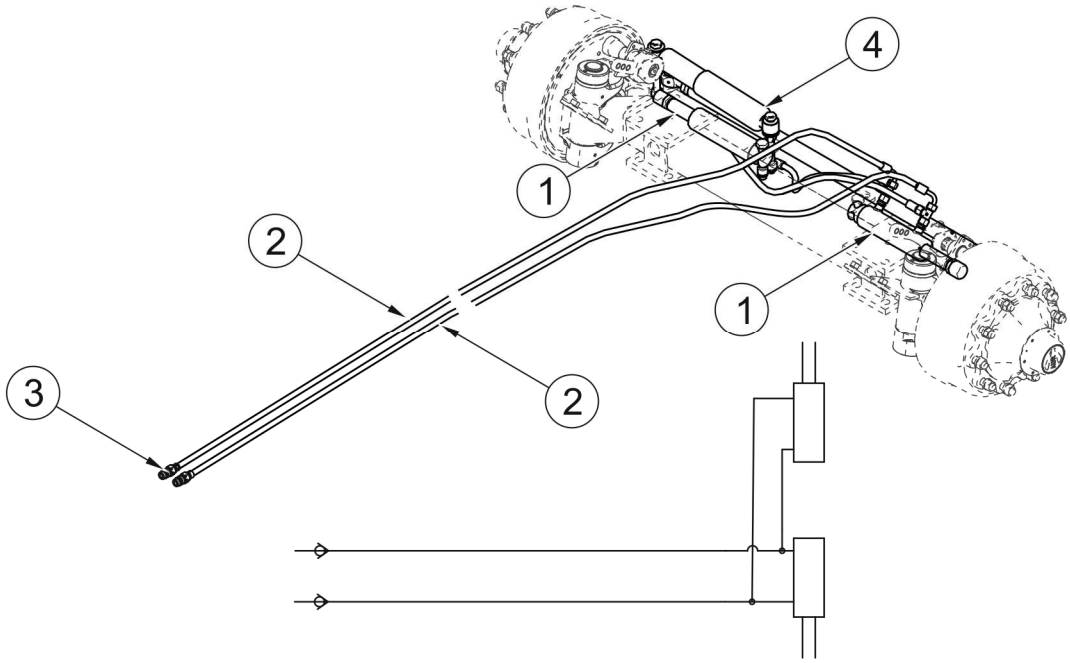


FIG. 3.9 Design and diagram of rear axle turning interlock hydraulic system

(1) turning interlock cylinder, (2) hydraulic conduit, (3) hydraulic quick coupler, (4) shock absorber

Turning interlock hydraulic system shown in figure (*3.9*) enables interlocking the rear axle. The hydraulic system is supplied with oil from the tractor external hydraulic system. Before reversing the tractor with trailer, activate the interlock by means of the manifold lever. After the reversing manoeuvre, disengage the interlock by releasing the lever.

3.2.7 SUPPORT HYDRAULIC SYSTEM

The parking stand hydraulic system extends the stand to support the trailer disconnected from the tractor or when it is parked in the garage after use. Using parking stand hydraulic system drawbar height can be adjusted when hitching and disconnecting the trailer. The parking stand hydraulic system is supplied with oil by the tractor hydraulics. The parking stand is extended or withdrawn by extending or withdrawing a hydraulic cylinder. The support cylinder is controlled by means of the hydraulic oil manifold of the tractor's external hydraulic system .

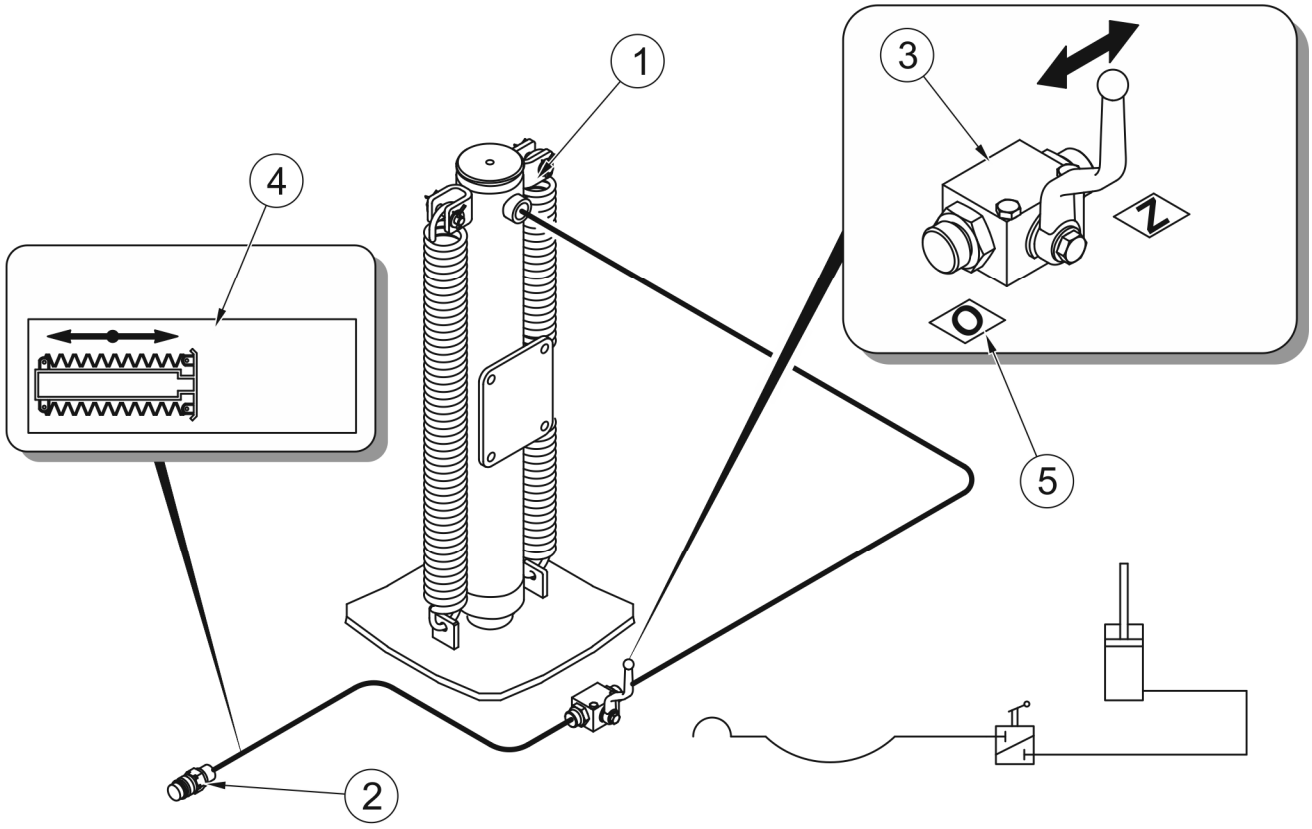


FIG. 3.10 Straight support hydraulic system construction and diagram

(1) hydraulic support, (2) quick coupler, (3) valve, (4), (5) information decals

The straight hydraulic support was used for the trailer - Figure *(3.10)*. Lowering the support (1) is carried out by opening the valve (3). Hydraulic oil supplied from hydraulic selective control valve extends the cylinder ram to the desired height. After the pressure is hydraulic line is reduced, withdrawal of the parking stand to transport position is forced by means of springs. Hydraulic line which controls straight support is marked with decal (4) near the connector. The valve (3) locks the support in a fixed position.

TIP

The hydraulic system of the support is filled with L-HL32 Lotos hydraulic oil.

3.2.8 ELECTRICAL SYSTEM

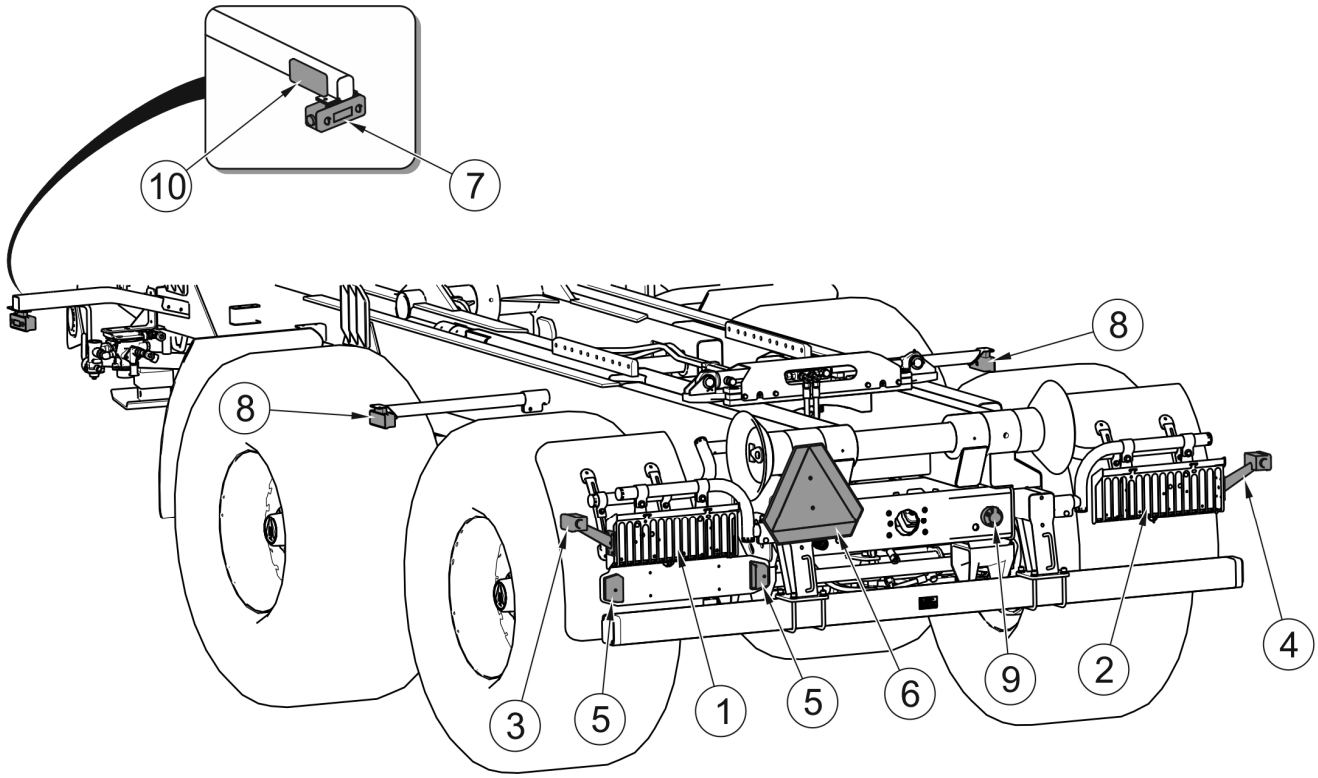


FIG. 3.11 Positioning of electrical system components and reflective lights

(1), (2) rear lamp assembly left/right, (3), (4) front rear and side parking light left/right, (5) license plate illumination light, (6) slow-moving vehicle warning plate, (7) front clearance and left/right parking light, (8) side parking light, (9) 7-pole socket, (10) front reflector

The trailer's electrical system is designed for supply of 12 V DC. In order to cooperate correctly with the trailer, the tractor should be equipped with a 7-pin electric socket *(figure 3.12-6)* and a 3-pin electric socket *(figure 3.13-4).* Connection of the trailer's electrical lighting system *(figure 3.12)* with the tractor should be made through an appropriate connection lead (5) with a 7-pin socket.

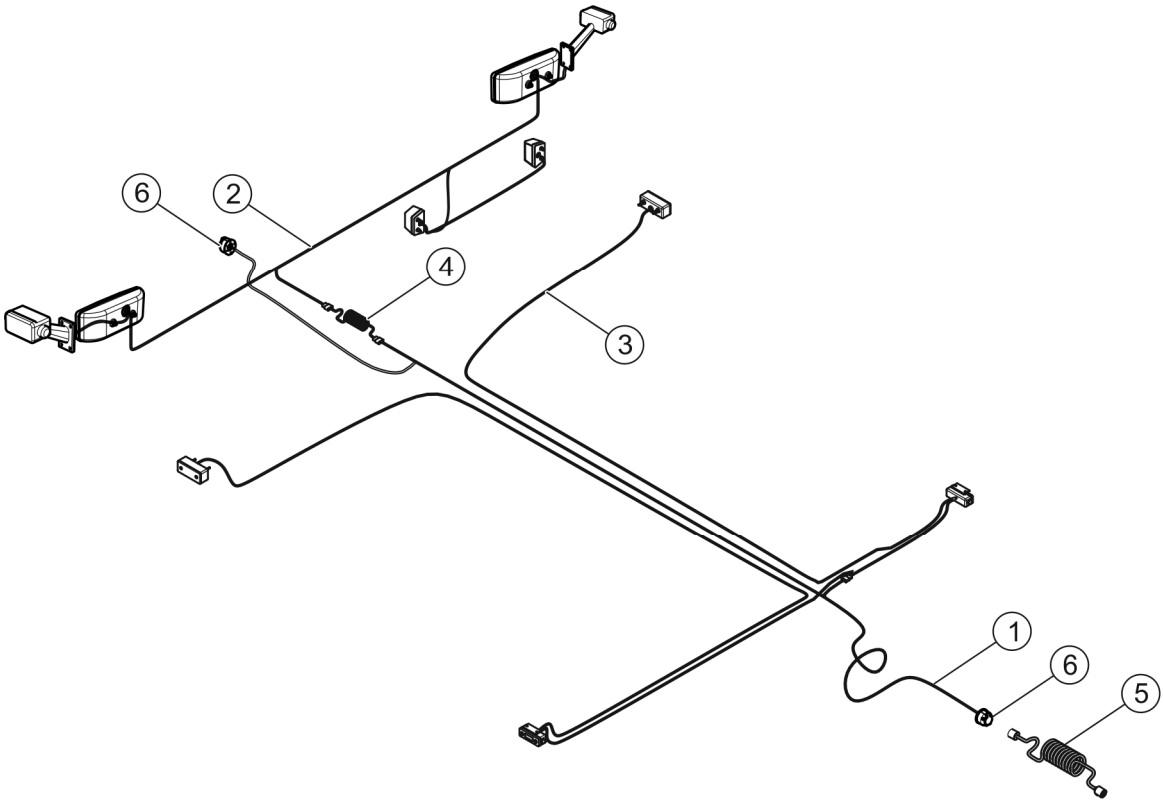


FIG. 3.12 Design of electrical lighting system

(1) central wiring harness, (2) rear wiring harness, (3) front wiring harness, (4) connecting wiring harness, (5) connection lead, (6) 7-pin socket

The electrical system of the hydraulic system *(figure 3.13)* is connected using a connection lead (2) with a 3-pin plug. If the tractor is not equipped with such sockets or is equipped with a different type of sockets, carry out the sockets installation according to the recommendations of the tractor manufacturer. The standard equipment of the trailer includes a 3-pin socket (4) for installing in the tractor.

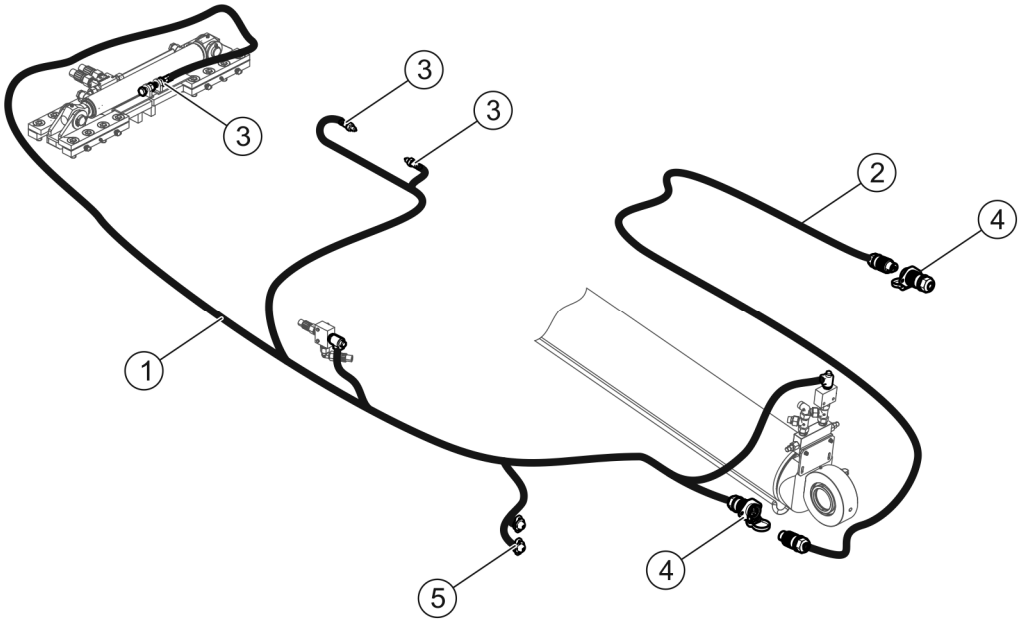


FIG. 3.13 Design of electrical lighting system of hydraulic system

(1) solenoid valves wiring harness, (2) connection lead, (3) sensor, (4) 3-pin socket, (5) front clearance lamp

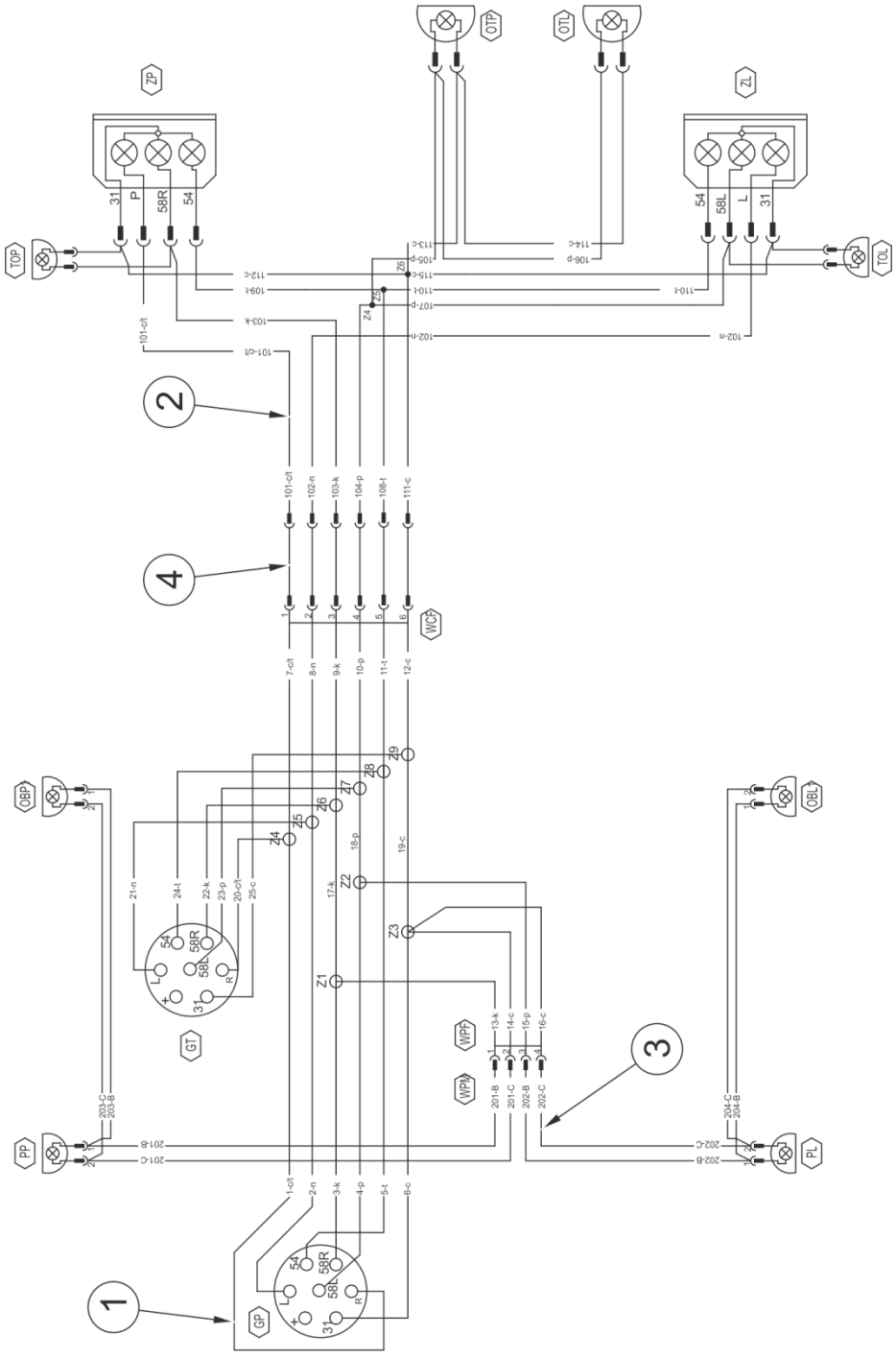


FIG. 3.14 Electrical system diagram

(1) central wiring harness, (2) rear wiring harness, (3) front wiring harness, (4) connecting wiring harness

Marking according to table (3.2), (3.3) and (3.4)

TAB. 3.2 List of electrical component markings

SYMBOL	FUNCTION
ZP	Rear right lamp assembly
ZL	Rear left lamp assembly
GP	Front seven pin socket
GT	Rear seven pin socket
OTP	Right license plate light
OTL	Left license plate light
PP	Front clearance lamp and right side parking light (LED)
PL	Front clearance lamp and left side parking light (LED)
TOP	Front-rear clearance lamp and side right parking light (LED)
TOL	Front-rear clearance lamp and side left parking light (LED)
OBP1	Right clearance lamp (LED)
OBL1	Left clearance lamp (LED)

TAB. 3.3 Marking of connections of GP and GT sockets

MARKING	FUNCTION
31	Weight
+	Power supply +12V (not used)
L	Left indicator
54	STOP light
58L	Rear left parking light
58R	Rear right parking light
R	Right indicator

TAB. 3.4 Line colour marking

MARKING	COLOUR
B	White
C	Black
F	Violet
K	Red
L	Lazurite
N	Blue
O	Brown
P	Orange
R	Pink
S	Grey
T	Green
Z	Yellow

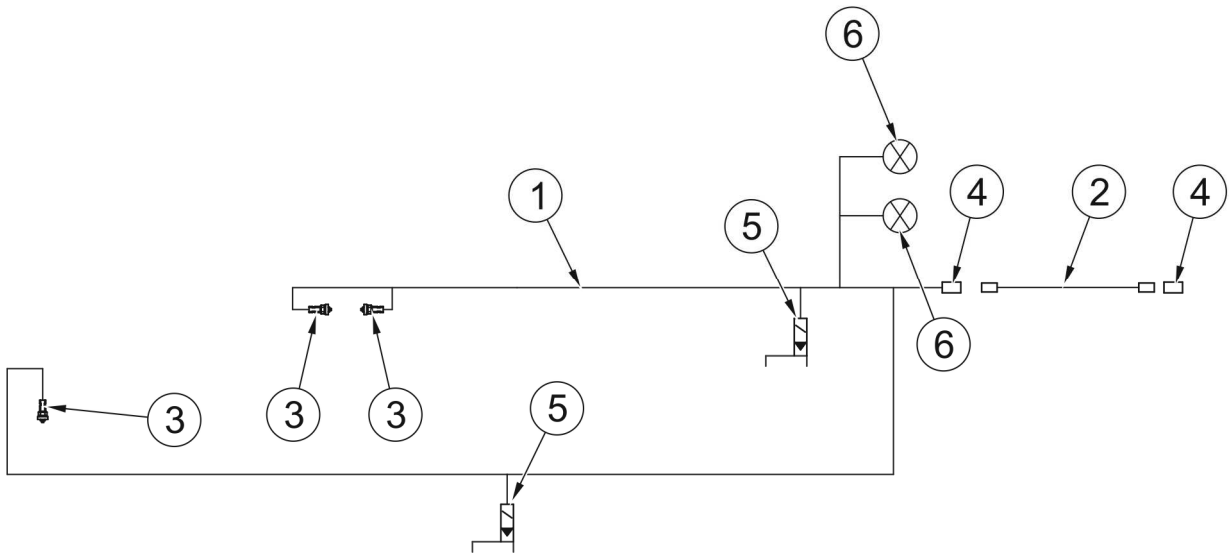


FIG. 3.15 Diagram of electrical system of hydraulic system

(1) solenoid valves wiring harness, (2) connection lead, (3) sensor, (4) 3-pole socket, (5) solenoid valve, (6) front clearance lamp

SECTION

4

CORRECT USE

4.1 PREPARING FOR WORK BEFORE FIRST USE

4.1.1 CHECKING THE TRAILER AFTER DELIVERY

The manufacturer guarantees that the trailer 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.

Before commencing work, machine operator must inspect the technical condition of the trailer and prepare it for test start-up. The user must carefully read this Operator's Manual and observe all recommendations, understand the design and the principle of machine operation.

IMPORTANT!

Before proceeding to hitching to tractor the user must carefully read this Operator's Manual and additional publications attached to machine and observe all recommendations.

External inspection

- Check completeness of machine (standard and optional equipment).
- Check condition of protective paint coat,
- Inspect trailer's individual components for mechanical damage resulting from incorrect transport (dents, piercing, bent or broken components).
- Check technical condition of tyres and tyre pressure.
- Check technical condition of elastic hydraulic lines,
- Check technical condition of pneumatic lines,
- Check that there are no hydraulic oil leaks.
- Check electric lamps.
- Check hydraulic rams for leaks of hydraulic oil.

4.1.2 PREPARE THE TRAILER FOR FIRST HITCHING TO TRACTOR

Preparation

- Check all the trailer's lubrication points, lubricate the machine as needed according to recommendations provided in section 5,
- Check if the nuts fixing the wheels, drawbar retaining bolts and other major nut and bolt connections are properly tightened.
- Drain air tank of the brake system.
- Ensure that pneumatic, hydraulic and electric connections in agricultural tractor are according to the requirements, if not the trailer should not be hitched to the tractor.
- Adjust the height of the drawbar eye setting or location of upper transport hitch.

Test drive

If all the above checks have been performed and there is no doubt as to the trailer's good technical condition, it can be connected to tractor. Start the tractor, check all systems and conduct test run of trailer without load (no load in load box). It is recommended that the inspection is conducted by two people, one of which should always remain in the tractor cab. Test start should be conducted according to the sequence shown below.

- Connect trailer to appropriate hitch on agricultural tractor.
- Connect brake, electrical and hydraulic system conduits.
- Raise support to transport position.
- Switch on individual lights, check correct operation of electrical system.
- Check correct operation of hydraulic tipping system, suspension interlock, load box interlock and hook frame.
- When moving off check if the main brakes operate correctly.
- Perform test drive.

TIP

Such operating activities as hitching to/unhitching from tractor, connecting/disconnecting the load box etc. are described in detail in further parts of the Operator's Manual, in sections 4 and 5

The trailer may be hitched only when all preparatory activities including inspection of technical condition have been completed satisfactorily. If during test run worrying symptoms occur such as:

- noise and abnormal sounds originating from the abrasion of moving elements of the trailer design,
- hydraulic oil leak,
- pressure drop in brake system,
- incorrect operation of hydraulic and/or pneumatic cylinders

or other faults, find the cause of the problem. If a fault cannot be rectified or the repair could void the warranty, please contact retailer for additional clarifications or to perform repair.

DANGER

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

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

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

After completion of test drive check tightness of wheel and drawbar nuts.

4.2 HITCHING AND DISCONNECTING FROM TRACTOR

Ensure that pneumatic, hydraulic and electric connections and the hitch of agricultural tractor are according to the Manufacturer's requirements, if not the trailer should not be hitched to the tractor.

In order to hitch the trailer to the tractor perform the actions below in the sequence presented. Machine must be immobilised by parking brake.

Connection

- ➡ Immobilise trailer with parking brake.
  - ⇨ Pull brake mechanism clockwise until resistance is felt.
- ➡ Position agricultural tractor directly in front of drawbar eye.
- ➡ Connect supply conduit of cylinder of hydraulic support to socket in tractor (cylinder of single-acting hydraulic support),
- ➡ Set valve (3) to open position (O) – figure *(4.1)*.
- ➡ Set the drawbar eye with the aid of the tractor external hydraulic system manifold lever at such a height that it is possible to hitch the machine.
- ➡ Reverse tractor, hitch trailer, check coupling lock protecting machine against accidental unhitching.
  - ⇨ If the agricultural tractor is equipped with an automatic coupler, ensure that the hitching operation is completed and that drawbar eye is secured.
- ➡ Turn off tractor engine. Ensure that unauthorised persons do not have access to the tractor cab.
- ➡ Connect pneumatic system lines.
  - ⇨ Connect pneumatic line marked yellow with yellow socket in tractor.
  - ⇨ Connect pneumatic line marked red with red socket in tractor.

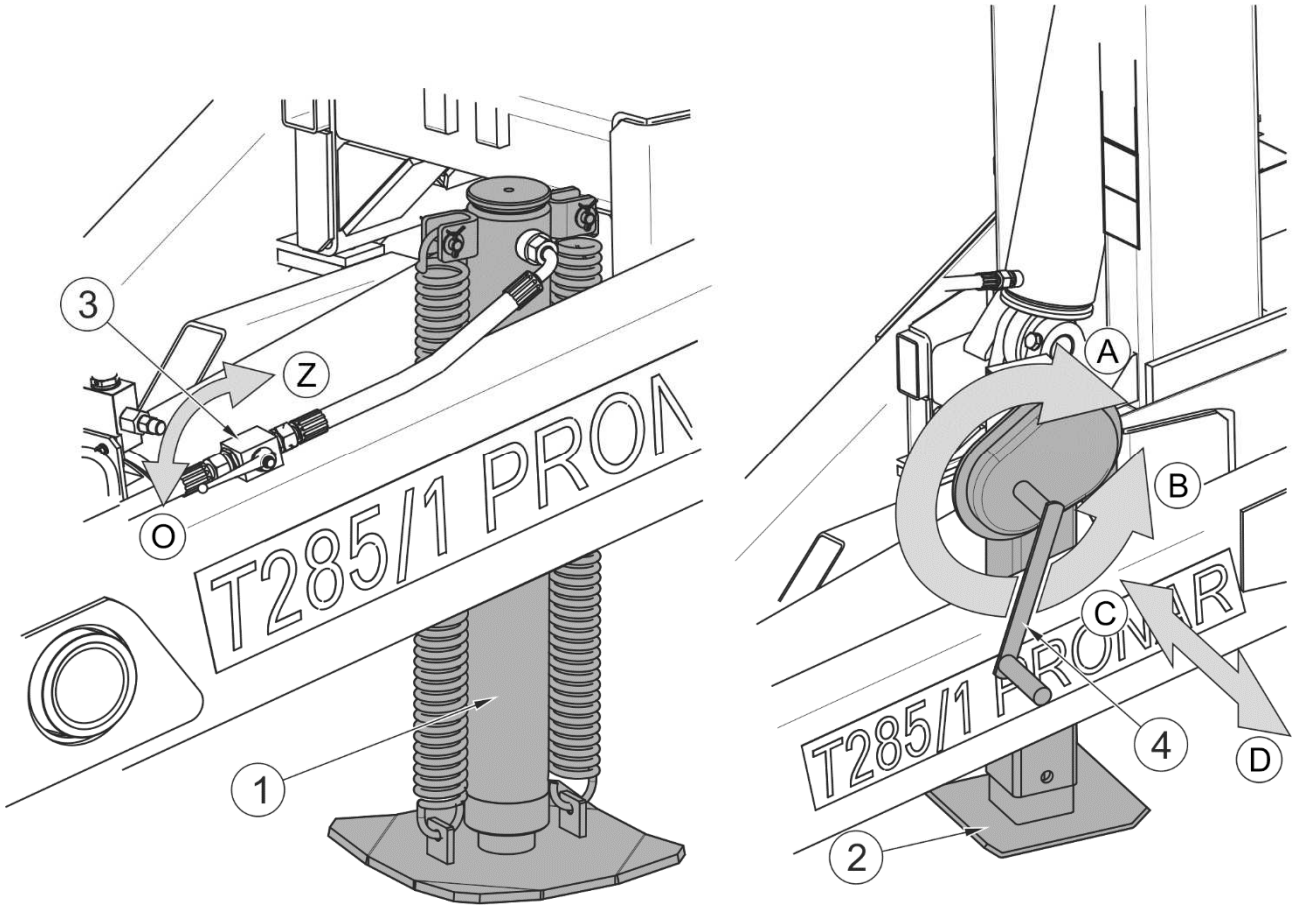


FIGURE 4.1 Trailer parking stand

(1) hydraulic support, (2) mechanical gear support, (3) hydraulic support valve, (4) gear crank, (O) valve position OPEN, (Z) valve position CLOSED, (A) mechanical support lifting, (B) support lowering, (C),(D) choice of gear setting

- Connect hydraulic brake system line (applies to trailer version with hydraulic brake system).
- Connect hydraulic system lines. The lines are marked with colours. The lines marked with the same colour should be connected to one section of the tractor hydraulic manifold.
- Connect the main lead supplying electric lighting system (7--pin) and the connecting lead of electrical system of hydraulic system (3-pin) to sockets on the tractor. If the tractor is not equipped with such sockets or is equipped with a different type of sockets, carry out the sockets installation according to the recommendations of the tractor manufacturer.

➡ Raise support maximally upwards, valve (3) set in closed position (Z),

➡ Release parking brake.

⇨ Turn the brake mechanism anticlockwise.

DANGER

When hitching, there must be nobody between the trailer and the tractor. When hitching the machine, tractor driver must exercise particular caution and make sure that nobody is present in the hazard zone.

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

Ensure sufficient visibility during hitching.

Exercise particular caution during folding support - danger of severing limbs.

If trailer is equipped with mechanical gear support; the drawbar shaft height is obtained by turning crank (4) of support gear. The applied support is equipped with a mechanism enabling change of reducer setting. Moving lever in direction (D), gear works in greater setting mode. Lever (4) when placed in a central position is in neutral setting – releasing or raising support is impossible. After finishing hitching tractor to trailer, the support should be maximally raised upwards, the lever set in neutral setting and the foot secured with cotter pin.

IMPORTANT!

Ensure compatibility of oils in tractor hydraulic system and in the trailer hydraulic tipping system.

During connection of braking system lines (pneumatic double line) the correct sequence of line connection is very important. First connect the yellow connector to yellow socket in the tractor and only then connect the red connector to the red socket in the tractor. Once the 2nd line is connected, the braking system will switch to normal mode of operation (disconnection or interruption of the lines causes the trailer's braking system control valve to automatically apply brakes). Lines are marked with coloured protective covers, which identify the appropriate system line.

IMPORTANT!

Trailer may only be hitched to a tractor, which has the appropriate hitch, connection sockets for braking, hydraulic and electrical systems, and hydraulic oil in both machines is the same type and may be mixed.

Do NOT travel with trailer which has an unreliable brake, lighting or signalling system.

When hitching is completed, secure the electrical leads and hydraulic and braking system lines in such a way that they do not become entangled in tractor's moving parts and are not at the risk of breaking or severed when making turns.

Disconnecting the trailer

IMPORTANT!

The trailer may not be unhitched from the tractor, if the tipping frame or central frame are not fully retracted and when hydraulic cylinder suspension blocks are extended.

In order to disconnect the trailer from the tractor carry out the following actions in the following sequence.

- ➡ Immobilise tractor and trailer with parking brake and place chocks under trailer wheels.
  - ⇨ Wheel chocks shall be so placed that one of them is in front of the wheel and the second is behind it.
- ➡ Set valve (3) of hydraulic support to open position (O) – figure *(4.1)*.
- ➡ Lower the support to enable safe unhitching of the trailer.
  - ⇨ Operate the selective control valve on the tractor in the direction corresponding to the hydraulic support cylinder piston extension.
  - ⇨ When the hydraulic support is lowered, set selective control valve lever to "neutral" position.
  - ⇨ Close the hydraulic support valve to lock the support in a fixed position.
  - ⇨ If the trailer is equipped with a mechanical support, secure it with locking pin provided after adjusting the drawbar eye to correct height.

- ➡ Turn off tractor engine. Ensure that unauthorised persons do not have access to the tractor cab.
- ➡ Disconnect hydraulic system conduits, pneumatic system conduits and electrical leads from the tractor.
- ➡ Protect terminal ends with covers, Place line terminals in appropriate sockets.
- ➡ Release tractor hitch and disconnect trailer drawbar from tractor hitch and drive tractor away.

DANGER

Exercise caution when disconnecting trailer from the tractor. Ensure good visibility. Unless it is necessary, do not go between tractor and trailer.

Before disconnecting lines and drawbar eye, close tractor cab and secure it against access by unauthorised persons. Turn off tractor's engine.

IMPORTANT!

Do NOT park the trailer with load box, which is disconnected from the tractor and resting on the parking stand.

4.3 COUPLING AND UNCOUPLING SECOND TRAILER

A second trailer may only be connected, if it is a machine built on a dual axle chassis and if it fulfils all the requirements specified in section 1.

Coupling a second trailer to the assembly requires experience in driving an agricultural tractor with a trailer. It is recommended while coupling the second trailer to use the help of another person to guide the tractor driver.

Coupling second trailer

- ➡ The tractor with the coupled first trailer is positioned directly in front of the drawbar of the second trailer.
- ➡ Immobilise second trailer with parking brake.

- ➡ Remove cotter pin securing pin and take out hitch pin (2) in the first trailer - figure (*4.2*).
- ➡ Adjust the height of the drawbar of the second trailer in such a manner as to enable coupling the machines.
- ➡ Reversing tractor, drive the rear hitch of the first trailer onto the drawbar of the second trailer.
- ➡ Insert drawbar pin and securing cotter pin.
- ➡ Connect lines of pneumatic, hydraulic and electrical connections according to instructions contained in section *(4.2)*

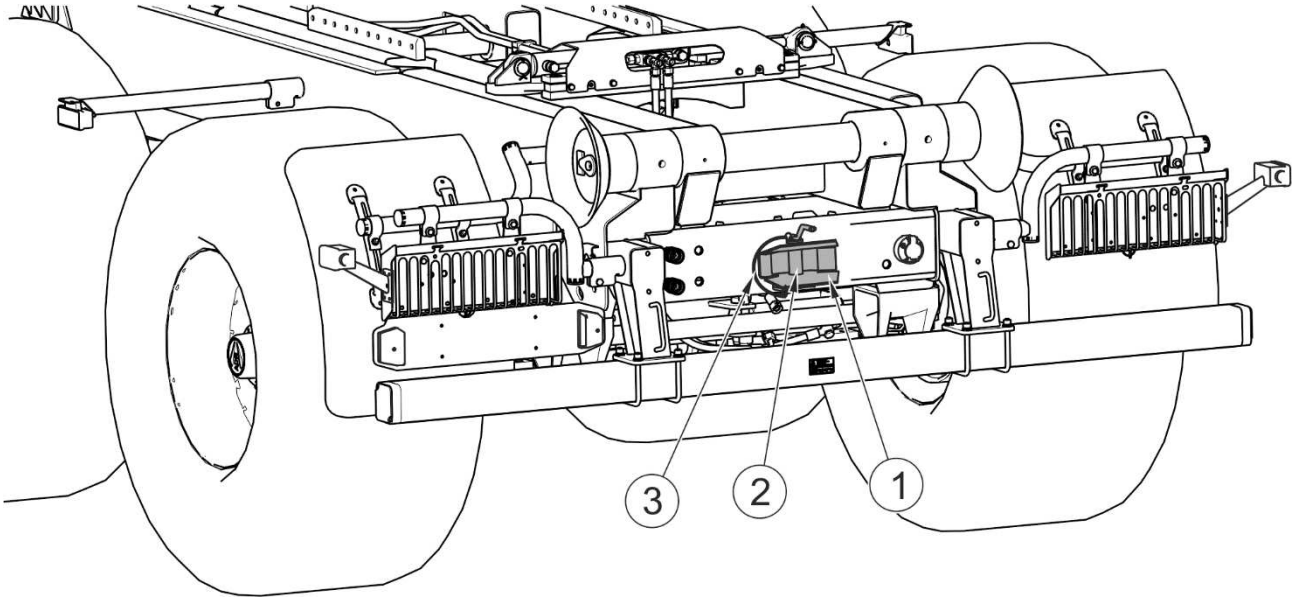


FIGURE 4.2 Rear hitch,

(1) hitch body, (2) hitch pin, (3) chain with cotter pin securing pin

Disconnecting the second trailer

- ➡ Immobilise tractor and trailers with parking brake.
- ➡ Turn off tractor engine. Ensure that unauthorised persons do not have access to the tractor cab.
- ➡ Disconnect lines of pneumatic, hydraulic and electrical connections according to instructions contained in section *(4.2)*.

➡ Remove cotter pin from pin of the hitch of the first trailer. Remove drawbar pin and drive tractor away.

DANGER

When hitching, there must be nobody between the trailers. Person assisting hitching up machines should stand outside the area of danger and be visible to the tractor driver at all times.

IMPORTANT!

Do NOT hitch a second trailer constructed on any chassis except dual axle.

4.4 PULLING THE LOAD BOX ON THE TRAILER

IMPORTANT!

Before connecting load box one must take off the slow-moving vehicle plate. Suspension should be blocked using hydraulic ram cylinders. Connecting the load box should be carried out on flat, even and level ground.

If the trailer or load box is tilted sideways or is not positioned in the trailer's axis of symmetry while pulling in the load box, stop connecting and take the load box off the trailer.

In order to pull the load box onto the trailer, carry out the following actions in the following sequence.

➡ Take off slow-moving vehicle plate from trailer.

➡ Slide in the trailer's bumper maximally and secure it against sliding.

➡ If necessary, adjust position of hook – see section 5.6.

➡ Place the tractor and the trailer in front of the load box, in the straight line, at a distance of about 1 meter from the load box hitch.

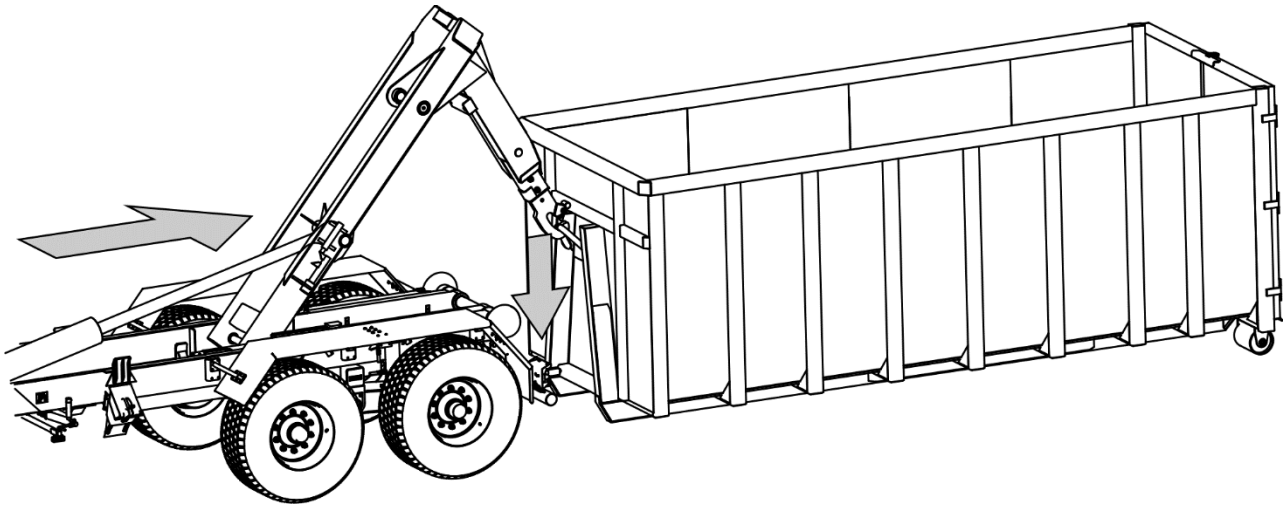


FIGURE 4.3 Pulling the load box on the trailer – stage 1

- Set the trailer to "hook trailer" function. Correct setting of the trailer will be indicated by the indicator light located next to the "hook trailer" symbol. In this function: raising (active), hook frame (active), load box interlock will be unlocked.
- Shift the hook frame maximally to the rear.
- Move the central frame to such a position in which the hook is located at the height of the load box hitch.
- Reverse the trailer to such a position in which it is possible to hook the load box – figure (*4.3*).

IMPORTANT!

Pulling the load box onto the trailer should be carried out on flat, even and level ground. While connecting load box arrange it in such a way that the longitudinal axis of the trailer is aligned with the longitudinal axis of the load box. If not, the load box longitudinal members of the frame may not fit on the trailer rollers lengthwise. While pulling the load box onto the trailer, it is necessary to observe whether its longitudinal members are properly supported on the trailer guide rollers. If necessary, stop pulling the load box, put the load box aside and position the trailer once again in a proper manner for pulling the load box.

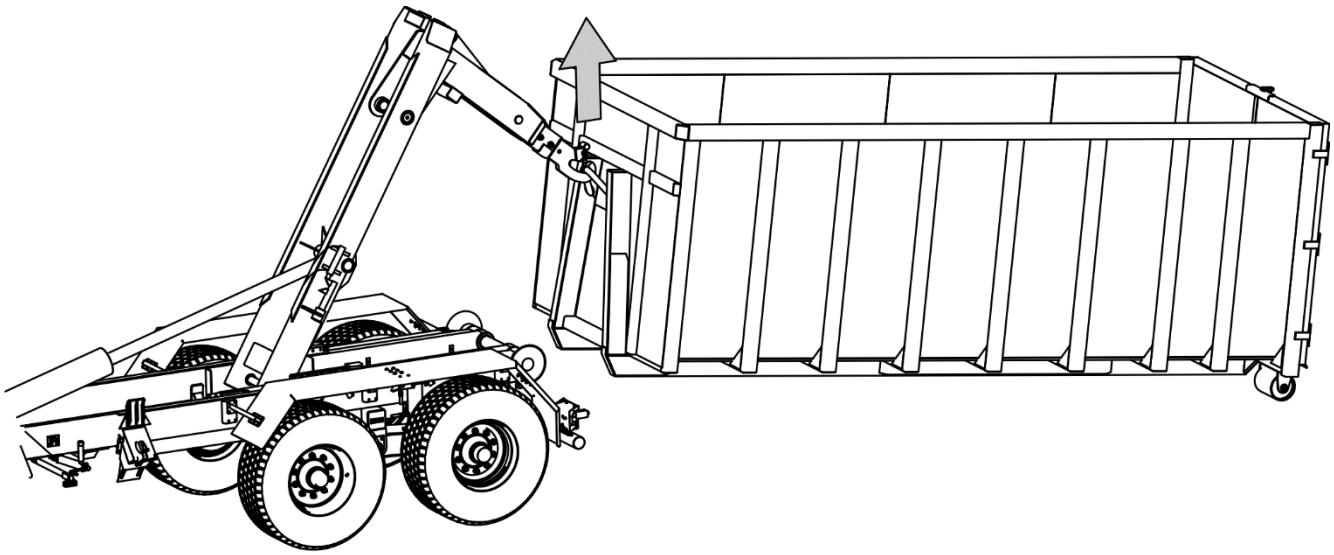


FIGURE 4.4 Pulling the load box on the trailer – stage 2

- Move the hook frame slightly forward in order to raise the front of the load box and support the load box lug on the hook.
- Retract central frame to original position. While pulling the load box, pay attention to ensure that the load box longitudinal members are not jammed by the trailer's guide rollers. If the longitudinal members are jammed, stop retracting the central frame and move the hook frame forward and raise the front of the load box in this way. When the front of the load box is located above the rollers, restart retracting the central frame.
- When the central frame is retracted to its original position, move the hook frame maximally forward.
- Set the trailer to "tipper" function. Correct setting of the trailer will be indicated by the indicator light located next to the "tipper" symbol. In this function: raising (active), hook frame (not active), load box interlock will be locked.
- Place slow-moving vehicle plate on the rear wall of the load box.
- Extend and lock the trailer's bumper so as to ensure that the distance between the load box end and the bumper does not exceed 400mm.

IMPORTANT!

Hook frame is operated only when the load box is unlocked.

In the event of pulling the load box, which is not standing on hard ground, it is permissible to reverse the trailer after raising the load box to a height enabling it to be pulled in. Soft ground preventing easy rolling of the load box rollers significantly hinders the load box pulling in process. When reversing delicately attempt to retract the hook frame. The described process needs to be carried out taking particular care and with the assistance of a person standing to the side of the trailer, who is able to observe the connection stage.

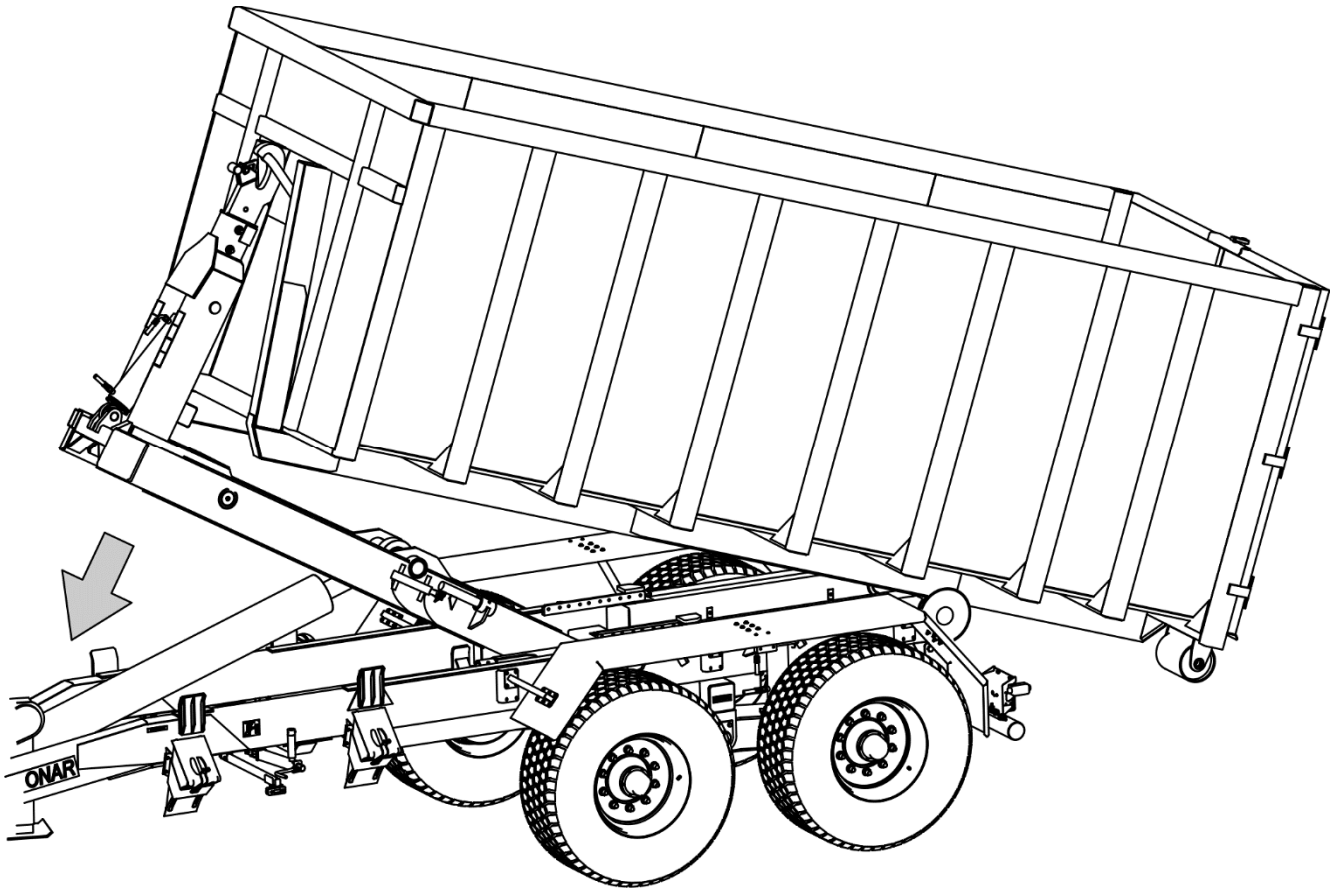


FIGURE 4.5 Pulling the load box on the trailer – stage 3

DANGER

When pulling in the load box onto the trailer the drawbar shaft and tractor hitch are subjected to great load.

Other persons must NOT be in the immediate vicinity of the trailer and especially behind the connected load box.

Take particular care while working near electric power lines.

Do NOT operate the frame interlock while connecting the load box. Selection of trailer's working mode is only possible when the tipping frame is retracted in rest position.

4.5 REMOVING LOAD BOX FROM TRAILER

Removing load box from trailer must be done on hard and level ground. If not, the load box rollers may dig into the earth and hinder disconnection from the trailer. The load box must not be left on a slope.

In order to disconnect the load box from the trailer carry out the following actions in the following sequence.

- Set tractor and trailer on hard level ground; tractor and trailer must be positioned in order to drive straight forwards.
- Slide in the trailer's bumper maximally and secure it against sliding.
- Set the trailer to "hook trailer" function. Correct setting of the trailer will be indicated by the indicator light located next to the "hook trailer" symbol. In this function: raising (active), hook frame (active), load box interlock will be unlocked.
- Shift the hook frame maximally to the rear.
- Tilt the central frame to the rear. While removing the load box from the trailer, pay attention to ensure that the load box longitudinal members are not jammed by the trailer's guide rollers. If the longitudinal members are jammed, stop tilting the central frame and move the hook frame forward and raise the front of the load box in this way. When the front of the load box is located above the rollers, restart tilting the central frame.
- After putting the load box on the ground, stop tilting the central frame.
- Set the hook frame in a position that enables disconnecting the hook from the load box and drive the tractor away from the load box in order to disconnect it.
- Fold down the hook frame and the central frame.
- Attach slow moving vehicle plate.

ATTENTION

When disconnecting the load box, user must take particular care that prior to lowering the load box to the ground it shall not strike any trailer's structural elements.

DANGER

When disconnecting the load box from the trailer the drawbar shaft and tractor hitch are subjected to great loading.

Other persons must NOT be in the immediate vicinity of the trailer and especially behind the disconnected load box.

Do NOT travel with trailer if the hook frame and the tipping frame are not completely folded.

Take particular care while working near electric power lines.

Do NOT operate the frame interlock while disconnecting the load box. Selection of trailer's working mode is only possible when the tipping frame is retracted in rest position.

4.6 LOADING THE LOAD BOX

Before beginning the load box loading make certain that the load box side walls are properly closed and secured. The trailer must be positioned to travel forwards and be hitched to the tractor. Loading should only take place, when trailer is placed on flat level surface and hitched to tractor.

Distribute load evenly in the load box using suitable tools (crane, loader, conveyor, etc.), depending on type of load. Loading should be carried out by a person experienced in this type of work and having appropriate authorisation for operating equipment (if required). Type of load carried depends on load box use.

Due to the various density of materials, using the total load box capacity may cause exceeding permissible carrying capacity of hook trailer. Please note that the weight of empty load box and its load must not exceed the permissible carrying capacity of the trailer. Guideline specific weight of selected materials is shown in table (*4.1*). Take care not to overload the trailer.

TABLE 4.1 Guideline weights by volume of selected loads

TYPE OF MATERIAL	VOLUME WEIGHT KG/M^3
Root crops:	
raw potatoes	700 - 820
steamed crushed potatoes	850 - 950
dried potatoes	130 - 150
sugar beet - roots	560 - 720
fodder beet - roots	500 - 700
Organic fertilisers:	
old manure	700 - 800
mature manure	800 - 900
fresh manure	700 - 750
compost	950 – 1 100
dry peat	500 - 600
Mineral fertilisers:	
ammonium sulphate	800 - 850
potash salt	1 100 – 1 200
super phosphate	850 – 1 440
basic slag phosphate	2 000 – 2 300
potassium sulphate	1 200 – 1 300
kainite	1 050 – 1 440
milled lime fertiliser	1 250 - 1 300
Building materials:	
cement	1 200 – 1 300
dry sand	1 350 – 1 650
wet sand	1 700 – 2 050
solid bricks	1 500 – 2 100
hollow bricks	1 000 – 1 200
stones	1 500 – 2 200
soft wood	300 - 450
hard sawn timber	500 - 600
impregnated timber	600 - 800

TYPE OF MATERIAL	VOLUME WEIGHT KG/M^3
steel structures	700 – 7 000
milled burnt lime	700 - 800
cinders	650 - 750
gravel	1 600 – 1 800
straw litter and bulk feeds	
meadow hay dried in the swath	10 - 18
hay wilted in the swath	15 - 25
hay in gathering trailer (dry wilted)	50 - 80
wilted cut hay	60 - 70
dry baled hay	120 - 150
wilted baled hay	200 - 290
stored dry hay	50 - 90
stored cut hay	90 - 150
clover (lucerne) wilted in the swath	20 - 25
clover (lucerne) cut wilted on trailer	110 - 160
clover (lucerne) wilted on gathering trailer	60 - 100
dry stored clover	40 - 60
cut dry stored clover	80 - 140
dry straw in round bales	8 - 15
damp straw in round bales	15 - 20
cut damp straw in bulk trailer	50 - 80
cut dry straw in bulk trailer	20 - 40
cut dry straw in gathering trailer	50 - 90
cut dry straw in stack	40 - 100
baled straw (lightly crushed)	80 - 90
baled straw (heavily crushed)	110 - 150
cut cereal mass in bulk trailer	35 - 75
cut cereal mass in gathering trailer	60 - 100
green fodder in swath	28 - 35
cut green fodder in bulk trailer	150 - 400
green fodder in gathering trailer	120 - 270
fresh beet leaves	140 - 160

TYPE OF MATERIAL	VOLUME WEIGHT KG/M^3
cut fresh beet leaves	350 - 400
beet leaves in gathering trailer	180 - 250
concentrated feeds and mixed feeds:	
stored chaff	200 - 225
pressed cake	880 – 1 000
milled dry feed	170 - 185
mixed feeds	450 - 650
mineral mixtures	1 100 – 1 300
ground oats	380 - 410
wet sugar beet pulp	830-1,000
pressed sugar beet pulp	750 - 800
dry sugar beet pulp	350 - 400
bran	320 - 600
bone meal	700 – 1 000
pasture salt (1)	1 100 – 1 200
molasses	1 350 – 1 450
silage (pit silo)	650 – 1 050
hay silage (tower silo)	550 - 750
Seeds and grains:	
beans	750 - 850
mustard	600 - 700
peas	650 - 750
lentils	750 - 860
runner beans	780 - 870
barley	600 - 750
clover	700 - 800
grass	360 - 500
maize	700 - 850
wheat	720 - 830
oil seed rape	600 - 750
linseed	640 - 750
lupins	700 - 800

TYPE OF MATERIAL	VOLUME WEIGHT KG/M^3
oats	400 - 530
lucerne	760 - 800
rye	640 - 760
Others:	
dry soil	1 300 – 1 400
wet soil	1 900 – 2 100
fresh peat	700 - 850
garden soil	250 - 350

Source: "Technology of machine work in agriculture", PWN, Warszawa 1985

✶- building materials, mineral fertilisers and mineral mixtures cause damage to trailer structure and/or paint coating and cause the creation of corrosion points

IMPORTANT!

Always aim at distributing the load uniformly in the load box.

Do NOT exceed permissible load weight of trailer because this may cause danger to road traffic and cause damage to the machine.

Individual types of load boxes are adapted to carrying various groups of materials, therefore the user is obligated to carefully read the load box operator's manual and comply with its recommendations.

Light materials with a large volume (hay, round or rectangular bales, straw, green fodder etc.), maybe loaded even above the edge of the load box paying particular attention to trailer stability. Regardless of the type of load carried, the user is obliged to secure it in such a manner that the load is unable to spread and cause contamination of the road.

Mineral fertilisers and other materials, which by having contact with painted or steel surfaces may cause damage, are recommended to be carried in sealed packing (sacks, boxes, drums, barrels etc.).

4.7 TRANSPORTING LOADS

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

- Before moving off make sure that there are no bystanders, especially children, near the trailer or the tractor. Take care that the driver has sufficient visibility.
- Make sure that the trailer is correctly attached to the tractor and tractor's hitch is properly secured.
- Vertical load borne by the trailer drawbar eye affects the steering of the agricultural tractor.
- While transporting the load box, the trailer must be set to "tipper" function".
- The trailer must not be overloaded, loads must be uniformly distributed so that the maximum permissible trailer axle and hitch loads are not exceeded. The trailer's maximum carrying capacity must not be exceeded as this can damage the trailer and pose a risk to the operator or other road users.
- Permissible design speed and maximum speed allowed by road traffic law must not be exceeded. The towing speed should be adapted to the current road conditions, load carried by the trailer, road surface conditions and other relevant conditions.
- Trailer may be towed on slopes of up to 8° and unloading must take place only on a level surface.
- When not connected to the tractor, the trailer must be immobilised using parking brake and possibly also with chocks or other objects without sharp edges placed under the front and back wheels. Do NOT leave unsecured trailer. In the event of machine malfunction, pull over on the hard shoulder avoiding any risk to other road users and position reflective warning triangle according to traffic regulations.
- When driving on public roads trailer must be marked with a slow-moving vehicle warning sign attached to the rear chassis beam (travelling without load box), or on rear wall of load box.

- While driving on public roads the trailer must be fitted with a certified or authorised reflective warning triangle.
- When driving, comply with all road traffic regulations, indicate an intention to turn using indicator lamps, keep all road lights and indicator lights clean at all times and ensure they are in good condition. Any damaged or lost lamps or indicator lights must be immediately repaired or replaced.
- Avoid ruts, depressions, ditches or driving on roadside slopes. Driving across such obstacles could cause the trailer or the tractor to suddenly tilt. This is of special importance because loaded trailer's centre of gravity is higher, which reduces safety. Driving near ditches or channels 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, avoid sharp turns especially on slopes.
- When trailer is towed (with load box or without load box), hydraulic cylinder suspension blocks must be completely raised.
- Please note that the braking distance of the tractor and slurry tanker combination is substantially increased at higher speeds and loads. Before beginning travel appropriately adjust trailer braking force, by appropriate brake force regulator setting (applies to pneumatic brake systems).
- While travelling on roads (public or private), take the guards protecting rear light assemblies from the light beam profiles and secure them on the other side of the profiles using star nuts.

4.8 UNLOADING

Unloading materials from the load box takes place by tipping the load box to the rear. Operation is controlled from driver's cab using external tractor hydraulic system selective control valve.

	DANGER
	Tipping may only be performed when trailer is hitched to tractor. **Do NOT tip load box in strong gusty winds conditions.** **Do NOT move off or drive when load box is raised.** **Take particular care while working near electric power lines.**

Unloading of the trailer is performed in the following sequence:

- Tractor and trailer must be placed to drive forwards on flat and hard ground,
- Immobilise tractor and trailer with parking brake.
- Slide in the trailer's bumper maximally and secure it against sliding.
- Open the rear wall of the load box. During opening exercise particular caution, because the load may exert great pressure on the wall.
- Set the trailer to "tipper" function. Correct setting of the trailer will be indicated by the indicator light located next to the "tipper" symbol. In this function: raising (active), hook frame (not active), load box interlock will be locked.
- Raise the tipping frame together with the load box.
- If, in the initial stage, the tipping frame can not raise the load box, do the following:
  - ⇨ lower the tipping frame completely,
  - ⇨ set the trailer to "hook trailer" function. Correct setting of the trailer will be indicated by the indicator light located next to the "hook trailer" symbol. In this function: raising (active), hook frame (active), load box interlock will be unlocked
  - ⇨ shift the load box to the rear using the hook frame
  - ⇨ set the trailer to "tipper" function. Correct setting of the trailer will be indicated by the indicator light located next to the "tipper" symbol. In this function: raising (active), hook frame (not active), load box interlock will be locked.
  - ⇨ continue rising the tilting frame together with the load box

- ➡ Lower the tilting frame after unloading.
- ➡ If needed, shift the load box completely forward using the hook frame and setting the trailer to the "hook trailer" function.
- ➡ Remove remains of load from the load box edges and the trailer components.
- ➡ Extend and lock the trailer's bumper so as to ensure that the distance between the load box end and the bumper does not exceed 400mm.
- ➡ Close and secure rear wall of load box.
- ➡ Make sure that the suspension interlock cylinders are maximally raised.

DANGER

Tipping the load box must be done on hard and level ground.

When opening load box closure take particular care, because of the pressure of the load on the wall.

When closing load box wall take particular care to avoid crushing fingers.

Ensure that during unloading nobody is near tipped load box or load material pouring out.

4.9 PROPER USE AND MAINTENANCE OF TYRES

- When working on the tyres, chocks or other objects without sharp edges should be placed under the wheels of the trailer to prevent it from rolling. Wheels can be taken off the trailer axle only when the trailer is not loaded.
- Repair work on the wheels or tyres should be carried out by persons trained and entitled to do so. This work should be carried out using appropriate tools.
- Inspect tightness of nuts before the first use of trailer, after the first travel under load and then every 6 months of use or every 25,000 km. In the event of intensive work, check the nut tightening at least every100 km. The inspection should be repeated individually if a wheel has been removed from the wheel axle.
- Regularly check and maintain correct pressure in tyres according to Operator's Manual (especially if trailer is not used for a longer period).

- Pressure and tyres should be also checked during the whole day of intensive work. Please note that higher temperatures could raise tyre pressure by as much as 1 bar. At high temperatures and pressure, reduce load or speed.
- Do not release air from warm tyres to adjust the pressure or the tyres will be underinflated when temperatures return to normal.
- Protect tyre valves using suitable caps to avoid soiling.
- Do not exceed the trailer's maximum design speed.
- When the trailer is operated all day, stop working for a minimum of one hour in the afternoon.
- Adhere to 30 minutes rest for cooling tyres after driving 75 km or after 150 minutes continuous travel depending on which occurs first.
- Avoid potholes, sudden manoeuvres or high speeds when turning.

4.10 USING UNDER-RUN PROTECTIVE DEVICES

Two pairs of hinged tiltable under-run protective devices can be installed as trailer additional equipment. The under-run protective devices fulfil a very important role in road safety and therefore their good technical condition should be ensured.

Lifting

➡ Pull the under-run protective device by holding its lower bar.

➡ Raise the under-run protective device to the height shown in Figure (*4.6*)

➡ Move the under-run protective device away (the direction indicated by arrow). Appropriate recess and slotted holes allow the locking of under-run protective device in the raised position.

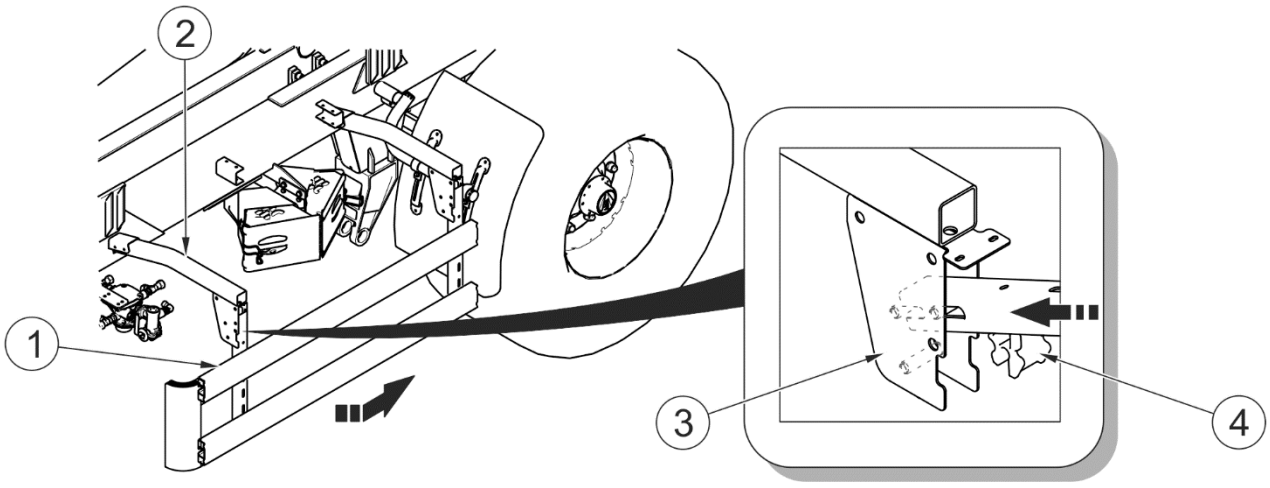


FIGURE 4.6 Under-run protective device, left

(1) under-run protective device, left, (2) arm of under-run protective device, (3) bracket, (4) latch

Lowering

- ➡ Pull the under-run protective device.
- ➡ Lower the under-run protective device and press until the bracket pin (3) locks into the latch.
- ➡ Secure the under-run protective device with pins.

DANGER

Do NOT move off or drive when under-run protective device is raised. Before driving, make sure that under-run protective devices are lowered and locked in the lower position.

Unless necessary, do not leave the under-run protective device in the raised position.

SECTION

5

MAINTENANCE

5.1 PRELIMINARY INFORMATION

When using the trailer, regular inspections of its technical condition are essential and the performance of maintenance procedures, which keep the machine in good technical condition. In connection with this the user of the trailer is obliged to perform all the maintenance and adjustment procedures defined by the Manufacturer.

Repairs during the warranty period may only be performed by authorised service points.

Detailed procedures and extents of functions are described in this section, which the user may perform with his own resources. In the event of unauthorised repairs, changes to factory settings and other actions, which are not regarded as possible for the trailer operator to perform, the user shall invalidate the warranty.

5.2 SERVICING WHEEL AXLE

5.2.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of axle components should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- Inspection and adjustment of loose play of axle bearings,
- mounting and dismounting wheel, inspection of wheel tightening,
- checking air pressure, evaluating technical condition of wheels and tyres,
- mechanical brakes adjustment,
- checking thickness of brake shoe linings,
- change of parking brake cable and adjustment of cable tension.

Procedures connected with:

- changing grease in axle bearings,
- changing bearings, hub seals,
- replacement of brake shoes,

- other axle repairs,

may be performed by specialist workshops.

5.2.2 CHECK WHEEL AXLE BEARINGS FOR LOOSENESS

DANGER

Before commencing work the user must read the instructions for lifting and adhere to the manufacturer's instructions.

The lifting jack must be stably supported by the ground and so must the axle.

Ensure that trailer shall not move during inspection of bearing looseness of axles.

Preparation procedures

➡ Hitch trailer to tractor, braking tractor with parking brake.

➡ Park tractor and trailer on hard level ground.

⇨ Tractor must be placed to drive forward.

➡ Place securing chocks under one trailer wheel. Ensure that trailer shall not move during inspection.

➡ Raise wheel (opposite to the side where chocks are placed).

⇨ Lifting jack should be placed as close as possible to the place where the leaf spring is mounted on the axle. Lifting jack must be suited to weight of trailer.

Check wheel axle bearings looseness

➡ Turning the wheel slowly in both directions check that movement is smooth and that the wheel rotates without excessive resistance.

➡ Turn the wheel so that it rotates very quickly, check that the bearing does not make any unusual sounds.

➡ Holding the wheel above and below, try to feel any looseness.

⇨ You may use a lever placed under the wheel supporting the other end on the floor.

➡ Repeat the inspection procedure for other wheels, remembering that the lifting jack must be on the side opposite to the chocks.

If play is felt, adjust bearing. Unusual sounds coming from bearing may be symptoms of excess wear, dirt or damage. In such an event the bearing, together with sealing ring, should be replaced with new parts, or cleaned and greased again During inspection of bearings ensure that possibly detected looseness comes from the bearing and not from the suspension system (e.g. looseness of leaf spring pins etc.).

TIP

Damaged hub cover or lack of hub cover causes penetration of contamination and dampness to hub, which causes significantly faster wear of bearing and hub seals.

Bearing life is dependent on working conditions of trailer, loading, speed of travel and lubrication conditions.

Check condition of hub cover, if necessary replace with new cover. Inspection of bearing looseness may only be conducted, when the trailer (without load and load box) is hitched to a tractor.

Check wheel axle bearings for play:

- **after passing the first 1,000 km,**
- **after intensive use of trailer,**
- **every six months use or every 25,000 km.**

5.2.3 ADJUSTMENT OF WHEEL AXLE BEARINGS LOOSENESS

The wheel should turn smoothly without stiffness or detectable resistance. Adjustment of bearing play may only be conducted, when the rotary rake is hitched to a tractor.

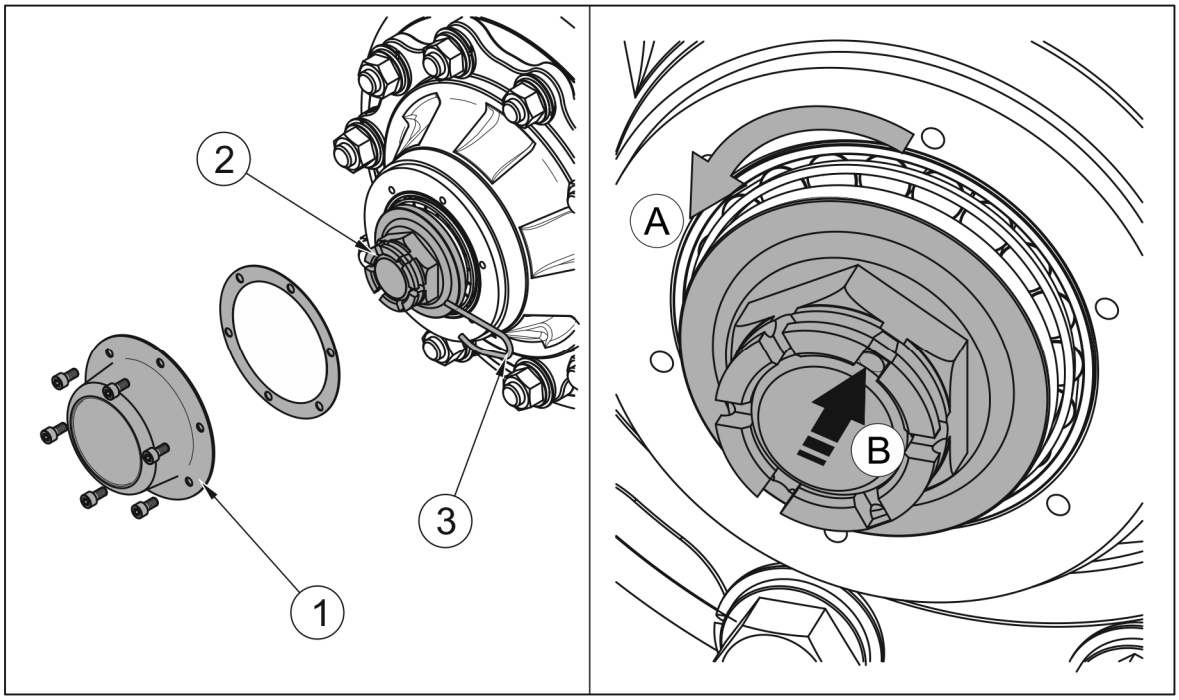


FIG. 5.1 Adjustment of road wheel axle bearings

(1) hub cover, (2) castellated nut, (3) securing split cotter pin

Preparation procedures

➡ Prepare tractor and trailer for adjustment procedures according with description provided in section *5.2.2*.

Adjustment of road wheel axle bearings

➡ Take off hub cover (1) - figure *(5.1)*.

➡ Take out split cotter pin (3) securing castellated nut (2).

➡ Tighten castellated nut in order to eliminate looseness.

⇨ Wheel should rotate with insignificant resistance.

➡ Unscrew nut in (A) direction, (not less than1/3 rotation) to cover the nearest thread groove with alignment to opening in wheel stub axle (B). Wheel should rotate with insignificant resistance.

⇨ Nut may not be excessively tightened. Do not apply excessive pressure with regard for deterioration of bearing working conditions.

➡ Secure castellated nut with cotter pin and mount hub cap.

➡ Delicately tap hub cap with rubber or wooden hammer.

TIP

If the wheel is dismounted, bearing looseness is easy to check and adjust.

5.2.4 MOUNTING AND DISMOUNTING WHEEL, INSPECTION OF WHEEL NUT TIGHTENING.

Checking wheel axle tightening:

- **after first use,**
- **after first travel with load,**
- **after passing the first 1,000 km,**
- **every six months use or every 25,000 km.**

In the event of intensive work check the nut tightening at least every 10,000 km. The above actions should be repeated individually if a wheel has been removed from the wheel axle.

Dismounting wheel

➡ Immobilise trailer with parking brake.

➡ Place chocks under wheel that will not be dismounted.

➡ Ensure that trailer shall not move during wheel dismounting.

➡ Loosen wheel nuts according to sequence given in figure (*5.2*).

➡ Place lifting jack and lift trailer.

➡ Dismount wheel.

Wheel mounting

➡ Clean axle pins and nuts of dirt contamination.

⇨ Do not grease thread of nuts and pins.

➡ Check condition of pins and nuts, if necessary replace.

➡ Place wheel on hub, tighten nuts so that wheel rim adjoins hub exactly.

➡ Lower trailer, tighten nuts according to recommended torque and given sequence.

TIP

Wheel nuts should be tightened using a torque of 450 - 510 Nm - nuts M22x1.5.

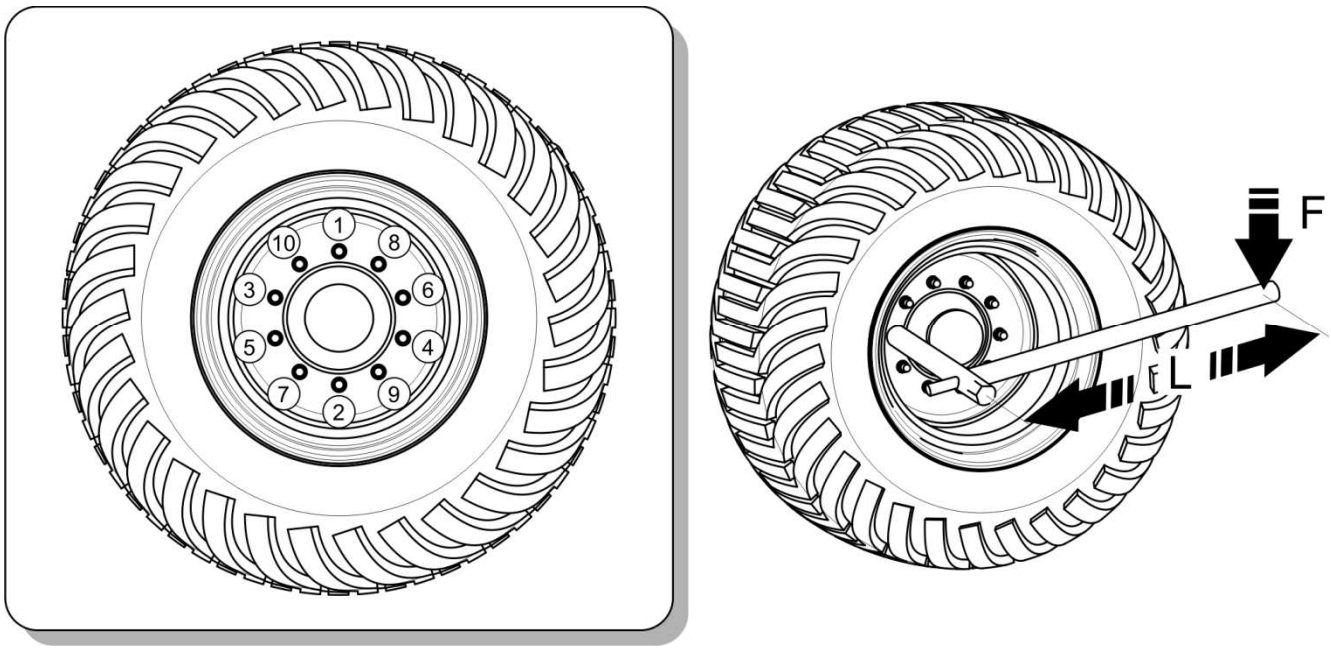


FIG. 5.2 Sequence of nut tightening

(1) - (10) sequence of nut tightening, (L) spanner length, (F) user weight

Tightening nuts

Nuts should be tightened gradually diagonally, (in several stages, until obtaining the required tightening torque) using a torque spanner. If a torque spanner is not available, one may use an ordinary spanner. The arm of the spanner (L) Figure (*5.2*) should be selected according to the weight of the person (F) tightening the nut. Remember that this method of tightening is not as accurate as the use of a torque spanner.

IMPORTANT!

Axle nuts may not be tightened with impact wrench, because of danger of exceeding permissible tightening torque, the consequence of which may be breaking the thread connection or breaking off the hub pins.

The greatest precision is achieved by use of a torque spanner. Before commencing work, ensure that correct tightening torque value is set.

TAB. 5.1 Spanner arm

WHEEL TIGHTENING TORQUE	BODY WEIGHT (F)	ARM LENGTH (L)
[Nm]	[kg]	[m]
450 – 510	90 ÷ 102	0.50
	79 ÷ 89	0.57
	69 ÷ 78	0.65
	60 ÷ 68	0.75

5.2.5 CHECK AIR PRESSURE, EVALUATE TECHNICAL CONDITION OF WHEELS AND TYRES

Tyre pressure should be checked each time after changing spare wheel and not less than every month. In the event of intensive use it is recommended to check air pressure more frequently. During this time trailer must be unloaded. Checking should be done before travelling when tyres are not heated, or after an extended period of parking.

TIP

Tyre pressure values are specified in information decal, placed on wheel or on upper frame above trailer wheel.

DANGER

Damaged tyres or wheels may be the cause of a serious accident.

While checking pressure pay attention to technical condition of wheels and tyres. Look carefully at tyre sides and check the condition of tread.

In case of mechanical damage consult the nearest tyre service and check whether the tyre defect requires tyre replacement.

Wheels should be inspected with regard to distortion, breaking of material, breaking of welds, corrosion, especially in the area of welds and contact with tyre.

Proper technical condition and appropriate maintenance of wheels significantly extends the life of these components and ensures appropriate level of safety to trailer users.

Checking tyre pressure and steel rims:

- **every 1 month of use,**
- **every week during intensive work,**
- **after changing spare wheel.**

5.2.6 CHECKING THICKNESS OF BRAKE SHOE LININGS

During use of trailer, friction lining of brake drums is subject to wear. In such a case, the complete brake shoes should be replaced with new ones. Excessive wear of brake shoes is the condition in which the thickness of linings which are glued or riveted to steel structures of brake shoes is smaller than the minimum value. This condition is indicated by extended cylinder piston stroke. Check technical condition of brake shoe linings through inspection openings (3) – figure (5.3).

TIP

Minimum thickness of brake shoe linings is 5 mm.

- **Thickness of brake shoe linings should be checked every 6 months.**

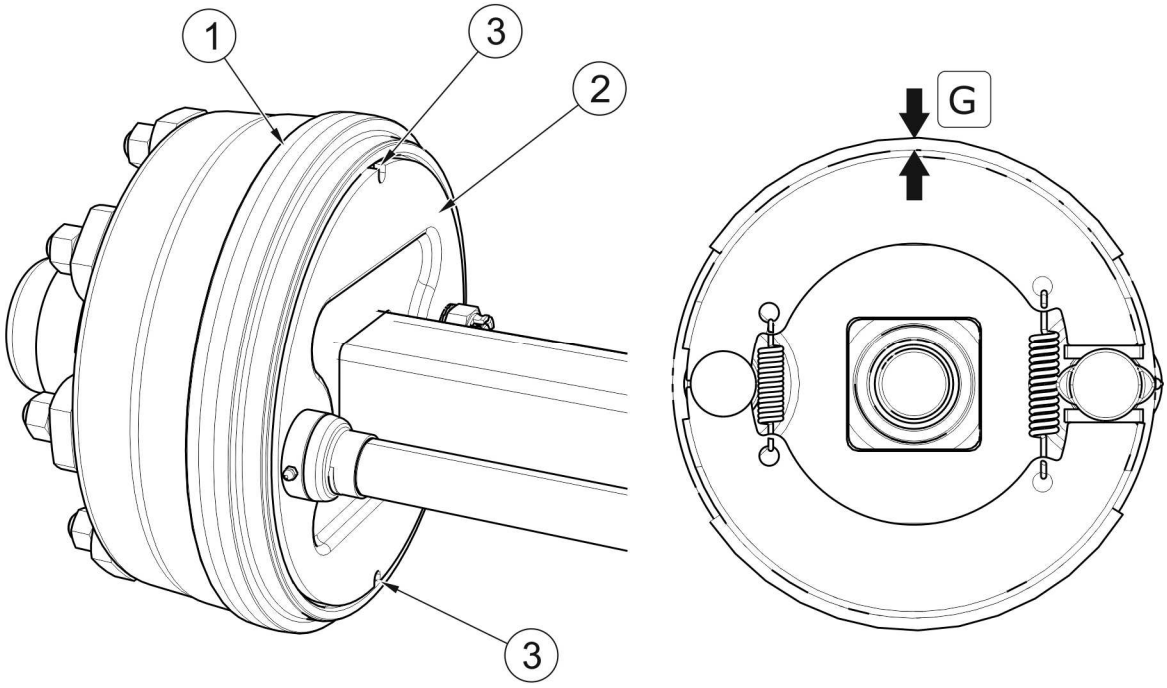


FIG. 5.3 Check brake shoe linings for wear

(1) brake drum, (2) disc, (3) inspection openings, (G) thickness of brake shoe lining

5.2.7 MECHANICAL BRAKES ADJUSTMENT

During use of trailer abrasive friction covering of brake drums is subject to wear. Piston stroke extends, and exceeding braking force limiting value declines.

TIP

Proper cylinder piston stroke should be between 25 – 45 mm.

Braking force decreases also when the operating angle of the brake cylinder piston (5), in relation to the expander arm (1), is wrong – figure (5.4). In order to obtain the optimum mechanical operating angle, the cylinder piston fork (6) must be installed on the expander arm (1) in such a manner as to ensure that the operating angle at full braking is about 90°.

IMPORTANT!

Incorrectly adjusted brake may cause rubbing of brake shoes against brake drums, which may lead to faster wear of brake linings and/or brake overheating.

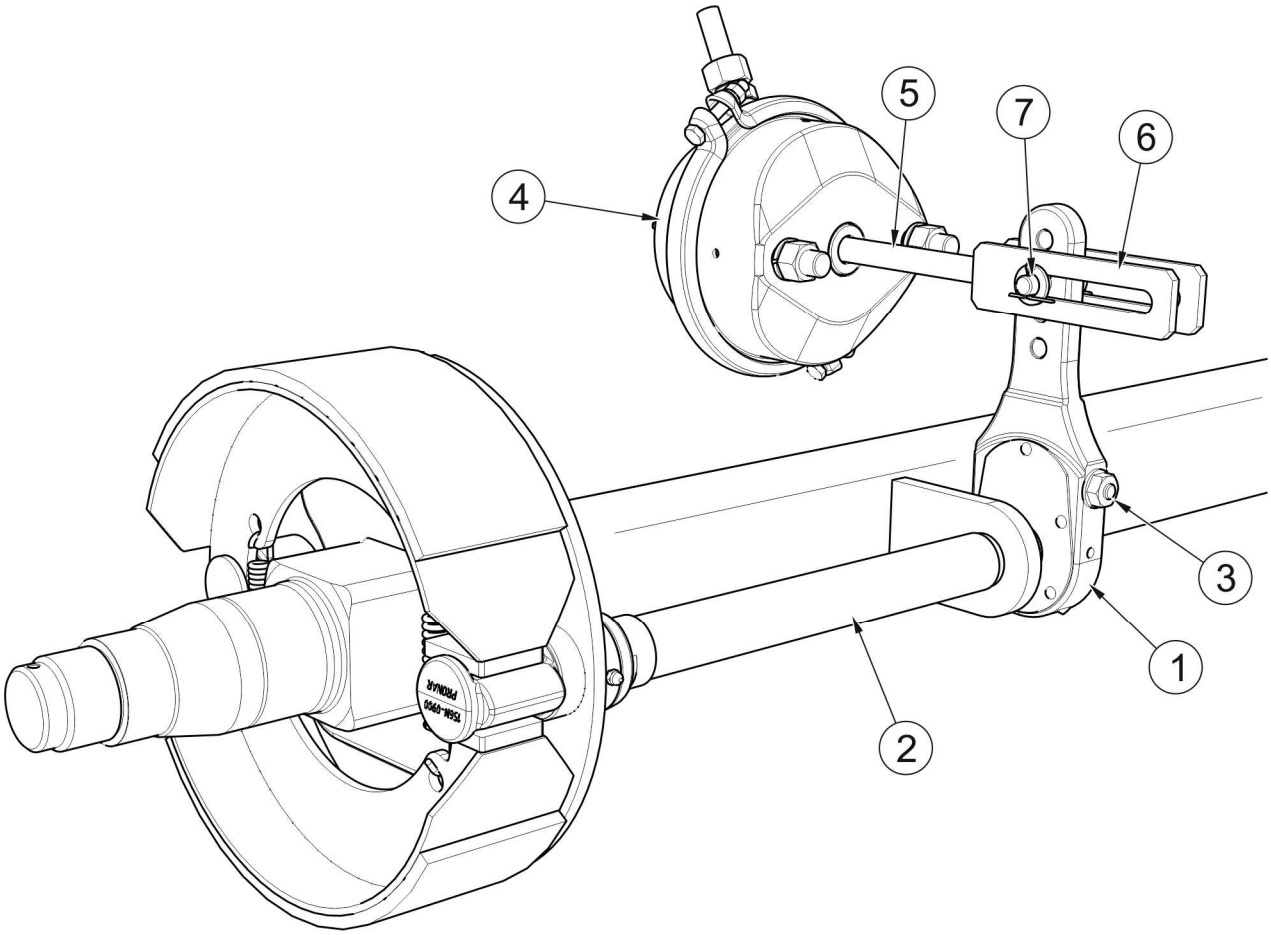


FIG. 5.4 Design of axle brake system

(1) expander arm , (2) expander shaft, (3) adjustment bolt, (4) brake cylinder, (5) brake cylinder piston, (6) cylinder fork, (7) fork pin

During braking, the brake cylinder piston stroke should be within the specified operating range and the angle between brake cylinder piston (1) and expander arm (3) should be about 90º– figure (5.5).

TAB. 5.2 Operating data of pneumatic cylinder

NOMINAL STROKE OF CYLINDER L [mm]	MINIMUM STROKE OF CYLINDER L_{MIN} [mm]	MAXIMUM STROKE OF CYLINDER L_{MAX} [mm]
75	25	45

- **Technical condition of the brake system should be checked every 6 months.**

The inspection involves measuring the extension length of each brake cylinder piston while braking at parking. If the brake cylinder piston stroke exceeds the maximum value (45 mm), the braking system should be adjusted.

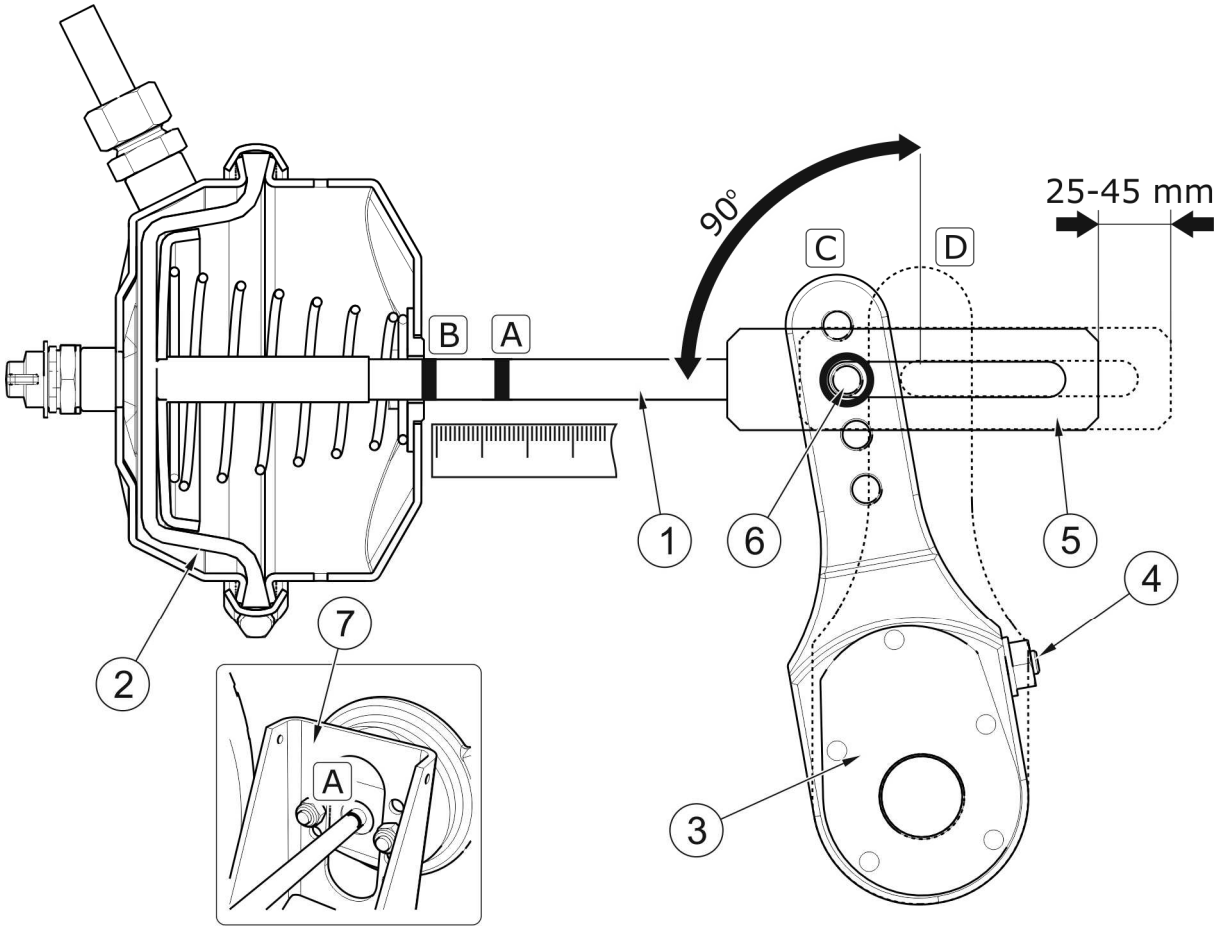


FIG. 5.5 Principle of brake system adjustment

(1) brake cylinder piston, (2) brake cylinder membrane, (3) expander arm, (4) adjustment bolt, (5) cylinder fork, (6) position of fork pin, (7) brake cylinder bracket, (A) mark on the brake cylinder at brake release position, (B) mark on the brake cylinder at full braking position, (C) position of arm at brake release position, (D) position of arm at full braking position

Required service actions

- ➡ Hitch trailer to tractor.
- ➡ Switch off tractor engine and remove key from ignition.
- ➡ Immobilise tractor with parking brake.
- ➡ Make sure that the trailer's brakes are not engaged.
- ➡ Secure the trailer with wheel chocks.
- ➡ Make a line (A) on the brake cylinder piston (1) to indicate the position of the maximum withdrawal of the brake cylinder piston when the trailer's brakes are released – figure (5.5).
- ➡ Press the tractor brake pedal and mark the position of the maximum extension of the brake cylinder piston with a line (B).
- ➡ Measure the distance between lines (A) and (B). If the brake cylinder piston stroke is outside the proper operating range, adjust the expander arm.
- ➡ Dismantle brake cylinder fork pin.
- ➡ Remember or mark the original position of pin (6) – figure (5.5), brake cylinder fork (5) in expander arm opening (3).
- ➡ Check if the brake cylinder piston moves freely and within the whole nominal range.
- ➡ Check if the brake cylinder vent holes are not blocked with impurities and that there is no water or ice inside the brake cylinder. Check if the brake cylinder is correctly installed.
- ➡ Clean the brake cylinder. If necessary, defrost the brake cylinder and drain water through the unblocked vent holes. Replace damaged brake cylinder with a new one. When installing the brake cylinder, maintain its original position with regard to bracket (7).
- ➡ Rotate adjustment bolt (4) to align the marked expander arm opening with the brake cylinder fork opening.
    - ⇨ During adjustment, membrane (2) must rest on the rear wall of the brake cylinder – figure (5.5).

- ➡ Install the brake cylinder fork pin and washers and secure the pin with cotter pins.
- ➡ Rotate adjustment bolt (4) to the right until one or two clicking sounds are heard in the expander arm regulating mechanism.
- ➡ Repeat adjustment activities for the other brake cylinder on the same axle.
- ➡ Engage the brake.
- ➡ Remove previous marks and measure the brake cylinder piston stroke again.
- ➡ If the brake cylinder piston stroke is outside the proper operating range, repeat the adjustment.

- **Every 6 months.**
- **After repair of braking system.**
- **In case of uneven trailer wheel braking.**

IMPORTANT!

The positions for fixing the brake cylinder in the bracket openings and the brake cylinder pin in the expander arm are determined by the Manufacturer and must not be changed.

Each time when dismantling the pin or brake cylinder, the original fixing position should be marked.

5.2.8 CHANGE OF PARKING BRAKE CABLE AND ADJUSTMENT OF CABLE TENSION.

Proper operation of the parking brake is dependent on the effectiveness of the axle brake and the correct brake cables tension.

Before commencing adjustment make certain that the main break is correctly regulated and is functioning properly.

Adjustment of parking brake cable tension should be conducted in the event of:

- stretching of cable,
- loosening of parking brake cable clamps

- after adjustment of axle brakes,
- after repairs to axle brake system,
- after repairs in parking brake system.

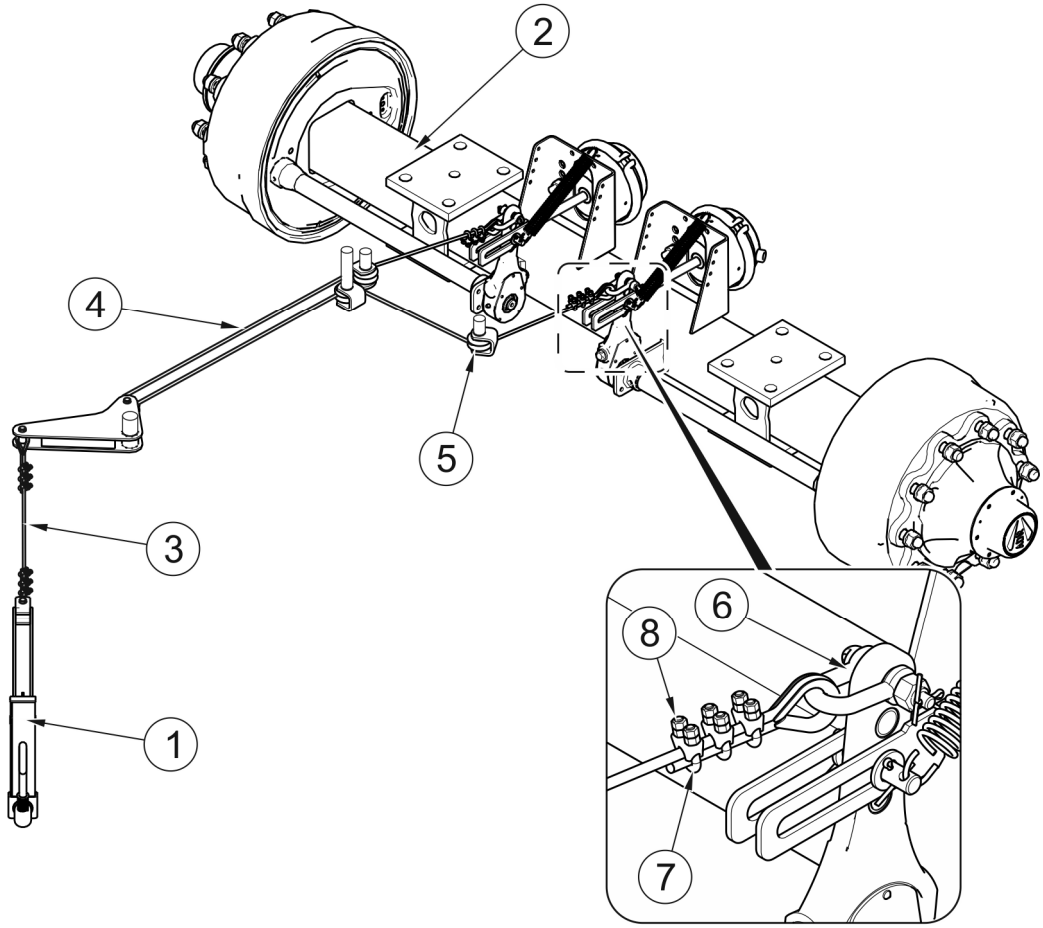


FIG. 5.6 Adjustment of parking brake cable tension

(1) brake crank mechanism, (2) wheel axle, (3) handbrake cable I; l=900mm, (4) handbrake cable II; l=2900, (5) cable roller, (6) shackle, (7) U-bolt clamp, (8) U-bolt clampnuts

Replacing the parking brake cable

- ➡ Hitch trailer to tractor. Park trailer and tractor on level surface.
- ➡ Place wheel chocks under trailer wheel.
- ➡ Fully unscrew the bolt of the brake crank mechanism (1).
- ➡ Loosen nuts (8) of U-bolt clamps (7) located at the ends of cable to be replaced.

- ➡ Dismantle proper shackles (6) at the ends of cable to be replaced.
- ➡ Dismantle parking brake cable.
- ➡ Clean parking brake components, lubricate crank mechanism and pins of cable guide rollers.
- ➡ Install new cable.
  - ⇨ Parking brake cable must be fitted carefully.
  - ⇨ Thimbles and three clamps must be fitted at the ends of the cable.
  - ⇨ Clamps must be tightened. The distances between the clamps may not be less than 40 mm.
  - ⇨ Clamp jaws must be placed at the load bearing cable side - see Figure *(5.7)*.
  - ⇨ The first clamp should be placed directly on the thimble.
- ➡ Install bolts and new securing cotter pins.
- ➡ Adjust tension of parking brake cables.
- ➡ After first loading of the brake, check tension of brake cable. If necessary, correct the tension.

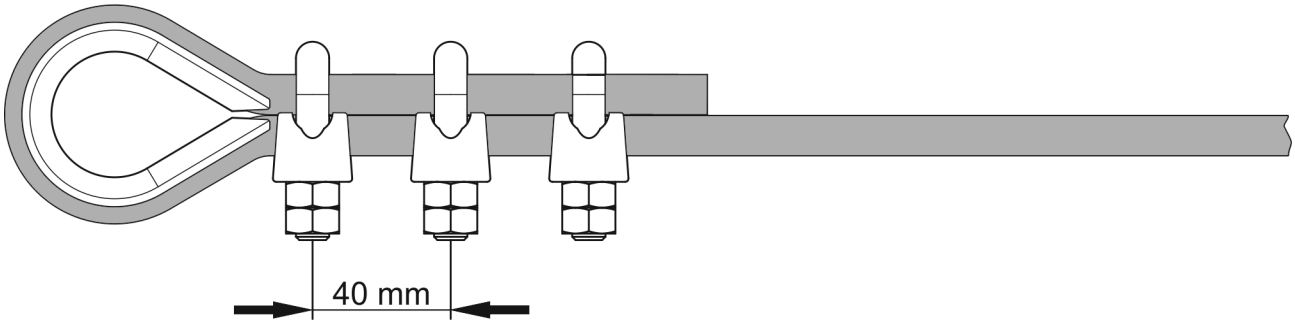


FIG. 5.7 Installing brake cable clamps

Adjustment of parking brake cable tension

- ➡ Hitch trailer to tractor. Park trailer and tractor on level surface.
- ➡ Place wheel chocks under trailer wheel.
- ➡ Unscrew the brake bolt mechanism maximally (1) – figure (*5.6*), (anti clockwise).

➡ Loosen nuts (8) of U-bolt clamps (7) on handbrake cable I (3).

➡ Tighten cable and tighten clamps.

⇨ Length of parking brake cable should be so selected that at total release of working and parking brake the cable would be loose and hanging by 1 - 2 cm.

Checking and parking brake adjustment:

- **every 12 months,**
- **if needed.**

5.3 PNEUMATIC SYSTEM MAINTENANCE

5.3.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of system components (brake cylinders, lines, control valve, braking force regulator etc.) should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

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

- inspecting and checking air tightness of system.
- cleaning the air filter (filters),
- draining water from air tank,
- cleaning drain valve,
- cleaning and maintaining pneumatic line connections,

DANGER

Do NOT use the trailer when brake system is unreliable.

5.3.2 INSPECTING AND CHECKING AIR TIGHTNESS OF PNEUMATIC SYSTEM.

Checking hydraulic system tightness

- Hitch trailer to tractor.
- Immobilise tractor and trailer with parking brake. Place chocks under trailer wheel.
- Start tractor in order to supplement air in trailer brake system tank.
  - In double line systems air pressure should amount to approx. 6.5 bar.
- Turn off tractor ignition.
- Check system components by releasing brake pedal in tractor.
  - Give particular attention to line connections and brake cylinders.
- Repeat system check with depressed tractor brake pedal.
  - The help of a second person is required.

In the event of the appearance of leaks, compressed air will reach places of damage on the exterior, with a characteristic hiss. Lack of system tightness may be exposed by covering checked elements with washing fluid or other foaming preparations, which will not react aggressively with system components. It is recommended to supply preparations commercially available designed to facilitate discovering air leaks. Damaged components should be replaced or repaired. If leaks appear at connections then tighten the connections. If air continues to escape replace connection component or seal.

Checking tightness of pneumatic system:

- **after passing the first 1,000 km,**
- **each time after making repairs or changing system components,**
- **annually.**

Visual assessment of system

During tightness inspection attention should additionally be given to technical condition and degree of cleanness of the system components. Contact of pneumatic line seals etc. with oil,

grease, petrol etc. may cause damage and accelerate the ageing process. Bent lines, permanently deformed, cut or worn should be replaced.

Visual assessment of system:

- **Conduct inspection of system at the same time as when checking tightness.**

IMPORTANT!

Repair, exchange or regeneration of pneumatic system components may only be performed in a specialised workshop.

5.3.3 CLEANING THE AIR FILTERS

Depending on trailer working conditions, but not less than once in three months, take out and clean air filter inserts, which are located in pneumatic system connection lines. Inserts are used many times and are not subject to changing unless they are mechanically damaged.

DANGER

Before proceeding to dismantle filter, reduce pressure in supply line. While disengaging filter slide gate, hold cover with other hand. Stand away from filter cover vertical direction.

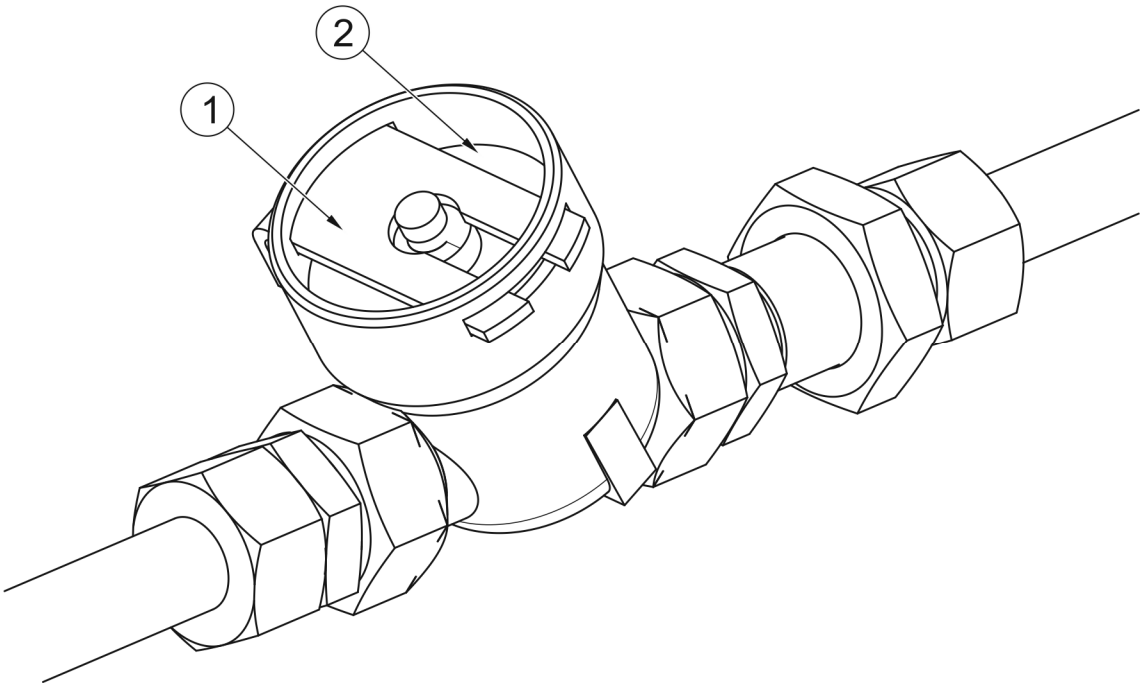


FIG. 5.8 Air filter

(1) securing slide lock, (2) air filter cover

Required service actions

- Reduce pressure in supply line.
  - Reduction of pressuring line may be achieved by pressing the head of the pneumatic connection to resistance point.
- Remove securing slide (1) – figure (*5.8*).
  - Hold the filter cover (2) with the other hand. After removing slide lock, the cover is pushed off by the spring, in the filter housing.
- The insert and the filter body should be carefully washed with water and blown through with compressed air. Assembly should be done in reverse order.

Cleaning the air filter (filters):

- **every 3 months of use,**

5.3.4 DRAINING WATER FROM AIR TANK

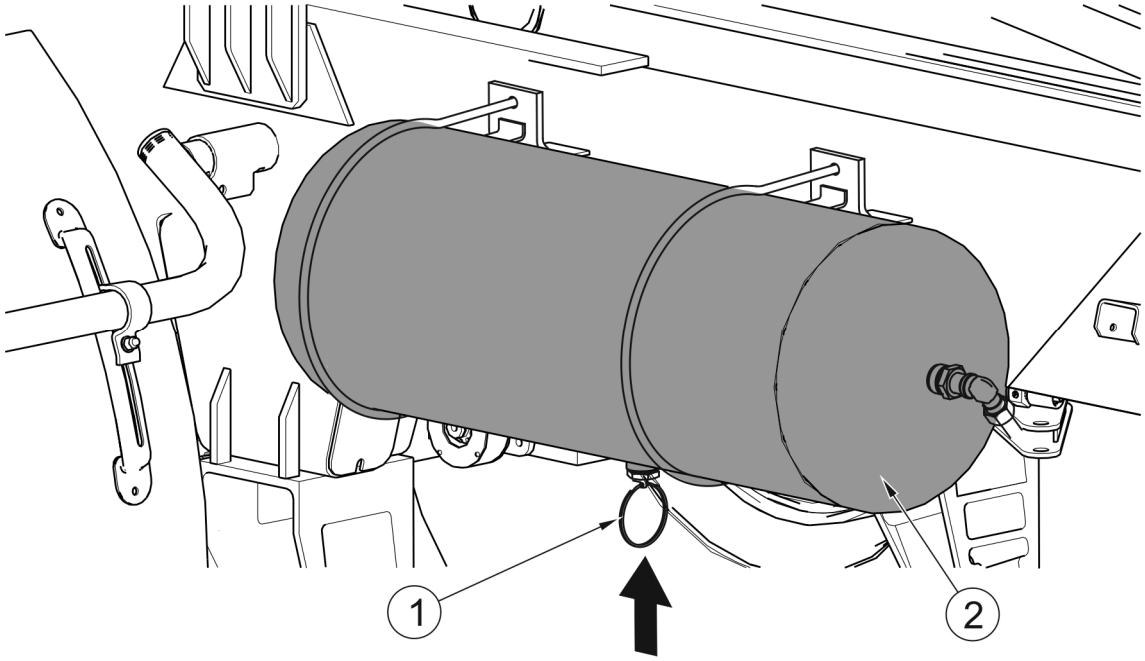


FIG. 5.9 Draining water from air tank

(1) drain valve, (2) air tank

Required service actions

- ➡ Open out drain valve (1) placed in lower part of tank (2) – the tank is placed on brackets of right longitudinal frame of lower frame.
  - ⇨ The compressed air in the tank causes the removal of water to the exterior.
- ➡ After release valve stem should automatically close and stop airflow from tank.
  - ⇨ In the event, that the valve stem resists returning to its setting, then the whole drain valve must be unscrewed and cleaned, or replaced (if it is damaged) - see section *5.3.5*.

Draining water from air tank:

- **every seven days of use.**

5.3.5 CLEANING DRAIN VALVE

DANGER

Before dismantling drain valve release air from tank.

Required service actions

- ➡ Reduce pressure in air tank.
  - ⇨ Reduction of pressure in tank is achieved by tilting the drain valve mandrel.
- ➡ Unscrew valve.
- ➡ Clean valve, purge with compressed air.
- ➡ Change copper seal.
- ➡ Screw in valve, fill air tank, and check tank tightness.

Cleaning valve:

- **every 12 months (before winter period).**

5.3.6 CLEANING AND MAINTAINING PNEUMATIC LINE CONNECTIONS AND PNEUMATIC SOCKETS

DANGER

Unreliable and dirty trailer connections may cause unreliability and faulty functioning of braking system.

Damaged connection body or connection socket to second trailer should be replaced. In the event of damage to cover (2) or seal (1) – figure (*5.10*), replace these elements with new reliable ones. Contact of pneumatic connector seals with oils, grease, petrol etc. may cause damage and accelerate ageing process.

If the trailer is unhitched from the tractor, connections should be protected by cover or placed in their designated socket. Before the winter period it is recommended to preserve the seal with special preparations (e.g. silicon grease for rubber elements).

Each time before connection of the machine inspect technical condition and cleanness of contacts and sockets in tractor. If necessary clean or repair tractor socket.

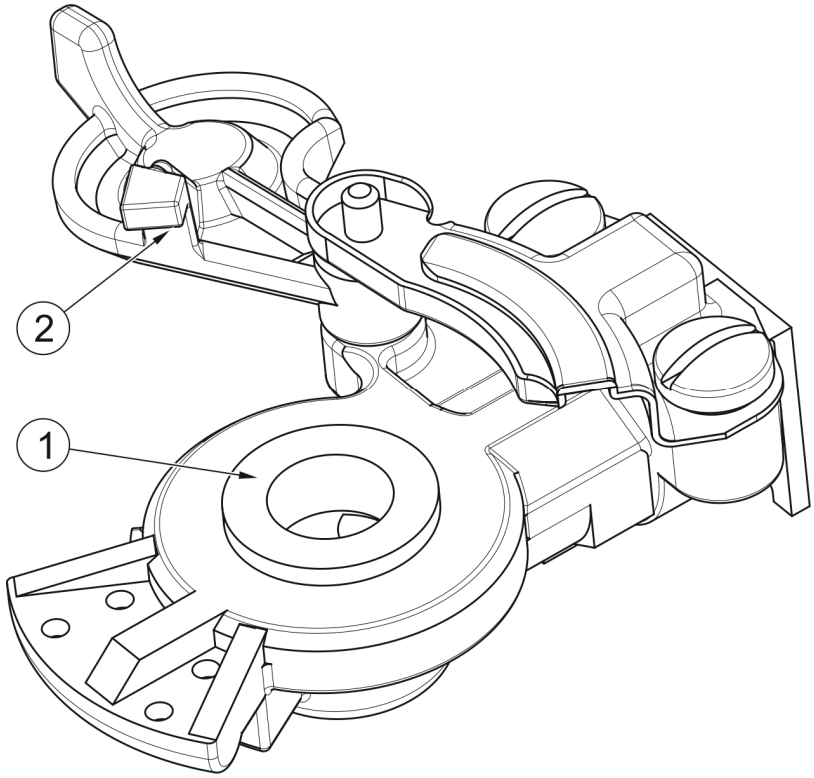


FIG. 5.10 Pneumatic conduits connection

(1) rubber seal, (2) security cover

Inspect trailer connections:

- **connection should be inspected every time before connecting trailer to tractor or second trailer.**

5.4 HYDRAULIC SYSTEM OPERATION

5.4.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of hydraulic system components (raising cylinder, valves etc.) should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

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

- inspecting and checking air tightness of system.
- Checking technical condition of hydraulic connections.

DANGER

Do NOT use the trailer if hydraulic system is unreliable.

Do NOT use the trailer if hydraulic brake system is unreliable.

5.4.2 CHECKING HYDRAULIC SYSTEM TIGHTNESS

Required service actions

- ➡ Hitch trailer to tractor.
- ➡ Connect all hydraulic system lines according to service instructions.
- ➡ Clean connectors and cylinders (raising cylinder, suspension cylinder, supports etc.).
- ➡ Actuate hydraulic cylinders several times and hold them in the position of maximum extension for about 30 seconds.
- ➡ Press tractor brake pedal several times.
    - ⇨ If trailer is equipped with hydraulic brake system.
- ➡ Check tightness of hydraulic system, inspect cylinders and hydraulic lines.
- ➡ If leaks appear at connections then tighten the connections.

In the event of confirmation of oil on hydraulic ram cylinder bodies ascertain origin of leak. Inspect hydraulic seals when ram cylinder is completely extended. Minimum leaks are

permissible with symptoms of "sweating", however in the event of noticing leaks in the form of "droplets" stop using the trailer until faults are remedied. If unreliability is evident in brake cylinders do NOT use trailer with damaged system until faults are remedied.

Checking tightness:

- **After a week of use**
- **every 12 months of use.**

5.4.3 CHECKING TECHNICAL CONDITION OF HYDRAULIC CONNECTIONS AND SOCKETS.

Hydraulic connections and sockets designed for connection with second trailer must be in good working condition and kept clean. Each time before connecting check if socket in tractor or connection of second trailer are maintained in good working condition. Tractor and trailer hydraulic systems are sensitive to the presence of permanent contamination, which may cause damage to precision system components (contamination may cause scratching of hydraulic valves, abrasion of piston surfaces etc.)

Inspection of hydraulic connections and sockets:

- **connection should be inspected every time before connecting trailer to tractor or second trailer.**

5.4.4 CHANGE OF HYDRAULIC LINES

Hydraulic lines must be changed every 4 years regardless of their technical condition. This should be entrusted to specialised workshops.

Change of hydraulic lines:

- **every 4 years,**

5.5 OPERATION OF ELECTRICAL SYSTEM AND WARNING ELEMENTS

5.5.1 PRELIMINARY INFORMATION

Work connected with the repair, change or regeneration of electrical system components should be entrusted to specialist establishments, having the appropriate technology and qualifications for this type of work.

The responsibilities of the user are limited to:

- technical inspection of electrical system and reflectors,
- Changing bulbs

IMPORTANT!

Do NOT travel with unreliable lighting system. Damaged lamp lenses, and burned-out bulbs must be replaced immediately before travelling. Lost or damaged reflective lights must be replaced.

Required service actions

➡ Hitch trailer to tractor with appropriate connection lead.

⇨ Check if the connection lead is reliable. Check connection sockets in tractor and trailer.

➡ Check completeness and technical condition of trailer lights.

➡ Check completeness of all reflectors.

➡ Check correct mounting of triangular slow-moving vehicle sign.

➡ Before driving on to public road check that the tractor is equipped with warning reflective triangle.

Checking technical condition of electrical system:

- **each time while connecting trailer.**

TIP

Before driving away make certain that all lamps and reflective lights are clean.

5.5.2 CHANGING BULBS

Bulb set is presented in table (*5.3*). All light lenses are secured by screws and it is not necessary to dismantle whole lamp or trailer subassemblies.

TAB. 5.3 List of bulbs

LAMP	LAMP TYPE	BULB / QUANTITY IN 1 LAMP	NUMBER OF LAMPS
Rear left lamp assembly	WE 549L	R10W / 1 unit P21W / 2 units	1
Rear right lamp assembly	WE 549P	R10W / 1 unit P21W / 2 units	1
Licence plate illumination light	LT-120	C5W-SV8.5 / 1 unit	2
Front-rear clearance lamp and side left parking light	W21.9L	LED 0.4W 12V; 0.8W 24V	1
Front-rear clearance lamp and side right parking light	W21.9P	LED 0.4W 12V; 0.8W 24V	1
Front clearance lamp	W24	LED 0.4W 12V; 0.8W 24V	2
Side parking light	W17D	LED 0.4W 12V; 0.8W 24V	2
Front clearance lamp and left side parking light	W22	LED 0.4W 12V; 0.8W 24V	1
Front clearance lamp and right side parking light	W22	LED 0.4W 12V; 0.8W 24V	1

5.6 HOOK SETTING ADJUSTMENT

Hook trailer enables connection with load boxes, with hitching eye at height of 1,570 mm (standard, according to DIN 30722-1) or 1,450 mm. Changing height of hook should be performed by two persons. Self-locking nuts M20-8 should be replaced and tightened to appropriate moment.

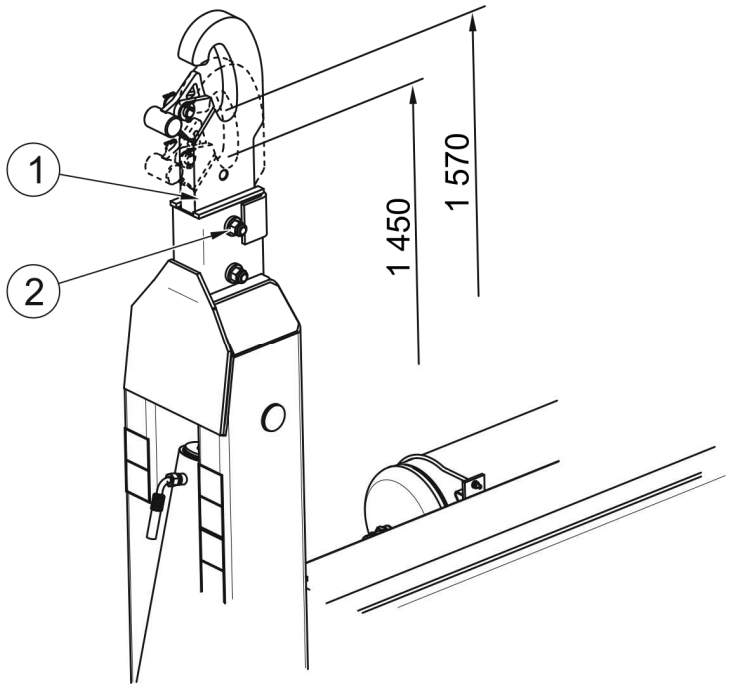


FIG. 5.11 Hook setting adjustment

(1) hook, (2) bolt connection

5.7 ADJUSTING LIMIT VALVES AND LIMIT SWITCHES

Limit valves enable closing the oil flow in the hydraulic system (normally closed valve). The valve opens the oil flow when the slide is pushed.

Limit valves (1) – figure (*5.12*) – should be regulated by means of adjustment bolts (2) of bumper (3). When the main brake cylinder piston (4) is maximally withdrawn, the valve lifters must be pressed (about 3mm) – it should be possible to extend and withdraw the cylinders

(5) of suspension interlock and load box hydraulic interlock (6). After adjustment, secure adjustment bolts with counternuts (7).

Activation of limit switch (8) should be regulated by means of bolt (9). When slides (10) of the interlock are slid together, the limit switch (8) must be pressed. After adjustment, secure bolt (9) against unscrewing by means of counternut (11). Attach electric wiring harness to the cylinder with band clips in such a manner as to prevent damage to the wiring harness.

Activation of limit switches (12) (13) of switching cylinder (14) should be adjusted by means of bolts (15).

Right limit switch (13) must be pressed when the trailer is set to "hook trailer" position – in this position, appropriate light located on the indicator plate must be switched on – figure (*3.3*).

Left limit switch (12) must be pressed when the trailer is set to "tipper" position (switching cylinder is maximally extended) – in this position, appropriate light located on the indicator plate must be switched on – figure (*3.3*). After adjustment, secure adjustment bolts (15) with counternuts (16).

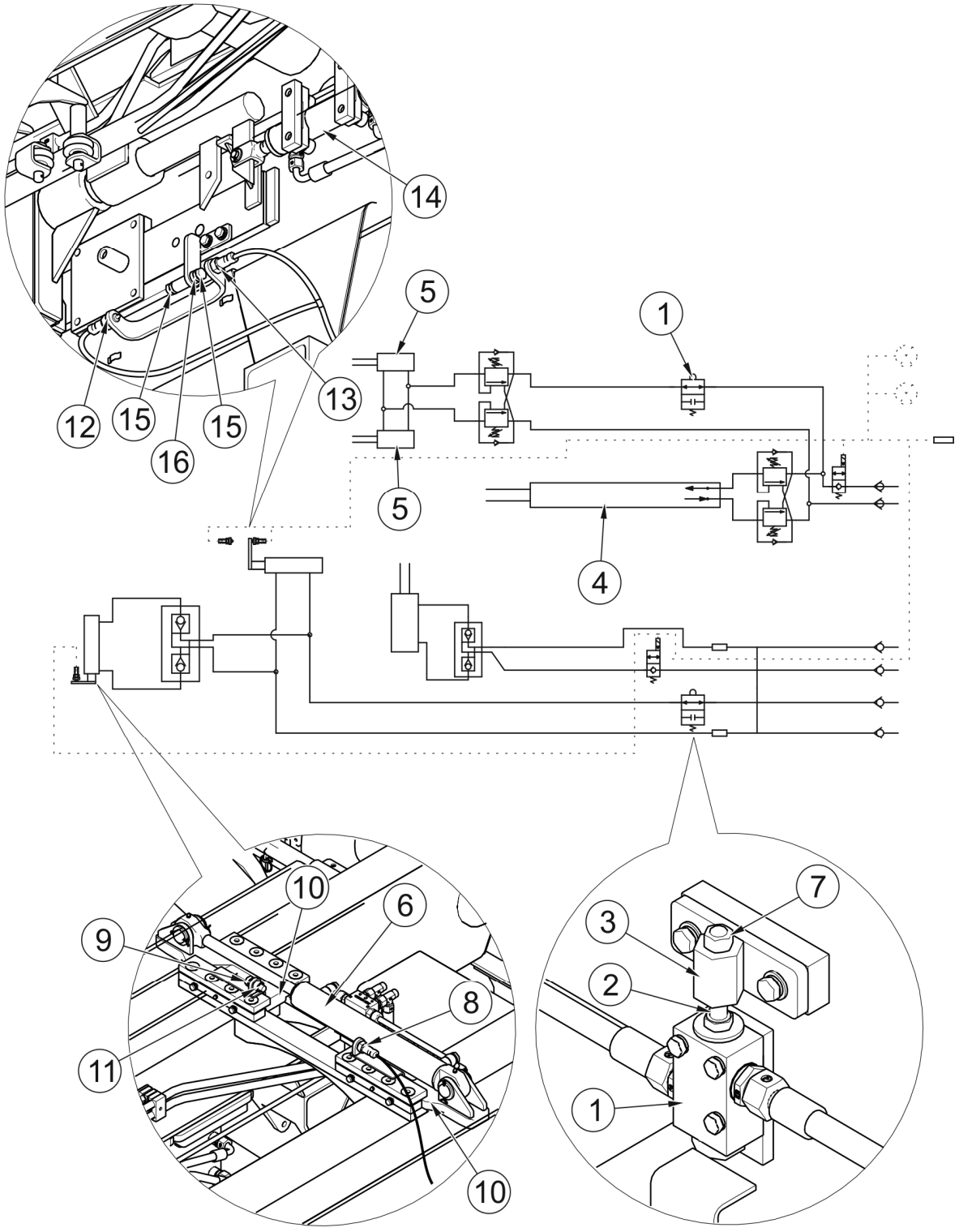


FIG. 5.12 Adjusting limit valves and limit switches

(1) limit valve, (2) adjustment bolt, (3) bumper, (4) raising cylinder, (5) suspension cylinder, (6) load box interlock cylinder (7) counternut, (8) limit switch, (9) bolt, (10) interlock slide, (11) counternut, (12) left limit switch, (13) right limit switch, (14) switching cylinder, (15) bolt, (16) counternut

5.8 TRAILER LUBRICATION

Trailer lubrication should be performed with the aid of a manually or foot operated grease gun, filled recommended grease. Before commencing work insofar as is possible remove old grease and other contamination. Remove and wipe off excess oil or grease.

Parts, which should be lubricated with machine oil, should be wiped with dry cleaning cloth and then a small quantity of oil should be applied do surfaces (with oil can or brush). Wipe off excess oil.

Change of grease in hub bearings should be entrusted to specialised service points, equipped with the appropriate tools. According to the recommendations of the axle Manufacturer, dismantle the entire hub, remove the bearing and individual sealing rings. After careful washing and inspection mount lubricated elements. If necessary, bearing and seals should be replaced with new parts. Lubrication of axle bearings shall be performed at least once in 2 years or every 50,000 km. In the event of intensive use, lubrication should be performed more frequently.

Empty grease or oil containers should be disposed of according to the recommendations of the lubricant Manufacturer.

TAB. 5.4 Recommended lubricants

LISTED ON TAB. (5.5)	DESCRIPTION
A	machine general-purpose grease (lithium, alkaline),
B	permanent grease for heavily loaded elements with addition of MOS_2 or graphite
C	anticorrosion preparation in aerosol
D	ordinary machine oil, silicon grease in aerosol

During trailer use the user is obliged to observe lubrication instructions according to attached lubrication schedule.

TAB. 5.5 Trailer lubrication schedule

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
1	Hub bearing	4	A	24M
2	Drawbar eye	1	B	14D
3	Pins of the main cylinder and hook frame cylinder	4	B	1M
4	Hook lock pin	1	A	2M
5	Parking brake mechanism	1	A	6M
6	Central frame rotation sleeve	2	B	3M
7	Leaf spring absorber sliding surface	4	B	6M
8	Leaf springs	4	C	6M
9	Hook frame slide sleeve	2	B	3M
10	Tipping frame rotation sleeve	2	B	3M
11	Guide roller slide sleeve	4	B	2M
12	Frame lock sleeve	2	A	2M
13	Lock slide	1	A	2M
14	Expander shaft sleeve	8	A	3M

ITEM	LUBRICATION POINT	NUMBER OF LUBRICATION POINTS	TYPE OF GREASE	FREQUENCY
15	Expander arm	4	A	3M
16	Pin of turn cylinder fixing	2	B	1M
17	Connection pin	2	A	3M
18	Stub axle pin	4	B	3M
19	Side slide	4	A	3M
20	Pin of the load box interlock cylinder	2	A	3M
21	Parking brake guide roller pins (1)	4	A	6M

Lubrication periods – M months, D – days, (1) – not shown in figure

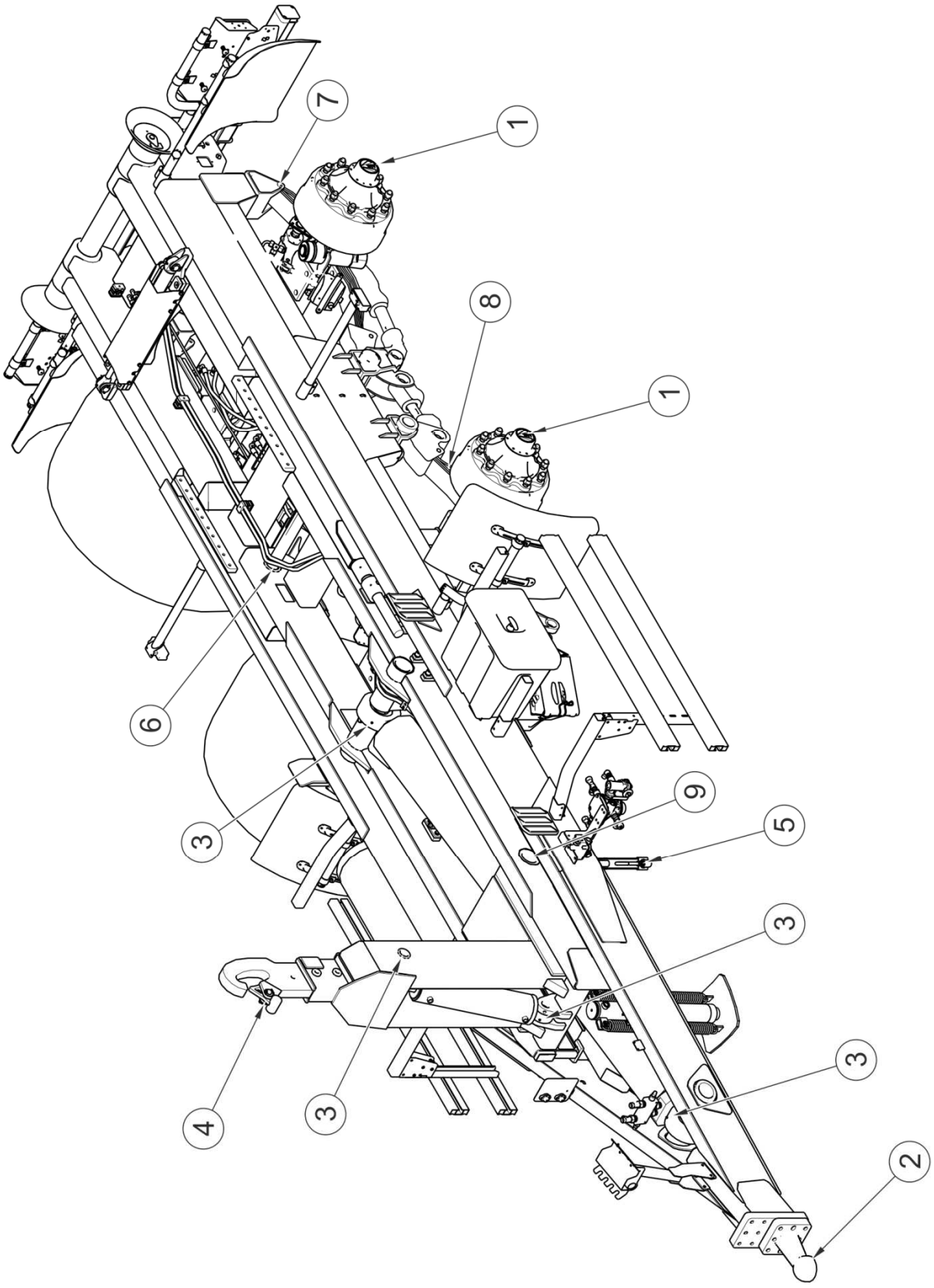


FIG. 5.13 Trailer's lubrication points, part 1

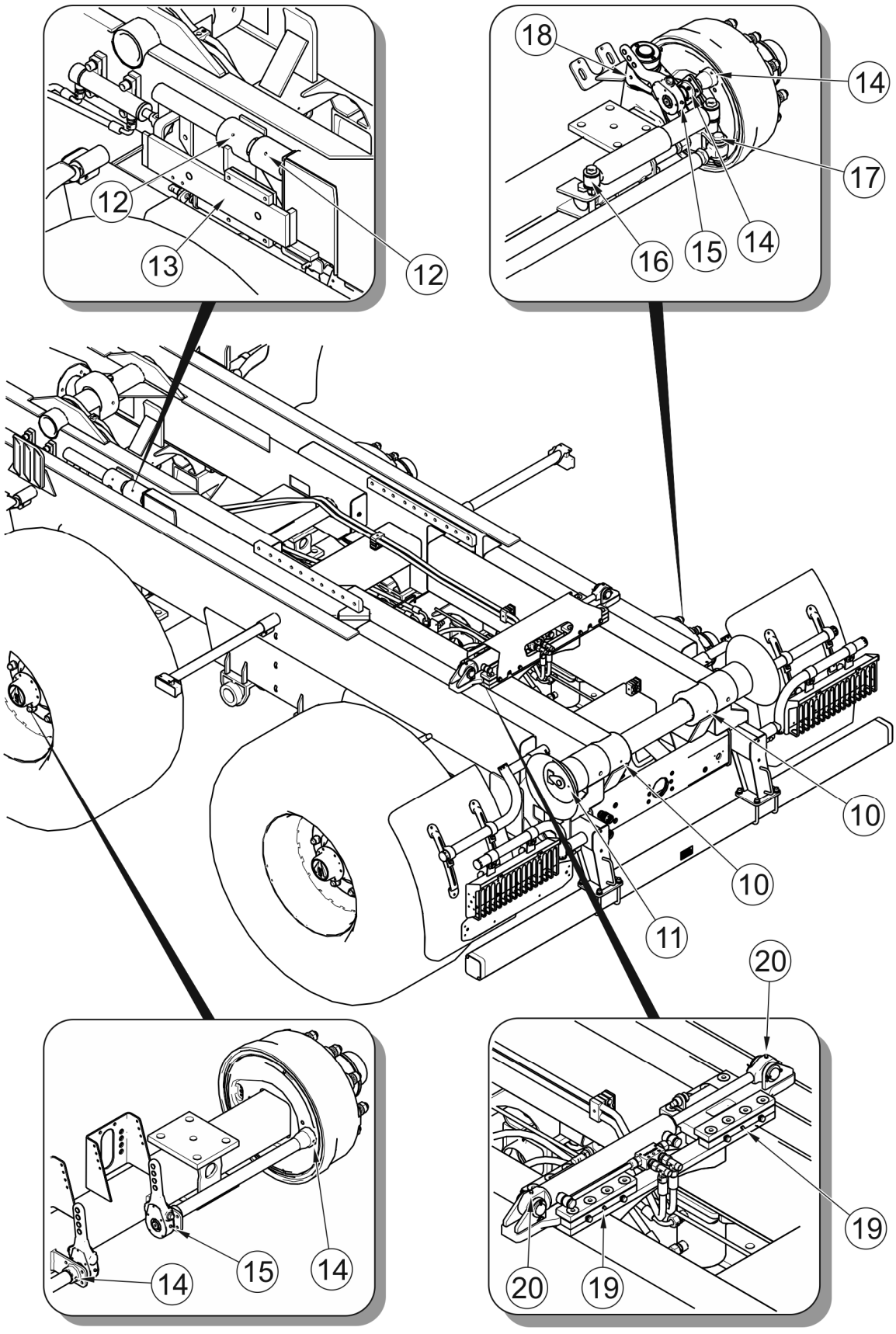


FIG. 5.14 Trailer's lubrication points, part 2

5.9 CONSUMABLES

5.9.1 HYDRAULIC OIL

Always adhere to the principle that the oil in the trailer hydraulic system and in the tractor hydraulic system are of the same type. In the event of application of different types of oil make certain that both hydraulic substances may be mixed together. Application of different oil types may cause damage to trailer or tractor. In a new machine, the hydraulic system is filled with L HL32 Lotos hydraulic oil.

TAB. 5.6 L-HL 32 Lotos hydraulic oil characteristics

ITEM	NAME	UNIT	VALUE
1	ISO 3448VG viscosity classification	-	32
2	Kinematic viscosity at 40°C	mm^2/s	28.8 – 35.2
3	ISO 6743/99 quality classification	-	HL
4	DIN 51502 quality classification	-	HL
5	Flash-point	C	230

In the event of necessity of changing hydraulic oil for another oil, check the recommendations of the oil Manufacturer very carefully. If it is recommended to flush the system with the appropriate preparation, then comply with these recommendations. Attention should be given, so that chemical substances used for this purpose do not damage the materials of the hydraulic system. During normal trailer use change of hydraulic oil is not necessary, but if required, this operation should be entrusted to a specialist service point.

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

with the use of carbon dioxide, foam or extinguisher steam. Do not use water to quench oil fires.

5.9.2 LUBRICANTS

For parts under great load it is recommended to apply lithium grease with molybdenum disulphide (MOS_2) or graphite additive. In the case of less loaded sub-assemblies the application of general purpose machine greases is recommended, which contain anticorrosion additive and have significant resistance to being washed away by water. Similar characteristics should typify aerosol preparations (Silicon greases and anticorrosive lubricant substances).

Before starting to use greases acquaint oneself with the content off the information leaflet for the chosen product. Particularly relevant are safety rules and handling procedures for given lubricant product and waste utilisation (used containers, contaminated rags etc.). Information leaflet (material safety data sheet) should be kept together with grease.

5.10 CLEANING TRAILER

Trailer should be cleaned depending on requirements and before longer idle periods (e.g. before winter period). Before using pressure washer the user is obliged to acquaint himself with the operating principles and recommendations concerning safe use of this equipment.

Trailer cleaning guidelines

- To clean trailer only use clean running water or water with a cleaning detergent additive with neutral pH.
- Using pressure washer increases washing effectiveness, but particular care must be taken during work. During washing washer nozzle may not be closer than 50 cm from the surface being cleaned.
- Water temperature shall not exceed 55°C.
- Do not direct water stream directly at system and equipment elements of trailer i.e. control valve, braking force regulator, brake cylinders, hydraulic cylinders, pneumatic, electric and hydraulic plugs, lights, electrical connections, information and warning decals, identification plates, line connections and trailer lubrication points etc. Great water jet pressure may damage these elements.

- For cleaning and maintenance of plastic coated surfaces it is recommended to use clean water or special preparations designed for this purpose.
- Do not apply organic solvents, preparations of unknown origin or other substances, which may cause damage to lacquered, rubber or plastic surfaces. In the event of doubt it is recommended to make a test on an unseen surface area.
- Surfaces smeared with oil or grease should be cleaned by application of benzene or other degreasing agents and then washed with clean water with added detergent. Comply with recommendations of the Manufacturer.

DANGER

Carefully read the instructions for application of washing detergents and maintenance preparations.

While washing with detergents wear appropriate protective clothing and goggles protecting against splashing.

- Washing detergent should be kept in original containers, optionally in replacement containers, but very clearly marked. Preparations may not be stored in food and drink containers.
- Care for the cleanness of elastic lines and seals. The plastic from which these elements are made may be susceptible to organic substances and some detergents. As a result of long-term reaction of some substances, the ageing process may be accelerated and risk of damage increased. Rubber elements should be maintained with the aid of special preparations after previous thorough washing.
- Observe environmental protection principles and wash trailer in a place designed for this purpose.
- Washing and drying trailer must take place at temperatures above 0°C.
- After finishing washing wait until trailer is dry and then grease all inspection points according to recommendations. Remove excess oil or grease with a dry cloth.

5.11 STORAGE

- Trailer should be kept in a closed or roofed building.
- If the machine will not be used for a long time, it is essential to protect it from adverse weather, especially rust and accelerated tyre deterioration. During this time the machine must be unloaded. Trailer should be very carefully washed and dried.
- Corroded places should be cleaned of rust, degreased and protected using undercoat paint and then painted with surface paint according to colour scheme.
- In the event of prolonged work stoppage, it is essential to lubricate all elements regardless of the period of the last lubrication process.
- Wheel rims and tyres should be carefully washed and dried. During longer storage of unused trailer it is recommended that every 2 to 3 weeks the machine may be moved a bit so that the place of contact of tyres with ground is changed. The tyres will not be deformed and maintain proper geometry. Also tyre pressure should be inspected from time to time, and if necessary pressure should be increased to appropriate value.

5.12 TIGHTENING TORQUE FOR NUT AND BOLT CONNECTIONS

Unless other tightening parameters are given, during maintenance repair work apply appropriate torque to tightening nut and bolt connections. Recommended tightening torque of most frequently applied nut and bolt connections are given in table *(5.7)*. Given values apply to non-lubricated steel bolts.

TAB. 5.7 Tightening torque for nut and bolt connections

THREAD METRIC	**5.8(1)**	**8.8(1)**	**10.9(1)**
	Md [Nm]		
M8	18	25	36

THREAD METRIC	**5.8**[(1)]	**8.8**[(1)]	**10.9**[(1)]
	Md [Nm]		
M10	37	49	72
M12	64	85	125
M14	100	135	200
M16	160	210	310
M20	300	425	610
M24	530	730	1,050
M27	820	1,150	1,650
M30	1,050	1,450	2,100

(1) – resistance class according to DIN ISO 898 standard

TIP

Hydraulic lines should be tightened with torque of 50 – 70 Nm.

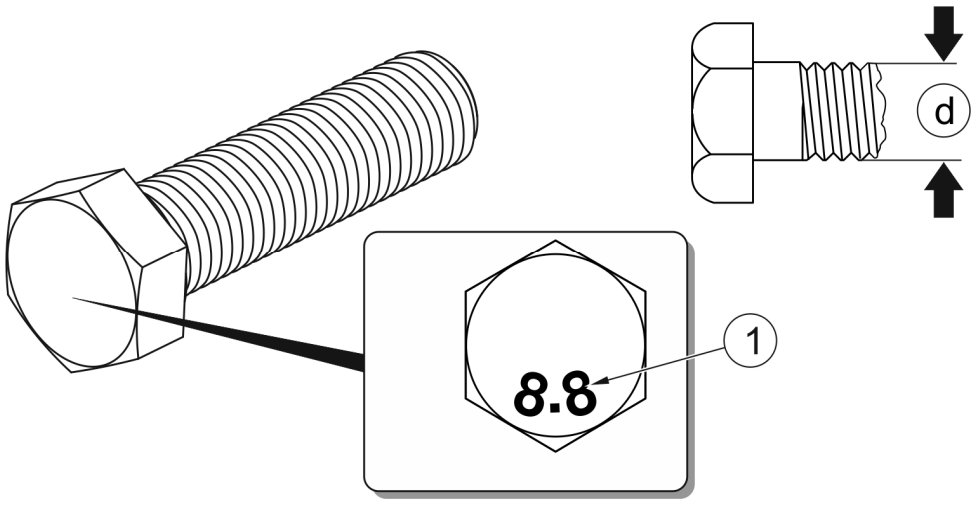


FIG. 5.15 Bolt with metric thread

(1) resistance class, (d) thread diameter

5.13 DRAWBAR EYE ADJUSTMENT

To adjust drawbar eye position change the position of drawbar eye (2-4) with regard to drawbar's faceplate (1) – figure (*5.16*).

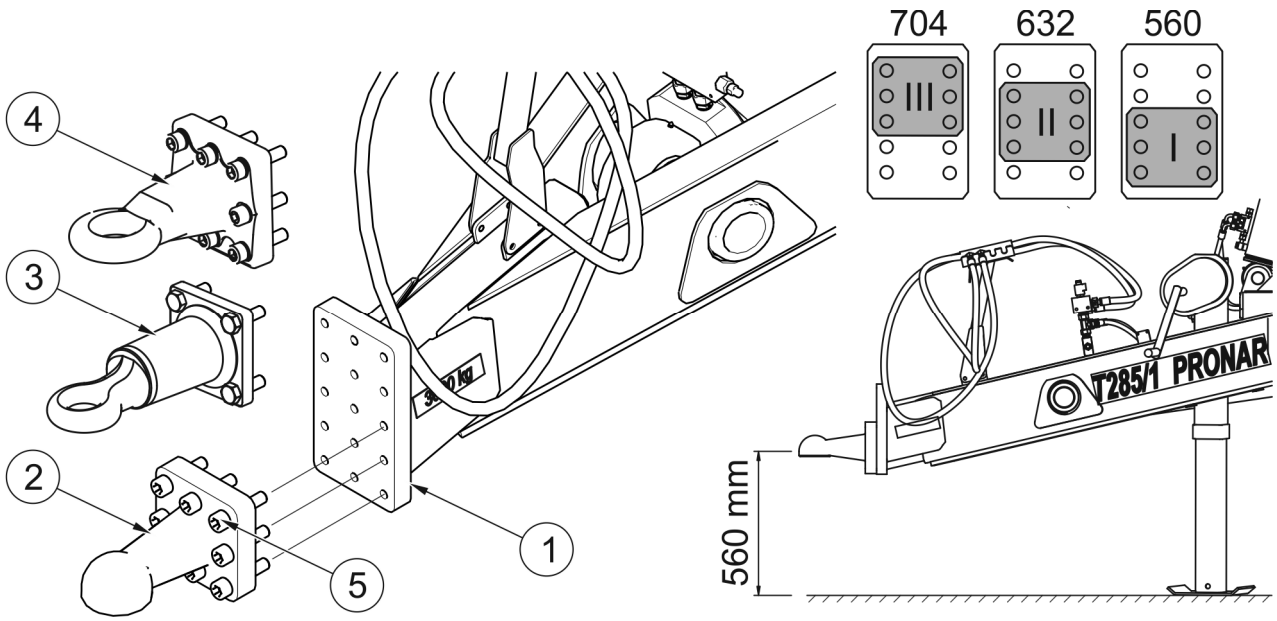


FIG. 5.16 Adjustment of drawbar position

(1) drawbar's faceplate, (2) ball drawbar, (3) rotating drawbar eye, (4) fixed drawbar eye, (5) bolt connection

Extent of activity

- ➡ Immobilise trailer with parking brake.
- ➡ Place wheel chocks under trailer wheels.
- ➡ Unscrew drawbar eye from the drawbar's faceplate (1).
- ➡ Set drawbar eye in new position and tighten with appropriate torque.
  - ⇨ The faceplate (1) design allows 3 possible drawbar eye positions, every 72 mm, compare figure *(5.16)*.
- ➡ Check degree of drawbar eye tightening after first travel under load.

5.14 TROUBLESHOOTING

TAB. 5.8 Troubleshooting

FAULT	CAUSE	REMEDY
Problem with moving off	Brake system pneumatic lines not connected	Connect brake lines (applies to pneumatic systems)
	Applied parking brake	Release parking brake.
	Damaged pneumatic system connection lines	Replace.
	Leaking connections	Tighten, replace washers or seal set, replace lines.
	Damage control valve or brake force regulator	Check valve, repair or replace.
Noise in axle hubs	Excessive play in bearings	Check play and regulate if needed
	Damaged bearing	Replace bearing
	Damaged hub parts	Replace
Poor reliability of braking system	Insufficient pressure in system	Check pressure on tractor pressure gauge, wait till compressor fills tank to required pressure. Damaged air compressor in tractor Repair or replace. Damaged brake valve in tractor. Repair or replace. Leaking system lines or connections. Check system for tightness.
Excessive heating of axle hubs	Incorrect main or parking brake adjustment	Regulate setting of expander arms or tension of brake cable
	Worn brake linings	Change brake shoes
Incorrect hydraulic system operation	Improper hydraulic oil viscosity	Check oil quality, make sure that the oil in both machines is of the same type. If necessary change oil in tractor or in trailer

FAULT	CAUSE	REMEDY
	Insufficient tractor hydraulic pump output, tractor hydraulic pump is damaged.	Check tractor hydraulic pump.
	Damaged or contaminated ram cylinder	Check cylinder ram piston (bending, corrosion), check ram cylinder for tightness (piston seal), in case of need repair or replace ram cylinder.
	Excessive cylinder ram loading	Check mechanism controlled by ram cylinder for mechanical damage
	Damaged hydraulic lines	Check and ascertain that hydraulic lines are tight, not fractured and properly tightened. If necessary replace or tighten.
Tipping / connecting / disconnecting load box not possible	Brake system hydraulic lines not connected	Connect lines
	Incorrect placing of line leads in tractor hydraulic system sockets	Check connections, if necessary correct
	Damaged hydraulic quick couplers	Replace
	Insufficient quantity of hydraulic oil in tractor's hydraulic system	Use tractor, having hydraulic oil capacity/output according to oil requirements of trailer
	Incorrectly adjusted limit valves or limit switches	Adjust limit valves and limit switches
Knocking in vicinity of suspension system during travel	Hydraulic cylinder suspension blocks are not completely withdrawn	Slide hydraulic cylinders maximally upwards

NOTES