LASKI s.r.o.
SMRŽICE 263
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# OPERATING INSTRUCTIONS


# CHIPPER LS 150 D
# LS 150 DW

Version 06.2010

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTMENT IN YOUR FUTURE

# Foreword

Thank you very much that you have just purchased our product, the chipper LS 150 D. 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 proved 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:

# Contents

# EC Conformity Declaration

## CE conformity declaration

We, as the manufacturer, LASKI spol. s r.o.
Smržice 263
798 17
CRN: 45479593

declare hereby that our product:

- designation: Chipper
- type: LS 150 D
- designed for: disposal of wood waste, twigs, barks, branch-wood and other above-ground biomass or for manufacture of chips

complies with the given CE directives

98/37/EC – machinery
89/336/EEC – EMC
2000/14/EC – noise

List of technical standards, specifications and harmonised norms used for review of its conformity: EN 13525, EN 953, ISO 3744, EN ISO 3767-1, EN ISO 11201, EN ISO12100-1,2, EN 13478, EN ISO 13732-1, EN ISO 13857, EN ISO 14121-1, EN ISO 14982, ISO 11 684, EN 60 204-1

Basic technical parameters:

| Parameter | Unit | Value |
|---|---|---|
| Length | mm | 3995 |
| Width | mm | 1500 |
| Height | mm | 2720 |
| Chassis | - | PG 13 |
| Weight | kg | 1100 |
| Engine - type | - | LOMBARDINI 9 LD 625-2 |
| Engine performance | $kW/min^{-1}$ | 21/3000 |
| Max. Ø of material to be chipped | mm | 150 |

Conformity assessment in accordance with directives 2000/14/EC, art. 14, point 2, Appendix V

The person participating in this conformity assessment in accordance with directives 2000/14/EC: NB 1017, TÜV SÜD Czech s.r.o., Novodvorská 994/138, 142 21 Praha 4

Measured sound power level of this equipment: $L_{WA}$ = 108,3 dB

Guaranteed sound power level: $L_{WA}$ = 109 dB

In Smržice, on 1.12.2008

Zdeněk Zapletal, Ing.
Managing Director

# CE konformity declaration

enacted law § 13 No. 22/1997 EC

| | |
|---|---|
| We, as the manufacturer: | **LASKI , s r.o.**<br>**Smržice 263**<br>**798 17**<br>**ID: 45479593** |
| Declare hereby that our product | **Chipper** |
| - type | **LS 150 D** |
| - Serial NO. | ..... |

Complies with the given CE diredtives

**č. 24/2003 Sb. (directive 98/37/EC - machinery)**
**č. 616/2006 Sb. (directive 2004/108/EC - EMC)**
**č. 9/2002 Sb. (directrive 2000/14/E )**

List if technical standards, specifications and harmonised norms used for review of its conformity: **ČSN EN 13525, ČSN EN 953, ČSN EN ISO 3744, ČSN EN ISO 3767-1, ČSN EN ISO 11201, ČSN EN ISO12100-1,2, ČSN EN 13478, ČSN EN ISO 13732-1, ČSN EN ISO 13857, ČSN EN ISO 14121-1, ČSN EN ISO 14982, ČSN EN 60 204-1, ISO 11684**

Basic technical parameters :

| Parameter | Unit | Value |
|---|---|---|
| Length | mm | 3491 |
| Width | mm | 1800 |
| Height | mm | 2009 |
| Chassis | - | PG 16-20 |
| Weight | kg | 1150 |
| Engine - type | - | LOMBARDINI 9LD 625-2 |
| Power | kW/ $min^{-1}$ | 21 / 3000 |
| Max. Ø of material to be chipped | mm | 150 |

Conformity assessment in accordance with directives **NV č. 9/2002 Sb., §5, odst. 2**
The person participate in the data assembly of technical documentation
Ing. Jiří Kvasnička
Petra Bezruče 205
664 43 Želešice, Czech republic

Measured sound power level of this equipment : $L_{wa}$ = 108,3 dB
Guaranteed sound power level : $L_{wa}$ = 109 dB

In Smržice 1.12.2008

# CE konformity declaration

enacted law § 13 No. 22/1997 EC

We, as the manufacturer: **LASKI , s r.o.**
**Smržice 263**
**798 17**
**ID: 45479593**

Declare hereby that our product **Chipper**

- type **LS 150 DW**
- Serial NO. .....

Complies with the given CE diredtives

**č. 24/2003 Sb. (directive 98/37/EC - machinery)**
**č. 616/2006 Sb. (directive 2004/108/EC - EMC)**
**č. 9/2002 Sb. (directrive 2000/14/E )**

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Basic technical parameters :

| Parameter | Unit | Value |
|---|---|---|
| Length | mm | 3995 |
| Width | mm | 1500 |
| Height | mm | 2720 |
| Chassis | - | PG 16-20 |
| Weight | kg | 1100 |
| Engine - type | - | LOMBARDINI LDW 1603 |
| Power | kW/ $min^{-1}$ | 30/3000 |
| Max. Ø of material to be chipped | mm | 150 |

Conformity assessment in accordance with directives **NV č. 9/2002 Sb., §5, odst. 2**
The person participate in the data assembly of technical documentation
Ing. Jiří Kvasnička
Petra Bezruče 205
664 43 Želešice, Czech republic

Measured sound power level of this equipment : $L_{wa}$ = 108,3 dB
Guaranteed sound power level : $L_{wa}$ = 109 dB

In Smržice 8.6.2010

# Product Identification

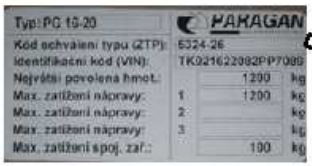
Our product is identified with its serial number stamped both on the type plate and on its chassis. Pay your attention also to the type plate on the engine. Upon take-over of the product we recommend you to fill required data in the following form concerning the given product and your dealer.

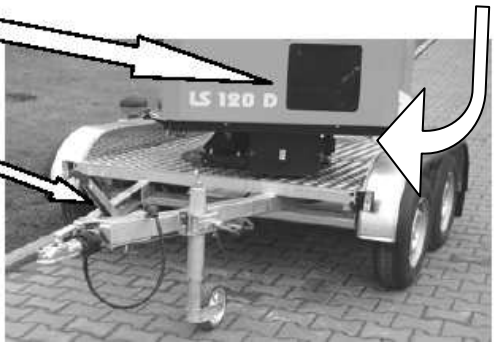
| | |
|---|---|
| Type of product: | |
| Serial number of product: | |
| Engine type: | |
| Serial number of engine: | |
| Chassis type: | |
| Serial number of chassis: | |
| Dealer's address: | |
| Address of authorised service: | |
| Date of delivery: | |
| Warranty expiration date: | |
| Interruption of warranty period: | |
| | |

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

*Type plate under hood*


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

# Work Safety Instructions

## Utilisation

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 boards and plates with thickness up to 60 mm. The wooden pieces 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. For transport the chipper should be coupled to transport means equipped with towing brackets with a joint ball of size ISO 50.

## 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).

## 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.
- A towing vehicle driver should have a respective driver's license.
- The given towing vehicle should be approved for transport on public roads and equipped with a respective towing bracket for vertical coupling load up to 100 kg and weight of a braked trailer up to 1200 kg.
- While using the machine, especially at transport, the attendant/driver must respect instructions given by the chassis manufacturer PARAGAN s.r.o. in its separate manual.
- Training courses for attending personnel 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!**

- It is strictly forbidden to change or to set the controller frame so that the STOP position is under the loading chute edge.
- 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 up to 60$^{o}$ to longitudinal axis (upper turnable part) opposite to the loading chute. Do not direct it toward the attendant's place.
- While working the chipper should rest on supporting legs on the loading side and be braked by means of its parking brake. If uncoupled from a towing vehicle it should be based on its front wheel. Travel wheels should be slightly unloaded by lowering of the front wheel.
- It is forbidden to let stand the chipper on its travel wheels only while chipping.
- Keep this machine beyond children's and unauthorised person's reach. Avoid their attendance 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.
- Instructions for use of the engine operation and the trailing truck are an integral part of this manual.

## While chipping the operator is obliged:

- o to use only such a chipper which is in optimal operating condition, not damaged through transport, storage or from previous operation,
- o to check functions of all controls and safety elements 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. 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.
- 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 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 battery was disconnected.
- Avoid any random start - disconnect the plus pole of the battery.
- Fill up the fuel tank before working and only if the machine is turned off. To fill up the fuel tank use always a proper filling funnel with an extension.
- Do not fill the fuel tank while the engine is hot or still running.
- Do not start if some fuel has been spilled.
- 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 change the engine adjustment, especially its speed regulator.
- Be careful at battery handling.
- Warning! The battery contains sulphuric acid that could cause burns. Rinse all stained spots with water properly and wash them with soap.
- The battery must be always installed and fixed properly in its holders.
- Do not start the machine in confined or ill-ventilated spaces.
- Do not use the machine under conditions of low visibility, especially at foggy weather on public roads.
- Do not use the machine without prior reading this manual.
- 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, the chipper should be blocked against unwilling motion (pin coupled).
- 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 help you at coupling.

**valid only for LS 150 DW**: - it is strictly forbidden to open the cooler cap while the cooling liquid is still hot, particularly just after having put the engine off – risk of scalding from hot liquid.

- discharge the cooling liquid only if it is cooled down
- do not touch the engine if it is still running or having been just stopped – risk of burns
- keep your hands beyond range of the cooling fan while turning
- it is strictly forbidden to start the engine with removed guards on the chipping device
- the chipping rotor starts turning simultaneously!!

## Before transport on public roads

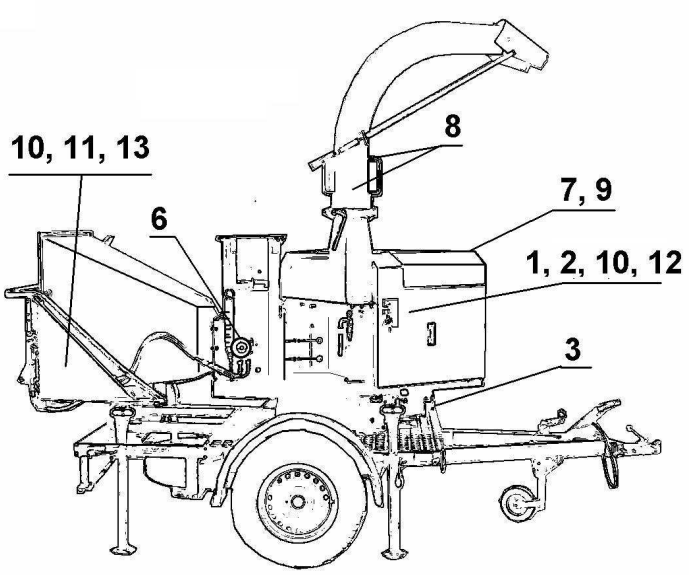
- Set the machine in the transport position, i.e. its loading chute backwards, discharge duct forwards, tilted and blocked against motion.
- Couple the chipper to a towing vehicle properly and check proper coupling.
- Check locks of supporting legs and a tilting part of the loading chute.
- Plug and check traffic lights of the chipper.
- Keep chassis in proper order.
- Respect all instructions for use of the PARAGAN chassis manufacturer.

## Transport on public roads

- Any transport on public roads is allowed only with the engine off.
- Any transport of persons or of any load on the machine is not allowed.
- Never exceed max. allowed transport speed.
- Putting the chipper aside block it against unwilling motion by means of its parking brake system and scotch blocks.
- Pay attention to handling performance on roads. Cornering, turning and braking make new demands on driving.
- If necessary, remove all mud, especially from tires, always before coming to a public road.
- Adjust driving speed to ambient conditions, especially at turning, obstacle crossing, exits to plots etc.
- This machine is approved to transport on public roads. Some restrictions are given in your registration papers. Take these papers always with you.
  -This chipper can be towed also by a car. Before coupling to a car check up the allowed weight on the towing bracket and compare it with the weight of your chipper. If its weight is higher than the allowed value of a towed trailing truck then its coupling to a car is forbidden. A towing vehicle should be approved for transport on public roads and equipped with a respective towing bracket (with a ball ISO 50) for vertical coupling load up to 100 kg and weight of a braked trailer up to 1200 kg.

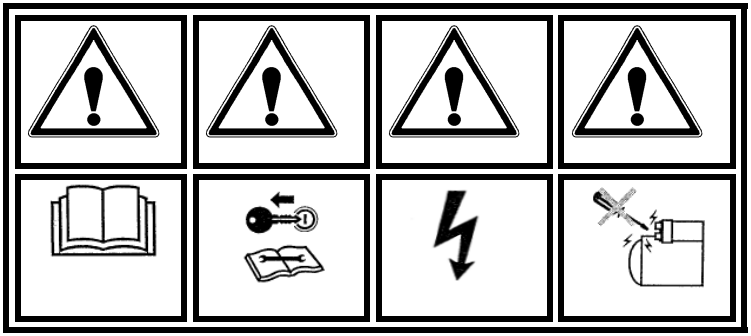
**Note:** Be aware that traffic rules and regulations in different countries may differ.

## Work Safety Symbols

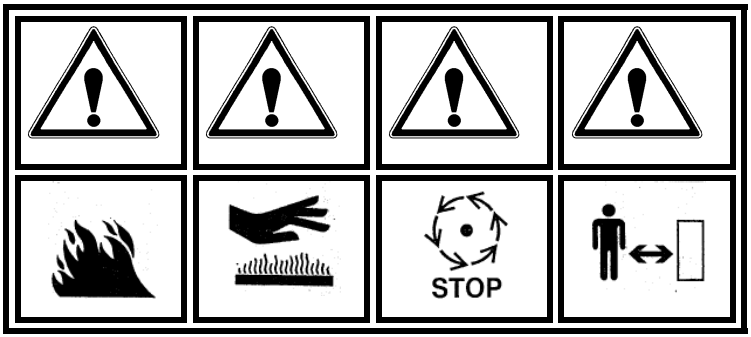



This article introduces work safety symbols (pictographs) used on this machine. Under the given pos. number there is their location on the machine. These work safety symbols warn the operator against risks connected with the machine use. Your respect to the symbol meaning is a precondition for your work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

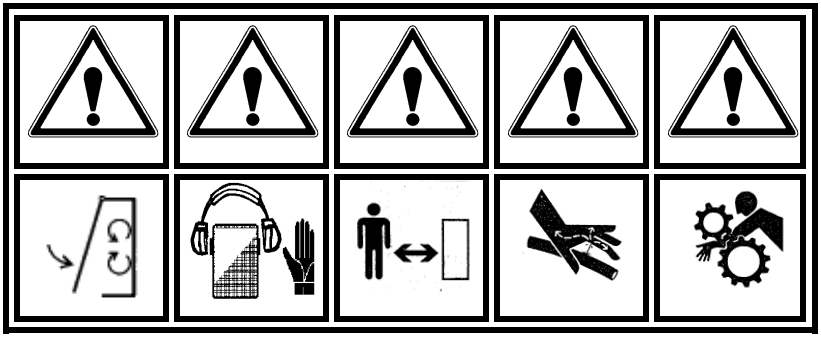
The user is obliged to keep all the work safety symbols legible, clear and undamaged. In case of any damage or illegibility ask your local dealer or an authorised service for a new relevant pictograph.



| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Read this operating manual before use. | Always follow the manual while maintaining, servicing or repairing the machine and take always the switch key out of ignition. | Warning! Electric current is present on the machine. | Start the machine with the switch key only. Do not short circuit its contacts. |




| 5 | 6 | 7 | 8 |
|---|---|---|---|
| Warning! Fuel is flammable! Keep open fire away! | Warning! Hot parts of exhaust manifold and engine. | Warning! Turning wheel is running out. | Warning! Ejected objects hazard. Keep away. |



| 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|
| Warning! Close all guards before starting the machine. | Wear personal protective aids. | Keep safety distance. | Warning! Risk of high-pressure liquid leakage. | Warning! Rotating rolls. Pull-in hazard. |

Positions 4 and 5 are located under the engine hood close to the starter and on the fuel and oil tank.

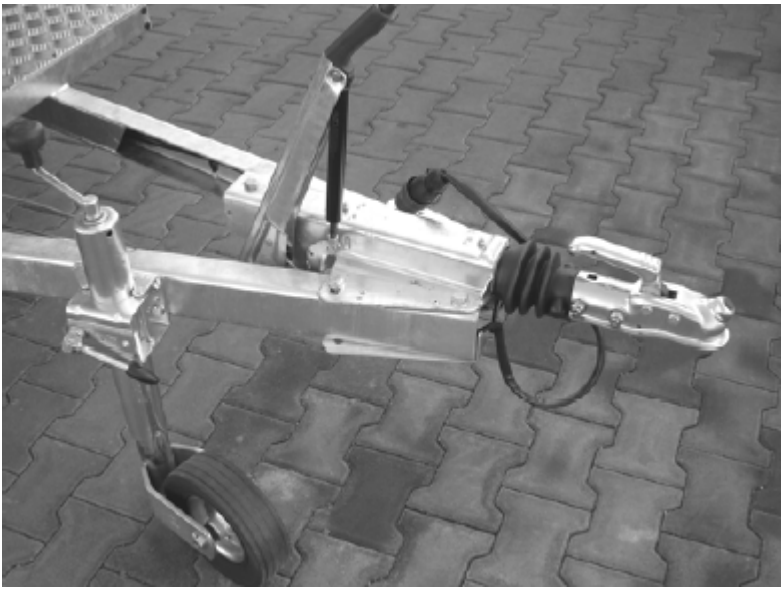
## Transport of Product/Handling

- This product is delivered completely mounted and fitted on its chassis. The chipper can be towed by towing means which, according to its total weight, even a car can be.
- Handling the chipper is supposed only at coupling/uncoupling to/from a towing vehicle.
- Any chipper displacement only by hand is not allowed.

- 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.

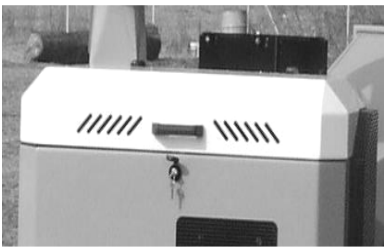
- Uncouple the chipper always on compact, flat and sufficiently bearing surface only.
- It is not allowed to put any objects or tools on the machine. Never pile chippers up on each other.

When having uncoupled the chipper, protect the hitch against impurities, especially sand etc. Before coupling first clean the joint ball and grease it slightly. Use a supporting jockey wheel for putting the chipper aside.



## Precautions in Design

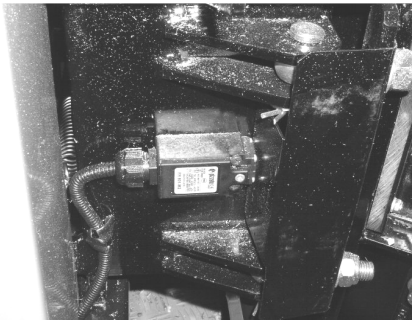
This product is equipped with hoods and covers protecting rotary and hot parts against touching. Protective covers are usually fixed, bolted down on framing.



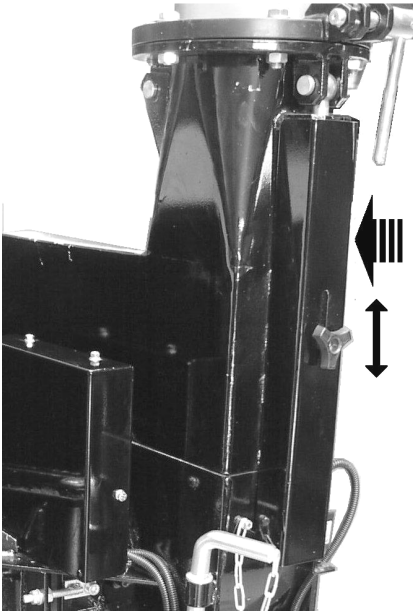
**A hinged hood of the engine** compartment can be locked to prevent it against unwished access.

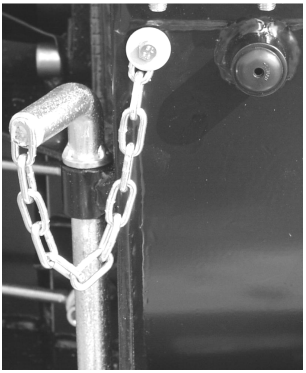

**An ignition box** for starting with a removable switch key. Confusion of ignition keys is not possible. When starting, turn the key in the START position. The engine goes on running in the RUN position. This ignition box does not allow repeated starting if the key remains in the RUN position but it must be turned back in the initial OFF position.

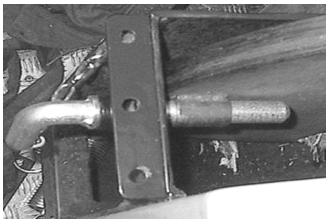
**A safety frame** for material loading serves as an actuator for the loading rolls control, i.e. stopping or reversing. Once being pushed the chipper stops loading motion immediately, the next pushing brings reverse turning of the loading rolls.



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.







Dangerous space of the chipping wheel 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 move it in the arrow direction, see figure. 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 edge of the machine. A hole for the pin inserting is covered with a rubber stopper. The chipping device is blocked if the pin is inserted into a bush on the rotor.

A terminal switch of a hinged part of the loading chute turns the engine off if the chute is tilted.

## Controls

The chipper can be controlled by means of particular controls on the control board and under it.


Ignition box LS 150 D
Upper part
- running hours counter
- charge indicator lamp
- switch key
- NOSTRESS switch

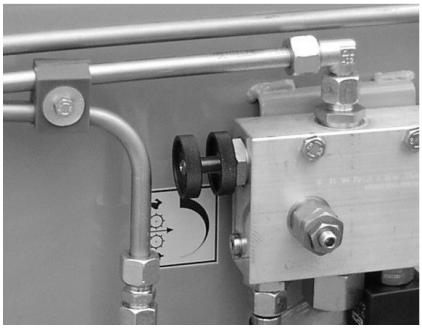
Ignition box LS 150 DW
Upper part
- box with indicator lamps
- running hours counter (daily and total hours)
- fuse
- NOSTRESS switch

Controls under ignition box
From left (valid only for LS 150 D)
- lever of V-belts tightening
- speed control of driving engine
- engine run switching

- battery disconnector

Safety frame for material loading
MATERIAL LOADING - pulling toward attendant
- STOP - central position
- REVERSE - back position

Chassis controls
- parking brake
- crank of supporting jockey wheel



Controller of loading speed
Change of loading roll speed.
Speed regulation in range from 0 to 40 m/min

Discharge duct setting
- drawbar for locking of end piece
- discharge duct turning

# Use

## Transport Safety

- For transport the chipper should be coupled to transport means equipped with towing brackets with a joint ball of size ISO 50.
- Having coupled the chipper, plug the traffic lights.
- Checks before drive:
    - lights
    - tire pressure
    - machine for completeness
    - locking of turnable parts against turning (discharge duct)
    - locking of hinged part of loading chute in transport position
    - rear registration plate legibility
    - condition of towing bracket/hitch and overrun brake (rope of overrun brake must be attached to towing vehicle).
- It is strictly forbidden to transport the chipper with its engine on.
- It is not allowed to transport any objects or loads on the chipper.
- Never couple another machine to the chipper.
- Keep the traffic lights clean.
- Avoid any damage of the traffic lights.
- If necessary, remove all mud and other deposits always before coming to a public road.
- Check auxiliaries for completeness (e.g. scotch blocks).
- Check the wheel nuts for proper tightening.
- Putting the chipper aside block it against unwilling motion by means of the parking brake system and scotch blocks and mark it as a transport obstacle.
- While going on public roads keep all applicable traffic rules not to endanger other road users.
- While working on a public road, use always prescribed road signs for road works.
- While working along public roads, keep the direction of ejected chips away from other road users and avoid any road fouling.
- In case of any fault repair the machine always off the road.
- While repairing, avoid any site fouling (oil products, dirty rags).

**Transport position**

Jockey wheel up and locked, turnable part of slewing gear longitudinally locked over chassis, hinged part of loading chute tilted, discharge duct tilted and locked against turning, scotch blocks inserted in holders behind wheels

## Storage

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

- During storage keep the switch key separately.
- Keep the stored machine beyond unauthorised persons reach.
- Before storage clean all parts of the machine. For cleaning you can use pressure water.
- 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.
- Before putting the machine aside for a longer time change the engine oil and its filter.
- Discharge the used oil into a special bin. Dispose the used oil always in accordance with applicable laws and local regulations.
- Remove any spilled oil and clean all oily spots.
- Always put the machine aside on a flat and solid floor and block its wheels against unwilling motion by means of scotch blocks.
- Do not put any objects or tools on the machine.
- Store the fuel canisters separately.

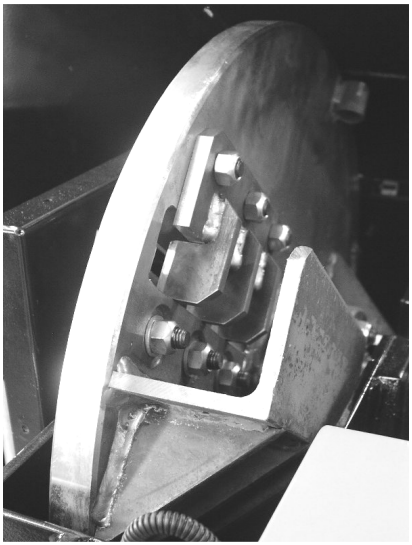
**valid only for LS 150 DW**: - before putting the machine aside for a longer time/storage check out the cooling liquid – it should be mixed for -20℃. Pay attention to it particularly in winter time.

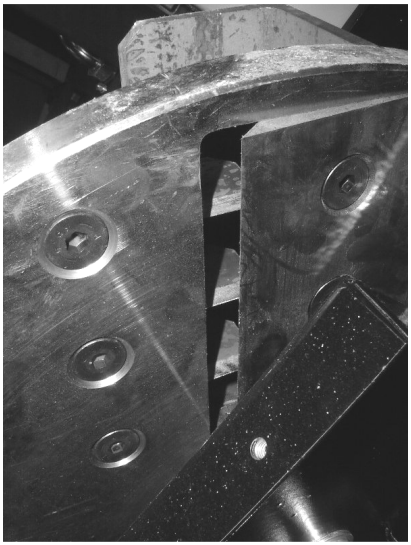
## Before Putting into Operation

- 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).
- Check the suction line for tightness – any leakage reduces chipping performance essentially.
- Check the fuel line for tightness and electric wiring for completeness.
- 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.
- Max. capacity of the fuel tank is 20 l. Minimal fuel charge is 5 l.
- For engine operation use Diesel fuel only (winter Diesel fuel according to season).
- After storage check out the battery. Recharge it if necessary.
- Plus and minus poles should be connected just before starting.
- It is strictly forbidden to do any technical changes on the machine.
- If any adjustment is required, do it always at standstill only. Remember blocking the wheels against unwilling motion.
- Check out the air filter, especially at work with very dry and rotten materials. Empty the pre-cleaner element regularly.
- 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 (loosen the V-belts). Do not start the machine in confined or ill-ventilated spaces.

**valid only for LS 150 DW**: - fill up the cooling liquid only if mixed for -20℃.





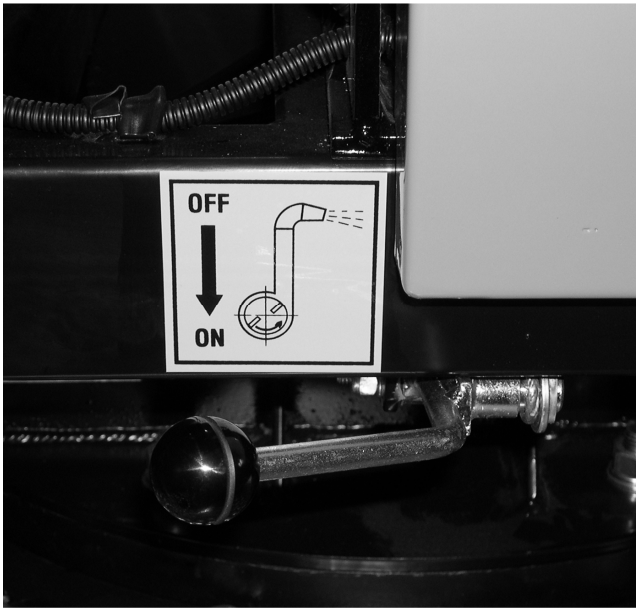
The optional breaker, as shown in this auxiliary view, is installed on the output opening and close to the blade in order to break the transversely cut wood slices.

**The breaker is not included in standard machine delivery**

**RECOMMENDATION:**
The breaker should not be used for small and short wooden pieces, leaved or coniferous branch wood (with low weight) that may bring fouling due to shortage of woody mass. To clean the fouled ducting, just put some more woody materials in the loading chute.

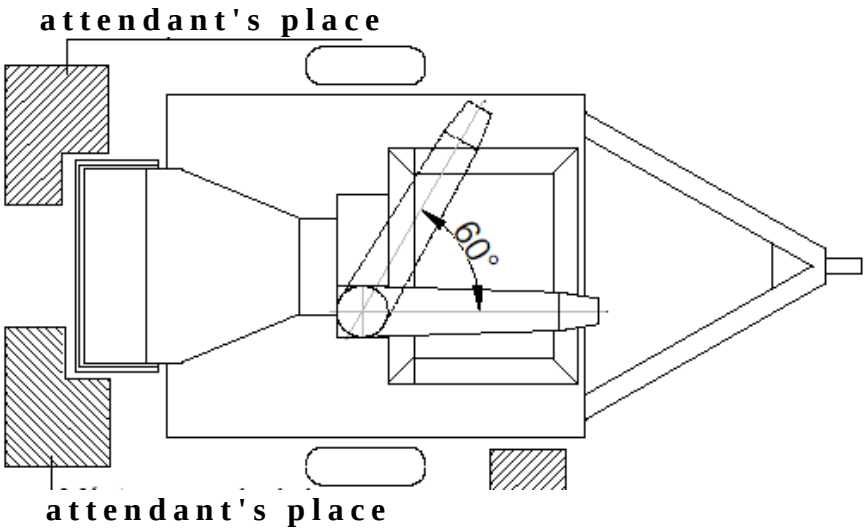
# Putting into Operation

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.

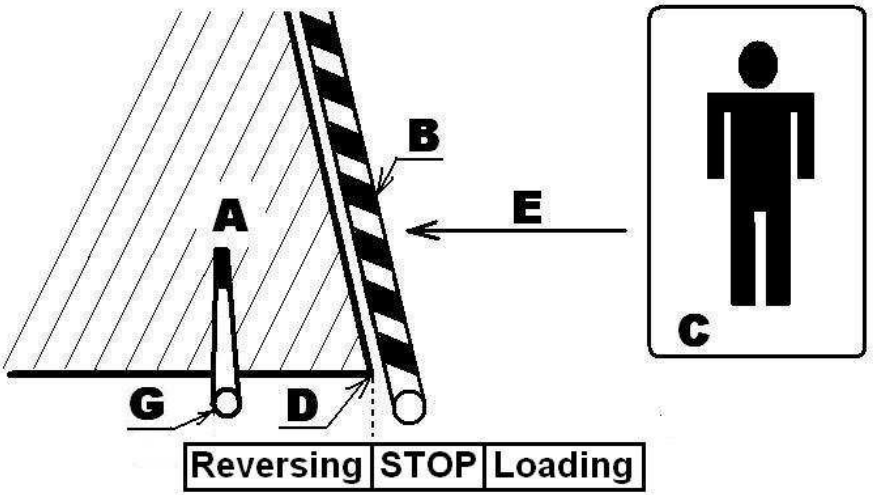



**A lever to tighten or to loosen the V-belts**
(valid only for LS 150 DW)
Lever down – position ON - belts tightened
Lever up – position OFF - belts loosened

- Swing away the hinged part of the loading chute and lock it.
- 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).
- For loading of materials and operation of the machine stand in the attendant's place only (as shown below).
- Avoid directing the discharge duct to the area of possible motion of other persons.
- Set the accelerator lever for max. speed (especially at cold starting).




- Set the switch key in the START position. Having the engine started release the key.
- Reduce the engine speed and let the engine running.
- If the engine runs regularly, turn on the chipping device by a lever for belts tightening. Increase the engine idling speed.
- **valid only for LS 150 DW**: while starting the engine the breaker starts turning simultaneously – this transmission of power cannot be interrupted!!
- Having turned the chipping device on wait for speed stabilization. With that you may soever increase or reduce the speed.
- **CAUTION!!! As soon as the chipping device is ON then the chips from previous operation may be ejected from the discharge duct.**
- Carry out functional checks of the safety frame of 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.
- If you heard any strange noises or vibrations during initial run turn off the chipper immediately and contact the authorised service.
- At cold starting, especially in winter time, do not increase the engine speed but first let the engine running in idle speed to warm up the engine and hydraulic oil for about 1 – 1,5 min and then you can set its max. speed.

- **Do not leave the machine unattended.**

At the first start there is much more air in the intake manifold and on this account the engine may not roar to life immediately when turning the switch key for the first time. Do not crank the engine for a longer time than 10 sec. Keep an interval between two starts (standstill) 30 sec at least.

## Putting out of Operation

If you want to stop the engine running or to stop chipping:

- In case of loaded material wait for emptying of the loading chute.
- Reduce the engine speed by the accelerator lever and wait for real speed decrease (delayed by rotor run-out).
- Pull out the STOP switch and hold it pulled out for a moment. Turn the switch key in the STOP position.
- Release V-belts tension of the chipping device.

(valid only for LS 150 D)

You may put the chipper out of operation also in this way:

- Reduce the engine speed by the accelerator lever and release V-belt tension of the chipping device simultaneously.
- Pull out the STOP switch and hold it pulled out for a moment. Turn the switch key in the STOP position.

**Warning! After release of the V-belts tension the rotor of the chipping device runs out.**

**Do not disconnect the battery or its disconnector while the engine is still running – risk of machine damage!**

## 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. Turn the chipper off and

having all rotary parts stopped (after about 1 minute) use an elastic rod and try to release clogged material in the end piece of the discharge duct. Turn the duct over the towing bar of the chassis which you may use as a ramp for standing. Having clogging materials released try to turn on the chipper again. If not, hinge away the upper hood part and try to remove all materials by hand (chipper OFF).

## Chipping

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

- While chipping you may let the chipper coupled to a towing vehicle. Just turn the loading chute and the discharge duct in required direction.
- 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 to avoid ejecting chips back out of the container. Be careful at turning and going on uneven ground. Set the discharge duct if necessary.
- 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.
- 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 their blades.
- Fill up the fuel tank before working and only if the machine is turned off.
- If necessary during work, refill the fuel tank at standstill only.
- Do not fill the fuel tank while the engine is still hot or running. Put it out of operation and let it cool down.
- To fill up the fuel tank use always a proper filling funnel.
- If any fuel is spilled or overflowed then wipe off the spots and let them fully evaporate before the next start.
- When finishing the work first wait for emptying of the loading chute.

**Recommendations:**

- **Do chipping always at max. engine speed, i.e. at sufficient power of the chipping wheel for ejecting chips.**
- **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 parts of impurities, such as of 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 impurities 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.**

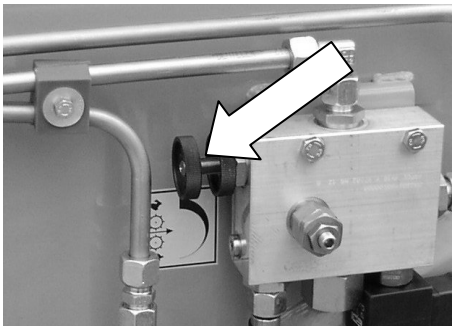
The chipper is equipped with the NOSTRESS equipment monitoring speed of its chipping wheel and control of continuous material feeding in accordance with actual engine load which provides continuous run and reliability in service. The chipping wheel speed is set by the manufacturer to 1450 rpm to turn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

**Recommendations:**

**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.



# Noise and Vibrations

Operation of this chipper brings following emissions:

| | Measure unit | Value | |
|---|---|---|---|
| | | LS 150 D | LS 150DW |
| Noise | dB(A) | 92,2 | 92,2 |
| Sound power - measured | dB | 108,3 | 108,8 |
| - guaranteed | | 109,0 | 110 |

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

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

# Technical Description

This machine consists of following main parts:

- **chipping device**
  - ❖ **loading chute**
  - ❖ **loading rolls**
  - ❖ **chipping wheel**
  - ❖ **discharge duct**
  - ❖ **slewing gear**
- **driving engine**
- **chassis**

## Chipping Device

### ❖ Loading chute

The loading chute is made of welded steel plates consisting of two parts: fixed and hinged. 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 supported on 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. 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 was opened or got loose.

## ❖ Discharge duct

This duct continuously prolongs the chipping wheel shielding and serves for directing chips being ejected. The duct can turn in 360° and its end piece ("tilting gate") serves also for setting the range of ejected chips.

## ❖ Slewing gear

It serves for directing the chipper at work against its chassis. This sewing gear provides 12 turning positions and in the given position it can be locked by a safety pin. This pin is controlled by means of a stranded wire from the loading chute. On the slewing gear framing there are functional parts of the chipper installed.

## Driving Engine

The chipper is driven by a Lombardini engine, air-cooled and located under its hinged hood. The engine is controlled by means of elements outside the engine compartment, on its right side. The driving power is transmitted to the chipping wheel pulley by means of three V-belts being tightened for easy start.

## Chassis

This chassis, type PG 13, is made by the firm PARAGAN s.r.o. and equipped with a slewing gear with framing.

## Technical Parameters

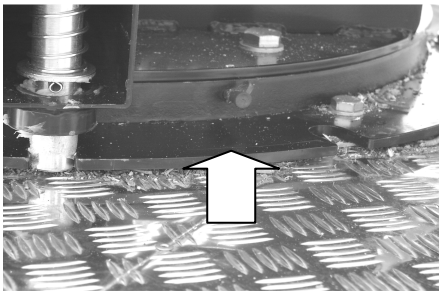
| **Parameter** | **Unit** | **Value** | |
|---|---|---|---|
| | | LS 150 D | LS 150 DW |
| Overall length / for transport | mm | 3995 / 3530 | |
| Overall width | mm | 1500 | 1800 |
| Overall height / for transport | mm | 2720 / 2030 | |
| Weight | kg | 1100 | 1260 |
| **Chassis:** | | | |
| Type | - | PG 13 , PG 16-20 | PG 16-20 |
| Manufacturer | - | PARAGAN s.r.o. | |
| Travel speed | km/h | 80 | |
| Tires | - | 185 R 14 | 155 R 13 C |
| Tire pressure | kPa | 250 | |
| **Chipping device:** | | | |
| Chipping wheel – diameter | mm | 560 | |
| - number of blades | - | 2 | |
| - rate of cutting | m/s | 42 | |
| Max. diameter of materials to be disposed | mm | 150 | |

| | | | |
|---|---|---|---|
| Chipping wheel drive | | 3 belts B17x 1250 Li | |
| Power | m3/h | about 12 | |
| **Loading device:** | | | |
| Inlet hole size | mm | 290 x 220 | |
| Number of loading rolls | - | 2 | |
| Diameter of rolls | mm | 190 | |
| Feeding speed | m/min | 12 - 40 | |
| Driving unit | - | hydrostatic | |
| Speed regulation | - | NOSTRESS | |
| **Loading chute:** | | | |
| Angular adjustment | - | 5 positions / 120° | |
| Feeding profile | mm | 920 x 800 | |
| **Engine:** | | | |
| type | | LOMBARDINI 9 LD 625-2 four-stroke, air-cooled | LOMBARDINI LDW 1603 four-stroke, water -cooled |
| Power output/revolutions | kW/rpm | 21/3000 | 30/3000 |
| Fuel | - | diesel | |
| Fuel consumption | l/h | 4,0 | 4,9 |
| Fuel tank capacity | l | 20 | 15 |
| Lubrication | - | forced with full-flow oil filter | |
| Starter | - | electric | |
| Oil charge | l | 2,8(SAE 15W-40) | 3,8 (SAE 15W-40) |
| Max. engine inclination | ° | 25 in all directions | |
| Battery | V/Ah | 12 V, 55 Ah | 12V100Ah |

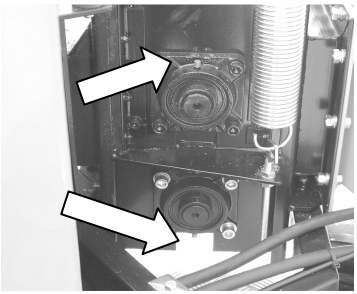
# Maintenance

- Any servicing of the chipper should be carried out by authorised persons only.
- Check up the machine for completeness and its general condition.
- 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 and chipping wheel vanes regularly.
- Check up hydraulic hoses for wear. Replace them if necessary or every five years.

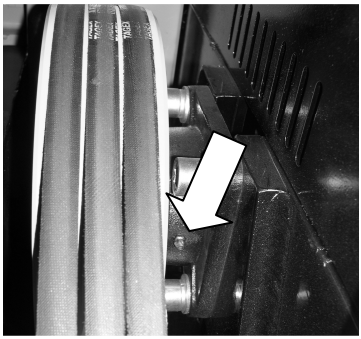
## Lubrication



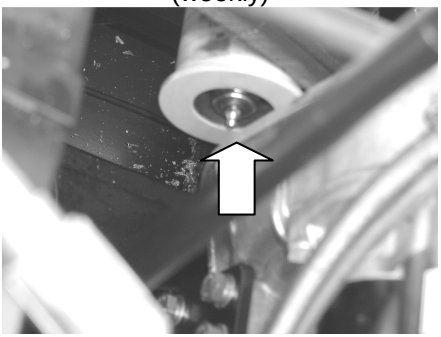
Grease cups of slewing gear
Lubrication every 500 running hrs



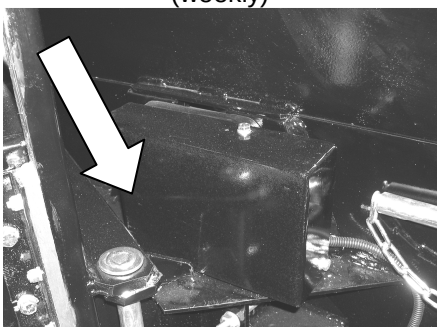
Grease cups of loading rolls
Lubrication every 40 running hrs (weekly)



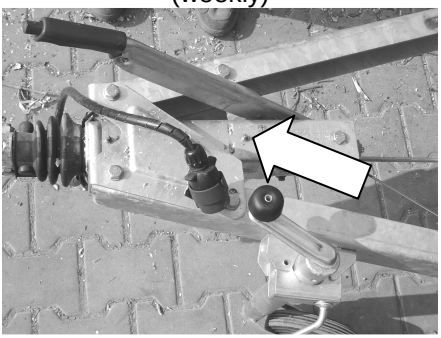
Grease cup of chipping wheel
Lubrication every 40 running hrs (weekly)



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



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



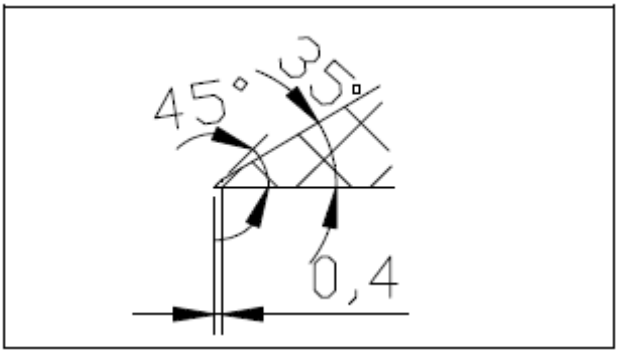
Grease cups of towing bar
Lubrication every 500 running hrs

## Blade Grinding

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

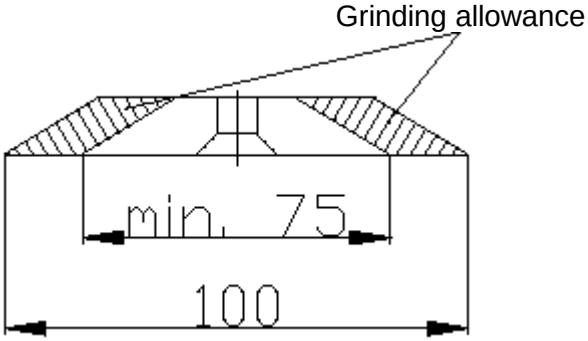
Blades edge regrinding requires high demands for keeping cutting edge shape. While grinding it is necessary to keep its optimal geometry, see the following figure. Right shape prolongs blade service life.

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

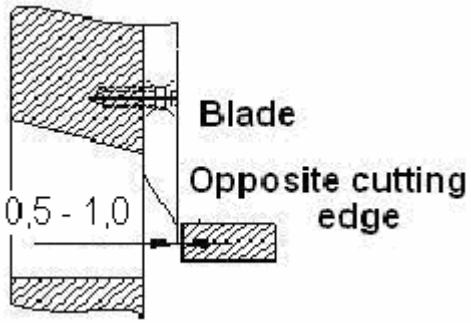
Grind the blade only up to minimum distance from the edge to its fixing bolt axis which is 37,5 mm. This distance on a new blade is 100 mm, see the following figure.




**Max. wear/grinding of cutting edge**

## Adjustment of chipping device

Optimal operation of the chipping device requires right setting of 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

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.

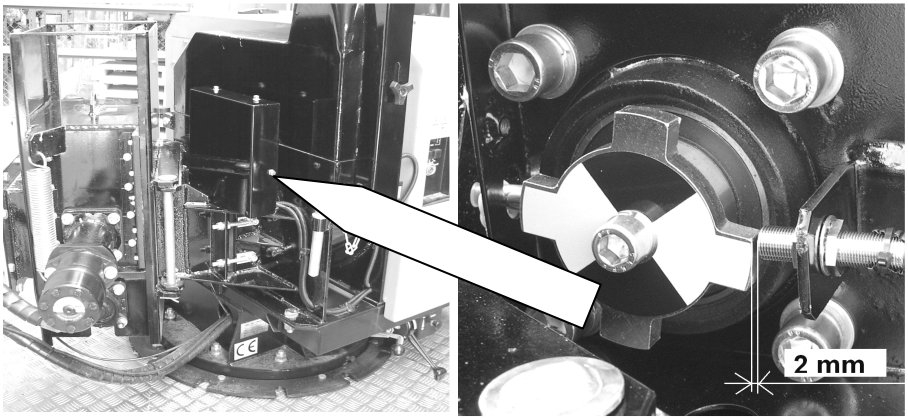
- **Right function of NOSTRESS system**:

The speed regulator reduces material feeding upon contingent overloading. The chipping wheel speed is set by the manufacturer to 1525 rpm to turn the loading rolls off and to 1550 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 (respectively check-up) of the speed sensor should be done at machine standstill only.**

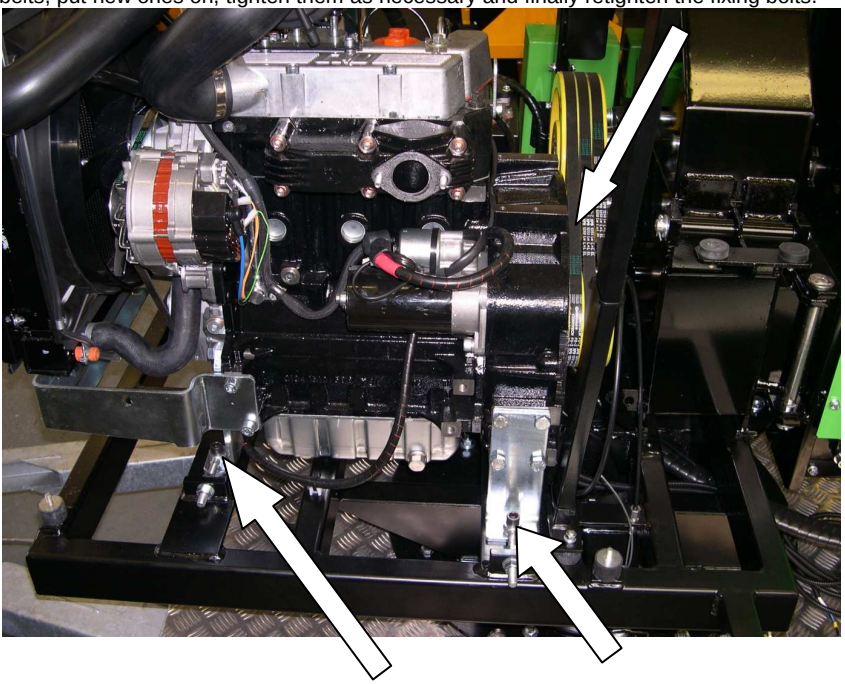



Location of sensor under hood

(valid only for LS 150 DW)

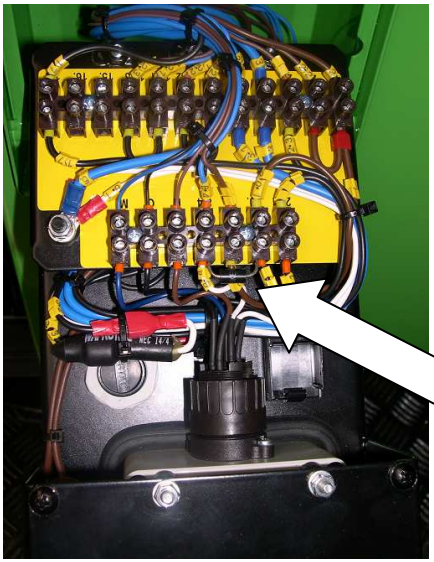
The chipping rotor of the machine LS150DW is powered by means of three V-belts, type **XPB 1250Lw**.

For replacement of the V-belts remove four bolts fixing the engine to the frame, move slightly the engine in order to extend the space between the flywheel guard and the bigger pulley. Remove the belts, put new ones on, tighten them as necessary and finally retighten the fixing bolts.



## Overvoltage protection of the Nostress systém

In the case of a overvoltage in electrical system will fuse and break-through the TRANSIL , so is protected by an electronic control unit Nostress.
With repeated Nostress fuse (5A) is necessary to first replace the damaged TRANSIL first and then insert a new fuse.



TRANSIL

PART. No. :004009

FUSE 5A

## Maintenance Intervals

| | |
|---|---|
| **Engine Oil Change SAE 15W-40** | The first oil change after first 50 working hours and next changes every 300 hrs. Change the oil always when the engine is turned off and still warm. Discharge the used oil into a bin through the drain plug in the casing bottom. Remove also the oil filter element. Having discharged the whole volume, screw up the plug and fill new oil of proper viscosity through the filler neck and then screw up the filler plug again. Before checking the oil level wait until the oil on casing walls flows down. In case of any failure in the lubrication system the related indicator lamp lights up and the engine stops. |
| **Oil Filter** | Change the oil filter element always with engine oil. |
| **Air Filter** | The air filter with two filter elements provides maximum protection against mechanic impurities and keeps continuous air flow into the fuel system. Remove the filter cap, unscrew the locking nut and remove the filter element.<br>Check the air pre-cleaner every 25 working hrs as follows:<br>- Loosen the pre-cleaner carefully from its cap and remove deposits from its plastic element, wash it in warm water with a non-foamy detergent.<br>- Rinse the filter element with the water, press the water out and dry it up. Put the cleaned element into the body, tighten up the nut and fit the cap again. In case of heavy fouling check up the element more frequently.<br>CAUTION! - Never oil the element and never clean it with paraffin or similar detergents. |
| **Valves** | Valves adjustment - see a separate engine manual. |
| **Cleaning of Engine** | Clean the engine according to its actual impurity grade by means of the pressure air. Clean the engine also after every change of oil or air filter element. Check up cooling air ducts for fouling and at the same time also bolts fixing the engine to the chassis.<br>CAUTION! Any repairs of the engine should be done by authorised Lombardini services only. |
| **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. Check the electrolyte level and density in individual cells of the battery. While charging, keep all instructions of the battery manufacturer. |
| **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. In addition to that keep regular checking interval every 50 working hours. Check up filter fouling especially after repairs of the hydraulic system. |

## Checking, Oil Exchange

| Operation | Component | Interval (hrs) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **10** | **100** | **300** | **500** | **1000** | **2500** | **5000** |
| Cleaning | Oil charge | * | | | | | | |
| | Filter delivery pump | | | * | | | | |
| | Finning of head and cylinder | | * | | | | | |
| | Fuel tank | | | | | * | | |
| | Injectors | | | | * | | | |
| | Internal oil filter | | | | | * | | |
| | Hydraulic oil tank | | | | | * | | |
| | Hydraulic oil filter | | | | | * | | |
| Checking | Oil level in air filter | * | | | | | | |
| | Oil level in crankcase | * | | | | | | |
| | Oil level in hydraulic oil tank | * | | | | | | |
| | Electrolyte level in battery | | * | | | | | |
| | Tappet clearance and valve rocker arm | | | | * | | | |
| | Shape of injection fuel beam | | | | * | | | |
| | Oil in air cleaner (**)(***) | * | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Exchange | Oil in crankcase (***) | | Δ | * | | | | |
| | Oil filter element | | Δ | * | | | | |
| | Fuel filter element | | | * | | | | |
| | Dry filter element of air cleaner | (o) | | | | | | |
| | Oil hydraulic circuit | | | | Δ | * | | |

(*) 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

| Failure | Cause | Remedy | |
|---|---|---|---|
| Engine does not start | Discharged battery | Recharge battery | |
| | Broken lead/battery disconnector off | Check up wiring/turn disconnector on | |
| | Faulty ignition box | Replacement | |
| | Low engine oil level | Refill oil | |
| | Fouled fuel filter | Clean filter element | |
| | Lack of fuel | Refill fuel | |
| 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 lever in loading direction | |
| | Wrong angle geometry | Regrind 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 | |
| Loading rolls do not turn | Throttle valve closed | Check up manual speed regulation for loading | |
| | Control lever of in-feed function in wrong position | Press the lever in loading direction | |
| | Failure of NOSTRESS system | Measure voltage on electromagnetic valve coil; it should be > 0 V at max. speed | |
| | Faulty electromagnetic | Replacement | |

| | | | |
|---|---|---|---|
| | valve coil | | |
| | Broken leads | Check up wiring for integrity | |
| | Faulty hydraulic pump | Replacement | |
| NOSTRESS system out of function | Blown fuse | Replacement of fuse 7,5 A | |
| | Faulty electronic control unit | Replacement of fuse 4 A (inside control unit) or replacement of control unit | |
| | Faulty speed sensor – LED is not flashing | Check up wiring or replacement of sensor | |
| 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 | |
| Discharge duct gets clogged | Low speed of driving engine | Stop loading and increase engine speed to maximum. | |
| | Too small, dry or rotten materials | Mix various materials before loading | |
| | Discharge ducting deformed | Repair/replacement | |
| | Worn blower vanes | Replacement | SERVICE |
| | Loading rolls overloaded with material | Reduce loading rolls speed | |
| Engine overheating | fouled cooler | clean it | |
| 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.

## 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 |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |