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# OPERATING INSTRUCTIONS

## CHIPPER
## LS 150-27C
## LS 150-27CB

Version 8.2012

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTMENT IN YOUR FUTURE

TÜV m TÜV ČSN EN ISO 9001:2001
CE

# Foreword

Thank you very much that you have just purchased our product, the chipper LS 150-27 C/CB. Our company has been engaged in production of equipment for wood residue crushing and disposal for many years and has gained considerable experiences in this field. Quality of our small and also powerful machines has been proven in 40 countries worldwide we export to.
Permanent innovations of the Laski manufacturing assortment have been crowned by the most important award in the company's history, the golden medal Grand Prix, gained for its complete family of chippers and shredders KDO and LS at the international show:

**Grand Prix Techagro 1998**
**Grand Prix Silva Regina 2002**
**Grand Prix Silva Regina 2008**

This manual brings important instructions for users, i.e. instructions for putting the machine into operation, work safety and operating experiences. You will learn how to carry out maintenance, repairs and servicing and who is authorised for doing checks and other actions on the machine.
Your local dealer will give you this manual with instructions for operation and maintenance while taking this new machine over. Make sure if you understand everything. If not, do not hesitate and contact your dealer and ask him for explanation. It is very important for you and your work safety to understand all instructions given in this manual.
The firm Laski, s.r.o. does not bear any responsibility for any claims resulting from disobedience to the instructions given in this manual.
This operation manual includes also work safety instructions in various parts of the text. If there is any work safety rule or instruction in general description, then this instruction is indicated with the following symbol:

# EC CONFORMITY DECLARATION

issued in compliance with applicable EC Directives

We, as the manufacturer,

**LASKI, s.r.o.**
**Blíšťka 263/16**
**CZ-798 17 Smržice**
**CRN: 45479593**

declare hereby that our product: - designation: **Chipper**

- type: **LS 150**
- model : **LS 150-27 C**
-serial number: .....

complies with the given CE directives

**(2006/42/EC – MD**
**2004/108/EC - EMC**
**2002/88/EC, 97/68/EC**
**2000/14/EC - NOI**

List of technical standards, specifications and harmonised norms used for review of its conformity: **EN 13525+A1, EN 953+A1, EN ISO 3744, EN ISO 3767-1, EN ISO 11201, EN ISO 12100, EN 13478+A1, EN ISO 13732-1, EN ISO 13857, EN ISO 14982, EN 1175-2, ISO 11 684**

Basic technical parameters:

| Parameter | UnitJednotka | ValueVeličina |
|---|---|---|
| Length | mm | 3275 |
| Width | mm | 1590 |
| Height operation/transport | mm | 2380/1690 |
| Weight | kg | 750 |
| Engine - type | | KOHLER COMMAND CH740 |
| Output power | kW/rpm | 20,1/3600 |
| Max. ∅ of material to be chipped | mm | 150 |

Conformity assessment in accordance with Directive No. **2000/14/EC, Art. 14, point 2, Appendix V.**

The entity participating in this conformity assessment in accordance with Directive No. 2000/14/EC: **NB 1017, TŰV SŰD Czech s.r.o., Novodvorská 994/138, CZ-142 21, Prague 4**

Measured sound power level of this equipment: **$L_{WA}$ = 104,2 dB**

Guaranteed sound power level: **$L_{WA}$ = 105,0 dB**

Completion of technical documentation: **Ing. Jiří Kvasnička**
**Petra Bezruče 205**
**CZ-664 43 Želešice**

In Smržice, on 12.9.2012

Ing. Jiří Kvasnička

# EC CONFORMITY DECLARATION

issued in compliance with applicable EC Directives

We, as the manufacturer,

**LASKI, s.r.o.**
**Blíšťka 263/16**
**CZ-798 17 Smržice**
**CRN: 45479593**

declare hereby that our product: - designation: **Chipper**

- type: **LS 150**
- model : **LS 150-27 CB**
-serial number: .....

complies with the given CE directives
**(2006/42/EC – MD**
**2004/108/EC - EMC**
**2002/88/EC, 97/68/EC**
**2000/14/EC - NOI**

List of technical standards, specifications and harmonised norms used for review of its conformity: **EN 13525+A1, EN 953+A1, EN ISO 3744, EN ISO 3767-1, EN ISO 11201, EN ISO 12100, EN 13478+A1, EN ISO 13732-1, EN ISO 13857, EN ISO 14982, EN 1175-2, ISO 11 684**

Basic technical parameters:

| Parameter | UnitJednotka | ValueVeličina |
|---|---|---|
| Length | mm | 3466 |
| Width | mm | 1590 |
| Height operation/transport | mm | 2380/1690 |
| Weight | kg | 750 |
| Engine - type | | KOHLER COMMAND CH740 |
| Output power | kW/rpm | 20,1/3600 |
| Max. ∅ of material to be chipped | mm | 150 |

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# Product Identification

Our product is identified with its serial number stamped both on the type plate and on its chassis. Pay your attention also to the type plate on the engine. Upon take-over of the product we recommend you to fill required data in the following form concerning the given product and your dealer.

Type of product: ……

Serial number of product: ……..

Serial number of chassis: ……..

Serial number of engine: ……..

Dealer's address: ……..

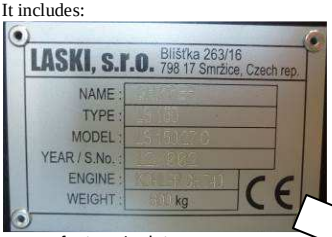
Address of authorised service: ……..

Date of delivery: ……..

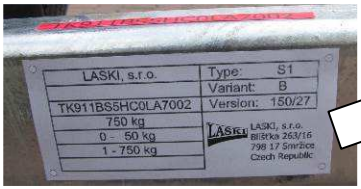
Warranty expiration date: ……..

Interruption of warranty period: ……..

The type plate is located on the machine frame.
It includes:




- manufacturer's data
- product trade name
- type
- serial number
- year of manufacture
- weight of machine
- CE designation




This product is available in two versions according to the modification of its chassis:

LS 150-27/C: unbraked chassis
LS 150-27/CB: braked chassis

# Work Safety Instructions

## Utilisation

For transport the chipper should be coupled to transport means equipped with a towing bracket with a joint ball of size ISO 50 or with a hitch intended for a drawbar/towing eye ∅40 mm.
This chipper is designed for disposal of wood waste, twigs, bark, branch-wood and other above-ground biomass or for manufacture of chips from aforesaid materials and also for disposal of redundant timber such as sticks, deals, pickets etc. The chipper can dispose all these materials with diameter up to 150 mm or flat materials with thickness up to 60 mm. The wooden pieces to be chipped must be free of metal, glass and other similar objects.
The chipper should be controlled and operated by two operators who in turns load materials to be chipped in a loading chute.

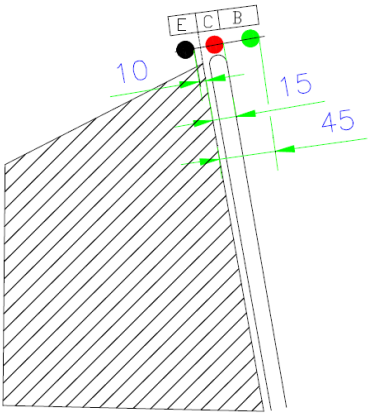
## Not Allowed Use

The chipper is not allowed to be used for disposal of aforesaid materials with foreign matters and objects such as metal, steel binding bands, glass cullet, stony debris, ceramics etc.
It is not possible to use the chipper in the presence of unauthorised persons who may stand or move in direction of discharge ducting. At work in residential zones use the machine in accordance with regulations of the local authorities to avoid disturbing of local inhabitants (noise level).
It is strictly forbidden to start the chipper with removed hoods and guards.
On hilly terrain its loading chute height should not exceed 600 mm.

## Generally

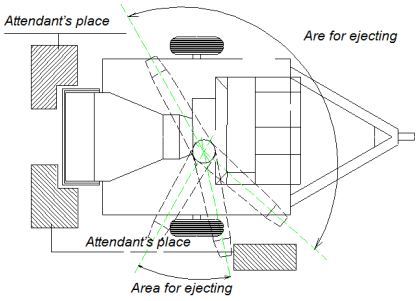
- This machine is allowed to be operated only by an operator who is over 18 yrs old, physically and mentally capable and demonstrably instructed with its operation.
- The chipper should be controlled and operated by two operators who in turns load materials to be chipped in a loading chute.
- Training courses for operating staff should include also practical operation under supervision of an experienced person or your dealer and necessary work safety instructions.

- Before working learn all functions of individual controls and safety elements and carry out functional checks before any use. Check especially loading of materials.
- By pushing the concerned controller in direction of material input the machine should stop material loading and by its next pushing the loading rolls should turn back. **The controller frame has to be advanced in front of the hinged loading chute edge so that the attendant stops the loading rolls or let them turn back at pushing the frame by leg or belly (positions C and B)!**
- It is strictly forbidden to change or to set the controller frame so that the STOP position (C) is under the loading chute edge.
- To stop loading you can push also the emergency STOP button under the loading chute (E).
- It is forbidden to retighten the nuts on the controller frame in order to increase resistance to unwished stopping by loaded material. The control force should remain in limits as set by the manufacturer, i.e. max. 80 N in the lower horizontal frame part. .
- It is strictly forbidden to remove guards and other safety elements. They serve for your safety.




- While chipping, it is not allowed to enter the area of ejected flying wooden chips.
- The end piece of the discharge duct can be set only in the angle (see fig.) to longitudinal axis (upper turnable part) opposite to the loading chute. **Do not direct it toward the attendant's place!!**

- Keep this machine beyond children's and unauthorised person's reach. Avoid their presence while chipping.
- When using the chipper without any container or closed bin, keep anybody beyond the area where chips are thrown. .
- When using the chipper with such a bin, never look inside if the



chipper is still working.
- When leaving the machine take always the switch key out of ignition.
- Every operator of this machine is fully responsible for any injury or damage caused to the third persons within the operating reach of the machine.
- At work in residential zones use the machine in accordance with regulations of the local authorities to avoid disturbing of local inhabitants (noise, flying chips).
- Warning!!! Be aware of ejected particles. They have substantial kinetic energy. If the loaded wooden material contains not allowed parts, such as metal, sand, glass etc., then such objects can reach a longer distance than wooden chips. Therefore direct the discharge duct in order to regulate ejecting.
- While coupling the chipper, do not stand between its towing bar and a towing vehicle. Do not stand behind a towing vehicle while backing. Ask other person to assist you at coupling.
- Before transport, fold always the discharge duct down. It must not remain in its working position. Set also the loading chute in its transport position.
- While putting the trailer aside, it should rest on its jockey wheel, be braked by means of its parking brake (braked trailer) and blocked by means of scotch blocks (unbraked trailer). Use always its supporting jockey wheel for putting the trailer aside. While being uncoupled from a towing vehicle, its travel wheels should be slightly unloaded by lowering of the front jockey wheel and rear supports which makes this uncoupling easier.
- Before transport, after coupling, lift up the jockey wheel under the drawbar and both rear supports.

**While chipping the operator is obliged:**
- ❑ to use only such a chipper which is in optimal operating condition, not damaged through transport, storage or from previous operation,
- ❑ to check functions of all controls and safety elements (especially functions of the safety frame) before putting the chipper into operation,
- ❑ to avoid disturbing of other people with noise, exhaust fumes or ejected flying particles (at windy weather),
- ❑ to keep traffic rules and local regulations when going or working on or nearby public roads,
- ❑ to turn the machine off if the discharge duct is clogged.
- ❑ **Clean the duct at standstill only**. For cleaning use only suitable hooks or bars to release pressed materials. After repeated putting the chipper into operation let the machine run idle in the chipping mode to empty the whole discharge ducting and the chipping wheel space. If proper cleaning is required then take always the switch key out of ignition before removing hoods.

- While working, never lean over the loading chute and never push wooden materials with your hand or foot only. Use always a wooden stock or a bar to push materials between the loading rolls
- While working, wear always personal protective aids - protecting shield or goggles, protective gloves, working shoes and working cloth properly buttoned. Avoid wearing free parts, such as ties, scarves and shawls, belts etc. In case of longer hairs use always a proper head piece. Otherwise, such a person is not allowed to operate this machine.
- In case of two attendants it is necessary to make simple signals clear before working and to appoint one who will manage the work.
- Both attendants must be trained in attendance and turning the chipper off in emergency cases.
- If any object, not allowed to be chipped, falls down into the loading chute, do not try to pull it out with your hand. It is hazardous for your health and operational safety. Turn always the machine off.

- Keep traffic lights and work safety symbols in proper order.
- Check up materials to be loaded and remove all undesirable objects. If you see such particles in ejected chips stop working immediately.
- This manual describes problems and faults which could occur at work and which may be remedied by an instructed person. In case of other problems and faults do not hesitate and contact the manufacturer. He is always ready to help you.
- Never do any technical changes or any actions which are neither given in this manual nor allowed by the manufacturer. The machine, not correctly installed or adjusted, may run without problems now but in the future it could damage any of important parts. Pay regular attention to all joints and bolts. Keep them properly tightened.
- Do not put any objects or tools on the machine.
- The manufacturer does not bear responsibility for any damages or injures to the third persons or to other equipment resulted from disobedience to instructions given in this manual.
- When handing the machine over to another person make sure if all controls, guards and other safety elements are complete.
- Do not remove guards and other safety elements. They serve for your safety.
- Keep the given intervals for checks of bolted joints.
- Always after work clean all parts of the machine with pressure water. Pay your attention especially to any oil spots or fuel leakage. Clean any oily spots.
- Some parts of the machine can be hot while in operation. Avoid any settling of flammable chipped materials on such parts or close to the fuel tank, the

hydraulic oil tank and the exhaust manifold. Stop working if such deposits exceed 1 mm.

- Any servicing can be done only if the machine was put out of operation and its chassis blocked against unwilling motion.
- Do not use petrol as a cleaning agent.
- Keep open fire away while filling the tank.
- Keep the machine beyond reach of open fire.
- Some parts of the machine run warm, such as hydraulic elements. Do not touch them when the engine is still running or having been just stopped.
- Do not let the engine running in high speed unreasonably.
- Do not start the machine in confined or ill-ventilated spaces.
- Do not carry out any repairs that are specified for authorised services only.
- Do not carry out any repair where its solution exceeds your experiences.
- It is strictly forbidden to work with damaged chipping device (out-of-balance, vibrations while running).
- While working on the chipping device, the chipping wheel should be blocked against unwilling motion (e.g. by a locking pin).

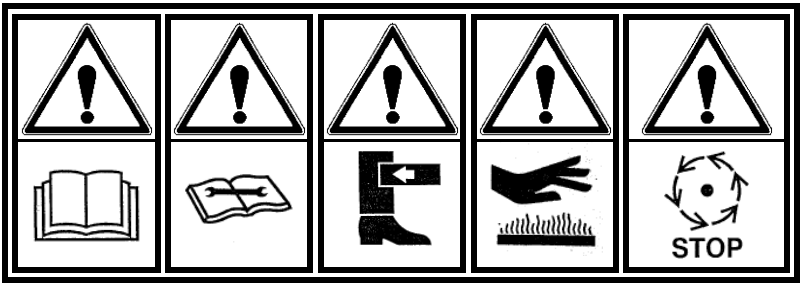
### Before transport on public roads

- ❑ For transport on public roads the chipper LS 150-27 C (CB) must comply with instructions in its operating manual and with applicable legal regulations and permissible conditions for trailers, category O1.
- ❑ For work close to public roads the towing vehicle must be equipped with a beacon of orange colour for flashing..
- ❑ Maximum transport/travel speed is 80 $km.h^{-1}$.
- ❑ For transport on public roads this chipper should be coupled to transport means equipped with approved towing brackets. The given towing vehicle should be approved for this way of transport and equipped with a respective towing bracket intended for permissible weight of an unbraked trailer or, in case of a braked trailer, for vertical coupling load of 50 kg at least and trailer gross weight of 750 kg at least
- ❑ Always before coming to a public road it is necessary to remove all mud and accumulated sediments, especially from trailer tires.
- ❑ Set the machine in the transport position, i.e. its loading chute backwards, discharge duct turned, folded down and mechanically blocked against motion.
- ❑ Couple the chipper to a towing vehicle properly and check up its proper coupling.
- ❑ Check up locks of the jockey wheel and supporting legs.
- ❑ Plug and check up traffic lights on the trailer.

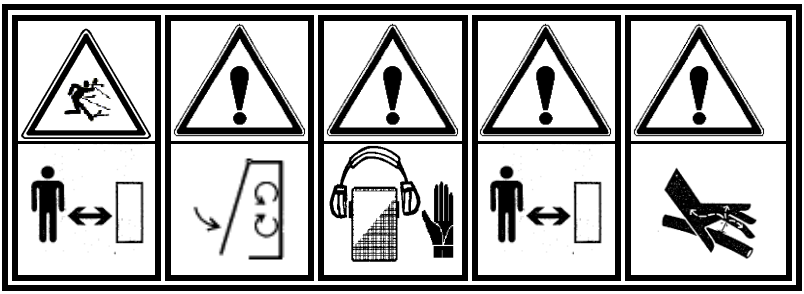
- Keep the chassis in proper order for transport.
- Respect all instructions for use by the manufacturer and applicable local regulations.

Note: Be aware that traffic rules and regulations in different countries may differ.

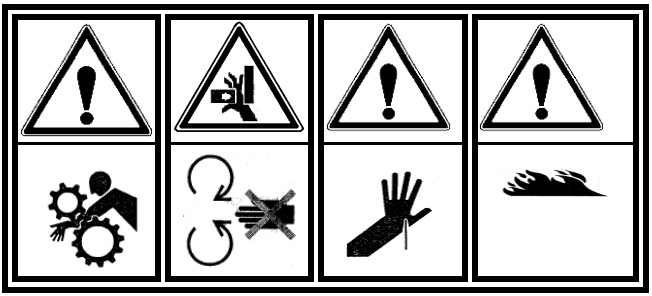
## Work Safety Symbols




| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Read this operating manual before use. | Always follow the manual while maintaining, servicing or repairing the machine. | While coupling/uncoupling the trailer, do not stand between its towbar and a towing vehicle – squeeze hazard. | Warning! Hot parts. | Warning! Turning wheel is running out. |



| 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|
| Warning! Ejected objects hazard. Keep away. | Warning! Close all guards before starting the machine. | Wear personal protective aids. | Keep safety distance. | Warning! Risk of high-pressure liquid leakage. |



| 11 | 12 | 13 | 14 |
|---|---|---|---|
| Warning! Rotating rolls. Pull-in hazard. | Warning! Rotating parts. Risk of accidents. | Warning! Risk of accidents. | Warning! Inflammable matter! Keep open fire away! |

The user is obliged to keep all the work safety symbols legible, clear and undamaged. In case of any damage or illegibility ask your local dealer or an authorised service for a new relevant pictograph.

This article introduces work safety symbols (pictographs) used on this machine. Under the given pos. number there is their location on the machine. These work safety symbols warn the operator against risks connected with the machine use. Your respect to the symbol meaning is a precondition for your work safety.

## Transport of Product/Handling

- This product is delivered completely mounted and fitted on its own chassis.
- While putting the chipper aside, block it against unwilling motion by means of its parking brake system and scotch blocks. On flat surface it is sufficient to block only one wheel from both sides.
- Uncouple the chipper always on compact, flat and sufficiently bearing surface only with inclination up to $10^{o}$.

## Precautions in Design

This product is equipped with hoods, guards and covers protecting rotary and hot parts against touching. Protective covers are usually fixed, bolted down on framing.

**An ignition box** for starting with a removable switch key. Confusion of ignition keys is not possible. When starting, first turn the key in the RUN position. An orange signal lamp indicates that the electric system on the chipper is on. For proper functionality of the loading rolls it is necessary to turn the key in the START position and finally release the key. A green signal lamp is on which means the machine safety circuit is activated. The engine goes on running in the RUN position. This ignition box does not allow repeated starting if the key remains in the RUN position but it must be turned back in the initial OFF position and the whole starting procedure must be repeated

**A safety frame** for material loading serves as an actuator for the loading rolls control, i.e. stopping or reversing. Once being pushed the chipper stops loading motion immediately; the next pushing behind the chute edge brings reverse turning of the loading rolls.

Dangerous space behind the loading rolls is protected with a hinged cover and by a terminal switch which blocks the driving engine before starting if the cover remains opened. Once opened the driving engine stops immediately. This cover is locked with two bolts that should be properly tightened.

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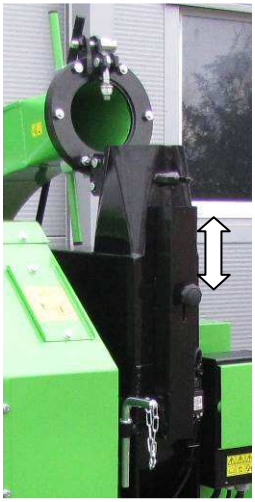
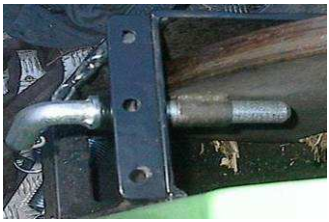


Dangerous space of the chipping wheel and of the discharge duct is secured by a terminal switch. To swing the discharge duck away or to open the upper half of the chipping wheel guard it is necessary to unlock the guard and to move it in the arrow direction, see fig. It is not possible to put the machine into operation if the guard remains opened.

**A safety pin** of the chipping device rotor serves for rotor blocking at blades exchange and servicing. The pin is chained on the edge of the machine frame. A rubber plug protects the hole for the pin. The chipping device is blocked if the pin is inserted into a bush on the rotor.



**An emergency STOP button** stops dangerous motion of the loading rolls and turns the engine off (like the safety frame).

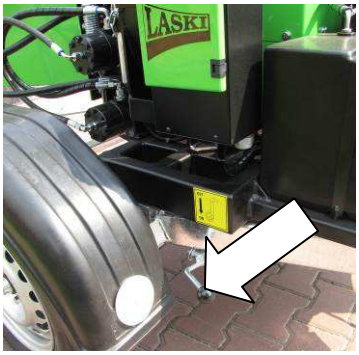
## Controls

Ignition box
intended for control and feeding of safety circuits.

NOTE:
To put the chipper into operation turn the key in the position START (for starting) and then let it in the position RUN.“

Safety frame for material loading
**MATERIAL LOADING - pulling forwards**
- STOP - central position
- REVERSE - back position

Control lever on safety frame for loading, stopping and reversing; emergency STOP button on upper chute part




Lever for V-belt tightening intended for chipping wheel drive

Controller of in-feed speed

Loading rolls speed regulation in range from 0 to 40 m/min

**Emergency STOP button** stops dangerous motion of the loading rolls (like the safety frame).

# Transport safety on public roads

For transport on public roads this chipper should be coupled to transport means equipped with approved towing brackets. The given towing vehicle should be approved for this way of transport and equipped with a respective towing bracket intended for permissible weight of an unbraked trailer or, in case of a braked trailer, for vertical coupling load of 50 kg at least and trailer gross weight of 750 kg at least. If the towing vehicle is equipped with a 13-pin receptacle for transport lighting, it is possible to use an applicable adapter for a 7-pin plug. The trailer can be also equipped with a 13-pin plug (option).

- For transport on public roads the trailer must comply with instructions in its operating manual.
- Maximum transport/travel speed is 80 $km.h^{-1}$.
- Always before coming to a public road it is necessary to remove all mud and accumulated sediments, especially from trailer tires.

## Transport position

First make the machine ready for transport:

- ❑ turn the engine off;
- ❑ empty the rear loading chute;
- ❑ couple the trailer on the towing bracket ball, or
- ❑ insert the drawbar in the hitch and lock it with a locking pin;
- ❑ connect the brake safety rope to the towing vehicle;
- ❑ release the parking brake;

- lift up the jockey wheel under the drawbar;
- retract the supporting foot in rear and lock it mechanically;
- turn the discharge duct to the left, fold it down and lock it mechanically;
- fold down the end piece and lock it mechanically;
- connect the electric plug to the towing vehicle.

## Trailer coupling/uncoupling

For transport this chipper can be coupled to transport means equipped with a respective towing coupler B50-X (with a ball ISO, ∅ 50 mm) or through a drawbar eye ∅ 40 mm in the towing vehicle hitch. The given vehicle should be approved for transport on public roads.

- While parking the unbraked trailer, block it against unwilling motion with scotch blocks. Should the trailer be braked, retract its parking brake. On hilly terrain, in addition to that, block it against unwilling motion with scotch blocks.
- While coupling, go always with the towing vehicle to the trailer. Be careful, this approaching could be dangerous, particularly on hilly terrain.
- First of all, set the drawbar in required height by means of its jockey wheel.
- Coupling through a ball coupler:
- Hold the coupler on its grip and put it on the ball in rear of the towing vehicle. After snapping on the ball release the grip and the coupler gets automatically locked. The pointer on the ball coupler Knott must be within the „+“ range. In case of the AL-KO ball coupler you should see the pointer in a green field.
- Try to lift it up by hand to check out if the ball coupler is properly locked.
    - Coupling through a drawbar eye, ∅ 40 mm: :
    - Having approached the towing vehicle to the drawbar and after its height adjustment by means of the jockey wheel put the eye into the hitch. Automatic couplers lock the drawbar inside by a pin automatically.
    - In case of manual couplers put the eye into the hitch and insert its locking pin. After snapping lock the pin by its locking spring or dowel against unwilling uncoupling.
    - Check out proper coupling and locking of the trailer drawbar.
- For a braked variant: connect the brake safety rope to the buffer, frame or towing bracket in rear of the towing vehicle. This rope of the overrun brake system should be led directly to the towing vehicle and freely for all reciprocal movements both of the trailer and the vehicle.

- If the towing vehicle is equipped with a 13-pin receptacle for transport lighting, it is possible to use an applicable adapter for a 7-pin plug. The trailer can be also equipped with a 13-pin plug (option).

While uncoupling the trailer, proceed in reverse order. Do not uncouple the trailer on a hillside as it is very dangerous. Before uncoupling, make sure if the trailer is sufficiently blocked against unwilling motion after uncoupling from the vehicle.

## Putting aside and parking

## Unbraked trailer

Do not park the trailer on hilly terrain. It is very dangerous as the trailer is not braked. While parking, block it against unwilling motion with scotch blocks under both wheels.
While putting aside or parking the trailer being coupled to the towing vehicle, retract the parking brake on the vehicle and, on hilly terrain, block it against unwilling motion with scotch blocks under both trailer wheels and at least under one wheel of the towing vehicle.

## Braked trailer

While braking the braked trailer, retract its parking brake by means of a control lever (in the position BRAKED). While putting aside or parking the trailer being coupled to the towing vehicle, retract the parking brake on the vehicle and also on the trailer. On hilly terrain, in addition to that, block it against unwilling motion with scotch blocks under both trailer wheels and at least under one wheel of the towing vehicle.

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CAUTION! Before removal of scotch blocks, first find out if the parking brakes can hold the whole set or the trailer also after this removal.

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For a longer putting the trailer aside, for example in winter time, block the trailer against unwilling motion so that its wheels are underlaid or supported without load and its parking brake remains released. In this way you can save tires, bearings and springs.

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## Trailer loading

While loading on a transport vehicle, the trailer must be properly fixed on the loading surface, lashed and secured against any displacement or overturning. This trailer is not designed for handling by crane, i.e. it has no lashing points. While loading on a transport vehicle, no persons are allowed to be under the trailer or in its close vicinity – risk of accidents.

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## Trailer checks before ride

The driver is obliged to carry out the following checks, in particular:

- wheels fixing
- condition of tires, tire pressure
- condition and function of lights and reflector glasses
- trailer coupling, condition of towing bracket/hitch, drawbar eye and its locking
- condition of overrun brake system and parking brake (braked variant)
- connection of brake safety rope (braked variant)
- fixing of machine parts on chassis (in their transport position)
- if there are no loose parts or tools laid on the trailer
- if the trailer is set in its transport position, i.e. engine off and concerned parts fixed
- if the jockey wheel is sufficiently lifted up and locked mechanically;
- if the supporting foot in rear is retracted and locked mechanically;
- if the parking brake is released (braked variant)
- if the trailer is free from mud and dirt

**Chipper ready for coupling before transport**
Discharge duct folded down

# Use and Product Handling

## Storage

**Store the chipper always in a dry shelter to protect it against weather effects.**

- Keep the stored machine beyond unauthorised persons reach.
- Before storage clean all parts of the machine. For cleaning you can use pressure water. After cleaning let the machine get air-dried. If some water penetrated into the chipping device space, let also this space get dried.
- Clean especially oily spots.
- Exchange all damaged or worn parts. Use always original spare parts. For spare parts contact your dealer or authorised services.
- Do not apply any grease or similar agents on elastic hydraulic hoses.
- Always put the machine aside on a flat and solid floor and block its wheels against unwilling motion by means of scotch blocks. We also recommend putting it aside on a wooden pallet.
- Do not put any objects or tools on the machine.

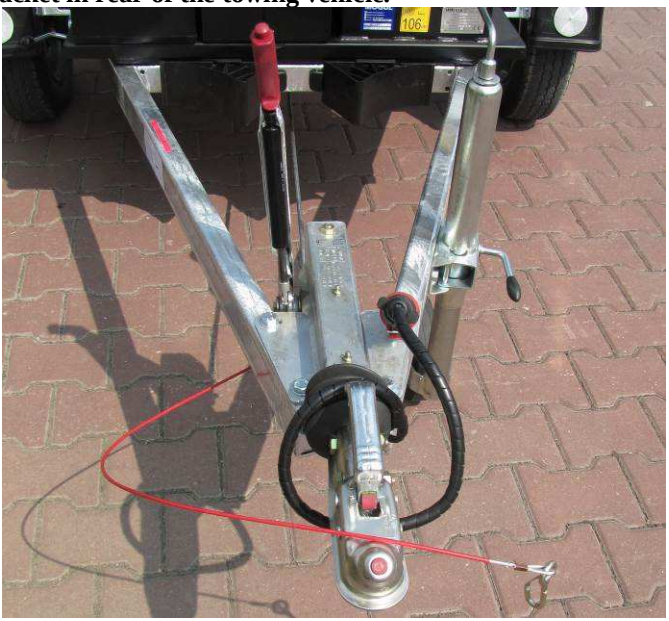
## Before Putting into Operation

- Before the first putting into operation check up the machine for contingent damages and completeness after its transport and storage.
- Check out tightening of bolted joints, especially guards, grids and completeness of other parts.
- Check out movability of turnable parts (loading chute, discharge duct etc.).
- Check out work safety labels for completeness and legibility. Replace any damaged and illegible label, if necessary.
- Grease bearings and sliding parts.
- Check out the engine oil level with a dipstick and refill if necessary. The oil level must be between both marks (MIN and MAX).
- Plug the traffic lights and check their function.
- Do not try to repair the machine if it is beyond your competence. Any servicing, especially of rotating parts, should be carried out by authorised persons only.
- Check out condition of blades. Replace them if worn or damaged.
- For replacement use always original spare parts. Parts, such as rotors, should be balanced properly.
- All blades should be replaced always at the same time as a set. Pay special attention to their fixing bolts. Replace them if worn or damaged.
- Avoid spillage at filling oil or fuel. Use always a proper filling funnel. If any fuel or oil is spilled or overflowed then wipe off the spots immediately.
- Do not use petrol or similar inflammable matters as a cleaning agent.
- It is strictly forbidden to do any technical changes on the machine.
- If any readjustment is required, do it always at standstill only. Remember blocking the wheels against unwilling motion.
- Check out condition and proper tightening of V-belts.
- It is strictly forbidden to start the chipper with removed hoods and guards.
- Start the machine always without its chipping device being engaged (with loosened V-belts). Do not start the machine in confined or ill-ventilated spaces.

## Trailer Coupling

While coupling the chipper, do not stand between its towbar and a towing vehicle. Do not stand behind a towing vehicle while backing. Ask other person to assist you at coupling.

**Plug and check traffic lights of the chipper. If the towing vehicle is equipped with a 13-pin receptacle for transport lighting, it is possible to use an applicable adapter for a 7-pin plug. The trailer can be also equipped with a 13-pin plug (option). Connect the brake safety rope to the buffer, frame or towing bracket in rear of the towing vehicle.**

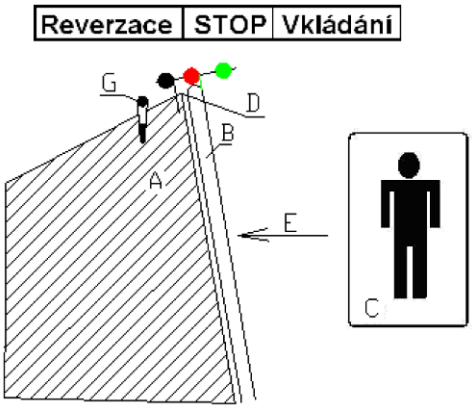


## Putting into Operation

Before start check up if the loading chute is free of any materials. Direct the discharge duct out of possible motion of other persons or prevent other persons to enter the working area. At work proceed always very carefully

- Swing away the hinged part of the loading chute and lock it.
- Avoid directing the discharge duct to the area of possible motion of other persons.
- Set the guard under the discharge duct in its top position and lock it by a nut.
- Set the safety lever in the central STOP position to block the loading rolls.

- Sink supporting legs and the jockey wheel until the travel wheels are unloaded/lifted up slightly.
- Close all guards (if opened).
- Set the control lever in the position LOADING.
- Set the switch key in the START position. Having the engine started, release the key in the position RUN. CAUTION!! The loading rolls start turning.
- Carry out functional checks of the safety frame on the loading chute. Set the lever in the in-feed position and the loading rolls start turning (loading). By first pushing the frame the rolls should stop loading immediately (EMERGENCY STOP), the next pushing behind the chute edge (D) brings their reverse turning.



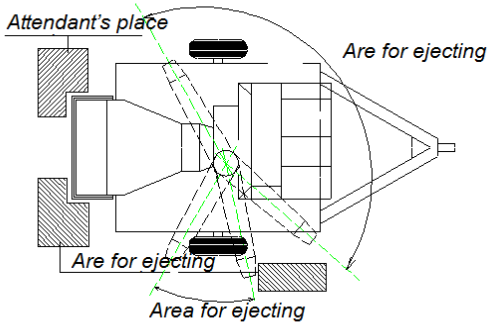

Legend:
A - loading chute, B - safety frame, C - attendant's place, D - loading chute edge, E – in-feed direction, G - control lever

- The safety frame must be always adjusted so that the EMERGENCY STOP must be activated before the point D – loading chute edge.
- **Do not leave the machine unattended.**

## Chipping

This chipper is driven by a combustion engine. Do not start it in confined or ill-ventilated spaces or under conditions of low visibility.

- While chipping, the chipper chassis (the trailer) must be properly blocked. You may let the chipper coupled to a towing vehicle. Just turn the loading chute and the discharge duct in the required direction.
- The end piece of the discharge duct should be set only in the angle, see fig. Do not direct it toward the attendant's place




- While working, the attendant should stand only on the given attendant's place.
- Having turned the chipping wheel on, wait for stabilisation of its speed. Then you may increase or reduce this speed by means of the engine speed regulator.
- Wooden chips can be gathered in bulk or into a container located on a towing vehicle.
- When discharging into a container pay your attention to ejecting in order to avoid ejecting chips out of the container.
- Before displacement of the chipper to another workplace, first turn the engine off and wait for run-out of all rotary parts.
- Do not load materials with parts of metal, glass and other similar objects.
- Do not chip or load materials while driving.
- Having put materials in the loading chute/between the loading rolls, release loaded materials immediately and keep a certain distance from the chute.
- While working, never lean over the loading chute and never pull out wooden materials, already loaded, from the chute.
- Do not load materials with diameters exceeding 150 mm.
- If loaded materials are spreading with risks of catch holding of attendant's dress being drawn in the loading chute then it is necessary to prepare such materials accordingly.
- Pay special attention to thorny materials, such as acacia and roses, which may easily catch your sleeves.

- Be careful while loading since materials may unexpectedly move in unwished directions.
- In case of two attendants it is necessary to make simple signals clear before working. During operation it is not easy to make any agreements because of operating noise.
- Observe the working area. If any person, children or animals approach while chipping, then stop working immediately.
- Be aware that there is a certain time period between loading and ejecting of the last chips.
- As far as possible load the chipper evenly, adapt loading speed accordingly and keep continuous chipping.
- While loading, stand aside the loading chute.
- When loading short materials throw them in the chute and push them forward between the loading rolls by means of a wooden rod or another branch.
- Never use metal objects. They could cause serious damage of the loading rolls and chipping blades.
- When finishing the work first wait for emptying of the loading chute.
- Should some bar material be loaded, then particular bars should be up to 3 m long.

**Recommendations:**

- **Do chipping always at max. engine speed, i.e. at sufficient power of the chipping wheel for ejecting of chips.**
- **While being loaded, short and fine materials may deposit or clog the space behind the loading rolls in front of the chipping wheel. To avoid such problems and clogging put occasionally also some longer branches.**
- **To prolong service life of blades never put any materials with foreign matters, such as metal, glass, ceramics and other similar objects.**
- **Optimal sharp blades reduce operating costs of the loading and chipping equipment (reduced wear of the chipping device).**
- **If loaded material is free of any foreign matters then a grinding interval for blades may last several months or several hundred m3 of loaded materials.**

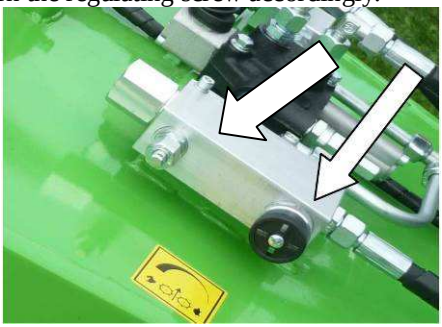
- **Blunt blades are evident on chipped edges that are not clean but broken.**
- **Should the chipper be used for chips shredding, then it brings higher energy intensiveness.**
- **Short and fine materials, leafed and coniferous branches with low wood mass may deposit or clog the space behind the loading rolls in front of the chipping wheel.**

The chipper is equipped with the NOSTRESS equipment monitoring speed of its chipping wheel and control of continuous material feeding in accordance with actual engine load which provides continuous run and reliability in service.
The chipping wheel speed is set by the manufacturer to 1450 rpm to turn the rolls off and to 1500 rpm to turn the rolls on again.

**<u>Recommendations</u>:**
**Should the loading rolls be frequently turned off while chipping, it means that there is too much material loaded and the chipping device is overloaded. To avoid this overloading:**

- **reduce volume of material to be loaded, or**
- **reduce in-feed speed of the loading rolls**

The loading rolls in-feed speed can be reduced by the regulating screw (see arrow on the following figure) under the hinged part of the loading chute. To change the in-feed speed, just turn the regulating screw accordingly.



## Putting out of Operation

If you want to stop chipping:

- In case of loaded material wait for emptying of the loading chute.
- Wait for emptying of the discharge duct.
- Turn the chipper off.
- Turn the switch key in the STOP position without regard to run-out of the chipping wheel.

## Emergency Situations

**Put the chipper out of operation immediately in following cases:**

- If any person or animal approaches under 20 m while chipping, then stop working immediately.
- If any breakage, damage or disengagement occurs, stop chipping immediately.
- If you heard any strange noise or vibrations or felt a strange smell while chipping, then turn off the machine immediately and contact your dealer or directly the manufacturer.
- In case of fire or breakdown, stop chipping immediately.
- In case of fire use foam extinguishers only.
- If you cannot damp the fire down yourself, call for a fire brigade.
- If an attending person gets caught by rotating parts or loaded materials stop the loading rolls by pushing the safety frame. Stop working and go on only if the attending person is uninjured and fully concentrated.
- If the discharge duct gets clogged, stop loading immediately and reverse the loading rolls by pushing the safety frame (position REVERZ). Turn the chipper off and having all rotary parts stopped (after about 1-2 min) use an elastic rod and try to release the clogged material in the end piece of the discharge duct. Having released clogging materials, try to turn on the chipper again. If not, hinge away the upper hood part and try to remove all materials by hand (the chipper must be OFF). Be aware, the chipping wheel must be blocked properly.

# Technical Description

This machine consists of the following main parts:

- **chipping device**
    - ❖ **loading chute**

- **loading rolls**
- **chipping wheel**
- **discharge duct**

- **chassis**

## Chipping Device

### ❖ Loading chute

The hinged part serves as an extension of the chute with a safety frame. This frame, if pushed by an attending person or branchy materials being caught, turns the loading rolls off. The chute itself, shaped as a square pyramid, is decreased in width toward the loading rolls and in this way loaded materials are pressed together.

### ❖ Loading rolls

They take over loaded materials and move them to the chipping wheel. Their speed can be regulated according to the given sort of material and expected results – chips. Both rolls are ribbed and enable loading of materials and also pulling them out at reverse turning if necessary (chipping wheel overloaded). The top roll is height-adjustable according to the given material. Both rolls are driven by a hydraulic motor

### ❖ Chipping wheel

It is a steel disc serving also as a flywheel for absorption of shocks while chipping. The wheel is bedded in ball bearings; a drive pulley is fitted on its shaft. The wheel is equipped with two blades for cutting of loaded materials. The vanes welded on its rear side serve for ejecting chips in the discharge duct. Optionally it is possible to complete the machine also with shredding hammers behind the chipping wheel intended for breaking of wood mass.
The chipping wheel is installed in a rigid frame and protected by a steel plate. Its protective shield consists of two parts and particular parts are bolted together. By safety reasons the upper hinged part is protected with a terminal switch for turning the drive off if the shield remains opened or got loose.

### ❖ Discharge duct

This duct continuously prolongs the chipping wheel shielding and serves for directing chips being ejected. The duct is turnable and its end piece (“tilting gate”) serves also for setting the range of ejected chips.

## Chassis

The chipper LS 150/27 is fitted on a special single-axle trailer, cat. O1. Its variant A is unbraked; its variant B is provided with an overrun brake. For coupling to a towing vehicle the trailer is equipped with a fixed drawbar and a ball coupler B50-X or a towing eye ∅40 mm.
The chipper is powered by an independent combustion engine. The chipping work is allowed to be done only with the trailer standing.
Necessary coupling device, overrun brake system, axle and brakes are subgroups delivered by f. AL-KO or Knott.
The rear bumper beam complies with applicable EU standards, particularly the Directive No. 70/221/EHS.
Its travel wheels, protected with plastic mudguards, comply with applicable EU standards, particularly the Directive No. 91/226/EHS.
Its engine, fuel tank and hydraulic oil tank are installed in the front part of the frame, protected against accidental damage by the chipper itself and by a rear bumper beam.
On the trailer mudguards there are white reflector glasses installed; in rear of the trailer there are two combined lamps with side, stop and direction indicator lights, sign plate light, rear triangular red reflector glasses and a fog lamp on the left side. Aside on the mudguards there are orange reflector glasses. All the lamps and glasses are approved for transport on public roads complying with applicable standards (EHK No. 48).
Standardly the trailer is equipped with a 7-pin plug. Should the towing vehicle be equipped with a 13-pin receptacle for transport lighting, it is possible to use an applicable adapter for a 7-pin plug. The trailer can be also equipped with a 13-pin plug (option).
For putting aside the trailer is equipped with an adjustable jockey wheel under the drawbar. Two scotch blocks are put in holders on the front frame part.
Tire pressure, see the plate on the mudguards.
This trailer is not equipped with a spare wheel.

## Technical Parameters

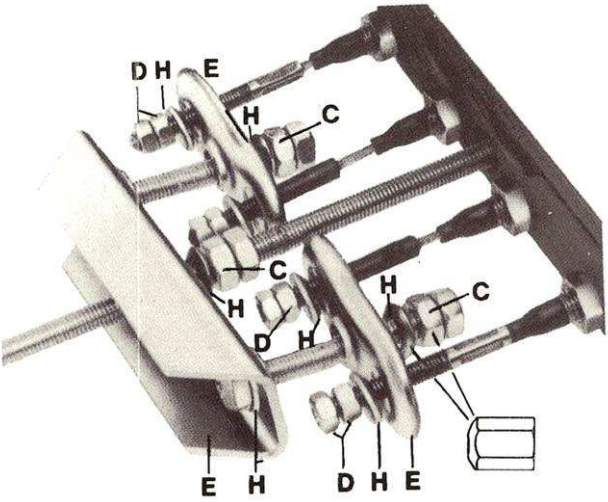
| Parameter | Unit | Value | |
|---|---|---|---|
| | | LS 150-27 C | LS 150-27 CB |
| Chassis type | - | Special trailer with chipper, cat. O1 | |
| Type | - | S1 | |
| Variant | - | A (unbraked) | B (braked) |
| Version | - | 150/27 | |
| Trade mark | | LS 150/27 C (unbraked)<br>LS 150/27 CB (braked | |

| | | | |
|---|---|---|---|
| Overall length / for transport | mm | 3275 | 3466 |
| Overall width / for transport | mm | 1590 | |
| Overall height / for transport | mm | 1690 | |
| Overall height / in working position | mm | 2380 | |
| Wheel base | mm | 1793 | 1995 |
| Weight (operating) | kg | 750 | |
| Weight (max. permissible) | kg | 750 | |
| Axle load (max. permissible) | kg | 750 | |
| Overall length / for transport | kg | 50 | |
| Overall width / for transport | kg | 600 | |
| Overall height / for transport | - | Class B50-X (ball ISO ∅50 mm)<br>Class S (towing eye ∅40 mm) | |
| Tires | - | 155/80 R13 84 N<br>155 R13 84 N | |
| Tire pressure | kPa | 270 | |
| Wheel rim | - | 4½ J x 13 H2 | |
| Max. travel speed | $km.h^{-1}$ | 80 | |
| Electric installation | - | 12 V, 7-pin plug | |
| NOSTRESS supply voltage | V | 12 | |
| **Chipping device:** | | | |
| Chipping wheel – diameter | mm | 560 | |
| - number of blades | - | 2 | |
| - number of shredding hammers | - | 2 | |
| - rate of cutting | $m.s^{-1}$ | 42 | |
| Max. diameter of materials to be disposed | mm | 150 | |
| Chipping wheel drive | - | 3 belts B17x 1250 Li | |
| **Loading device:** | | | |
| Inlet hole size | mm | 290 x 220 | |
| Number of loading rolls | - | 2 | |
| Diameter of rolls | mm | 190 | |
| In-feed speed | $m.min^{-1}$ | 12 - 40 | |
| Drive | - | hydrostatic | |
| Turning-off speed | $min^{-1}$ | 1450 | |
| Turning-on speed | $min^{-1}$ | 1500 | |
| Speed regulation | - | NOSTRESS | |
| **Loading chute:** | | | |
| Feeding profile | mm | 920 x 800 | |
| **Engine:** | | | |
| Type | | KOHLER COMMAND CH 740 S | |
| Power output/revolutions | kW | 20,1 at 3600 rpm | |
| Oil charge | l | 1,9 | |
| Oil sort | - | 15W-40 | |
| Lubrication | - | forced with full-flow oil filter | |
| Fuel | - | Petrol, ON 95 | |
| Fuel tank capacity | l | 16 | |
| Max. engine inclination | ° | 25 in all directions | |
| Alternator | - | 12 V, 20 A | |

| | | |
|---|---|---|
| Starter | - | electric |
| Battery (lead-acid) | V/Ah | 12/44 |

**Trailer braking system**

# Overrun brake Knott



## Assembly and disassembly

The overrun brake Knott should be installed as per the following figure. It is very important that the drawbar with its ball coupler or with its towing eye should be fully protruded forwards and the parking brake lever should be set in its zero position. Screw the threaded brake bar about 15 mm in the fork nut and lock it by the nut “F”. Screw freely other nuts as per the figure.
On the rocker arm it is possible to use a ball nut M8 instead of the ball washer “H” and the nut M8 “D” and on the bars a ball nut M10 instead of the ball washer “H” and the nut M10 “C”.

CAUTION! The parking brake lever remains under prestress. Do not remove the red locking thumb screw M10 until all the control elements, brake bars and the entire braking system are fully installed and adjusted.

Before disassembly of the control device or the braking system elements as well as before any routine maintenance or repair it is necessary to have this safety screw unconditionally screwed in. Any disobedience to this rule may bring accident risk since the parking brake lever could release its prestressed spring.

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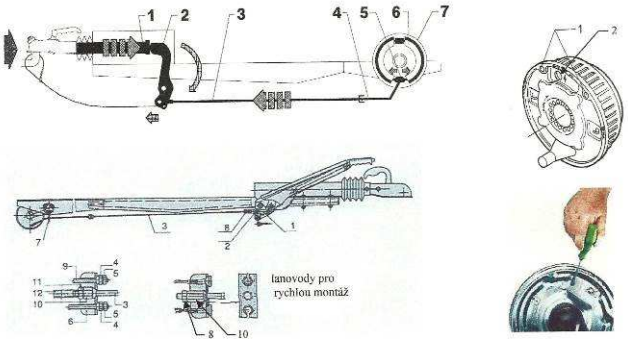
## *Adjustment of the brake Knott*

1. Lift up the trailer by means of lifting jacks so that its travel wheels can freely rotate and loosen the nuts “C”, “D” and “G”.
2. The following steps are the same as on the other trailers, i.e. the drawbar is fully protruded forwards, the parking brake lever is in its zero position and the threaded brake bar is locked by the nut “F” in the fork nut.
3. Finally, turn the travel wheels slowly in the travel direction and at the same time set the check screw “B” until the brake shoes start blocking the wheels. Then loosen the check screw by turning it by ½ to ¾ turn back so that each wheel can freely rotate without friction of its shoes on the wheel-brake drum.
4. Having adjusted the drum brakes, screw the nuts “C” and “D” to the rocker arms “E” and lock them by counter nuts. The nut “D” should be screwed on the bar about 8-10 mm. The main brake bar must be locked without any prestress but with max. play of 1-2 mm.
5. Screw the nut “G” to the spring suspension “A” without any prestress and lock it.
6. Having finished, apply the hand brake lever and release it repeatedly 3 or 4 times.
7. If some play occurs, remove it by setting the nuts “C” and “D”.
8. When the brake system is properly adjusted, then the brake effect must be evident after about 10-15 mm behind the dead point.
9. Should the brake system be adjusted with too small play, then you need more power for backing.
10. To check out functionality of the brake system we recommend a test run with two or three braking actions. If some play occurs, see the above-mentioned steps.
11. If some faults in adjustment persist, contact your dealer or authorised service.

It is necessary to proceed in the given order, i.e. first to adjust the wheel brakes and the rocker arm must be upright on the main brake bar.
The red safety screw should be removed first after adjustment of the whole braking system.

***Overrun brake AL-KO***

*Assembly and disassembly*




The overrun brake AL-KO should be installed as per the following figure. The brake must be released as for going forwards and the parking brake lever should be set in its zero position.

For installation it is possible to use brake cable assemblies with adjusting nuts or brake cable assemblies intended for fast installation without adjusting nuts. New braking systems are adjusted already by the manufacturer. However, after replacement of the brake shoes it is necessary to adjust the brakes again just before adjustment of the brake cable assembly.

***Adjustment of the brake AL-KO***

1. Lift up the trailer by means of lifting jacks so that its travel wheels can freely rotate and loosen the nuts, pos. 8 and 10, on the bar and the nuts, pos. 4 and 5 on the brake cable assembly.
2. The following steps are the same as on the other trailers, i.e. the overrun brake must be released as for going forwards and the parking brake lever should be set in its zero position.
3. Now, turn the travel wheels slowly in the travel direction and at the same time set the adjusting nut through the hole, pos. 2, on the rear side of the brake drum by means of a screwdriver until the brake shoes start blocking the wheels. Then loosen the adjusting nut by turning it back until each wheel can freely rotate without friction of its shoes on the wheel-brake drum. Then, make the play bigger by turning the nut by several teeth so that the play is sufficient also after warming of the shoes and the brake drum. Set the play in the same way

also on the opposite wheel. New brakes do not need any adjustment since they are adjusted by the manufacturer.

4. Set the play by a ball nut, pos. 10, for the control mechanism.
5. Set the brake cable assembly length by the nuts, pos. 4, so that the rocker arm, pos. 6, is upright to the main bar, pos. 3. If the system is equipped with brake cable assemblies intended for fast installation without adjusting nuts, then go directly to the step 6.
6. Set the play of the control mechanism by means of the nut, pos. 10, so that the rope, being drawn on the rocker arm, can be pulled out approximately by 4 mm. It corresponds with the proper play inside the brake, required for avoidance of slight braking and warming while driving. Finally lock the nut, pos. 10, by means of the counter nut, pos. 8.
7. Having finished, apply the hand brake lever and release it repeatedly 3 or 4 times.
8. If some play occurs, remove it by setting the nut, pos. 10. If the rocker arm did not remain in its upright position, readjust the brake cable assemblies again by means of the nut, pos. 4. In case of brake cable assemblies without adjusting nuts readjust the play setting in the brakes.
9. When the brake system is properly adjusted, then the brake effect must be evident just behind the dead point.
10. Should the brake system be adjusted with too small play, then you need more power for backing.
11. To check out functionality of the brake system we recommend a test run with two or three braking actions. If some play occurs, see the above-mentioned steps.
12. If some faults in adjustment persist, contact your dealer or authorised service.

It is necessary to proceed in the given order, i.e. first to adjust the wheel brakes and the rocker arm must be upright on the main brake bar.

## Instructions for operation

1. Having pulled the parking brake on hilly terrain and due to backing automatics the vehicle can move back approximately by 25 cm until the brake effect occurs. So, when using the parking brake, be aware of from other vehicles or obstacles behind the trailer.

2. The brake safety rope is connected with the parking brake lever. At unexpecit and keep a safety distance

3. ted uncoupling of the trailer from the towing vehicle the safety brake rope activates the parking brake that should brake the trailer. Therefore the safety brake rope must be properly connected to towing vehicle and led directly (freely) without risk of its catching or tangling on the trailer parts. If the towing vehicle is not equipped with a corresponding eye, make a loop on the towing bracket ball.

4. Lift fully up the jockey wheel under the drawbar and lock it in its top position to avoid its getting loose and falling down. If its top position is not sufficient, loosen its holder and lift it more up.

**Travel wheel replacement**

Any drive with a damaged tire or wheel rim is very dangerous; the tire can blow out and cause a road accident. Should any fault or damaged be detected on the tire or on the rim then do not hesitate to replace a complete wheel. However, this trailer is not equipped with any spare wheel.

- In case of light untightness it is possible to repair the tire by means of a special spray intended for tire service.
- Before wheel replacement block the trailer against unwilling motion by means of its parking brake or scotch blocks.
- The lifting jack should always stand under the place of axle fixing. Otherwise, it could damage the axle.
- All the wheel nuts should be tightened by torque 90 Nm.
- Inflate the tire to pressure of 270 kPa.
- After the first 50 km check out proper tightness of the wheel nuts.

# Noise and Vibrations

Operation of this chipper brings following emissions:

| | Measure unit | Values | |
|---|---|---|---|
| | | LS 150 – 27 C | LS 150 – 27 CB |
| Noise $L_{Aeq}$ | dB | 91,0 | |
| Sound power - measured<br>$L_{WA}$ - guaranteed | dB | 104,2 (A)<br>105 (A) | |

All measurements taken in accordance with: EN ISO 11201, EN ISO 3744

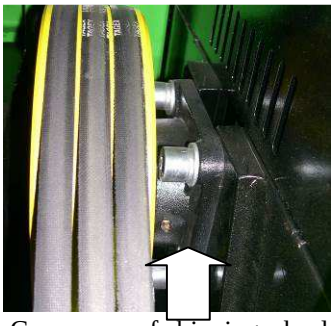
Extended uncertainty of measurements: U = t 0,6 dB

While working, the person operating this machine is obliged to use personal protective equipment efficient against the given noise accordingly.

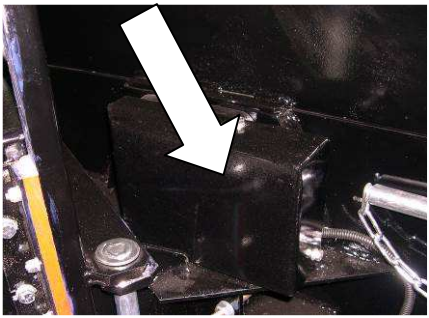
# Maintenance

- Any servicing of the chipper should be carried out by authorised persons only.
- Check up the machine for completeness and its general condition.
- Before any servicing, first turn off the chipper and block the trailer against unwilling motion.
- Pay special attention to safety elements.
- Check up V-belts for tightness and wear.
- Keep regular intervals for lubrication of bearings.
- Check up condition of blades, shredding hammers and chipping wheel vanes regularly.
- Check up hydraulic hoses for wear. Replace them if necessary or every five years

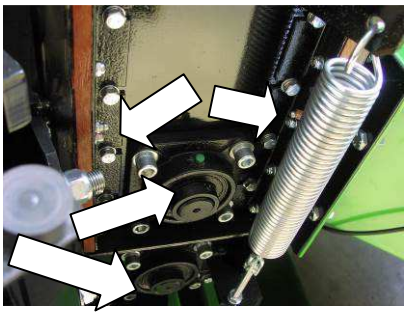
## Lubrication



Grease cup of chipping wheel
Lubrication every 40 running hrs (weekly)

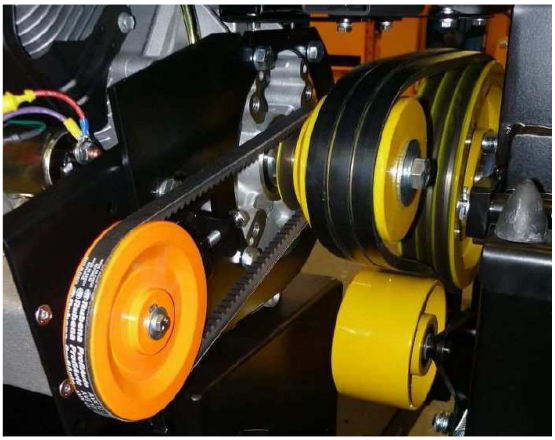


Grease cup of chipping wheel (under hood); lubrication every 40 running hrs (weekly)



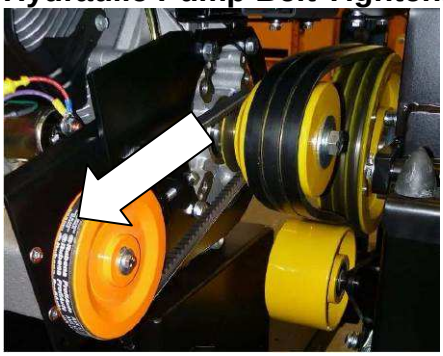
Grease cups of loading rolls
Lubrication every 40 running hrs
(weekly)

Grease cups on towbar
Lubrication every 10000-12000 km or
once a year



Grease cup of tension pulley
Lubrication every 40 running hrs
(weekly)

## Hydraulic Pump Belt Tightening



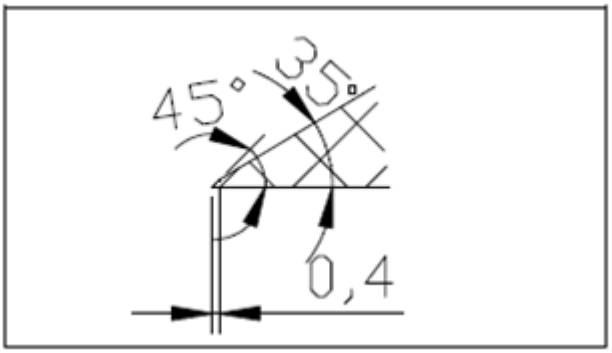
The hydraulic pump is powered by the PTO shaft. The pump is accessible after removal of its guard. To tighten the V-belt, loosen the fixing bolts and just move the whole pump assembly on its guides. After tightening, retighten the fixing bolts.

## Blade Grinding

Blades, fitted in the chipping wheel, are double-sided, i.e. reversible if one side is blunt.

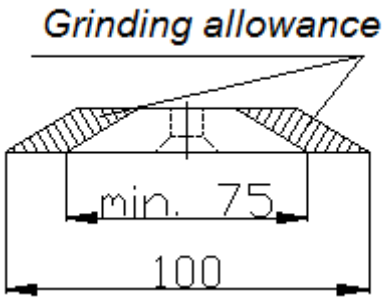
Blades edge regrinding requires high demands for keeping cutting edge shape. While grinding it is necessary to keep its optimal geometry, see the following figure. A right shape prolongs blade service life.

While regrinding it is necessary to keep the same weight of particular blades because of balance of their rotating mass. For grinding use always a grinder with a magnetic table and a special fixture.




Detailed geometry of blade edge

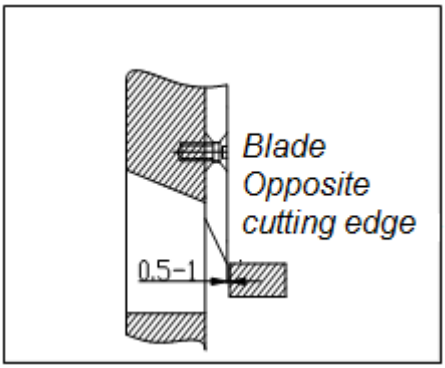
Grind the blade only up to minimum distance from the edge to its fixing bolt axis which is 37,5 mm. This distance on a new blade is 100 mm, see the following figure.




Max. wear/grinding of cutting edge

## Adjustment of Chipping Device

Optimal operation of the chipping device requires right setting of the clearance between the blade and the opposite cutting edge. This distance should be set (see the following figure) and checked after fitting the ground blades, then it grows with their wear and chipped branches may be squeezed between the blade and the opposite edge. It brings deterioration in quality of chipping.
Pay attention also to the blades exchange. In such case set the given clearance bigger to avoid damage of a new blade and its opposite cutting edge.
.




**Recommendation:** Check out conditions of blades every 40 operating hours. Regrind blade edges if they are found blunt.

Jointing elements (bolts and nuts) should be replaced together with the blades exchange. Safety nuts should be used only once, since they lose their self-locking properties if used repeatedly

## NOSTRESS System – Speed Regulation

(Option)
This system is intended for overload protection of the combustion engine consisting of an electronic control unit and a speed sensor installed on the rotor shaft.

NOSTRESS ON – the chipper works with automatic regulation of loading (no engine overloading).
NOSTRESS OFF – the chipper works without automatic regulation of loading. This way of

operation is recommended only in case of a failure of the control unit.

- Control unit:

This control unit displays actual rotor speed values. When the rotor stops, the unit displays a total number of running hours "th". To display a daily number of running hours, just press the button "S". To reset this daily number, just press the button "S" once to display a total number of running hours "th" and then press it again and hold for total resetting. This control unit is protected by two fuses: 7,5 A – installed just by the unit and 4 A – installed inside.

- Right function of NOSTRESS system:

The speed regulator reduces material feeding upon contingent overloading. The chipping wheel speed is set by the manufacturer to 1450 rpm to turn the loading rolls off and to 1500 rpm to turn the rolls on again. Actual rotor speed values are displayed on the control unit.

- Speed sensor:

This encapsulated sensor in fitted on a holder keeping its distance of 2 mm from the cam lobe. In the rear part of the sensor sleeve there is an orange LED installed flashing in case of proper sensing.

**Set-up of the speed sensor distance should be done at machine standstill only**

Location of sensor under hood

***Trailer maintenance:***

Check up the trailer daily for good technical condition (before ride) and remove detected faults. The trailer should be ready for operation only in good technical order.

Keep all the routine maintenance intervals. Should the trailer (chipper) work in dusty and heavy conditions, shorten these intervals accordingly.

**Checks on unbraked trailer:**

1. After first 500 km:
   - all bolted joints and retighten if necessary
2. Every 5 000 km or every 12 months:
   - all bolted joints and retighten if necessary
   - axle, springs, parts for excessive wear or contingent damages and replace them if necessary
   - wheel bearings are maintenance-free (with permanent grease packing)
   - exchange them only in case of contingent damage
   - ball coupler and towing bracket or towing eye and hitch: apply corresponding grease film on their surface (e.g. as per DIN 51825 KTA 3K4)
   - coupling parts for excessive wear or contingent damages and replace them if necessary
   - tires and wheel rims for wear or contingent damage
   - jockey wheel and its mechanism
   - lights and reflector glasses
   - plug and cables of electric installation - exchange them only in case of contingent damage

**Checks on braked trailer*:***

1. After first 500 km:
   - all bolted joints and retighten if necessary
2. After first 5 000 km or 6 months:
   - brake clearance between linings and brake drum
3. Every 5 000 km or every 12 months:
   - all bolted joints and retighten if necessary
   - axle, springs, parts for excessive wear or contingent damages and replace them if necessary
   - wheel bearings are maintenance-free (with permanent grease packing) – exchange them only in case of contingent damage
   - brake lining thickness (through inspection holes in rear brake drum

shields)
- ball coupler and towing bracket or towing eye and hitch – apply corresponding grease film on their surface (e.g. as per DIN 51825 KTA 3K4)
- coupling parts for excessive wear or contingent damages and replace them if necessary
- functionality of overrun brake incl. backing automatics and parking brake
- readjust them if necessary
- lubrication of overrun and parking brake mechanism – use always lithium grease (such as Castrol LM Grease, Castrol Spheerol AP2 or Fuch Renolit GL2)
- sensitiveness and response of overrun mechanism: set the hand brake backwards as much as possible and push the ball coupler with the towbar in the overrun brake – this pushing must be connected with increasing force. After release the towbar must go slowly forwards in its initial position (it must not "shot out"). If it is not possible to push the towbar check it for dirt or sediments and apply some grease. If this fault persists, the overrun mechanism must be repaired or replaced in authorised service (AL-KO or Knott).
- tires and wheel rims for wear or contingent damage
- jockey wheel and its mechanism
- lights and reflector glasses
- plug and cables of electric installation - exchange them only in case of contingent damage

4. Every 10 000 km or every 24 months:
- removal of brake drums and inspection of brake shoes, lining and drum for wear and contingent cracks or damage; in case of drum exchange replace also brake shoes
- inspection of brake shoes and backing automat springs
- functionality and condition of shoe brake mechanism with pins – replace them if necessary
- functionality of backing automatics – apply some grease
- brake clearance between linings and brake drum – readjust if necessary
- apply grease on braking bowden cables
- tightening of wheel nuts – torque for Knott axles: 280 Nm

**CAUTION:**

1) Avoid any grease or greasy spots on friction surfaces, i.e. grease residuals must not be between brake shoes and drum surface.

2) Axle Knott: the hub bearing is locked by means of a safety self-locking nut; after any wheel bearing removal/exchange it is always necessary to use a new nut. Before reassembly apply some graphite grease on the axle end threading.
3) Axle Knott: Should the wheel bearing be replaced, replace it always with the hub.
4) While lifting the trailer up, the lifting jack should always stand under the place of axle fixing. Otherwise, it could damage the axle.
5) Do not try to repair the machine if it is beyond your competence. Any servicing, especially of rotating parts, should be carried out by authorised persons only.

## Overrun brake:

The wheel rim technical data and parameters should be compared with that of the axle (connecting and fixing holes, ET offset depth, type of wheel bolts), see the type plate on the brake system – keep this type plate always legible and accessible.

Do not forget to retighten the wheel nuts after first 20 km and then again after 100 km.

## Hot-dip galvanized parts:

- So-called white corrosion may occur on their surface – it is only an optical problem.
- To eliminate this problem, take the following measures: when putting the trailer aside (or for storage), keep it in sufficiently ventilated space. After work in winter, rinse the hot-dip galvanized parts with clean warm water (by a steam jet).
- It is strictly forbidden to carry out any welding works on the axle, overrun mechanism and coupling device – damaged parts must be replaced.

## Maintenance Intervals

| | |
|---|---|
| **Electric Installation** | Protect all wires against contact with oil products. Keep all elements clean and avoid any damage of wires - short circuit risk. All connections must have clean and proper contact surfaces to avoid intermediate resistance at a wrong contact point. |

| | |
|---|---|
| **Hydraulic Oil Change** | First oil change after 500 working hours, next always after 1000 hours, respectively change the oil always after every season. |
| **Hydraulic Oil Filter Change** | We recommend changing the filter element together with the oil change. |
| **Chassis** | Check up tire pressure regularly and reinflate if necessary. |

## Checking, Oil Exchange

| Operation | Component | Interval (hrs) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | **10** | **100** | **250** | **500** | **1000** | **2500** | **5000** |
| Cleaning | Hydraulic oil tank | | | | | | * | | |
| | Hydraulic oil filter | | | * | | | | | |
| Checking | Oil level in hydraulic oil tank | | * | | | | | | |
| Exchange | Oil hydraulic circuit | | | | * | | | | |

(*)clean daily under special conditions

(**)clean every 4 – 5 hrs under extreme conditions

(***)see recommended oils

(o) if clogging indicated

(Δ)first exchange

# Failures and Troubleshooting

***Chipper:***

| Failure | Cause | Remedy | |
|---|---|---|---|
| Wrong chipping or in-feed function | Blunt blades | Remove and regrind blades. If worn, replace them for new ones. | |
| | Worn opposite cutting edge | Remove and regrind cutting edge; set optimal clearance between blade and opposite cutting edge | |
| | Malfunction of loading rolls | Press the lever in loading direction; check out hydraulic functions | |
| | Wrong angle geometry | Regrind blades in accordance with detailed figure of edge geometry | |
| | Damage/wear of loading rolls | Replace rolls | |
| | Too small, dry or rotten materials | Mix various materials before loading | |

| | | | |
|---|---|---|---|
| | Shredding disc with hammers clogged | Load longer woody branches | |
| | Loading rolls do not turn – rotor idling | Wrong setup of drive switching | service |
| Excessive engine overloading | Wrong setup of speed regulation (min. speed) | Readjust switching speed | service |
| | Blown fuse | Replacement of fuse | |
| | Faulty electronic control unit | Replacement of control unit | |
| | Faulty speed sensor – LED is not flashing | Check up wiring or replacement | |
| Loading rolls do not turn | Faulty electromagnetic valve coil | Replacement | |
| | Throttle valve closed | Check up manual speed regulation for loading | |
| | Failure of NOSTRESS system | Measure voltage on electromagnetic valve coil; it should be > 0 V at max. speed | |
| | Control lever of in-feed function in wrong position | Press the lever in loading direction | |
| | Broken leads | Check up wiring for integrity | |
| | Faulty hydraulic pump | Replacement | |
| | Control lever of in-feed Function in wrong position | Push control lever in loading direction | |
| | | | |
| Blades touch opposite edges | Wrong setting of clearance | Set distance to 0,5 – 1,0 mm | |
| | Loosened blade bolts | Tighten up fixing bolts | |
| | Clearance of chipping wheel bearings | Tighten up fixing bolt of wheel on its shaft | |
| N NOSTRESS system out of function | Blown fuse | Replacement of fuse 7,5 A | |
| | Faulty electronic control | Replacement of fuse 4 A (inside control | |
| | unit | unit) or replacement of control unit | |
| | Faulty speed sensor – LED not flashing | Check up wiring or replacement of sensor | |
| | Chipping space clogged | Replacement of sensor | |
| Discharge ducting repeatedly clogged | Low engine speed | Stop loading and increase engine speed | |
| | Deformation of discharge ducting | Remedy/replacement | |
| | Too small, dry or rotten materials | Mix various materials before loading | |
| | Too much material in chipping space | Reduce in-feed speed of loading rolls | |

| | | | |
|---|---|---|---|
| Bearings overheated | Insufficient lubrication or wrong lubricant used | Lubrication and lubricants should be in accordance with recommended intervals and sorts | |
| | Too high speed of chipping wheel | Optimal speed should not exceed 1500 rpm | |
| | Bearing loosened | Tighten up bearing housing bolts with required torque | |
| | Bearing worn | Replacement | |

NOTE:
The note "SERVICE" in the "Remedy" column means that this operation should be done by authorised services only

## ***Chassis:***

| **Failure** | **Cause** | **Remedy** |
|---|---|---|
| 1. Insufficient brake effect | Big play in brake system | Adjust as per manual |
| 1.1 | No contact of brake shoes | Pull out the hand brake and drive from 20 to 30 m with the trailer being braked. If necessary, repeat it after cooling-down. |
| 1.2 | Brake lining with oily spots or damaged | Replacement of brake shoes, removal of oily spots on brake drum surface |
| 1.3 | Overrun brake moves hardly | Grease all bearing and sliding points |
| 1.4 | Brake cable drags or damaged | Remedy |
| 1.5 | Brake cable rusty or broken | Replacement of cable |
| 2. Braking at backing | Big play in brake system | Adjust as per manual |
| 2.1 | Faulty overrun brake damper | Test it and replace if necessary |
| 2.2 | Brake shoes drag on pins | Replace shoes (and pins if necessary) |
| 3. Trailer brakes on one side | Wheel brake works on one side only | Check it out and adjust as per manual |
| 3.1 | See point 1.1/1.2/1.5/2.2 | See point 1.1/1.2/1.5/2.2 |

| | | |
|---|---|---|
| 4. Trailer brakes already at deceleration | Faulty overrun brake damper | Test it and replace if necessary |
| 5. Backing is impossible or very hard | Small play in brake system | Adjust as per manual |
| 5.1 | Prestress in brake cable | Adjust as per manual |
| 5.2 | Brake shoes drag on pins | Replace shoes (and pins if necessary) |
| 6. . Insufficient hand brake effect | Wrong play in brake system | Adjust as per manual |
| 6.1 | See point 1 and 2 | See point 1 and 2 |
| 7. Wheel brakes are hot | Wrong setting of brake system | Adjust as per manual |
| 7.1 | Dirt in wheel brakes | Remove dirt |
| 7.2 | Overrun brake lever drags | Remove the lever, clean and grease |
| 7.3 | Spring magazine prestressed in zero position; nut “G” resp. 10 tightened too much | Adjust as per manual |
| 7.4 | Hand brake lever not pulled out or partially released | Set the hand brake lever in zero position |
| 7.5 | Bowden cable holder deformed | Replacement |
| 7.6 | Bowden rusty or deformed | Replacement |
| 7.7 | Faulty or broken brake springs | Replacement |
| 7.8 | Corrosion in brake drum space | Replacement of brake drum resp. lining |
| 7.9 | See point 1, 2 and 5 | See point 1, 2 and 5 |
| 8. Uneven driving or jerking at braking | Big play in brake system | Adjust as per manual |
| | Faulty overrun brake damper | Test it and replace if necessary |
| 9. Ball coupler does not snap | Coupling parts dirty | Clean and grease them |
| 9.1 | Faulty towing bracket ball | Towing bracket ball should have max. ∅ 50 mm and min. ∅49,5 mm and its quality and shape should comply with DIN 74058 (otherwise replace it) |

| | | |
|---|---|---|
| 9.2 | Insufficient vertical coupling load | Press the coupler down by hand |
| 10. Hard or blocked uncoupling | Irregular ball shape | Set the trailer and the towing vehicle in the same direction (like for coupling) and try to uncouple. Finally grease the towing bracket ball or replace it if necessary. |
| 11. Too big clearance between coupler and ball | Ball coupler is worn | Replacement |

Caution:

- Replace always all the brake shoes on the axle.
- When servicing the wheel brakes, be aware that the brake shoe springs and the brake mechanism should be fitted correctly keeping the right turning direction.
- While setting the wheel brake, turn always the wheel in the driving direction forwards.
- Re-adjust the brake system always after any servicing or work on it.
- Should the wheel brakes, resp. brake drums, be hot, first wait for their cooling down before the next ride.
- Any work on the brake system should be carried out only by specialists or authorised services.

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## Waste Disposal

Any waste materials resulting from the machine operation should be disposed in accordance with laws and regulations applicable in the given country. Protect nature and water resources against used oil and filter elements.

Any parts of the machine should be disposed in accordance with laws and regulations applicable in the given country.

# Warranty

The manufacturer provides warranty on this product for a period as stated in the enclosed Letter of Indemnity. This warranty period begins upon delivery to the customer.

This warranty covers all failures resulted from faulty assembly, manufacture and materials.

The manufacturer bears no responsibility for damages resulted from user's wrong usage, such as:

- Usage by an unauthorised person.
- Unauthorised changes, repairs and actions on the machine.

- Usage of unoriginal spare parts or parts intended for other models.
- Disobedience to instructions for use.
- Damage of the machine caused by faulty handling, maintenance or overloading.
- This warranty does not cover faults resulted from damages caused by the user.
- This warranty does not cover parts being subject to ordinary wear and tear.
- This warranty does not cover any damage of machine caused by usage of unoriginal spare parts.
- This warranty does not cover consequences resulted from weather effects

Any warranty claims must be submitted in writing with papers concerning acceptance for warranty or post-warranty repair

# Maintenance and Servicing

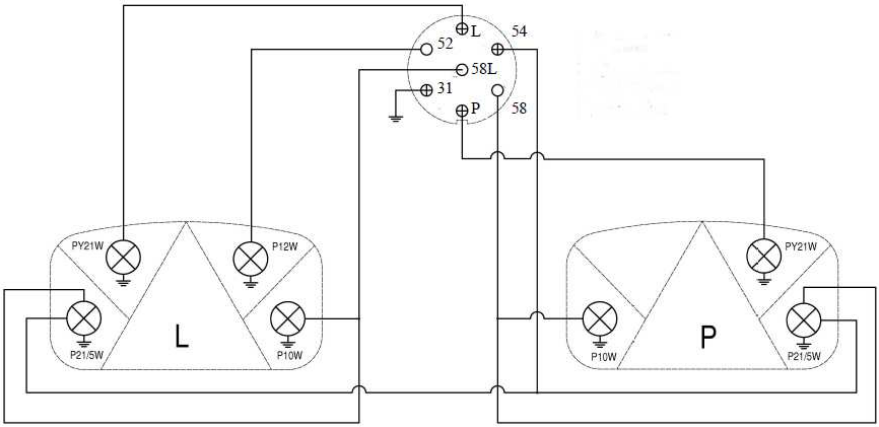
The following chart form serves for notes of all actions within service life of the machine. Complete the form with description of the given action, changed parts and signature of the competent technician.

| Description of work and changed parts | Technician's signature |
|---|---|
| | |
| | |
| | |
| | |

| | |
|---|---|
| | |
| | |

## Attachments

Wiring diagram of trailer lighting

legenda

L - RH direction indicator light
52 - LF fog light
31 - earthing
P - LH direction indicator light
58 - RH side light
54 - stop light
58L - LH side light