



**OPERATING MANUAL**  
**FOR**  
**TREE SPADE OPTIMAL 2500**  
**MOUNTED ON VOLVO A25 D**



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**Serial-Number : 250021**

## CONTENTS

	page
Safety Instructions	3
1. Operating Specifications	4
2. Hydraulic Supply	5
3. Operation and Transport	6
4. Care and Maintenance	14
5. Lubrication chart	15
6. Hydraulic System	17
7. Wiring Diagram	19
8. Spare Parts List	

## **Safety Instructions for OPTIMAL Tree Spade**

The operator and his assistant(s) must have read and understood the Operating Manual before running the tree spade. Furthermore, the operator must be experienced in driving the hauler truck and he must have studied the relevant truck manual.

Before starting operations, bolts and hydraulic fittings must be checked to make sure they are free of damage and well tightened.

Defective or loose hose pipes might cause serious injuries and therefore must be replaced immediately.

The operator is responsible for ensuring that no person is near the tree spade when in operation; in particular, no one should be standing underneath the raised tree spade or near shearing and pinching areas, or near the gate, or near blades or near hydraulic components.

We are advising the user that due to their functional positions and movements the danger areas cannot be furnished with protective guides.

When sight is limited, an assistant must direct the operator by hand signals.

When driving, the tree spade should be in the lowest possible position. When moving and working on public roads, the relevant traffic rules and regulations must be adhered to.

When doing cleaning, maintenance or repair work, lower the tree spade to the ground and stop the engine of the power unit.

The tree spade must be inspected by an expert on operational reliability annually.

All hydraulic hose pipes must get replaced every six years.

Do not modify the equipment unless the manufacturer has given his approval. Use original spare parts only.

When digging it might happen that a stone gets caught between two blades and the blades get bent. This causes tremendous tension in the steel blades. Place the digging head again into the planting hole and retract the blades. Thereby the stone will come loose. The blades got a high degree of bending strength and they will regain their former shape. After the stone has been released, the root ball can be dug again.

Do not try to release the stone by means of a crow bar or other tools!

The operator must be sure that the ground he is going to dig is free from any underground installations such as cables, pipes or any other utilities or dangerous matter. Damaging such underground installations or matter is dangerous and might result in serious injury or death.

Before commencing tree spade operation, switch on hydraulic pump. The switch is marked with an arrow on illustration 1 page 6. If the pump is not switched on, the hitch oscillating brake is not activated and the truck might overturn.

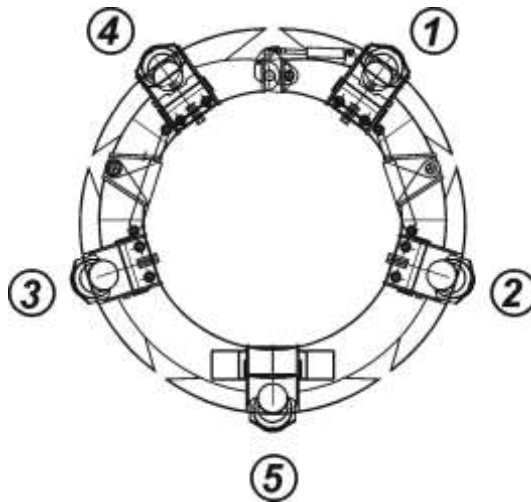
When travelling, the hydraulic pump should be switched off.

Tower 4:



A vertical safety sign for Tower 4. At the top is a red circle with a diagonal slash over a hand being struck by a tree spade. Below this is a red banner with a white triangle and the word "WARNING". The text reads "AVOID INJURY Stay Clear Of Elevated Unit And Tree Spade". Below that is another red banner with a white triangle and the word "AVISO". The text reads "EVÍTESE LA HERIDA No se acerque ni la unidad elevada ni la transplantadora". Next is a red banner with a white triangle and the word "PELIGRO". The text reads "MAQUINARIA EN MOVIMIENTO MANTENGA MANOS Y PIES ALEJADOS". Below that is a red banner with a white triangle and the word "DANGER". The text reads "MOVING MACHINERY KEEP HANDS AND FEET CLEAR". At the bottom are two yellow warning signs: one with a triangle and a hand being struck, and another with a triangle and a hand being struck by a tree spade.

Lock Cylinder



Tower 2,3,5:



A vertical safety sign for Tower 2,3,5. At the top is a red circle with a diagonal slash over a hand being struck by a tree spade. Below this are two yellow warning signs: one with a triangle and a hand being struck, and another with a triangle and a hand being struck by a tree spade.

Tower 1:



A vertical safety sign for Tower 1. At the top is a red circle with a diagonal slash over a hand being struck by a tree spade. Below this is a red banner with a white triangle and the word "DANGER". The text reads "KEEP AWAY FROM SWING AREA WHEN IN OPERATION". Below that is another red banner with a white triangle and the word "PELIGRO". The text reads "NO SE ACERQUE A LA ZONA DE MOVIMIENTO CUANDO ESTÁ EN FUNCIONAMIENTO". Next is a red banner with a white triangle and the word "WARNING". The text reads "AVOID INJURY Stay Clear! This structure swings outward". Below that is a red banner with a white triangle and the word "DANGER". The text reads "WATCH YOUR HANDS AND FINGERS" with a hand icon. At the bottom are two yellow warning signs: one with a triangle and a hand being struck, and another with a triangle and a hand being struck by a tree spade.

Gate Cylinder



Gate Cylinder



Main Frame, right and left



A yellow safety sign for the Main Frame. It features a white triangle with a black exclamation mark and the word "WARNING" in a red banner. The text below reads "KEEP 20 YARDS SAFETY DISTANCE".

main lift arm:



drivers cabin:



rear stabilizer:



frame:



## 1. Operating Specifications

<b>Description</b>	<b>Tree Spade OPTIMAL 2 5 0 0</b>		
<b>serial-Number</b>	250021		
<b>year of production</b>	2004		
<b>capacity</b>	upper root ball diameter	250 cm	98"
	root ball depth	150 cm	59"
<b>Dimensions of the digging head</b>	height	290 cm	114"
	width, gate closed	250 cm	98"
	width, gate open	304 cm	120"
	clearance between open gate	162 cm	64"
	inner diameter of frame	178 cm	70"
	working height	303 cm	119"
<b>weights</b>	digging head	5750 kg	
	superstructure	7800 kg	
<b>hydraulics</b>	hydraulic working pressure	200-220 bar	2900–3190 psi
	oil flow	80–100 l/min	21,1–26,4 GPM
	spade pressure at 200 bar	15000kg/blade	33000lbs/blade
<b>controls</b>	electro-hydraulic valves, double acting, activated either from control panel in the driver's cabin by means of levers, joystick and switch, or from valve banks at the base frame and the digging head by means of manual valve levers		
<b>application</b>	for moving and transplanting trees with a trunk diameter of up to approx. 25 cm (10")		

## **2. Hydraulic Supply**

- 2.1 All working movements of the tree spade are performed hydraulically. The hydraulic pressure is provided by a hydraulic pump integrated in the Volvo truck A25 D.

The truck and the tree spade work with biological hydraulic oil PANOLIN HLP SYNTH (Synth HLP 46) and it should never be mixed with a petroleum-based hydraulic oil. For specifications of hydraulic oil, please refer to annex.

In order to avoid any damages to the hydraulic system and related components, samples of the hydraulic oil must be taken regularly. This is extremely important because regular sampling is precondition for any damages claim.

Impurities in the oil must not exceed purity class 19/15/11 as per ISO 4406.

The first sampling and examination must be made after 50 working hours, each following sampling becomes due after every 1000 working hours.

The intervals for changing the hydraulic oil must be strictly observed, otherwise the durability of sealing components and hose pipes cannot be guaranteed.

In case the PANOLIN HLP SYNTH-run hydraulic system is changed on a petroleum-based hydraulic oil, the instructions of the truck manufacturer are to be followed.

- 2.2 For technical information on the hydraulic pump such as filling quantities and servicing intervals, please refer to the instruction manual of the truck manufacturer.
- 2.3 All working movements of the tree spade can be controlled either from the control panel installed inside the driver's cabin or they can be actuated by the manual valves installed at the base frame of the superstructure or the digging head respectively.

### **3. Operation and Transport**

**IMPORTANT** The operators must work absolutely reliable. Before they start with production work, they must have studied these instructions thoroughly.

The following safety instructions must always be observed:

It is the operators responsibility to ensure that no persons are in the danger area of the tree spade. In particular, no one should be underneath the raised tree spade or near areas where work functions might cause shearing and pinching injuries.

Do not perform any manual work on trees which are inside the tree spade. In particular, do not work with hand or feet inside the machine. Do not tie the tree when it is inside the digging head.

When sight is limited, an assistant must direct the driver by hand signals.

Before starting operations, bolts and hydraulic fittings must be checked to make sure they are well tightened and free of damage.

When moving and working on public roads, the relevant traffic rules and regulations must be adhered to.

**IMPORTANT** Before commencing tree spade operation, switch on the hydraulic pump. The switch is located in the drivers cabin on the panel as marked with an arrow on Illustration 1.

It is of utmost importance that the hydraulic pump is running. Otherwise the hitch oscillating brake is not activated and the truck might overturn!

When travelling, the hydraulic pump should be switched off again.



Illustration 1



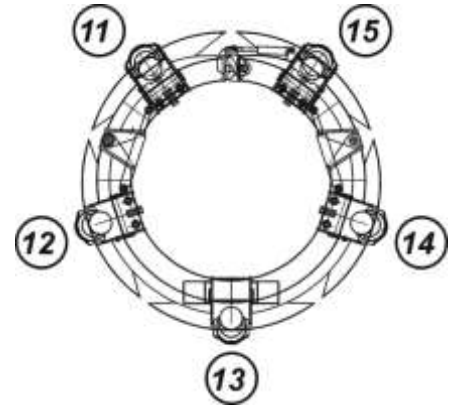
### 3.1 The Control Components

All directions (RH, LH) are given as seen from the control panel in driver`s cabin.

#### 3.1.1 Control Panel Inside the Driver's Cabin



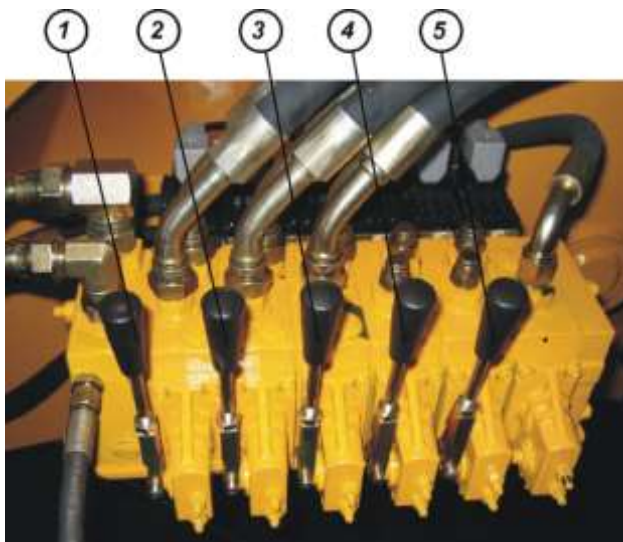
#### Location of Spades



- 1) gate lock – unlock / lock
- 2) LH gate – open / close
- 3) RH gate – open / close
- 4) root ball pad LH – up / down
- 5) root ball pad RH – up / down
- 6) preselect folding out spades - LH rear / front
- 7) folding out spades – in / out
- 8) preselect folding out spades - RH rear / front
- 9) rear stabilizer LH – up / down
- 10) rear stabilizer RH – up / down

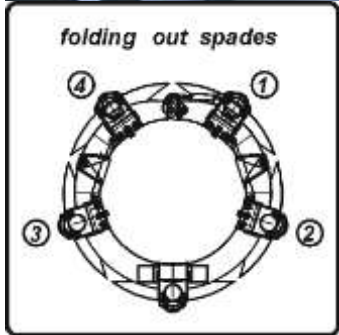
- 11) left spade, rear – up / down
- 12) left spade, front – up / down
- 13) center spade – up / down
- 14) right spade, front – up / down
- 15) right spade, rear – up / down
- 16) indicator light – gate lock open
- 17) indicator light – controls on
- 18) emergency off
- 19) oil supply min/max
- 20) ▲ main lift arm – up  
▼ main lift arm – down  
◄► digging head rotation – in / out
- 21) ▒ articulated lift arm – up / down

#### 3.1.2 Valve Bank on the Base Frame



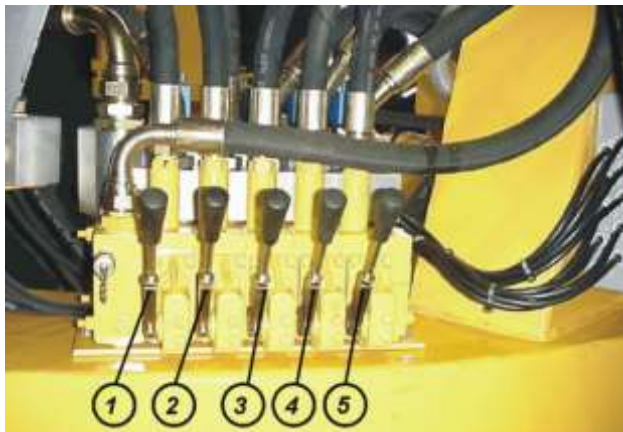
- 1) main lift arm – up / down
- 2) digging head rotation – in / out
- 3) articulated lift arm – up /down
- 4) rear stabilizer LH – up / down
- 5) rear stabilizer RH – up / down

### 3.1.3 Valve Bank at the Digging Head (6 functions)



- 1) LH gate – open / close
- 2) root ball pad LH – up / down
- 3) root ball pad RH – up / down
- 4) RH gate – open / close
- 5) gate lock – unlock / lock
- 6) folding out spades – in / out

### 3.1.4 Valve Bank at the Digging Head (5 functions)



- 1) left spade rear – up / down
- 2) left spade front – up / down
- 3) right spade rear – up / down
- 4) right spade front – up / down
- 5) center spade – up / down

### 3.2 Operating Procedure

#### 3.2.1 Extend both rear stabilizers before lowering the digging head to the ground

*control panel, lever 9 and 10 ▼ "down".*

The truck should be positioned on level ground, if possible.

In case the rear stabilizers do not reach down to the ground, the inner square pipe can be lowered by removing lock pin A (ill. 2) and extend the stabilizer (ill. 3) The stabilizer can be mechanically adjusted to 4 different sizes. When having selected the required extension size, lock pin A is put back in place.

**IMPORTANT:** When travelling, the stabilizers must be always in the **highest position** (ill.2) to grant sufficient clearance to the ground.



Illustration 2



Illustration 3

#### 3.2.2 In order to lower the digging head, the main lift arm and the articulated lift arm must be raised and the digging head must be rotated out into a vertical position.

*control panel: joystick 20, main lift arm ▲ "up"  
control panel: joystick 21, articulated lift arm ▲ "up"  
control panel: joystick 20 digging head rotation ► "out"*

The functions *main lift arm ▲ "up"*, *articulated lift arm ▲ "up"* and *digging head ► "rotate out"* must be actuated in repeating succession until the digging head is in a vertical position and it got sufficient clearance to the base frame. When rotating the digging head (*digging head rotation ► "out"*) make sure it does not touch the base frame, nor the cylinders, nor the main lift arms.

When the digging head is in a vertical position it must be lowered carefully:

*control panel: joystick 20, main lift arm ▼ "down"*

Make sure the digging head does not touch the rear of the truck. If necessary, do correct the position.

Now the 5 spades must be retracted:

*control panel, levers 11,12,13,14 and 15, spades ▲ "up".*

Lower the digging head until the points of the spades are approx. 20 cm (8") above the ground. The digging head should be close to the truck without touching the truck.

3.2.3 Now the gate of the digging head must be unlocked.

*control panel, lever 1, gate lock ▲ "unlock".*

Then the gate must be opened:

*control panel, lever 2, LH gate ▲ "open".*

*control panel, lever 3, RH gate ▲ "open".*

3.2.4 In case low branched trees have to be transplanted, the working height of the digging head can be reduced by folding out the spade towers. Each spade tower is controlled individually.

*control panel, lever 6, preselect: folding out spades – LH rear / front*

*control panel, lever 7, folding out spades – in / out*

*control panel, lever 8, preselect: folding out spades – RH rear / front*

3.2.5 Now the rear stabilizers must be retracted:

*control panel, lever 9 and 10, ▲ "up".*

**IMPORTANT: The truck must not move prior to having retracted the rear stabilizers!**

Reverse the truck until the tree is positioned in the center of the circular frame of the digging head, then close the gate:

*control panel, lever 2, LH gate ▼ "close".*

*control panel, lever 3 RH gate ▼ "close".*

Now the gate must get locked:

*control panel, lever 1, gate lock ▼ "lock"."*

**To ensure that the machine is digging only when the gate is locked, a safety switch has been installed. If the gate is not locked properly, a red indicator light at the panel (section 3.1.1, number 16) will flash and the spades do not move. This malfunction is probably caused by a branch or some other object obstructing the gate lock. Remove the obstruction and try again.**

**IMPORTANT: Locking the gate before starting with the digging operation is of utmost importance and must never be omitted!  
If the gate is not locked properly, the frame will get bent when digging!**

Next the digging head is lowered by means of joystick 20 or 21 resp. *main lift arm ▼ "down" and/or articulated lift arm ▼ "down"* until it is resting on the ground. Adjust digging head with joystick 20 *digging head rotation ◀▶ "in/out"* until the circular frame is in a horizontal position. Check again if tree is in the center of the frame and readjust, if necessary.

Now the spade towers must get folded back again.

If the spade folding has been actuated by the rotary preselect switch and the manual valve at the digging head (see section 3.1.3), get spades folded in completely and then rotate switch back to position 0.

3.2.6 Now digging can commence:

*control panel, lever 11, spade ▼ "down".  
control panel, lever 12, spade ▼ "down".  
control panel, lever 13, spade ▼ "down".  
control panel, lever 14, spade ▼ "down".  
control panel, lever 15, spade ▼ "down".*

In order to ensure proper digging and obtain full root ball depth, the digging head must remain in a horizontal position. This is achieved by activating two spades opposite to each other at a time until about one third of the spades has been pressed into the ground. Then two other opposite spades are activated and dig about one third of the depth. This crosswise digging is repeated until all five spades have been completely pressed into the ground.

The digging depth of one third of the spade per working cycle should be regarded as a rule of thumb only, since the actual working depth depends on the type of soil. Whenever the blades encounter too much resistance by hard soil and the digging head is lifted up, the next pair of opposite blades should be activated.

3.2.7 The root ball pads are meant to support the coherence of the root ball. Once the root ball has been dug, the pads should be pressed gently on the root ball.

*control panel, lever 4, root ball pad LH ▼ "down".  
control panel, lever 4, root ball pad RH ▼ "down".*

3.2.8 For lifting the root ball together with the tree, the rear stabilizers must be extended first, as explained under section 3.2.1.

3.2.9 Then the tree is lifted in vertical position by means of joystick functions 20 and 21. As soon as the digging head has been lifted above the elevation of the base frame, it must be rotated into a horizontal position:

*control panel, joystick 20, digging head rotation ▼ "in".*



The main lift arm A is lowered until the upper edge of the lift arm is level with the LH side of mark C on base frame B. An arrow indicates the LH side of the mark. (illustration 4).

*control panel, joystick 20, main lift arm ▼ "down"*

Illustration 4

Lower the articulated lift arm until the digging head rests on the base frame.

*control panel, joystick 21, articulated lift arm ▼ "down".*

Now the digging head is in transport position.

3.2.10 Before the truck starts moving, the rear stabilizers must be retracted:

*control panel, levers 9 and 10, rear stabilizers ▼ "up".*

3.2.11 When travelling, the hydraulic pump should be switched off.

**IMPORTANT** When moving or working on public roads, the relevant traffic rules and regulations must be adhered to.

### 3.3 Transport Position for Travelling Long Distances (without tree)

The circular digging head frame is collapsible. When travelling long distances or when being transported on a low bed loader on public roads, the frame can be folded up, thus reducing the transport height (see illustration 5).



Illustration 5



Illustration 5.1

To get tree spade Optimal 2500 into the transport position as shown above, the following work must be performed:

- Retract all spades to top position (spades "up") and get digging head in vertical position just above the ground.
- Unlock gate lock
- Open RH gate and LH gate
- Release snap-on pin (B) and remove stop pin (A) at both sides of the circular frame of the digging head (ill. 6)
- Put stop pin at depository position (C) as shown on illustration 7.
- First close the RH gate and then the LH gate completely
- Install stop pin (A) of LH gate as transport lock as shown on illustration 8.

- Unlock pivoting support block (ill. 9) and swing it down
- Raise lift arm and lower center spade ("down") completely.
- Now the tree spade can be placed on base frame in transport position:  
The main lift arm A is lowered until the upper edge of the lift arm is level with the RH side of mark D on base frame B. An arrow indicates the RH side of the mark. (ill. 5, 5.1)

*control panel, joystick 20, main lift arm ▼ "down"*

- This position is for road transport only. Do not move with collapsed digging head off road!



Illustration 6



Illustration 7



Illustration 8



Illustration 9

#### **4. Care and Maintenance**

##### 4.1 Blade guides

Thanks to plastic linings the spade guides do not require lubrication.

Once the plastic lining has been worn to the point where the heads of the countersunk screws are even with the surface of the plastic linings, they must be replaced to prevent the screws from damaging the blades.

##### 4.2 All moving parts of the tree spade must be greased at least once per week. The greasing points are shown on the lubrication charts (pages 15 and 16).

##### 4.3 The oil level of the hydraulic system is controlled by the cabin computer of the Volvo truck. Refill oil whenever necessary. For specification of hydraulic oil, please refer to data sheet attached as annex.

In order to avoid any damages to the hydraulic system and related components, samples of the hydraulic oil must be taken regularly. In case the impurities in the oil exceed purity class 19/15/11 as defined by ISO 4406, the hydraulic oil must be changed. This is extremely important because regular sampling is precondition for any damages claim.

The first sampling and examination must be made after 50 working hours, each following sampling becomes due after every 1000 working hours.

##### 4.4 All hydraulic hose pipes must get inspected thoroughly at least once per year. Defective hose pipes must be replaced.

After six years all hose pipes must get replaced.

##### 4.5 In case the tree spade is not getting used for two weeks, all piston rods of the hydraulic cylinders must be cleaned and covered with a preserving oil film.

**IMPORTANT: When doing cleaning, maintenance or repair work, lower the tree spade to the ground and stop the truck engine.**

**When fixing the guides, the bolts (see Spare Parts List, Table 2, item 19) must be tightened with a torque of 1450 Nm (1070 ft-lbs.)**

**Use original spare parts only.**

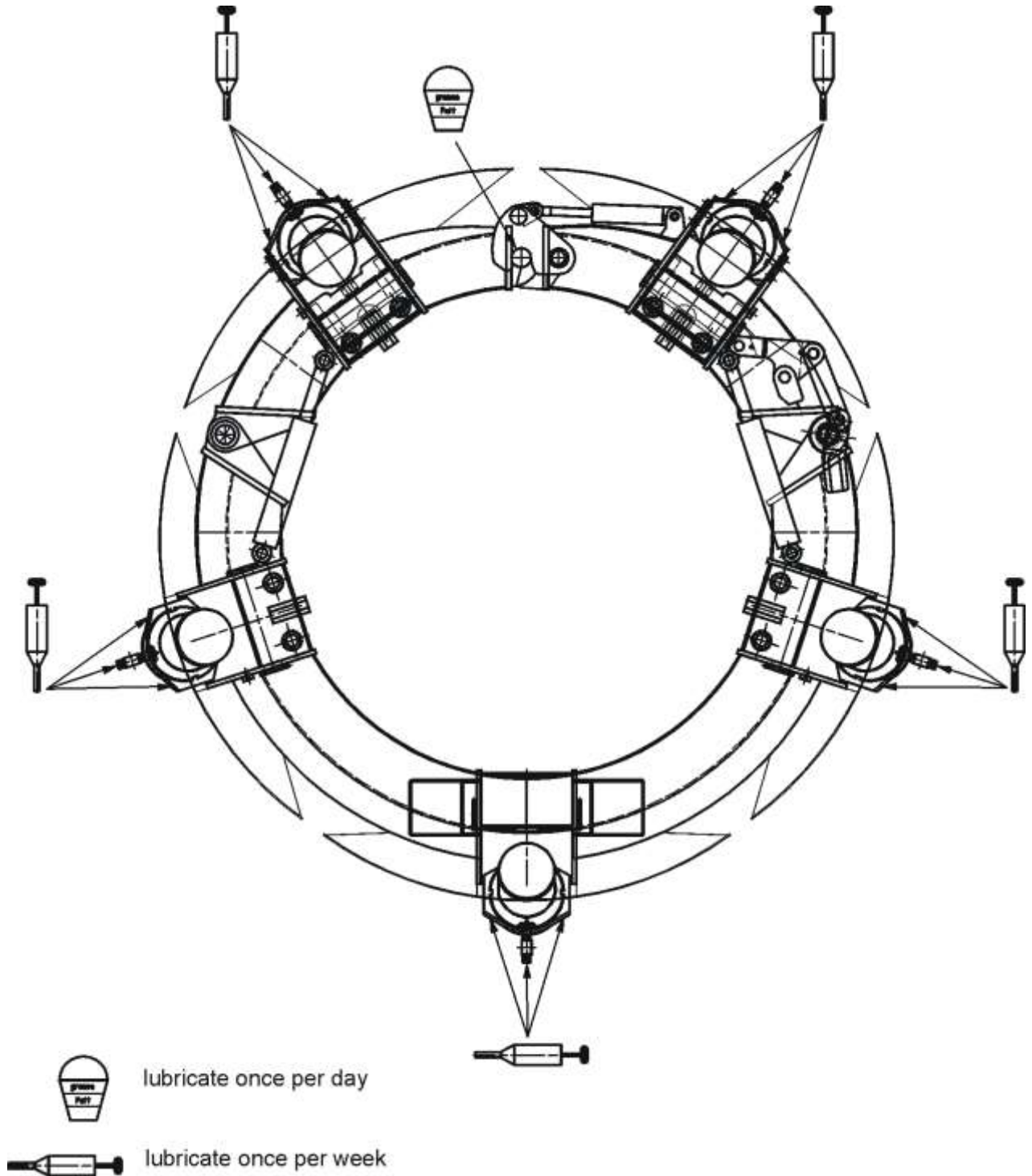
**The tree spade must be inspected by an safety expert once a year.**

**Do not modify the equipment unless the manufacturer has given his approval.**

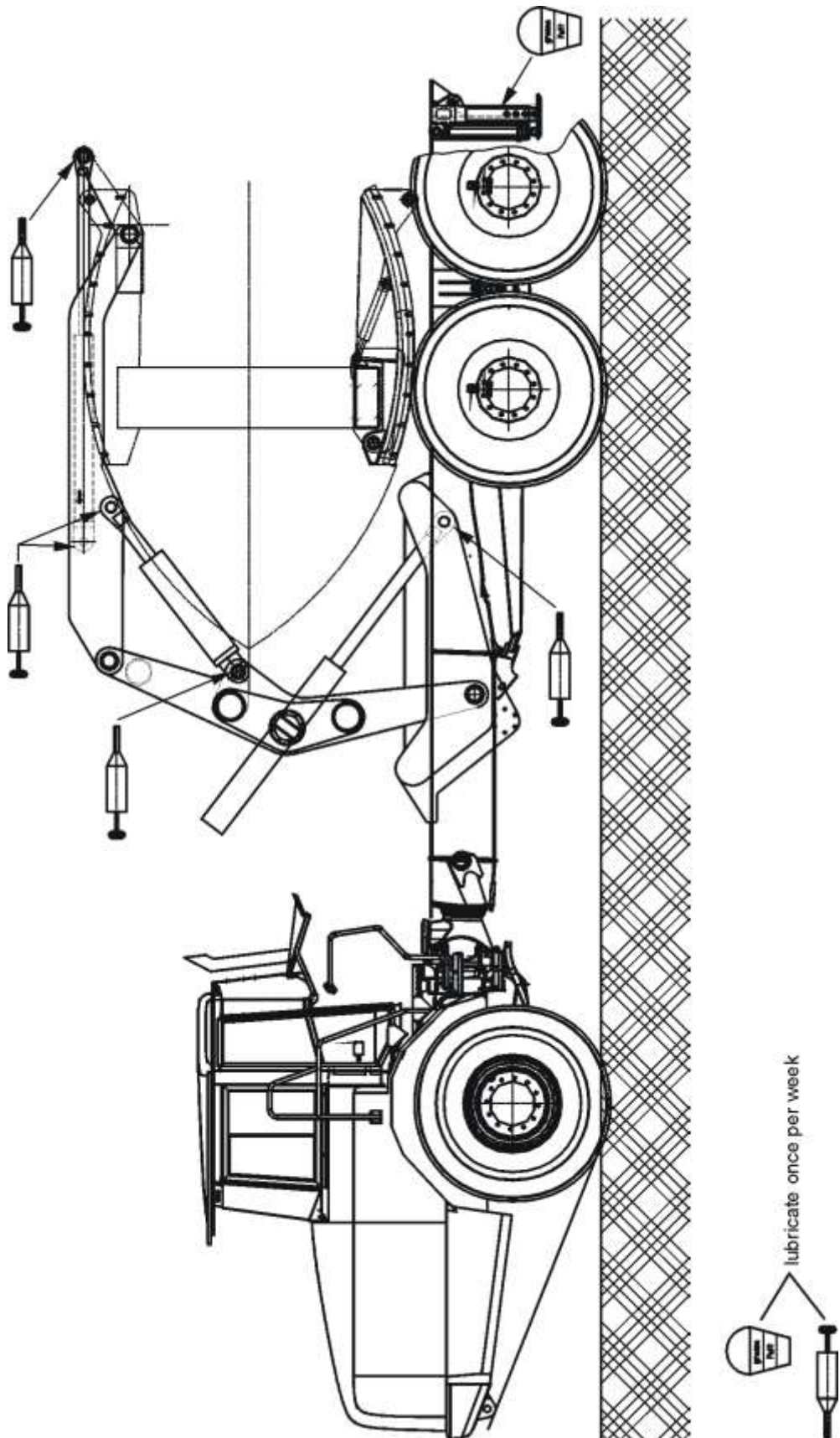


**5. Lubrication chart OPTIMAL 2500**

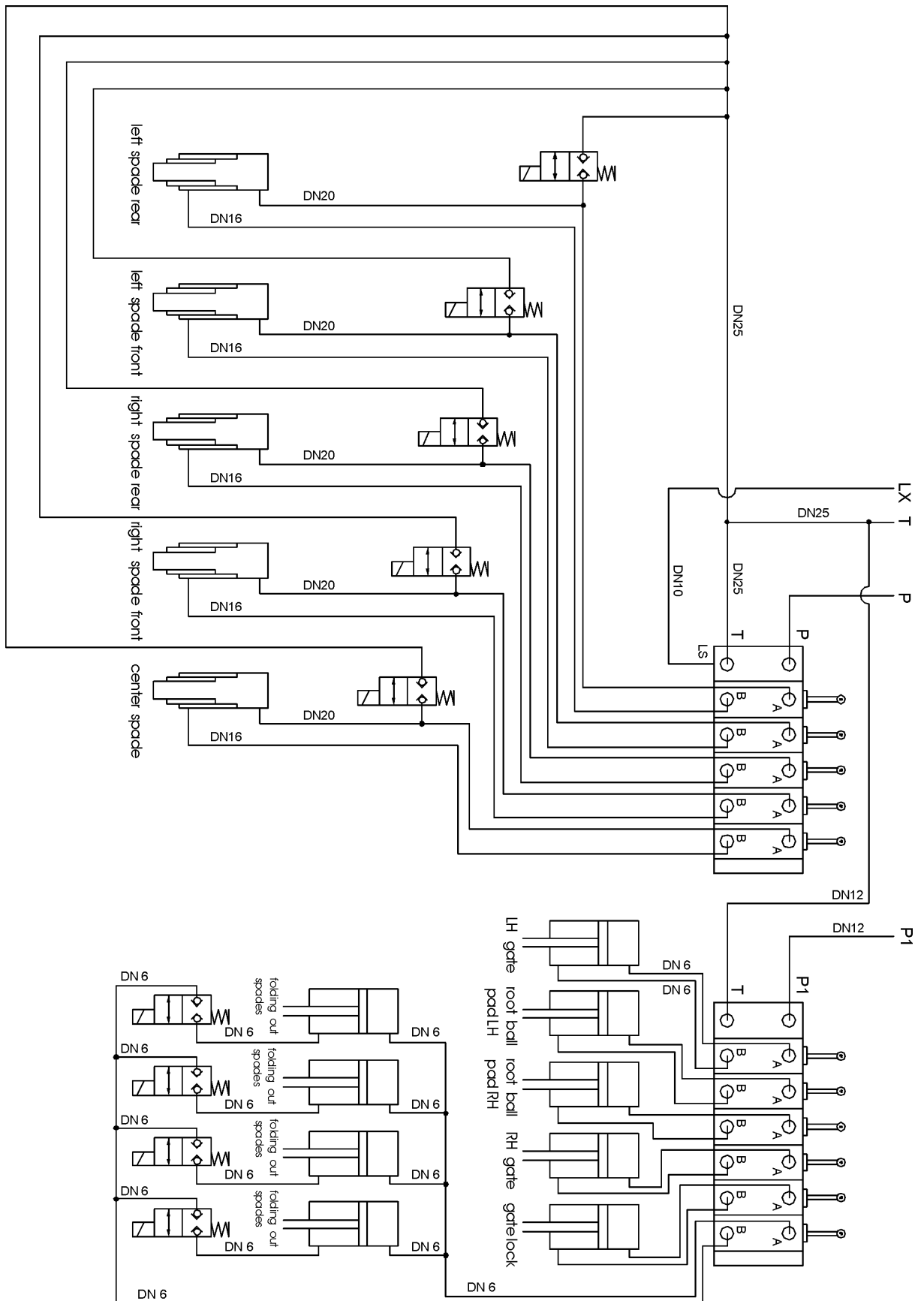
5.1 Digging head



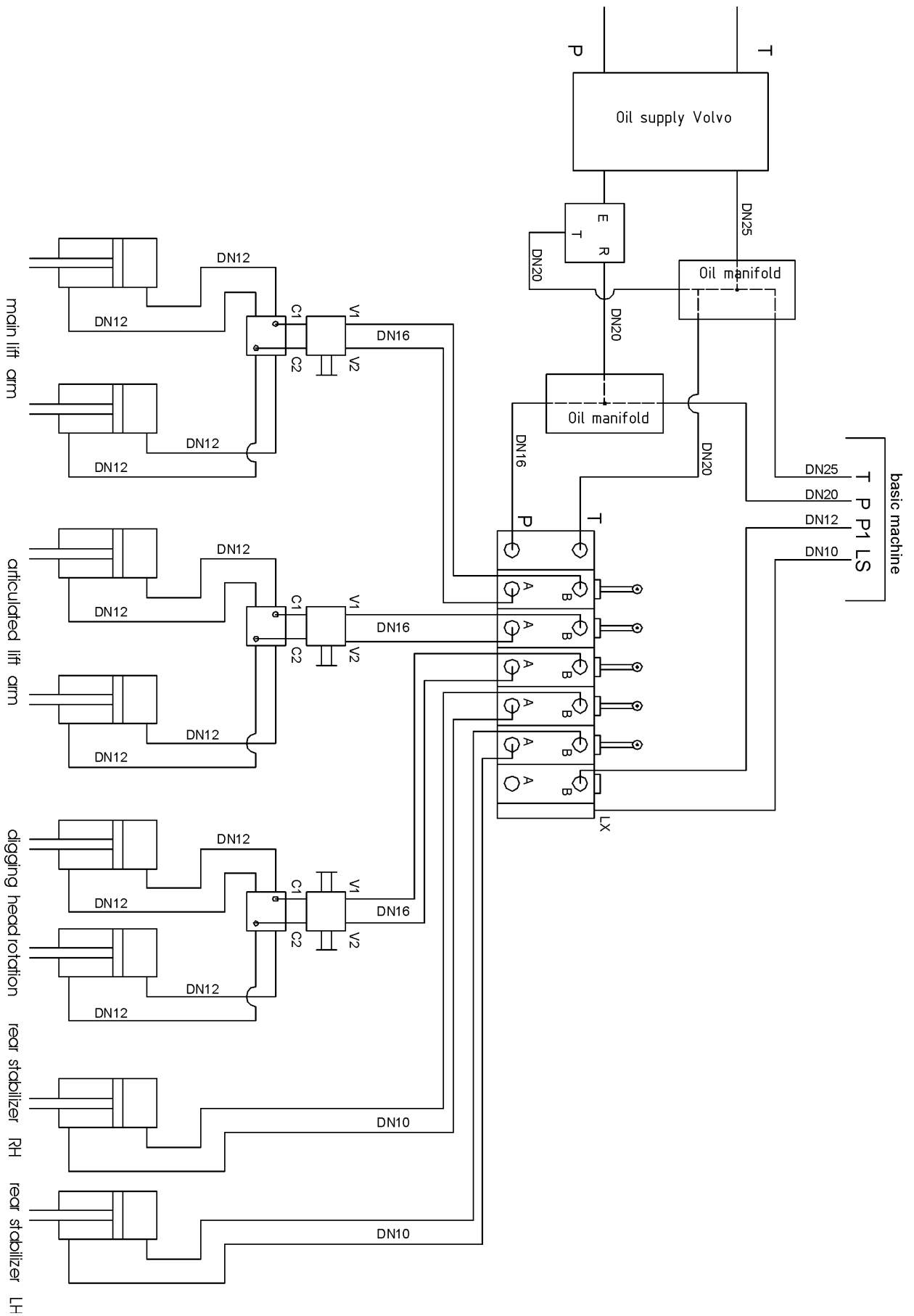
5.2 Superstructure



**6. Hydraulic System 1**



## 6. Hydraulic System 2





## Warranty

The manufacturer, Optimal-Vertrieb Opitz GmbH, warrants that your Optimal tree spade will be free from defects in material and workmanship for a period of 6 months from the date of delivery to the original purchaser.

If, during that warranty period, this tree spade proves to be defective the purchaser should report it immediately to the authorized Optimal distributor. The distributor will remedy the defect by either repairing or replacing the respective part, at its option.

This warranty does not cover any typical wear items such as guides.

This warranty cover damages to the hydraulic system and related components only, if the purchaser can prove that the hydraulic oil was regularly sampled as stipulated under section 4.3.

The owner is responsible for any repair costs arising due accident, fire or objects damaging the tree spade, or misuse as described in the Operation Manual.

Any downtime expenses, travel costs, travel time, transport cost to the service workshop, or loss of pay during warranty repairs are not covered by this warranty.

This warranty applies only to Optimal tree spades bought and operated in the United States and Canada.