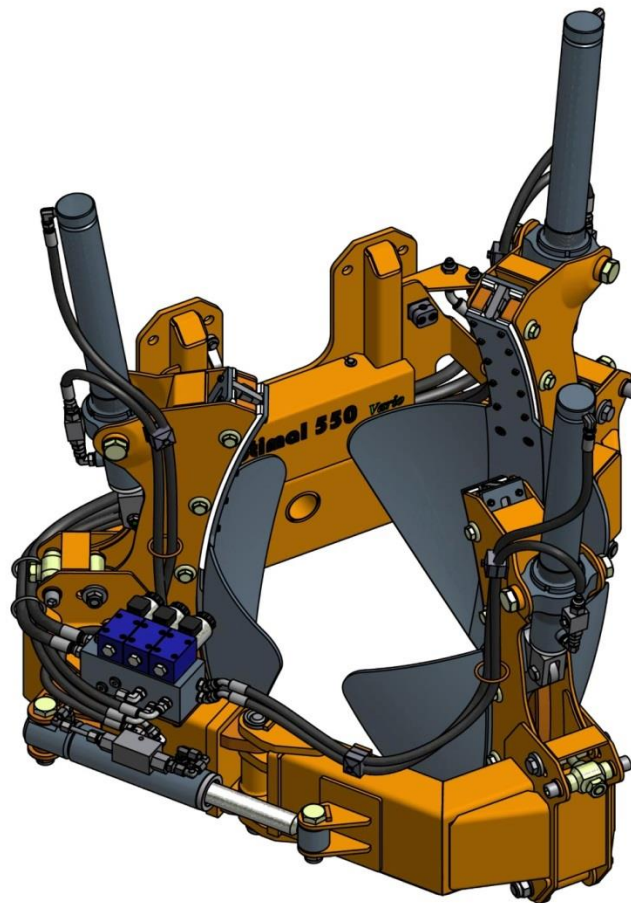


# M A N U A L O N



## TREE SPADE OPTIMAL 550 *vario*

550V003 -



### **Manufacturer:**

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**WARNING Operator must have read and understood instructions before running the tree spade. Untrained operators can cause injury or death.**

-  **Safety Alert Symbol:** This symbol is used for important safety messages. When you see this symbol, follow the message to avoid personal injury or death.
-  Never use tree spade without instructions. See machine signs (decals), and Operation & Maintenance Manual of tree spade. The operation instructions for power unit must be followed.
-  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.
-  No one should be underneath the raised tree spade or near shearing and pinching areas, or near any hydraulic components. We are advising the user that due to their functional positions and movements the danger areas cannot be furnished with protective guards.
-  Keep bystanders well away from work area.
-  Do not perform any manual work on the tree or shrub when it is inside the tree spade. In particular, do not check the position of the tree or shrub by hand or feet when it is inside the tree spade. Do not tie the tree or shrub when it is near or inside the machine.
-  When sight is limited, an assistant should 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 traffic rules and regulations must be adhered to.
-  Never leave power unit with engine running or with lift arms up.
-  To park, engage parking brake and put tree spade flat on the ground.
-  When doing cleaning, maintenance or repair work, lower the tree spade to the ground and stop the engine of the power unit.
-  Never modify equipment. Use only original spare parts approved by manufacturer for this particular model tree spade.
-  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 blade. Do not try to release the stone by means of a crow bar or other tools. Place the digging head again into the planting hole and retract the blades. Thereby the stone will come loose and the blades which got a high degree of bending strength will regain their former shape. After that the root ball can be dug again.
-  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.
-  Safety stickers have been placed on the tree spade to warn the user of possible dangers. In case a safety sticker has been worn or destroyed, it must be replaced immediately. Safety stickers can be ordered with your distributor or the manufacturer. For ordering please use the part numbers listed on page 2A. Fix the stickers on the locations marked on page 2A.



**1. Operating Specifications**

<b>Description</b>	<b>Tree Spade OPTIMAL 550 Vario</b>		
<b>Serial Number</b>	550V003		
<b>Capacity</b>	upper root ball diameter	21 in	18 in
	root ball depth	17 in	14 in
<b>dimesions of basic machine</b>	max. height	44 in	44 in
	width, gate closed	46 in	46 in
	width, gate open	44 in	44 in
	clearance between open gate	28 in	27 in
<b>weight</b>	basic machine, empty	717 lbs	705 lbs
<b>standard type of attachment</b>	attachment by means of back plate to wheel loader, excavator or front-end loader		
<b>Hydraulics</b>	at the front the power unit must be equipped with an auxiliary double-acting hydraulic circuit for implements: working pressure: 2000 – 2560 lbs./in <sup>2</sup> oil flow: 8 to 16 GPM		
<b>controls</b>	electro-hydraulic double-acting valves, for 3 functions, activated by electrical control switch		
<b>fields of application</b>	tree nurseries, gardens, green areas		

Coverage: Handling of a tree spade  
Compiled by: GH-Ing GmbH

Managing Directors:  
Christine & Roland Schlesag

## Scope of Application

### Handling of a Tree Spade

#### Risk for People and Environment

- Injuries due to bruising, push or shearing-off of extremities during operation
- Injuries due to lashing out or snapping-off of branches or the falling / tipping loads
- dangers due to lashing-out hydraulic hoses or leaking hydraulic oil
- tripping, slipping, falling, e.g. due to leaked hydraulic oil
- electric shock



#### Safety Precautions and Rules of Conduct

- Operation of tree spade only for the intended use and according to instruction manual
- keeping sufficient distance when attaching tree spade to power unit
- keep sufficient distance when digging, lifting, transporting and re-planting the tree; stay out off the danger area
- plan and communicate the coordination of work and the working process before the execution
- work with position adapting person when working area is difficult to keep in view
- when working on the tree spade (e.g. cleaning and repair work), stop the power unit, separate the tree spade from the power supply, and ensure that the hydraulics of the tree spade are unpressurised
- check working elements, in particular the hydraulic components incl. the hydraulic push-on couplings, before commencing work
- protect working area and transport ways (e.g. immediately remove any moisture technically appropriately / leaked hydraulic oil)
- Work on electric components must be carried out only by electrically qualified persons
- Always consult a medical doctor after an electric shock, even when there are no symptoms
- always consider the risk assessment of the tree spade and the power unit
- before commencing work, carry out a risk assessment in accordance with the services to be rendered.

#### Conduct in case of Disturbance

- report disturbance or defects to your superior, and stop the tree spade operation



#### Conduct in case of Accidents, First Aid

- immediate life-saving measures at place of accident, call for first-aider
- **emergency call: local emergency call**
- report accident / near miss (e.g. to employer, or to management of works)



#### Maintenance and Disposal of Wastes

- repair and maintenance work must be carried out only by assigned and qualified persons

## 2. Assembly

**IMPORTANT:** When doing assembly work, instructions of manufacturer of the power unit must be observed!

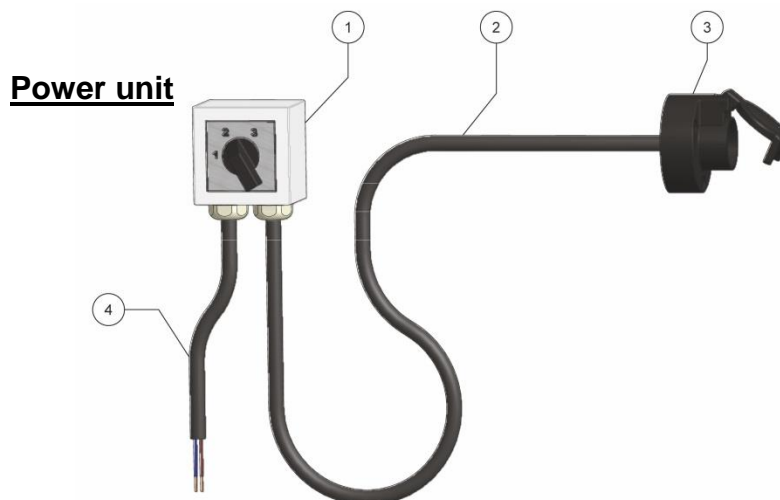
### 2.1. Back plate

The tree spade is attached to the power unit by means of a back plate. The back plate is procured from the manufacturer of the power unit, or it might be fabricated by OPTIMAL according to the drawings and instructions of the manufacturer of the power unit.

The back plate is to be furnished with borings as per drawing page 20. At these attachment points the tree spade is bolted tightly to the back plate.

### 2.2 Installation of Electro-Hydraulic Controls

- 2.2.1 Install rotary switch (item 1) at a suitable and dry location in the power unit, e.g. on the instrument panel.
- 2.2.2 Install 7-pole socket next to the quick-connect of the hydraulic supply.
- 2.2.3 Run 5-pole cable (item 2) in power unit from rotary switch to socket (item 3). The rotary switch must be connected to the power supply (12 V) of the power unit by means of a 2-pole cable (item 4), as shown on Electrical Connection Diagram, page 21.



Now the tree spade is ready for operation.

***Important: The current must run only when the electrical ignition of the power unit is switched on. Otherwise the battery may unload. Maximum current drain 5 Ampere!***

### **3. Putting into Service**

The tree spade is attached with the quick-change backplate to the power unit and is properly secured.

Both hydraulic connecting hoses of the tree spade are connected to the disconnect of the auxiliary hydraulic circuit of the power unit.

The plug of the electric control cable is plugged into the socket installed in the power unit.

**IMPORTANT:** When operating the power unit, the relevant instructions of the manual of the power unit must be observed!

The hydraulic disconnect of the tree spade and the power unit must match and must be connected properly.  
Faulty connections are extremely dangerous!



## 4. Operating Instructions

**⚠ IMPORTANT:** The operator must be a reliable person. Before commencing production work, he or she must study these operating instructions thoroughly.

The following safety instructions must be observed:

It is the operator's prime duty to ensure that any persons must stay clear off the danger area. Special care must be taken that no one is ever under the raised tree spade, or near the potential shearing and pinching areas, or near the opened gate, or near the blades or near any hydraulic components.

Do not perform any manual work at the tree or shrub when it is inside the tree spade. In particular, do not check the position of the tree or shrub by hand or feet when it is inside the tree spade. Do not bind the tree or shrub when it is near or inside the tree spade.

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

Before starting to work with the tree spade, make sure the hydraulic fittings and the bolts are properly tightened and free from any defects.

### 4.1 The Controls

The electro-hydraulic controls are to be operated as follows:

<u>Rotary Switch</u>	<u>Work Movement</u>
function 1 : --	
function 2 : gate	open / close
function 3 : blades	up / down
function 4 : is reserved for optional use, e.g. for rear stabilizers.	



The function required is preset with the rotary switch and then activated by the manual control valve (or pedal) of the auxiliary hydraulic circuit of the power unit.

## 4.2 Operation

First lower the tree spade by means of the lift arms of the power unit until the blade points are about 20 cm (8") above the ground.

Preset function 2 (gate) and activate "open" with manual control.

Drive the tree spade with opened gate towards the tree. When the tree is positioned in the centre of the main frame, preset function 2 "gate" and activate "close".

Lower the tree spade with closed gate to the ground and bring it in a horizontal position. Check again whether tree is positioned in the centre of the frame and correct, if necessary.

When the power unit is equipped with rear stabilizers, preset function 4 and "extend" the rear stabilizers with controls of the power unit..

Preset function 3 "blades" and activate "down" by means of manual controls. Now the blade cylinders press the blades into the soil.

When during the process of digging the tree spade begins to lift because of hard soil, retract the blades a bit and then continue digging. Never tilt the tree spade forward and backward with the tilting cylinder of the power unit.

**IMPORTANT:** 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 blade. Do not try to release the stone by means of a crow bar or other tools. Instead place the digging head again into the planting hole and retract the blades. Thereby the stone will come loose and the blades - which got a high degree of bending strength - will regain their former shape. After that continue digging.

Once all spades have been completely pressed into the soil, the tree spade with the planting material inside is lifted out of the ground by means of the lift arms of the power unit.

Releasing the Tree:

When transplanting or root-balling, lower the tree spade with the planting material by means of the lift arm, retract spades (function 3 "blades", control valve "up"), then unlock gate (function 1 "gate lock", control valve "unlock").

Finally open the gate (preset function 2 "gate", manual control "open") and reverse the power unit.

**IMPORTANT:** When driving on public roads, relevant traffic rules and regulations must be observed.  
When driving, lower tree spade as much as possible.

When operation of the tree spade is finished, put rotary switch into idle position by setting 0.

## **5. Care and maintenance**

**IMPORTANT:** When doing cleaning, maintenance or repair work, the tree spade must be lowered to the ground and the engine of the power unit must be switched off !

Use original spare parts only !

The tree spade must be inspected annually by an expert on operational safety !

Do not alter the design of the tree spade without approval of the manufacturer !

Bolts must be checked regularly whether they are tight. Retighten if necessary !

### **5.1 Blade Guides**

The blade guides are furnished with plastic linings and they do not need any lubrication. Worn plastic linings must be replaced before the screws can damage the tread surface of the blades.

### **5.2 Hydraulic Oil Supply**

Check level of hydraulic oil regularly. Replace oil according to instructions of manufacturer of power unit.

### **5.3 Hydraulic Hose Pipes**

All hydraulic hoses must be inspected at least once per year. Damaged hoses must be replaced. **Latest after six years, all hydraulic hoses must be replaced by new ones.**

### **5.4 Hydraulic Cylinders**

When not used for more than 2 weeks, all piston rods of the hydraulic cylinders must be cleaned and sprayed with a preserving oil in order to avoid any subsequent damage.

## 5.5 Adjusting blades of Optimal 550

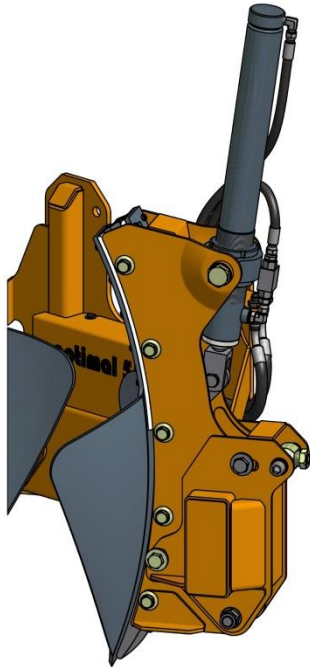


Illustration 1

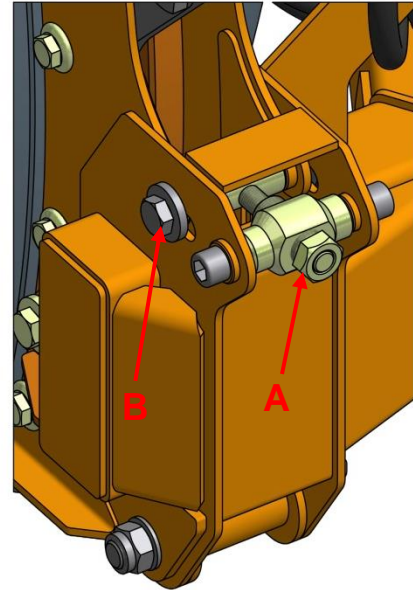


Illustration 2

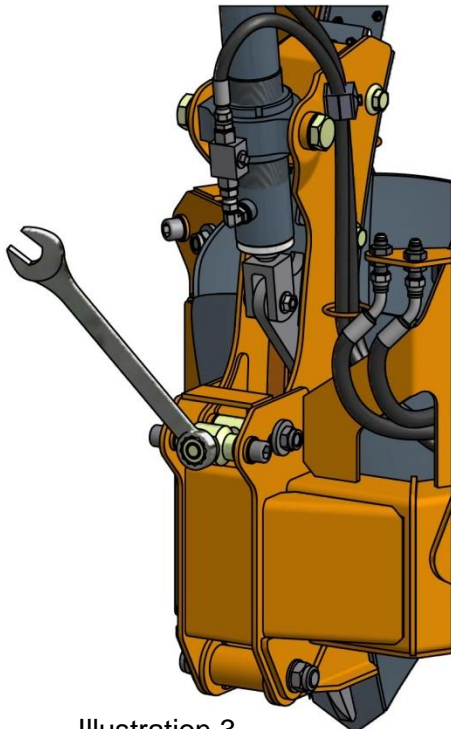


Illustration 3

Illustration 1: Overall view of blade tower

Illustration 2: A -> adjustment screw  
B -> locking screw

Illustration 3: slacken locking screw,  
move blade tower with  
adjustment screw forward or  
backward. When blade is in correct  
position, tighten locking screw.

In case the blade cannot be moved in the  
correct position, the guides and the plastic  
linings must be checked and – if necessary –  
must be replaced.

When they are still in good condition, then  
perhaps the blade points must be reshaped.

**Important:** The blades must be re-shaped in cold condition  
on a hydraulic press.  
**The blades must never be heated !!!**

## 5.6 Replacing Plastic Bushes at Blade Cylinder

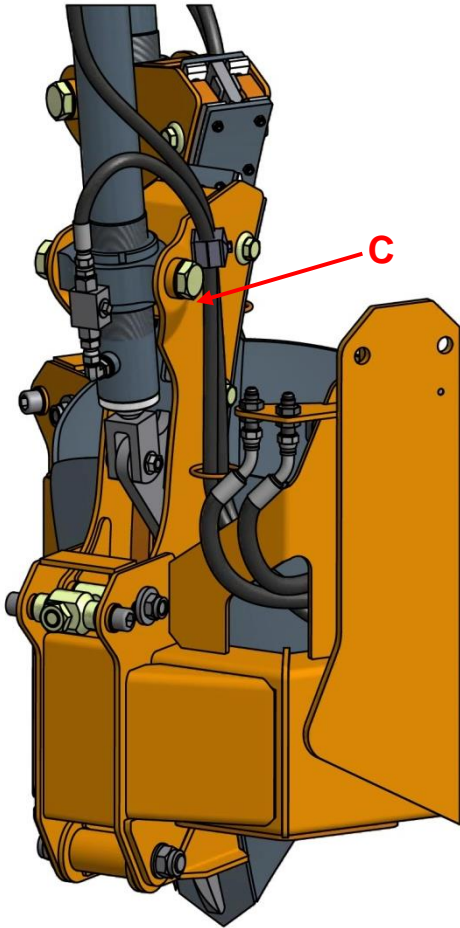


Illustration 4

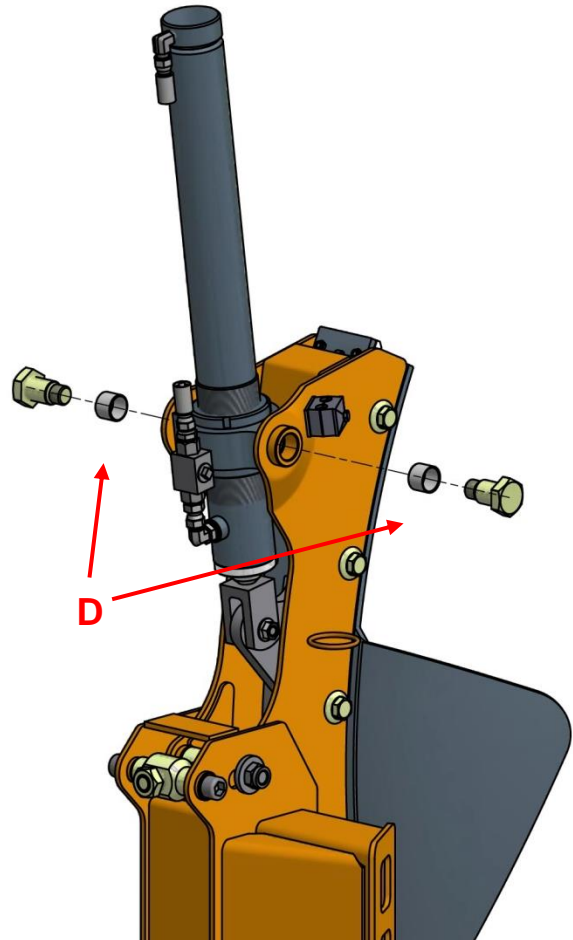


Illustration 5

Take off adjustment pin (C), remove worn bushes, insert new bushes (D).

## 5.7 Replacing Plastic Bushes at Gate Cylinder

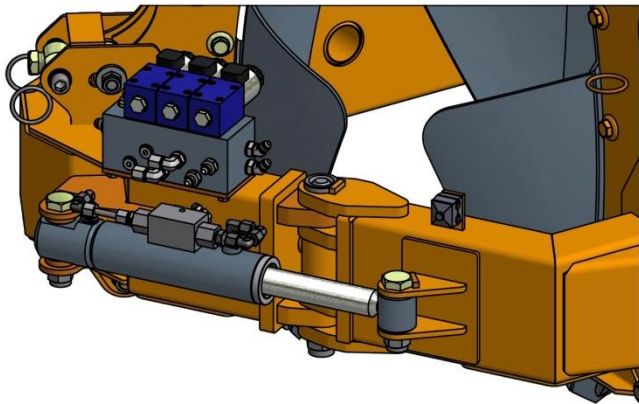


Illustration 1

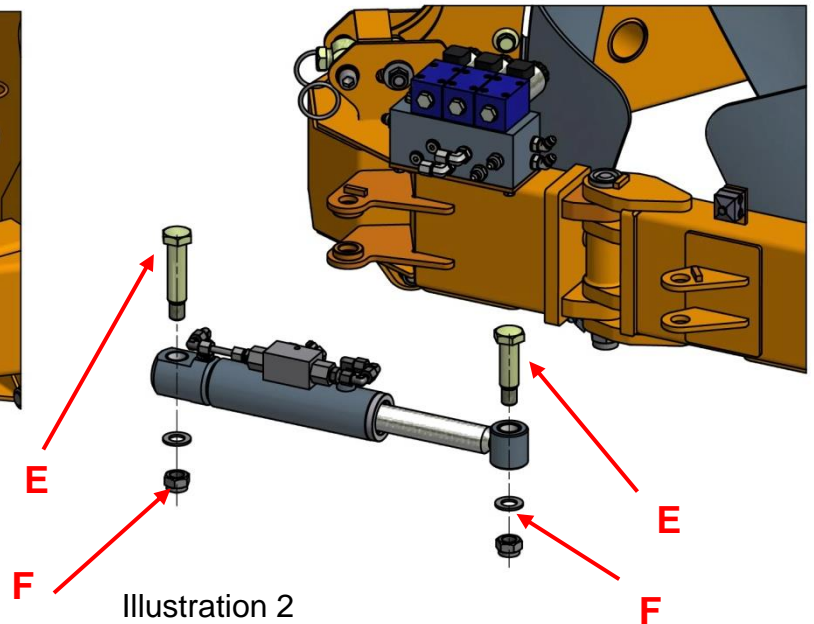


Illustration 2

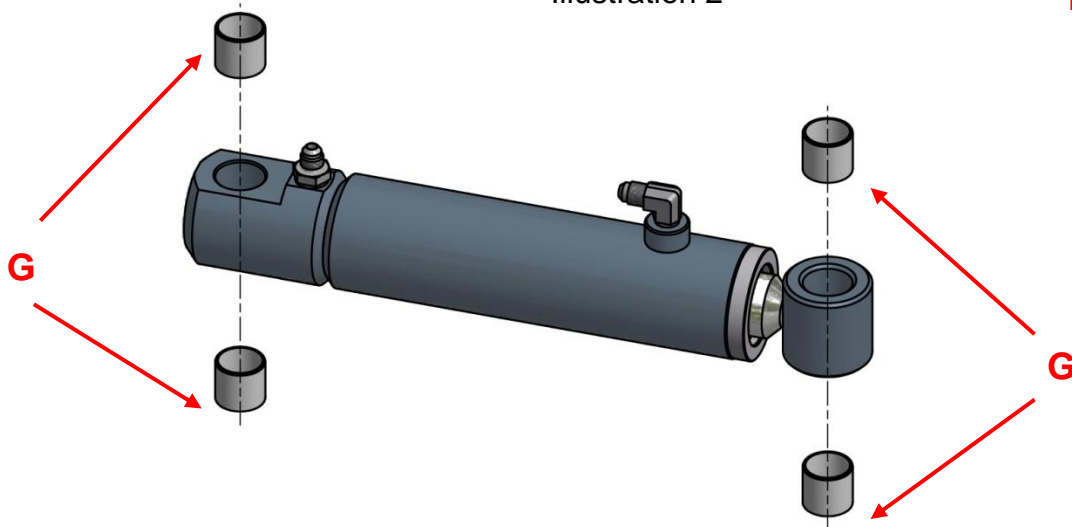


Illustration 3

illustration 1: overall view of installed gate cylinder.

illustration 2: dismantle hexagonal nut M20 (F) and bolt M20 (E), when necessary, loosen hydraulic hoses of cylinder, too.

illustration 3: remove worn plastic bushes (G) and replace by new ones. Then put gate cylinder, bolt and hexagonal nut and – when necessary – also hydraulic hoses back into position.

## 5.8 **Changing Blades** ([https://www.youtube.com/watch?v=llzgjJO\\_xS8](https://www.youtube.com/watch?v=llzgjJO_xS8))

For changing the blades we recommend the following tools and equipment:

- 1 pair protective gloves
- 1 off round sling (sling friction), usable length 0,45m
- 1 off shackle size 10 (width 20)
- 1 off underlay (rubber mat or wooden plate)
- 1 off open end plus ring spanner, width 21 mm
- 1 off open end plus ring spanner, width 17 mm
- 1 off controll lever for ball valve (included in delivery)
- 1 off plastic mallet



### 5.8.1 **Initial Position of Blades**

The tree spade should be attached to the power unit. The tree spade is lifted about 50cm and placed in a horizontal position.

The blades are raised into top position, the gate is opened.

Two blade cylinders are locked out with the ball valves (illustration 2) by mean of the control lever (illustration 1) which is included in delivery. Therefore only one blade can be moved up and down when function 3 of the rotary switch is set and the auxiliary hydraulic circuit is activated.



illustration 1



illustration 2

### 5.8.2 Dismounting Blades

The blade which has not been blocked is lowered (illustration 3) to place the blade bolt into an accessible position.

Remove hexagonal nut of blade bolt by means of open-end spanner (illustration 4).

Then the power unit carefully lowers the tree spade until the blade points almost touch the ground (illustration 5).

Now the blade bolt is removed with the plastic hammer (illustration 6).

The lift arms of the power unit slowly raises the tree spade, whereby the blade is sliding down and out (illustration 7+8).



illustration 3



illustration 4



illustration 5



illustration 6



illustration 7



illustration 8



### 5.8.3 Install Blades

For closing the blades as good as possible, the matching blades and guide towers are marked. Before doing the installation, check whether the marks match (illustration 9 + 10). Move blade a bit into the guide tower. Take care that it is well positioned. (illustration 11) Now fix round sling on one side with blade bolt on eye joint of blade cylinder, and on the other side with with a shackle on the blade (illustration 12). Then the blade cylinder must be slowly retracted (illustration 13 + 14).

Next the round sling, the shackle and the blade bolt must be removed (illustration 15). Re-align eye joint and slowly extend blade cylinder until borings of blade and eye joint are aligned. (illustration 16)

Then bolt and hexagonal nut must be installed and tightened properly (illustration 17). Retract blade and block with ball valve.

Same procedure must be performed with the other two blades.

When all blades have been changed, all ball valves must be opened. Close the gate and slowly shift the blades down.

Check the position of the blades to each other. If necessary, re-adjust blades. (for adjustment of blades, see 6.5)



illustration 9



illustration 10



illustration 11



illustration 12

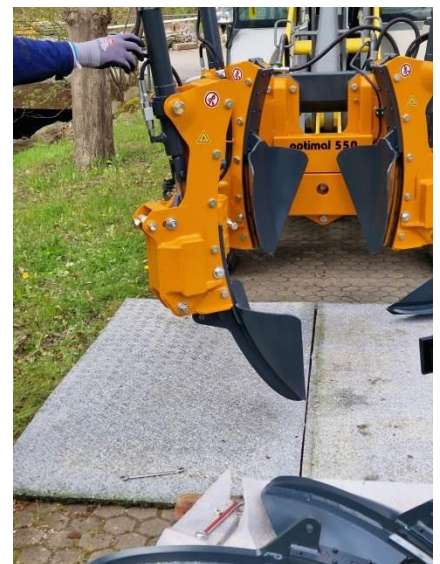


illustration 13



illustration 14



illustration 15



illustration 16



illustration 17

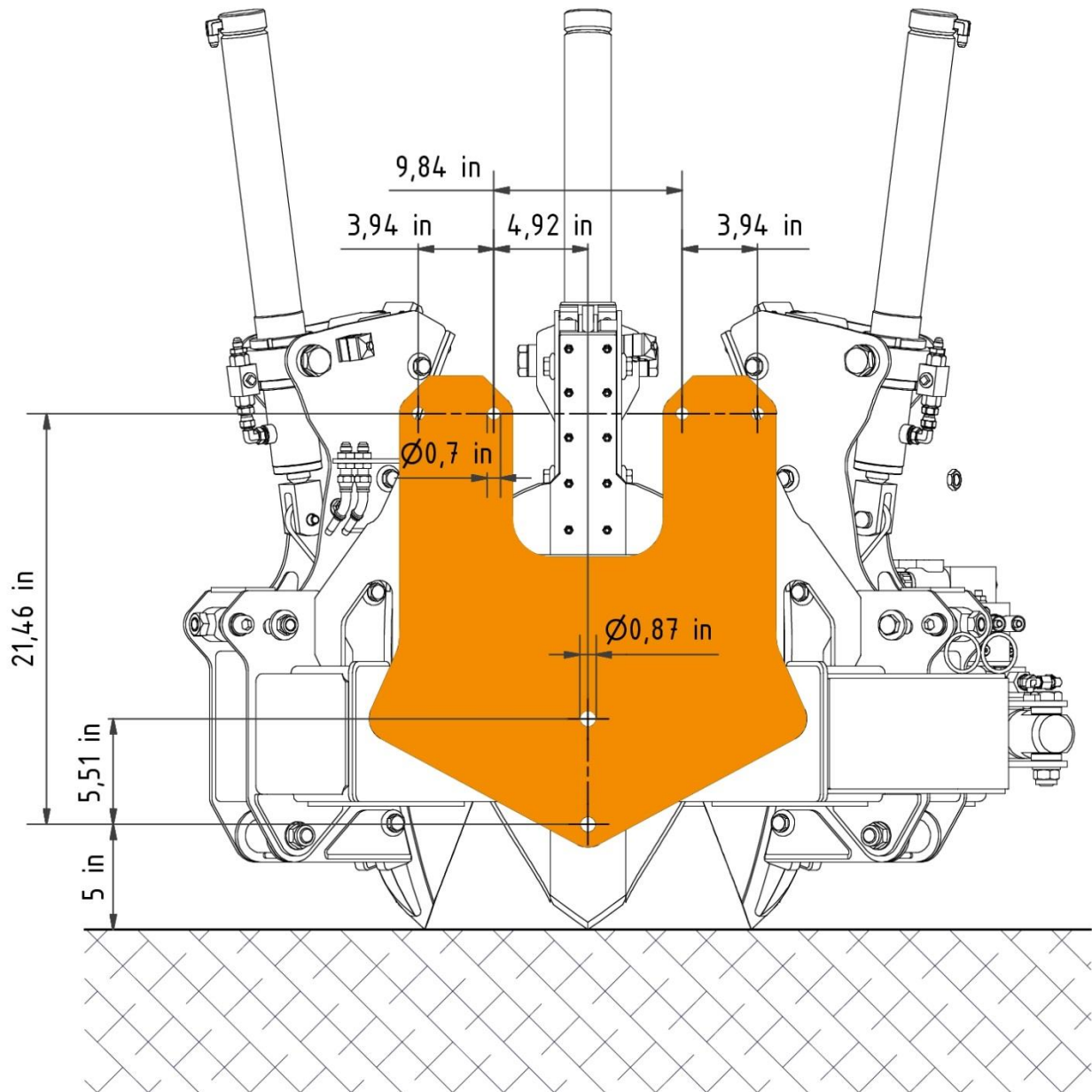
## **6. Trouble Shooting**

1. Nothing moves (none of the hydraulic function works).
  - The electric power supply to the rotary switch is interrupted; check fuses on the power unit.
  - The hydraulic connect is not properly connected. check hydraulic connection.
2. Two working functions (e.g. locking and blade movement) perform simultaneously.
  - The slide on one of the valves jams. Perhaps a dust particle causes this problem. Dismantle that valve and clean it.
  - When this procedure does not solve the problem, the valve must be replaced.
3. When the blades have been retracted, and the control valve has been stopped, immediately one or more blades are pushed down again.
  - When the blades are only slightly pushed down, the oil flow may be too high. The oil supply of the power unit must be regulated by the manufacturer.
  - When the blades are pushed down completely, then the seals of the blade cylinder are defect and must be replaced. Or
  - When the blades are pushed down completely, then the blade valve is defect and must be replaced.
4. The gate closes and / or locks not completely.
  - The adjustment screw on the hinge is not adjusted properly. Readjust adjustment screw.
  - The cylinder suspension of the gate cylinder is worn. The bushes must be replaced.
5. Although the gate is closed and properly locked, the blades cannot be lowered.
  - The sensor at the gate lock is not properly adjusted or defect. => re-adjust sensor (LED signals the correct reacting distance) or perhaps the sensor must be replaced.
  - Electrical power supply is interrupted. Check fuses.

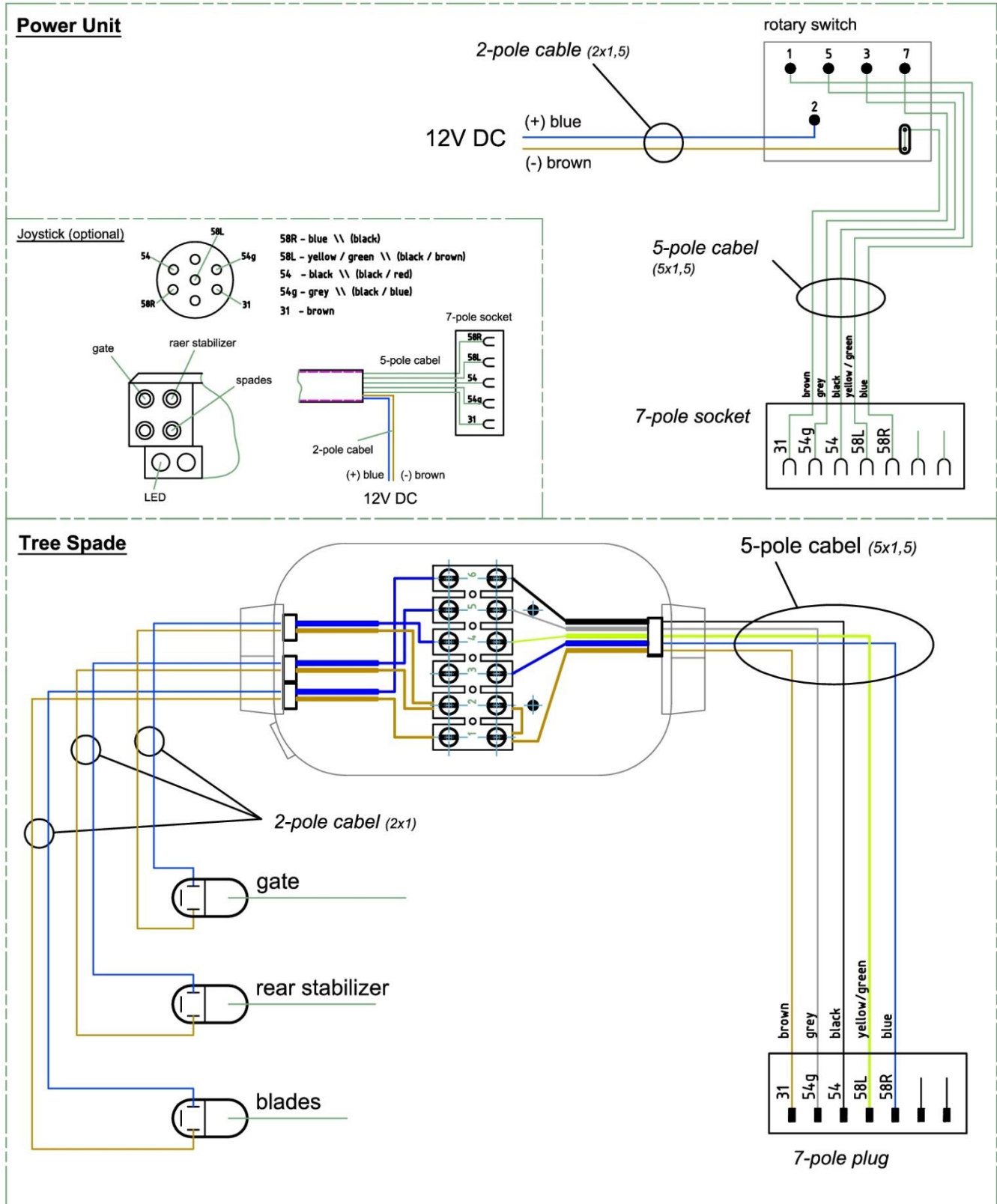
6. The blades do not close completely, although the blade cylinders have been fully extended.
  - The plastic linings and perhaps also the guides are worn and must be replaced.
  - The blades are bent and must be re-shaped.
  
7. Only one working function can be performed.
  - Electrical power supply is interrupted.  
Check power circuit.
  - The magnet of a control valve is defect. Replace valve.
  - The piston of a control valve is seized. Usually it is caused by dirt.  
Dismantle valve and clean; if necessary replace valve.

## 7. Appendix

### 7.1 Attachment Points of Basic Unit



## 7.2 Electrical Connection Diagram



### 7.3 Hydraulic System

