OPERATION MANUAL

Before attempting to operate this machine, read and fully understand the contents of this Operation Manual. Make yourself familiar with safety instructions, controls, servicing and maintenance of the machine. Operators must also read through the engine manual which is separately provided by the engine manufacturer.

ORIGINAL INSTRUCTIONS

WOOD CHIPPER

ES160DH

ohashi
ECOLOGICAL TECHNOLOGY

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260205

INTRODUCTION

To operate this machine most effectively, it is essential for you to perform daily checks and regular inspection, servicing and maintenance jobs.

Please feel free to contact and consult the dealer from whom you purchased the machine to solve any problem. When notifying the dealer, please report MODEL NUMBER and SERIAL NUMBER of the machine,

For the purpose of product improvement, specifications including spare parts may change without prior notice.

CONTENTS

SAFETY INSTRUCTIONS

CAUTION

1. This operation manual must be retained within easy access of operators. Operators must be careful not to lose or damage the operation manual.
2. If the operation manual is missing or illegible due to damage, obtain new one from our dealers and retain it within easy access.
3. If the machine discussed in this operation manual is rented, be sure to provide the manual with the machine. Let the renter read and understand the manual. Give new operators proper instructions and training before they start operating the machine.
4. If the machine is transferred to other people, make sure that this operation manual is provided with the machine.

CAUTION

1. Operators of this machine must read and understand the contents of this operation manual before attempting to operate it.
2. If safety decals are torn and illegible, obtain new ones from our dealers and replace them.

1. Read through this operation manual and make yourself familiar with the operation, servicing and maintenance of this machine before use.

2. Never operate the machines without repairing or replacing the deformed or defective parts.

3. Never alter or modify this machine.

4. Towing the machine is not possible as it will cause significant damage to the hydraulic parts.

5. When a machine is loaded/unloaded on/from truck or trailer for transport, stop the truck on a level surface, engage the truck's parking brake, and position it securely with wheel stoppers. Extreme caution must be taken not to topple the machine from the ramps or truck. (refer "**Loading, Unloading & Slopes**").

6. Never operate the machine alone. This machine must be operated by two or more operators.

7. Pay attention to the muffler and surrounds because it becomes very hot during the operation and after operation.

8. Don't directly touch the feed roller or its attaching portions.

9. Do not insert your fingers into the shooter or low dispatch unit. Your hands might be caught in the rotor and this could cause serious injury.

10. Diesel is extremely flammable.
    Extreme caution must be taken when handling the fuel.
    (1) Use only fresh, clean diesel.
    (2) Use an approved fuel container for the fuel tank. Fuel container's outlet must fit the fuel tank's inlet. Check to see if these ports fit. If not, use a suitable fuel pump.
    (3) Do not remove the fuel tank cap or add fuel while the engine is running or hot.
    (4) Do not fill the fuel tank indoors.
    (5) Wipe off any spilled fuel.
    (6) Do not use diesel as a cleaning fluid.
    (7) Never smoke while handling diesel.
    (8) Do not handle fuel near a naked flame or uncovered electric light.
    (9) Keep the fuel container away from open flames and equipment that may spark.

11. Wait until the machine has cooled before storing indoors and remove key.

12. When performing maintenance with two or more people stay aware of each others location by talking to avoid accidents.

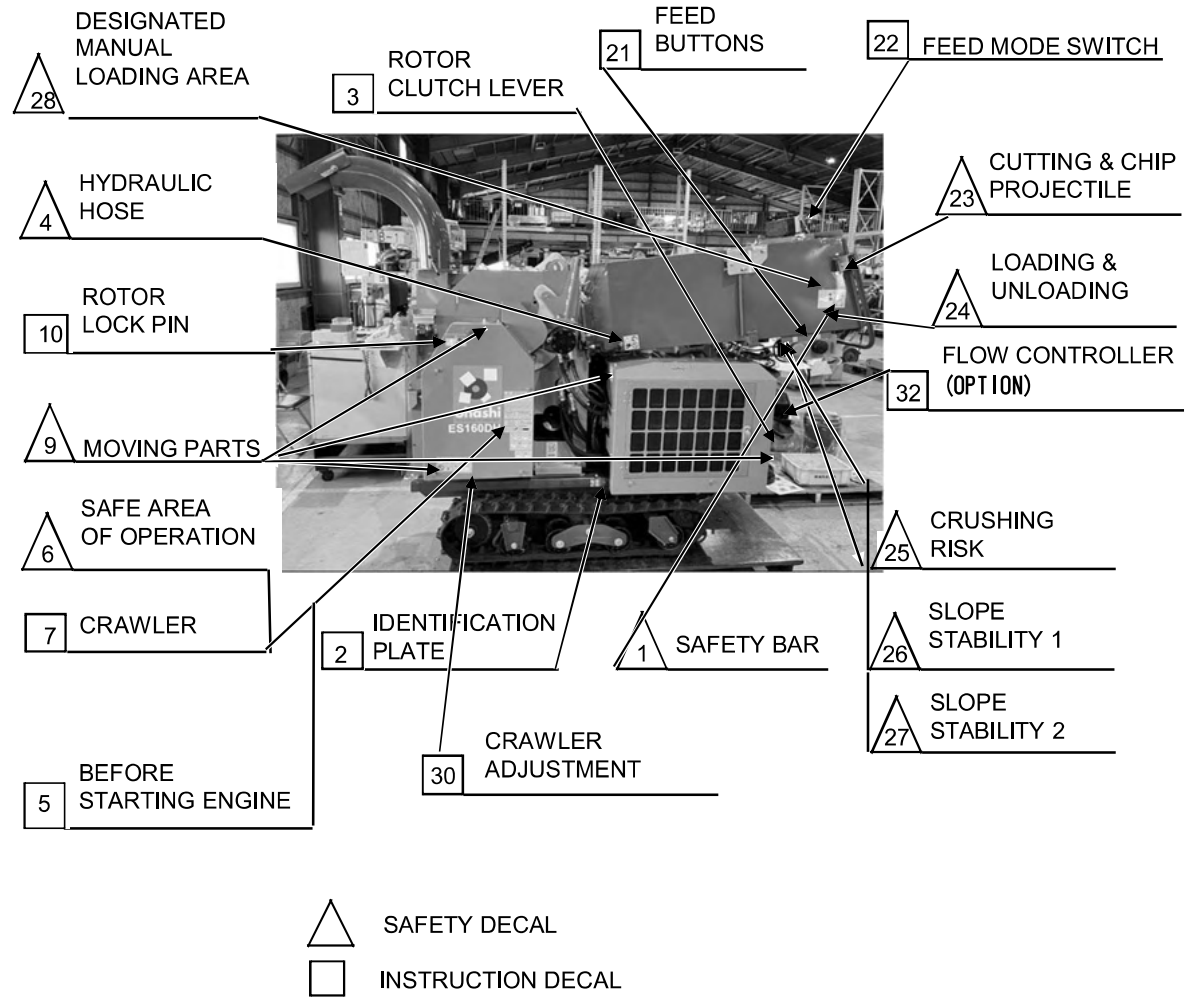
13. Remove chips or other material in and around the crawlers as this could cause transmission troubles.

14. Never perform chipping operations inside a building.

DECALS

Before attempting to operate the machine, read these decals and fully understand the instructions and meaning.
If a decal is worn, torn, damaged, ineligible or missing please obtain a new one from our dealers.
Safety decals must be placed to their proper location as indicated below.
For locations of other decals, see the following photographs and illustrations and affix them to their respective places.

Location of SAFETY decals



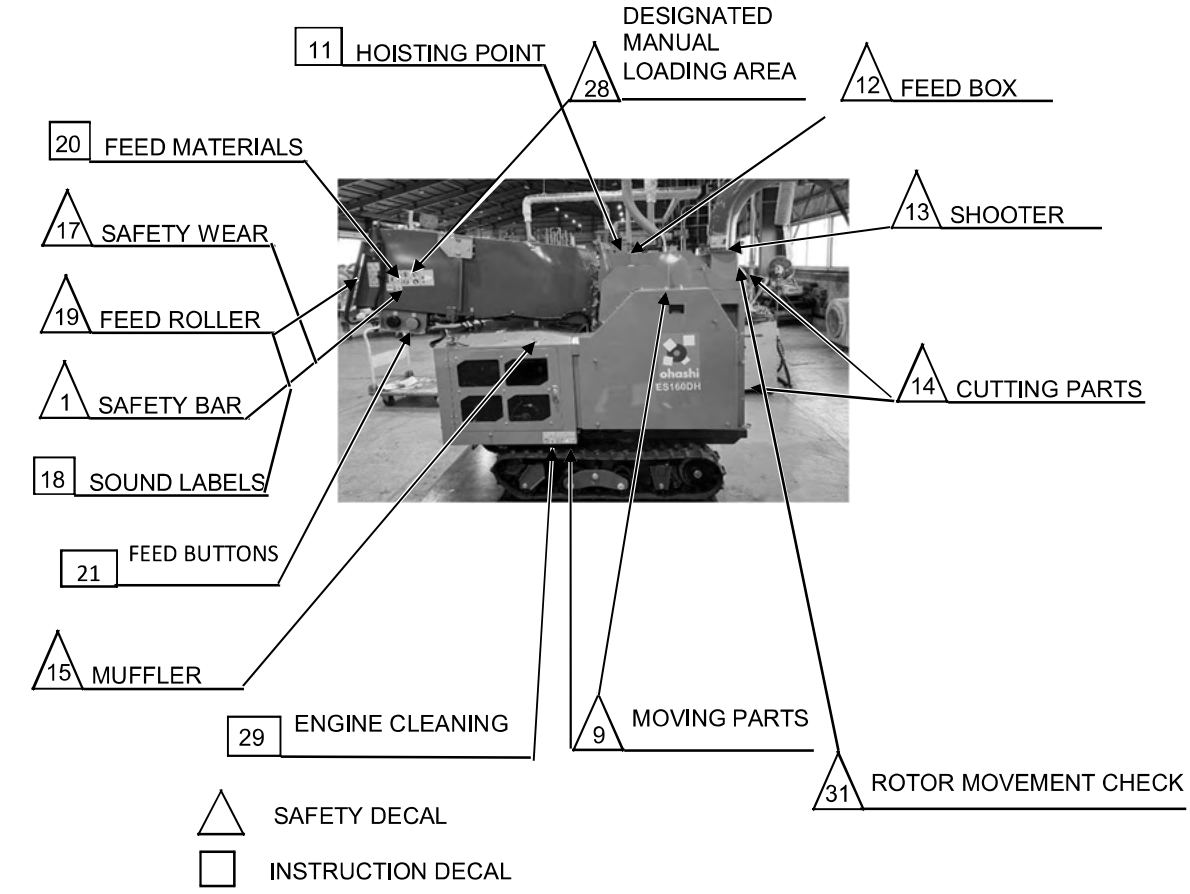
△ SAFETY DECAL

□ INSTRUCTION DECAL

DECALS

Before attempting to operate the machine, read these decals and fully understand the instructions and meaning. If any decal is worn, damaged, illegible or missing, obtain new one from our dealers. Safety decals must be placed to their proper location as indicated below.
For locations of other decals, see the following photographs and illustrations and affix them to their respective places. Keep all decals always legible.

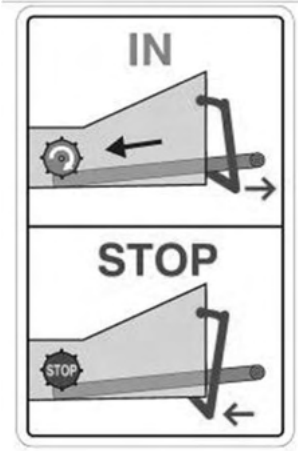
Location of SAFETY decals



DECALS

1 SAFETY BAR

The safety bar operates to stop the feed roller in the case of an emergency.



Pull the safety bar out to activate the feed roller so that feed material is pulled into the machine.

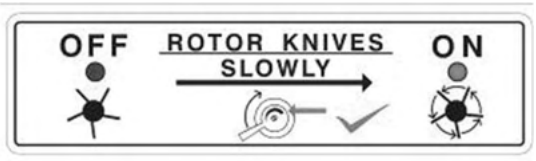
Push the safety bar in to de-activate the feed roller so that the feed roller no longer move.

2 IDENTIFICATION PLATE

The details of Ohashi inc., the CE mark and the specific details of the machine purchased.

3 ROTOR CLUTCH LEVER

The rotor clutch lever activates the rotor.



Pull the rotor clutch lever from OFF to ON slowly.
Ensure the throttle is at full.
Pause between OFF and ON so that the rotor clutch engages.

DECALS

4 HYDRAULIC HOSE

Do not touch the hydraulic hoses and their connections to the hydraulic pump, hydraulic motor and hydraulic tank. They are dangerous.

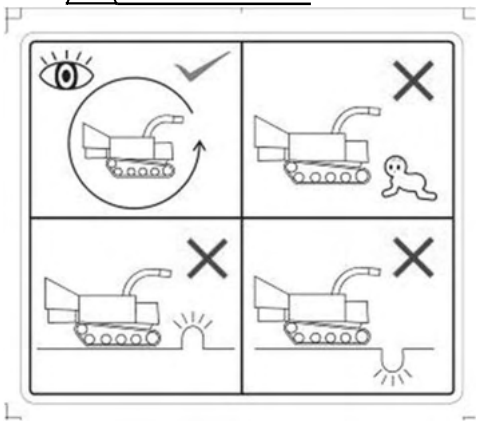
Refer to "**Re-fueling**" section in this user manual for more safety information.

5 BEFORE STARTING ENGINE

As well as reading the user manual and checklists before starting the engine users must especially take care of the following 6 points to maintain the machine in good condition and prevent damage to the machine.

DECALS

6 SAFE AREA OF OPERATION

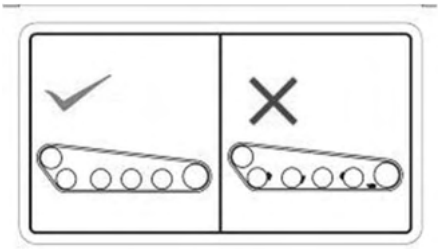


The area around the machine should be checked thoroughly before operating the machine.

Check for things you may not see from the operators control area.

Be careful not to damage the crawlers or the transmission by driving into holes or over obstacles.

7 CRAWLER



The crawlers and the area between the crawler wheels should be kept clean and free of materials to prevent damage to the transmission.

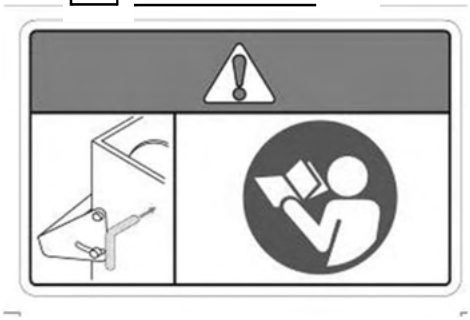
9 MOVING PARTS

Engine belts and other moving parts of the engine and machine can be danagerous and cause injury if touched during motion.

Do not attempt to remove covers while the machine is running or moving parts are moving.

DECALS

10 ROTOR LOCK PIN



When performing maintenance on the rotor, on the knives or when clearing out the rotor the rotor lock pin can be used to prevent injury from rotating knives.

Refer to "**Remove & Affix Knives - Chipper Knives**" in this user manual for further instructions.

11 HOISTING POINT

The hoisting point can be used to lift up the machine to perform maintenance and inspections

Refer to "**Hoisting the Machine**" section in this user manual for further instructions.

12 FEED BOX

The feed roller when activated can move up and down creating movement of the feed box. This movement can be dangerous and cause injury so therefore do not approach or put your hands or body near the feed box when the machine is operating.

13 SHOOTER

The shooter dispatches wood chips at a fast speed and may cause injury if the chips hit a person.

Before operating the machine check that the area around the machine is clear of persons and especially around where the chips are dispatched from the machine.

DECALS

14 CUTTING PARTS

Moving parts here will cut flesh and cause serious injury if touched by a persons hands or other body parts.

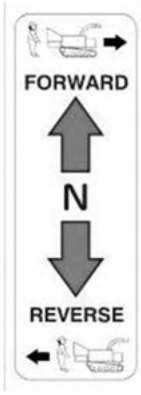
Do not remove safety covers while the engine is on or moving parts have not yet stopped.

15 MUFFLER

The muffler is hot during and after operation. Do not touch or a burn injury may occur.

Even after use the muffler may remain hot.
Wait until the machine cools down before making any contact with the muffler.

16 TRANSPORT LEVER



The transport levers allow the machine to move forward or in reverse and left and right

To initiate the movement of the machine, move the transport levers to FORWARD, REVERSE or STOP.
To turn the machine to the left hand side, return the transport lever(L) to the "N" position while driving and the machine turns left.
To turn the machine to the right hand side, return the transport lever(R) to the "N" position while driving and the machine turns right.

DECALS

17 SAFETY WEAR

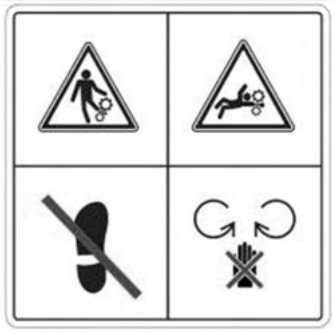
Read the user manual, and wear helmet, ear protectors, eye protectors, gloves and non-snag clothing before using the machine.

18 SOUND LABELS

Sound labels display the sound levels which users are likely to be exposed to.

Users must use ear protection equipment when operating this machine and must insist other people close to the machine also wear ear protectors.

19 FEED ROLLER

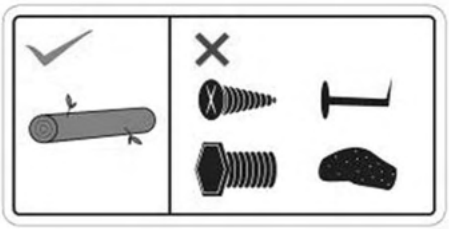


If caught in the feed roller serious injury will occur.

Do not place your hands, feet or any other body part near the feed rollers.

Do not attempt to climb into or on the lower edge of the hopper or you may be caught in the feed roller.

20 FEED MATERIALS

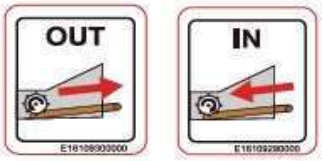


The machine is only designed to chip organic material like wood.

Do not place sand, dirt, metal, stones, plastic, rope, clothing, cardboard, books, newspapers rubber, glass or any other non-wood material into the hopper to be chipped or damage will occur to the machine.

DECALS

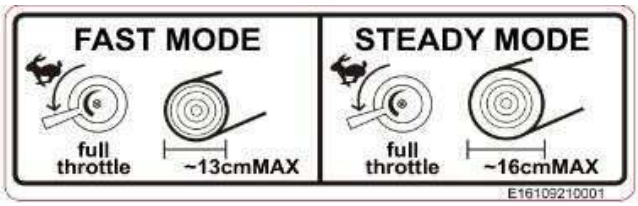
21 FEED BUTTONS



The feed buttons control the movement of the feed roller.

Push the black button in and hold to reverse the direction of the feed roller so that material is ejected out of the hopper.
Momentarily touch the black button in and quickly release to to stop the feed roller movement.
Push the green button IN to activate the feed roller to pull materials into the rotor.

22 FEED MODE SWITCH



The feed mode switch allows the user to match and optimize the feeding settings to the material being chipped.

Move the switch to "FAST MODE"
for the fastest chipping of branches no larger than than 13cm wide. Move the switch to "STEADY MODE" to if branches are 14cm or greater wide. Feed speed may reduce.

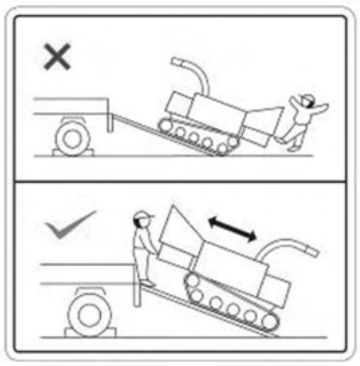
23 CUTTING & CHIP PROJECTILE

Moving parts may cut flesh and cause serious injury. Feed material occasionally projected out of the hopper can cause injury.

Do no place hands or body parts near the area where moving parts may cut flesh and cause injury. Do not remove covers while the machine is on or moving parts have not stopped.

Do not stand in front of the hopper while the machine is processing feed material. Stand to the side to avoid being struck by feed material that occasionally projects out of the hopper.

24 LOADING & UNLOADING



Load and unload the machine in the correct manner or injury may occur.

When loading or unloading the machine onto a truck, trailer, van or higher platform using ramps do not stand on the downward side of the machine. Always stand upward from the machine in the higher position so that if the machine rolls or tumbles you are in a safe position.

DECALS

25 CRUSHING RISK

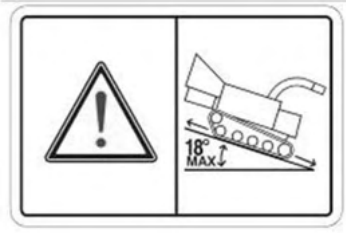
Be careful to avoid being crushed by the machine.

Be careful not to have your feet or other body parts crushed under the moving crawlers.

Be careful not to be crushed while driving the machine between the machine and another object.

Be careful not to drive the machine at a dangerous speed on a slope or on a slope which is too steep or the machine may tip and crush you.

26 SLOPE STABILITY 1



Only drive the machine up/down a slope of 18° or less.

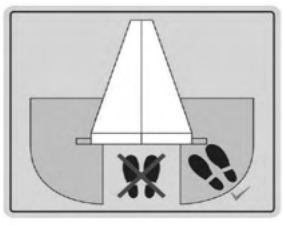
When driving the machine anywhere do not drive the machine on a slope of more than 18° in a straight up or down direction on the slope.

27 SLOPE STABILITY 2

Only drive the machine across a slope of 5° or less.

When unloading or loading or when driving the machine anywhere do not drive the machine on a slope of more than 5° in a horizontal across direction along the slope.

28 DESIGNATED MANUAL LOADING AREA

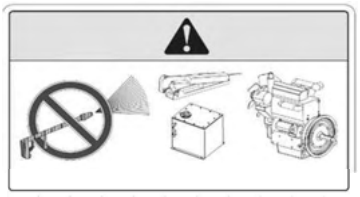


Chips can reflect back and hit the operator so after feeding the materials into the machine it is safer to stand to the side

While operating the machinery there is a risk of chips or other material reflecting back towards the operator.
To avoid any accident or injury after feeding the material into the hopper, stand to the side as indicated in the sticker.

DECALS

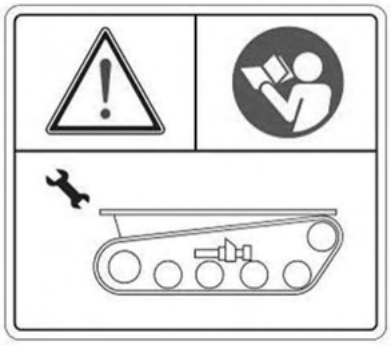
29 ENGINE CLEANING



Machinery damage from water exposure

Ensure when cleaning, water does not reach the engine, oil tank or any electrical components or damage may occur.

30 CRAWLER ADJUSTMENT



Crawler tension should be checked before operation.

The crawlers can be adjusted with adjust rod nut. Adjust the crawler when they become loose.

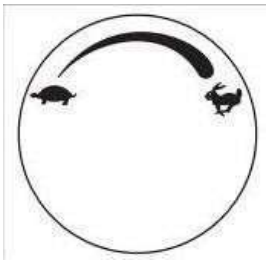
Refer to "**Rubber Crawler**" in this user manual for further instructions.

31 ROTOR MOVEMENT CHECK

The rotor can spin for a long time after cutting power via the clutch or engine. Do not open the rotor cover until the rotor has been confirmed to be not moving.

Ensure that the rotor is not moving before opening the rotor cover, by checking via the Rotor Observation Window. Never open the rotor cover unless the rotor has come to a complete stop.

32 FLOW CONTROLLER



The flow controller allows the user to adjust the feeding speed of the feed roller.
(OPTION)

Turn the flow controller clockwise to process process materials faster and produce large chips and anti-clockwise to process materials slowly and produce small / fine chips.

USE OF THIS MACHINE AND SPECIFICATIONS

USE OF THIS MACHINE

This operating machine is designed to chip / shred wood and other similar organic materials.
Make sure before chipping that no materials such as soil, sand stones, metals, bottles etc. are contained in the wood.

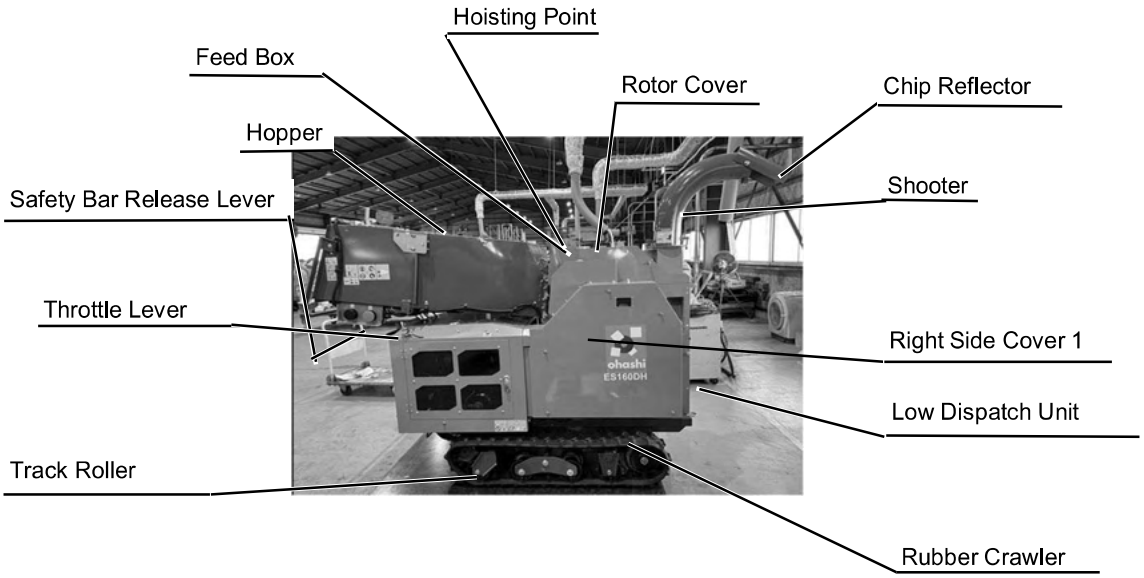
SPECIFICATIONS

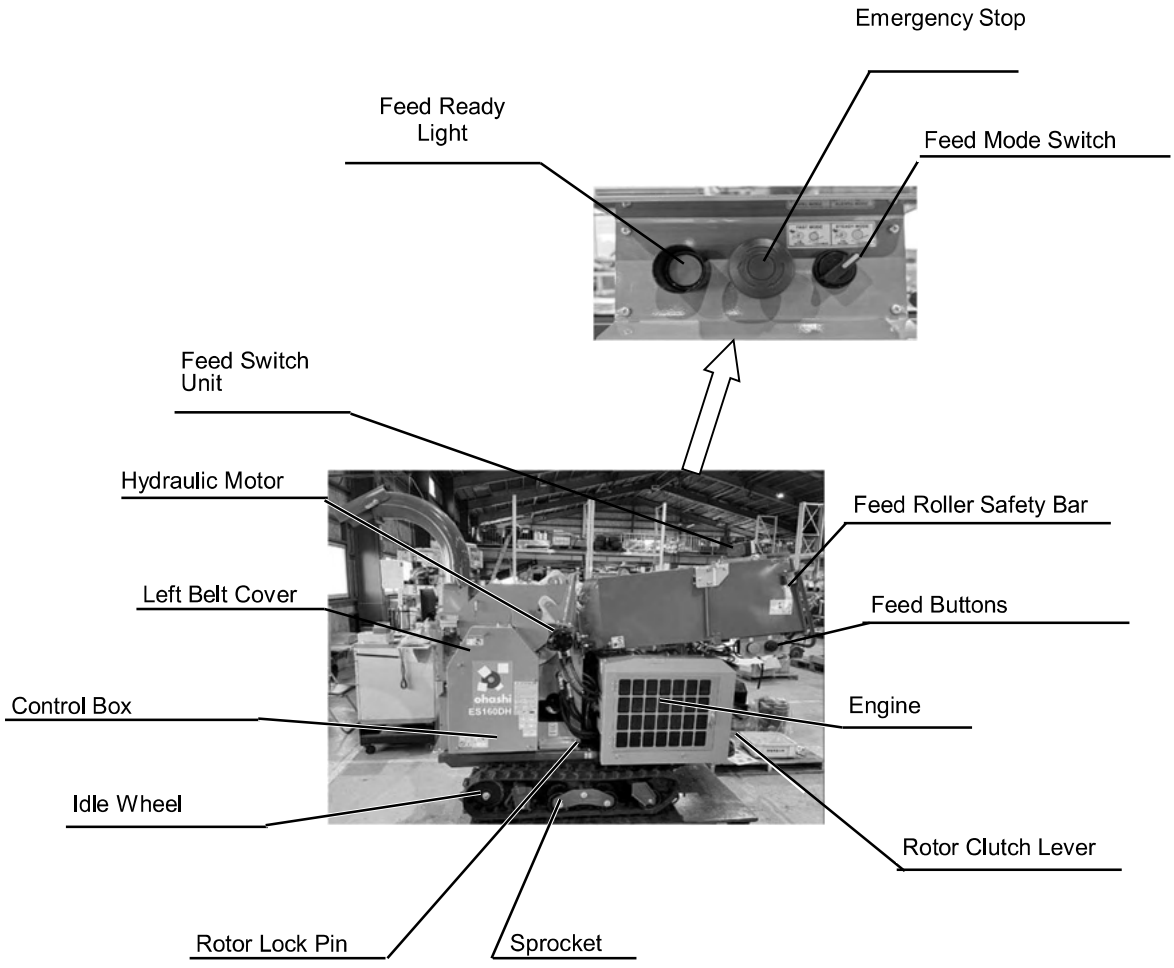
Description	Wood chipper / shredder
Model No.	ES160DH
Overall LengthxWidthxHeight (mm)	In use - 2500x810x1765 In transport - 1720x810x1765
Weight (kg)	850(kg)
Drive	Belt clutch, V-belt
Max. diameter of wood treated (mm)	160 (soft wood)
Cutting	2 chipper knives, 1 counter knife and 16 shredder knives
Infeed dimensions (mm)	160x370
Feeding system	Independent hydraulic motor integrated with automatic no stress electronic system
Discharge system	Fan forced shooter
Height of duct (mm)	1765
Discharge angle	Adjustable in 270°
Transport system	Rubber crawler
Transport speed	Forward : 2.0 Km/h
	Reverse : 2.0 Km/h
Engine Model	Kubota D902-E4B
Max. output	24.7 PS / 18.2 kW
Fuel tank capacity (ℓ)	Approx. 22, Diesel

Note: As product improvement takes place, specifications may change without prior notice.
For engine and battery, refer to respective manufacturer handling manuals.

NAME OF THE COMPONENT PARTS

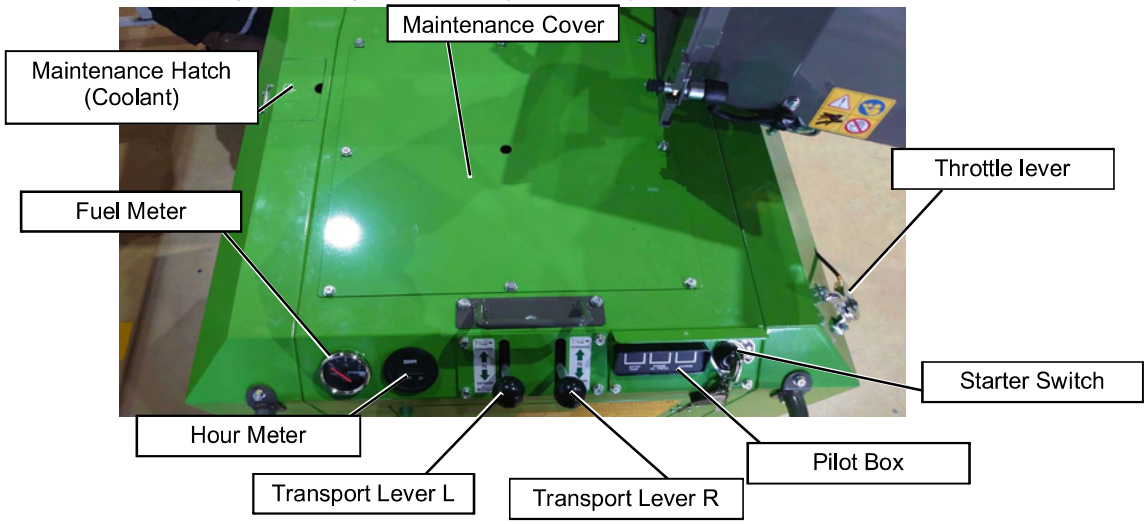
See the machine with your own eyes and identify each component.

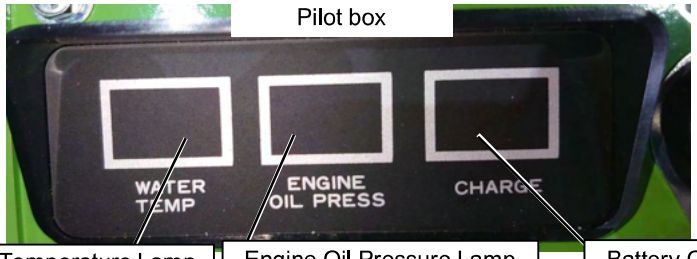




NAME OF THE COMPONENT PARTS

See the machine with your own eyes and identify each component.





CAUTION

After starting the engine, if either of the 3 lamps (TEMPERATURE, OIL, BATTERY) above the ignition key turn on and stay on, there is a problem. Please stop operating the machine and switch the engine off.

Water Temperature Lamp: The engine overheating (turn off the engine and let the machine cool down).

Engine Oil Pressure Lamp: Engine oil is running very low (refill).

Battery Charge Lamp: The baterry is not charging (parhaps the fan belt has broken).

PRE-OPERATING SAFETY CHECKLIST

To prevent injuries and fire hazards, comply strictly with the following instructions.

BEFORE STARTING ENGINE AND ACTIVATING RUBBER CRAWLERS

1. All safety and operating sections of User Manual **MUST** have been read, understood and applied where applicable.
2. **CHECK** all machine safety covers, guards and housing are closed and fitted securely with securing devices, bolts, locks etc and if engine is running **DO NOT REMOVE.** Do not lose covers' nuts and bolts.
3. Walk at least once around machine to **ENSURE** there are no obstacles, people or small children near machine and / or rubber crawlers and maintain your visibility of surrounding areas at all times.
4. **ENSURE** Rotor Clutch Lever is in OFF position,
5. **ENSURE** machine is in a well ventilated, open area. Exhaust fumes are very dangerous when breathed.
6. **ENSURE** machine is located on a flat, stable area.
7. **CHECK** for fluid leaks. If found **CONSULT** User Manual or dealer to locate the source and apply a remedy.
8. **WEAR** appropriate clothing, helmet, protectors for eyes, ears and gloves for hands. Clothing **MUST** fit operator tightly. Loose clothing **MUST** be avoided as it may get caught and pull operator into machine, causing serious injury or death.
9. **NEVER** smoke while operating machine or when handling fuel for refueling or transport. **NEVER** refuel or handle fuel near open flames or uncovered electric lighting.

BEFORE OPERATING THE CHIPPING FUNCTIONS (Feed Roller and Rotor)

1. **TEST** Feed Roller Safety Bar and Emergency Safety Button is working properly in Emergency Stop Position and Forward Feed Roller Position. If it is not working contact your dealer to repair the bar / button and / or it's sensor immediately.
2. This machine is designed to chip / shred wood and similar organic material. **ENSURE** soil, sand, stones, metals, rope, glass, wires and other such non-organic man-made materials are **NOT** contained in material to be inserted for chipping / shredding.
3. **DO NOT** operate machine's chipping / shredding functions on slopes and / or inside a building.
4. **ENSURE** that no person is located close enough to the shooter / low dispatch unit to be struck by wood chips and that dispatch units are securely fixed in position so as not to move during operation.
5. **ENSURE** before chipping and switching the Rotor Clutch Lever ON, that the engine is at full throttle.

BASICS

1. **NEVER** have safety covers off or refuel with engine on, parts still moving, key in machine or machine hot.
2. **PERFORM** inspections or tests of machine in an open, flat area free of obstacles and hazards.
3. **REPLACE** all covers, guards and housing parts after any inspection is performed.
4. If you feel any strange noise / vibration in machine, **STOP** the engine and **AFTER** moving parts have stopped consult your User Manual, inspect machine and if necessary contact your dealer.
5. Before leaving machine unattended, **CONFIRM** that engine is off with key removed and all moving parts stop, the Rotor Clutch Lever is in the OFF position.
6. **INSPECT** and clean machine parts after use.
7. **NEVER** drive up / down a slope slanting more than 18 ° or drive sideways on a slope slanting more than 5° and always stand up slope from the machine when driving.
8. **DO NOT** operate in insufficient lighting or in a situation where visibility is poor.
9. **DO NOT** operate machine if tired, sick or under the influence of drugs or alcohol.
10. **DO NOT** allow a child and / or untrained person to operate machine.
11. Where materials become caught in Feed Roller **DO NOT** remove directly with hands. **USE** a wooden broom or other such long wooden object to remove stuck material.
12. **STAND** to the side of Hopper during operation to avoid being hit by infeed materials returning irregularly.
13. **DO NOT** place hands near the Feed Box while the Feed Roller is in operation.

PRE-OPERATING MACHINE CHECKLIST

To keep machine in top working condition, comply strictly with the following instructions.

1. **CLEAN** air cleaner.
2. **CHECK** engine oil level, cleanliness and for any spillage (SE grade or above). ※1
3. **CHECK** for cracks and / or wear on the chipper knives.
4. **CHECK** for cracks and / or wear on the counter knife.
5. **CHECK** for cracks and / or wear on the shredder knives and that the knives axle is secure.
6. **RETIGHTEN** the bolts of chipper knives and counter knives.
7. **GREASE** Lubrication Points as per the User Manual Lubrication Chart using a lithium grease.
8. **LUBRICATE** machine parts as per the User Manual Lubrication Chart and ensure machine has sufficient Diesel. ※2
9. **CHECK** the hydraulic system (tank, pump, motor) for hose wear and cracks, oil leaks, and loose connections (nuts and bolts etc) and that the tank contains enough oil. ※3
10. **CLEAN** engine and rubber crawlers.
11. **CHECK** for incorrect tension, cracks and / or wear of belts and chains.
12. **RECORD** the hours indicated on the Hour Meter.
13. **CHECK** that the tension of the wire engaging the rotor clutch is appropriate and effective.
14. **CHECK** the battery fluid is full and the battery terminals are clean.
15. **ENSURE** the screen is installed before commencing chipping operations. Chipping hard materials without the screen may cause damage to the blower fins.

Notes:

※1 Engine oil must be replaced in first 50 hours and then every 100 hours.

※2 Diesel as motor car

※3 Hydraulic oil - ISO VG46 or equivalent viscosity.

Refer to the User Manual List of Consumable Parts and the Regular Service and Maintenance sections for parts details and instructions for regular service and maintenance.

HOW TO OPERATE MACHINE

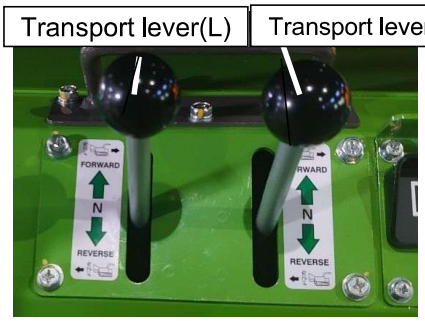
DANGER

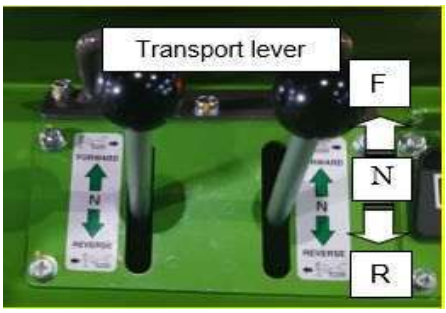
Read the Pre-Operating Safety Checklist and Pre-Operating Machine Checklist before starting the engine.

Whenever the terms "Right", "Left", "Forward" and "Reverse" are used in this manual, they indicate the directions from the operator facing forward looking into the hopper.

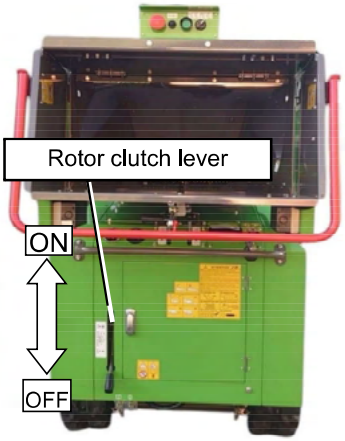
STARTING THE ENGINE

1. Make sure that the Transport levers are in neutral "N" .

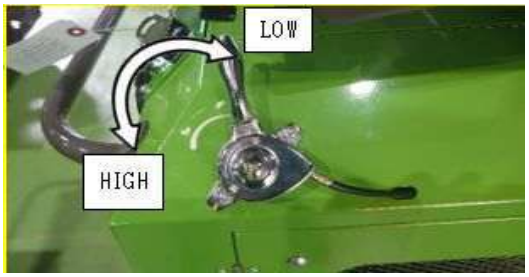




2. Rotor clutch lever should be in the "OFF" position.



3. Move the throttle lever to low.

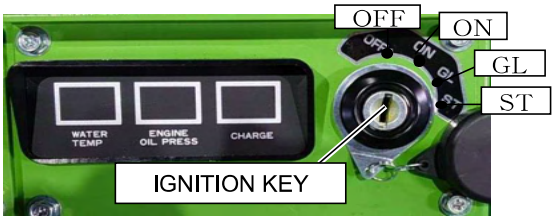


4. Insert the ignition key and turn it clockwise to "ON" (red lamp turns on). Turn the key further to "GL" and hold at that position for 3~5 sec to warm the starter motor when the outside temperature under 5°C.

Turn the key further to right to "ST" and when the engine starts running, release your hand from the key immediately (the key returns to "ON" automatically).
Never hold the key in "ST" more than 5 sec. If the engine doesn't start, wait for about 10sec, then try again.

CAUTION

If the engine is warm, there is no need to operate the GL.



HOW TO OPERATE MACHINE

5. After turning on the engine, run in LOW throttle for 5 minutes before starting chipping (Refer to the engine manual.)

CAUTION1

Never hold the ignition key in "GL" more than 10 seconds.
Even if it's difficult to start the engine, don't turn the key to "ST" many times repeatedly. It can make the battery run out or the starter burn out. If the engine doesn't start even after trying 4 or 5 times, wait for about 30 sec. then try again.

CAUTION2

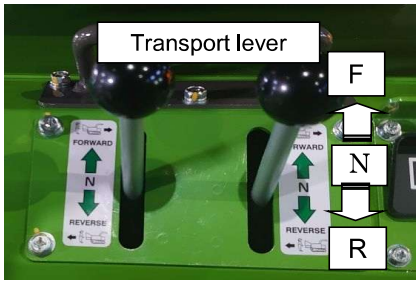
Before stopping the engine, the engine should run in low idling to cool down for 5 min
(Refer to the engine manual.)

CAUTION3

If the engine oil pressure lamp and battery charge lamp(next to key switch) do not light up when turning the key on, the lamp may be burnt out. Replace the lamp with a new one.
*In particular, those lamps is important for visual confirmation during the chipping.

HOW TO DRIVE THE MACHINE

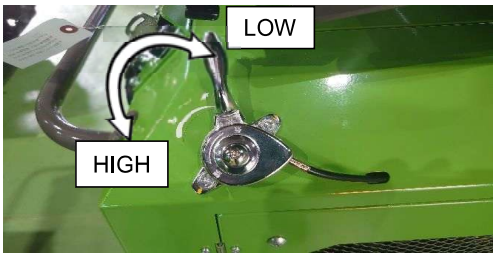
1. Both the transport levers should be moved in the direction of travel (forward or backward) at the same time.



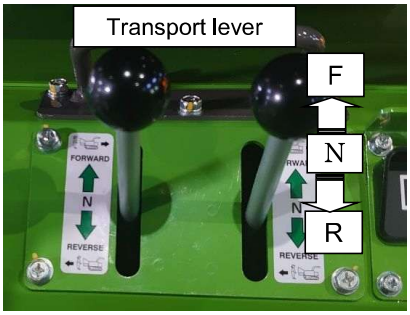
CAUTION

The machine turns when one lever is actuated more than the other.

2. Adjust the throttle slowly to control speed of the machine.

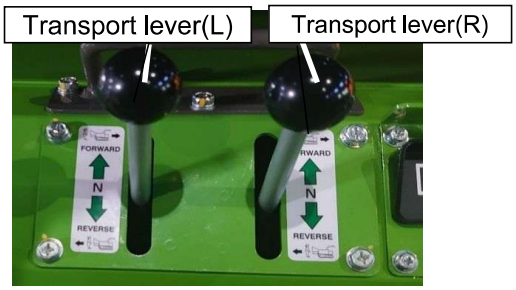


3. Return both transport levers to the “N” position and the machine stops driving.



HOW TO OPERATE MACHINE

TURNING THE MACHINE



1. To turn the machine to the left hand side, return the transport lever(L) to the "N" position while keeping the transport lever (R) actuated and the machine turns left.

2. To turn the machine to the right hand side, return the transport lever(R) to the "N" position while keeping the transport lever(L) actuated and the machine turns right.

CAUTION

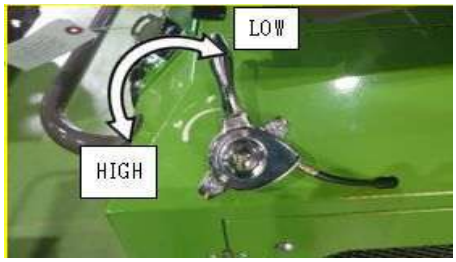
The turning radius can be adjusted at will by the force (amount) with which you actuate the lever. Actuating it lightly will result in a gentle turn, while actuating it strongly will result in a sharp turn.

HOW TO STOP THE MACHINE

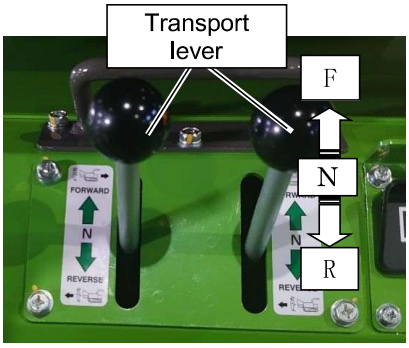
CAUTION

When parking the machine, stop at a flat area. There is a risk that the machine could descend downhill on a slope.

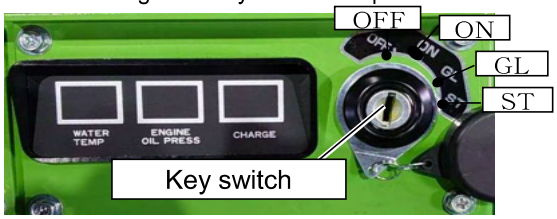
1. Turn the throttle lever to the LOW position and slow down the machine speed.



2. When both levers are moved to the "N" position at the same time, the machine stops.



3. Turn the ignition key to the OFF position.



CAUTION 1

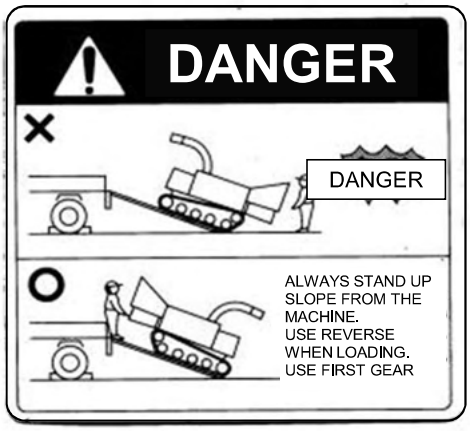
When the machine is left unattended, the key must be removed.

CAUTION 2

Check for any warning lights turning on while operating.

HOW TO OPERATE MACHINE

LOADING, UNLOADING & SLOPES



1. How to load and unload on/from the truck / trailer.
   a) Loading and unloading must be carried out at a flat and safe area.
   b) Stop truck engine, apply parking brake. Wheel stoppers should also be used so that the truck / trailer does not move at all.
   c) Use the ramps which are strong enough and put it in the correct position so that the rubber crawlers of the machine are positioned in the center of the ramps.

2. Suitable ramps for loading and unloading
   a) Strength, width, length and grip must be sufficient for loading the machine on the truck / trailer.
   b) Ramps must have affixing devices such as hooks to affix to the truck / trailer.
   c) The ramps length should be at least 3.5 times longer than the height between the ground and the truck / trailer platform.
   d) The ramp sloping angle when attached to the truck trailer / should be no more than 18 degrees.
   e) Ramp width should be wide enough to meet the width of rubber crawler.
   f) The ramps must be strong enough to accept the machine and operator weight.
   g) Ramps must have enough gripping power so that the machine does not slip on the ramps.

WARNING 1

If using a truck / trailer with a roof, ensure that the operator does not breath exhaust gas when starting the engine to load / unload machine from the truck / trailer. Ensure adequate ventilation.

WARNING 2

Make sure that the ramps hooks are fixed firmly at the truck / trailer platform and there should not be any significant gap and / or step.

WARNING 3

When loading and unloading, never try to change the machine direction or to shift the driving speed on the ramps.

WARNING 4

When the machine passes over the border between the truck / trailer and ramps, the center of gravity of the machine changes suddenly. The operator should know this fact so as to avoid the machine tipping or falling off the ramps.

WARNING 5

During transportation in a truck / trailer, the machine transport levers must be in its original position.
The machine should be fixed firmly inside the truck / trailer to prevent the machine moving and wheel stoppers should be put against the crawlers.
Serious accident may happen if the machine is not fixed firmly inside the truck / trailer.

WARNING 6

Never drive up / down a slope slanting more than 18 ° or drive sideways on a slope slanting more than 5° and always stand up slope from the machine when driving.

WARNING 7

Ensure machine does not roll or fall off ramps.

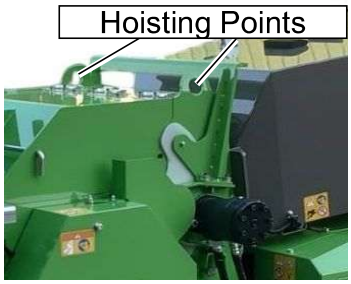
HOW TO OPERATE MACHINE

HOISTING THE MACHINE

CAUTION 1

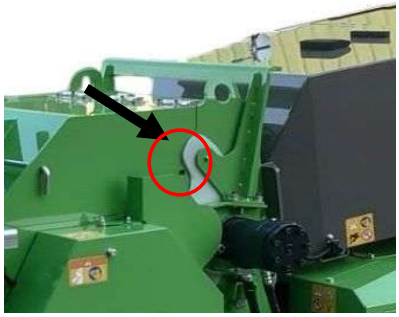
When hoisting the machine maintain the correct balance, and ensure your hoisting apparatus can maintain the weight of the machine.

1. Use the hoisting point on the machine as indicated in the picture below.



2. Remove the hoist setting pin from its location as indicated in the picture below.

3. Insert the hoist setting pin in the hole as indicated in the picture below.



CAUTION 2

The hoisting point is designed only to lift the weight of the machine. Ensure the hoisting point is not damaged before use.

HOW TO OPERATE MACHINE

CHIPPING OPERATIONS

DANGER

1. Read the **Pre-Operating Safety Checklist** and **Pre-Operating Machine Checklist** before starting the chipping operation.

2. Pay attention to the muffler and surrounds because it becomes very hot during the operation and after operation.

3. Check the emergency safety bar is functioning before commencing chipping operations. See **Feed Roller Safety Bar** section.

POSITION THE SHOOTER

CAUTION 1

Dust arising from dispatched wood chips that gathers around the engine can cause engine troubles. Therefore, consider wind direction and position the shooter direction accordingly.

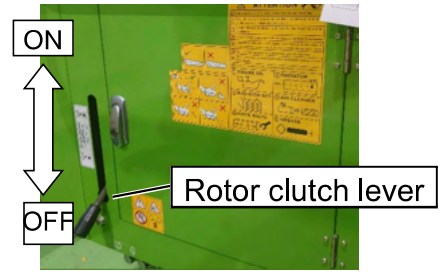
CAUTION 2

In the case whereby the shooter becomes clogged, place the rotor clutch lever to OFF, turn off the engine, and wait for moving parts to stop before attempting to unblock.

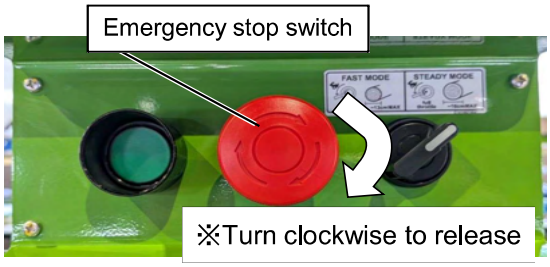
1. Use the shooter handle to turn the shooter to the direction desired.

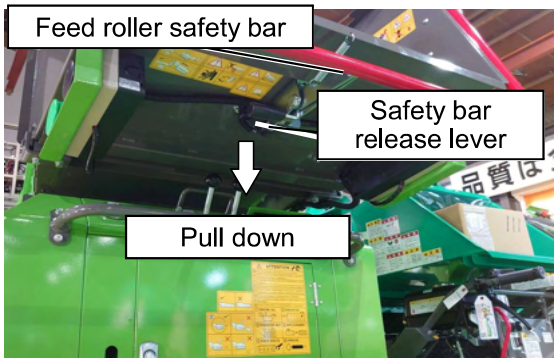
2. Secure the shooter tightly in position.

ROTOR CLUTCH

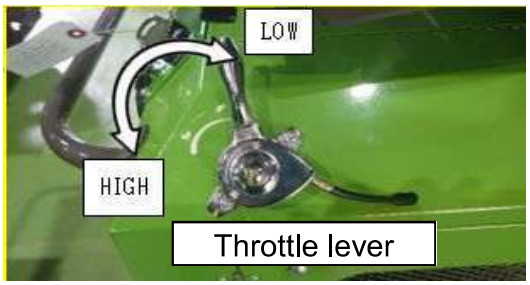


1. Check that the feed roller safety bar and emergency stop switch are dis-engaged.

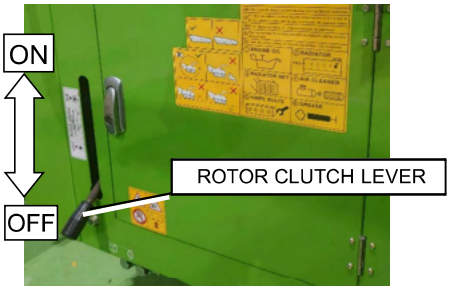




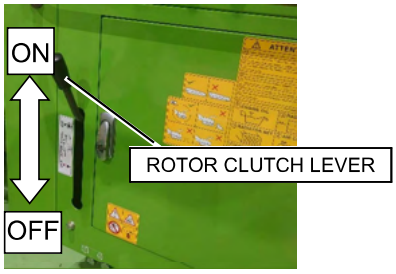
2. Ensure the rotor clutch lever is in the "OFF" position.
   Move the engine throttle lever to the high position, running the engine in full throttle.



3. Slowly move the rotor clutch lever from the OFF position to the ON position while checking that there is no extra-ordinary vibrations and hold the rotor clutch lever in the middle position between OFF and ON for 5 seconds, before fully moving it to the ON position.



5. Move the rotor clutch lever to the ON position slowly.

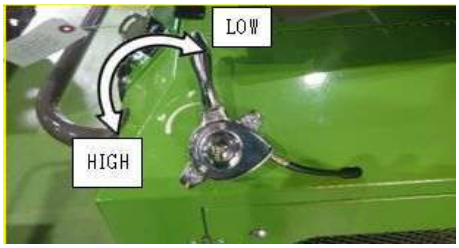


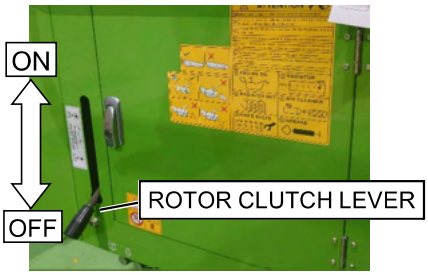
6. The machine should be operated for chipping only at the maximum engine power.

CAUTION 1

To avoid the belt damage always move the rotor clutch lever SLOWLY from OFF to ON slowly.

7. To stop the rotor, turn the throttle lever to low and position the rotor clutch lever to OFF.





HOW TO OPERATE MACHINE

FEED ROLLER OPERATION

DANGER

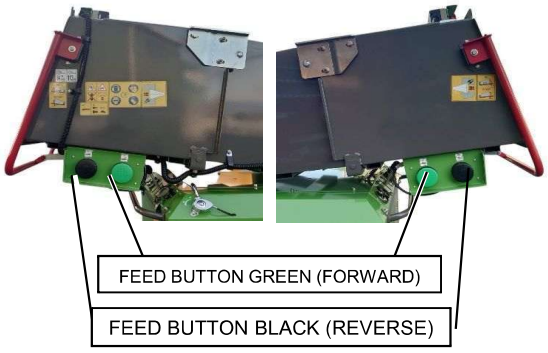
1. Do not place hands or feet near the feed roller at any time.
2. Do not attempt to remove materials stuck in the feed roller directly with your hands.
3. Ensure that the machine and engine parts have stopped when removing stuck materials from the feed roller.
4. Do not place your hands into or near the shooter or low dispatch unit while the engine is running.

FEED BUTTON

1. Pushing the feed button Green (Forward) makes the feed roller rotate pulling material into the rotor.
2. While pushing the feed button Black (Reverse) makes the feed roller rotate pulling material out of the rotor and exit via the hopper.

NOTE

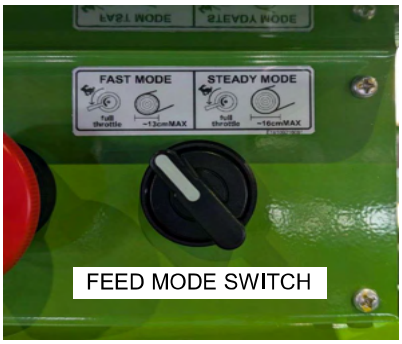
The no stress electronic automatic feeding system will stop the feed roller momentarily when the engine is heavily loaded and start the feed roller again once the engine is moving freely.



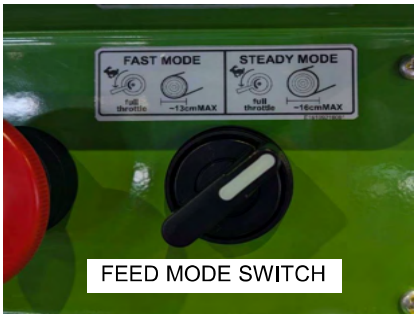
FEED MODE SWITCH

The feed mode switch allows the user to match and optimize the feeding settings to the material being chipped.

1. Left position: Fast Mode
   Move the switch to "FAST MODE" for the fastest chipping of branches no larger than 13cm wide.



2. Right position: Steady Mode
Move the switch to "STEADY MODE" for branches of 14cm or larger. Feed speed may reduce.



HOW TO OPERATE MACHINE

FEED ROLLER SAFETY BAR

The feed roller safety bar allows the user to stop the feed roller in an emergency and if necessary without using their hands (as shown below).
Check of safety functions before starting work with the machine.

ENGAGE FEED ROLLER SAFETY BAR

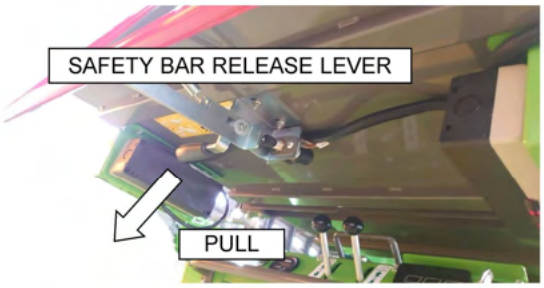
1. After starting the engine, putting the engine to full throttle and putting the rotor clutch to ON.

2. Push the feed button green (forward)

3. Push the feed roller safety bar in (toward the rotor) and check that the feed roller has stopped.

DISENGAGE FEED ROLLER SAFETY BAR

1. Pull the safety bar release lever to release the feed roller safety bar.



2. Return the feed roller safety bar to its original position, pulled in the direction toward the operator. At this moment, the feed roller must not start yet.

3. Push the feed button green (Forward) again. Check that the feed roller has started again.

CAUTION 1

Do not remove, jam, disable, bypass, override or otherwise impede the effectiveness of the feed roller safety bar.

CAUTION 2

Do not position the hopper in higher or lower positions such that the effectiveness of the safety bar is compromised.

HOW TO OPERATE MACHINE

FEED ROLLER EMERGENCY STOP

Check that all the safety security parts are working before using the machine.

1. Push to stop feed roller

2. Turn clockwise to restart the feed roller.

3. Push the feed button green (Forward) again.

CAUTION

When the emergency stop and feed roller safety bar are activated, the cause of the activation must be investigated.

START CHIPPING WORK OPERATIONS

After reading and understanding all the instructions in this "How to Operate Machine" section you may commence chipping operations.

Note

Maximum diameter of infeed materials allowed is 16 cm for soft wood.

FEED ROLLER CLOGGING RELEASE

DANGER

Ensure the engine and chipping components have come to a complete stop before attempting to release any clogged material from the machine.

Do not use your hands to remove materials stuck in the feed roller.

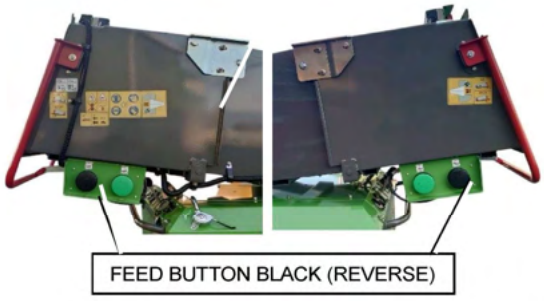
Use a wooden broom or other wooden instrument to remove stuck materials.

Do not place hands near the feed roller / feed box.

Be careful of the feed roller and feed box when clogged material is released from under the feed roller. When clogged material is released, the feed roller suddenly drops down and would crush a persons hands.

Avoid injury and be very careful of sharp knives when unclogging the rotor and use gloves.

1. Push the feed button black (Reverse) and clogged material will be released via the hopper.



IF ROTOR OR FEED ROLLER WILL NOT TURN

1. Move the rotor clutch lever to OFF and then turn the engine off and remove the key.
2. Wait for all engine parts and chipping components to stop moving.
3. Move the rotor clutch lever to the ON position which will stabilize the rotor.
4. Open the rotor cover.
5. Unclog the rotor of clogged materials.
6. Replace the rotor clutch lever to the OFF position.

REGULAR MAINTENANCE

DANGER

1. Before any inspection or maintenance:
   a) Switch Rotor Clutch Lever - OFF

   d) Switch Engine OFF and remove key

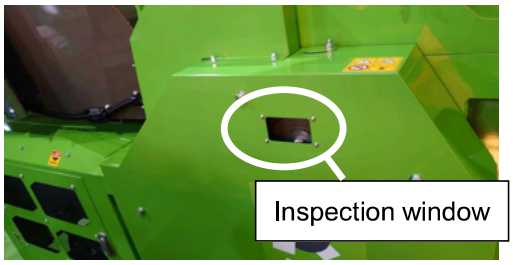
2. ENSURE that machine and engine parts are **NOT MOVING** and / or hot.

3. WEAR gloves when handling knives. Be careful as the knives are very sharp.

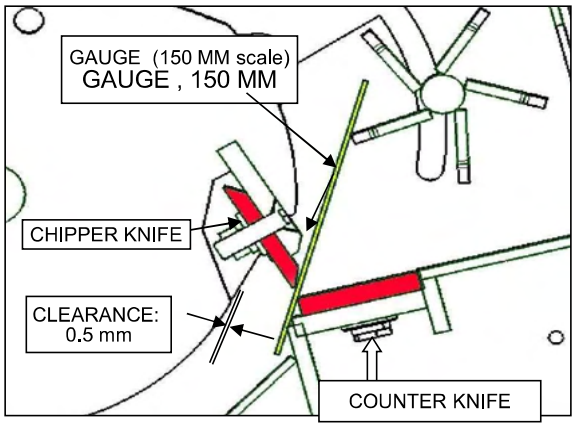
4. REPLACE all covers, guards and housing parts after inspection.

CAUTION

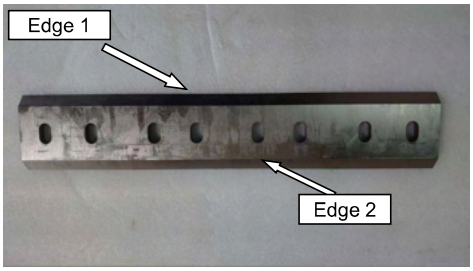
Check the inspection window to ensure the rotor is not moving.



KNIFE BASICS



CHIPPER KNIFE - LIFE AND SHARPENING

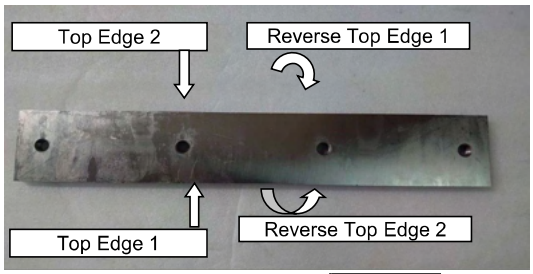


Cutting Edges	*Use*
Edge 1	*25 hrs*
Alternate edge (Turn)	
Edge 2	*25 hrs*

Sharpen both edges and use again

Note: Sharpen approx. 5 times (300 hrs knife life). Refer "**Remove & Affix Knives**" to alternate edge.

COUNTER KNIFE - LIFE AND SHARPENING



Cutting Edges	*Use*
Top Edge 1	*50 hrs*
Alternate edge (Turn)	
Top Edge 2	*50 hrs*
Alternate edge (Flip)	
Reverse Top Edge 1	*50 hrs*
Alternate edge (Turn)	
Reverse Top Edge 2	*50 hrs*

Sharpen all four edges and use again

Note: Can sharpen approx. 3 times = 800 hrs knife life. Refer to "**Remove & Affix Knives**" to alternate edges.

REGULAR MAINTENANCE

If chipper or counter knives becomes dull, it can cause clogging, extra noise, and rotor overloading.
Check knives regularly for damage, cracks or dullness. or chipping efficiency is reduced.
Always clear dust, dirt or chips before affixing knife bolts or they may become loose easily.

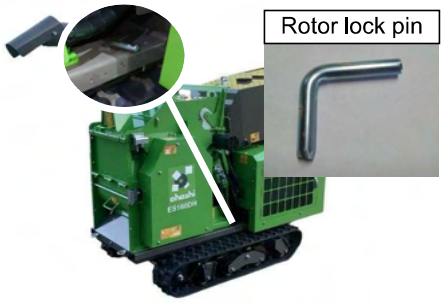
REMOVE & AFFIX KNIVES - CHIPPER KNIVES

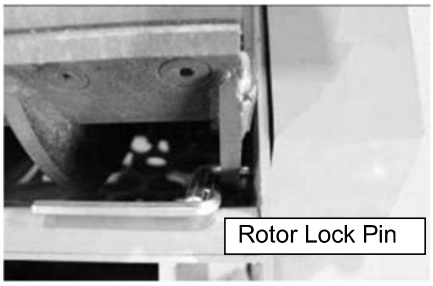
WARNING

ALWAYS turn engine OFF before opening covers.
ALWAYS put rotor clutch lever to OFF position and **wait till moving parts STOP** before starting maintenance.

1. Remove bolts and open the rotor cover.

2. Take the rotor lock pin and insert in rotor so that the rotor does not move (see pictures below).





3. Insert a hex key into the 8 socket bolts affixing the chipper knife to the rotor and loosen the nuts on the other side.

4. Remove chipper knife and alternate edges by turning knife or replace knife. Tightly secure socket bolts (110 N.m torque wrench).

5. After mounting the chipper knives, the clearance between chipper knives and counter knife MUST BE ADJUSTED according to "**Knife Adjustment**".

6. Remove the rotor lock pin and close the rotor cover and affix the rotor cover fixing bolts tightly.

IMPORTANT

ALWAYS perform knife adjustment after moving knives. Refer "**Knife Adjustment**" in this manual.

1) Replace spring washers after moving knives.

2) When replacing knives, also replace bolts, nuts, spring washers and plain washers.

REGULAR MAINTENANCE

KNIFE ADJUSTMENT (IMPORTANT)

After removing or affixing either chipper or counter knives **clearance between the chipper knife and the counter knife must be adjusted correctly.**

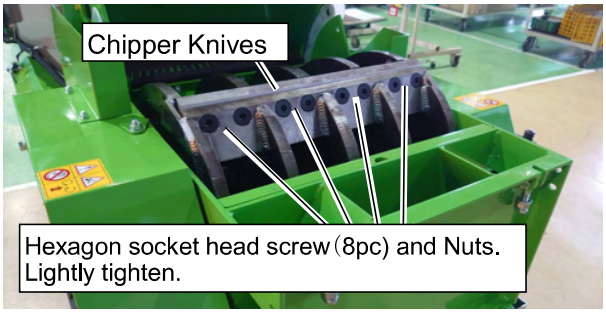
WARNING

ALWAYS turn engine OFF before opening covers.
ALWAYS put rotor clutch lever to OFF position and **wait till moving parts STOP** before starting maintenance.
When replacing knives, replace both chipper knives not just one of them.

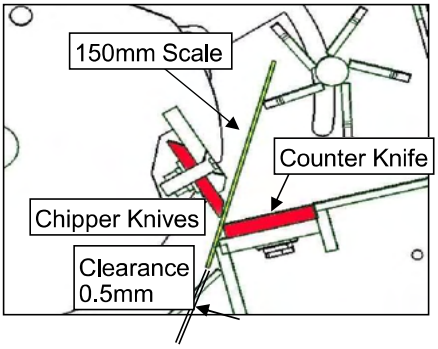
Refer to "**Remove & Affix Knives**" section of this manual for instructions on loosening knife fixing bolts.

1. Insert the rotor lock pin

2. Loosen chipper knife fixing bolts per instructions at "**Remove & Affix Knives**", but do not remove.



3. Remove the rotor lock pin and using one 150 mm scale and adjust the clearance between the counter knife and chipper knife.
Rotate the rotor slowly by hand to check that the chipper knives don't hit the counter knife and that there is a gap approxmately 0.5 mm.



4. When adjustmet is done, tighten the 8 fixing bolts tightly with 110Nm torque.

5. Remove the rotor lock pin and secure the rotor cover with bolts.

REGULAR MAINTENANCE

RE-FUELING

DANGER

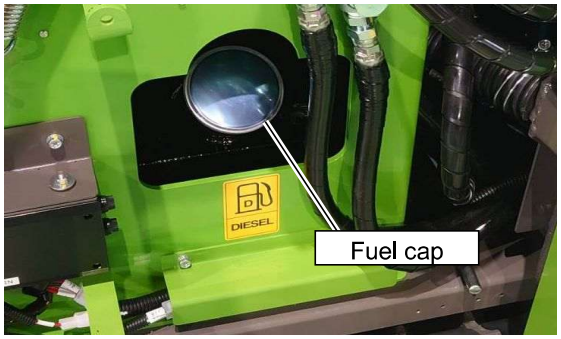
1. NEVER remove safety covers or refuel with engine on, parts still moving or machine still hot.
2. Never smoke while handling fuel or when servicing engine. Do not handle fuel or service engine near naked flames or uncovered electrical lighting.
3. Carry out any test drives on a level ground in an open and safe place where there is no obstruction.
4. Replace all covers, guards and housing parts after inspection and service.

CAUTION

Check the inspection window to ensure the rotor is not moving.

ADDING DIESEL

1. Open the fuel cap and fill tank with diesel.



For fuel, use diesel that complies with EN590 or ASTMD975 standards. Approximately 22.0L can be filled when the tank is full. Substitute fuels should not be used as their quality is unknown and kerosene has a very low cetane number and is harmful to the engine. Also, please use different types of diesel depending on the temperature.

2. Replace the fuel cap.

Refer to the diagrams below for guidance.

	Oil type	Capacity	Oil Change Interval
Engine Crank Case	CF, CH-4, CI-4, SAE10W-30 or higher	3.7 ℓ	After first 50 hrs. then every 100 hrs.
Hydraulic Tank	ISO VG46 (or equivalent)	23.0 ℓ	Every 300 hrs.

Contact your dealer to arrange the hydraulic oil change if necessary.

IMPORTANT 1

Use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble in the fuel injection pump.

IMPORTANT 2

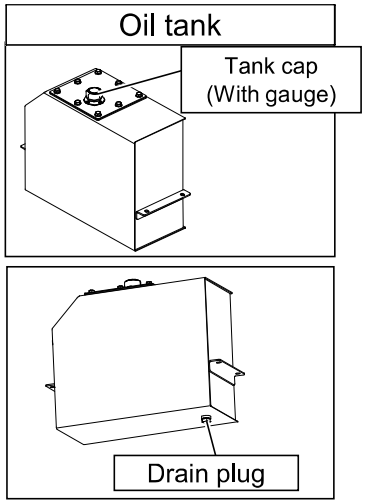
Be careful not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.

REGULAR MAINTENANCE

HYDRAULIC TANK OIL

CAUTION

Hydraulic oil can be extremely hot after use. Please wait for the oil and machine to cool down after use before attempting to replace or inspect it.



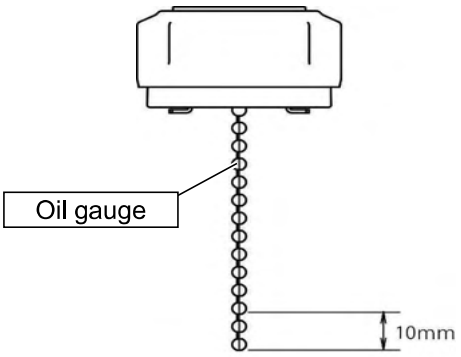
1. Changing the hydraulic oil

(1) Remove the tank drain plug and drain all the oil and replace.

(2) Be very careful not to allow dust, material fibber or any thing other than oil into the tank.

(3) Use the most suitable hydraulic fluid viscosity equipment to ISOVG 46. Shell Tellus S2 M 46 is recommended.

(4) Check the oil volume with gauge. Add oil if the volume is not enough (within 10mm).



CAUTION 1

Do not wash the hydraulic tank directly with water.

CAUTION 2

If the air temperature is less than 0°C then run the machine lightly for 5 minutes before draining the oil.

HYDRAULIC HOSE

Before using the machine ensure all the hoses, pipes and attachments acting as a medium for the hydraulic oil are in good condition and do not have any cracks or splits or severe wear.

Contact your dealer and arrange new hydraulic hoses every 2 years regardless of the frequency of use.

DANGER

1. Do not check the hydraulic oil hoses, pipes and fittings with your hands.
2. Hydraulic oil at high pressures will rip through flesh and cause severe injury. Be very careful.
3. Check that the hydraulic hoses and pipes do not rub on other parts of the machine to avoid wear.
4. Any split or damaged hydraulic hoses, pipes or fittings must be replaced before machine use.
5. Secure all hydraulic hose, pipe and fittings tightly before using the machine.
6. If the hydraulic hoses get twisted, use one spanner to secure the fixing and another to turn the hose. After untwisting, tighten hose and fixing very firmly.
7. Hydraulic assembly hoses and other hydraulic fixing parts need torque as per the table below.

Hydraulic Hose	
Size	Metal Fitting required Torque
3/8	34 (N.m)
1/2	59 (N.m)
※ ±10% acceptable variance ※ Do not apply this torque if oil is spilled on hose metal fitting	

REGULAR MAINTENANCE

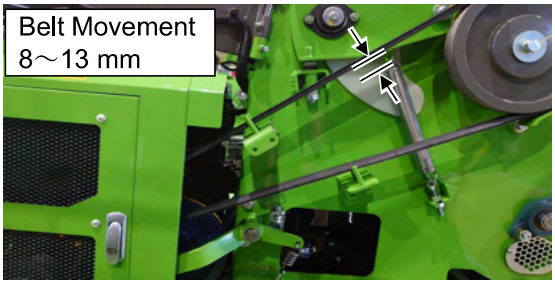
ROTOR CLUTCH

If rotor belt tension weakens, engine power is not transmitted efficiently. Check tension regularly. Belt tension can loosen sooner than usual with new machines. Check before starting operation and adjust when this occurs.

WARNING
NEVER have safety covers off with engine on.

1. Check rotor belt tension

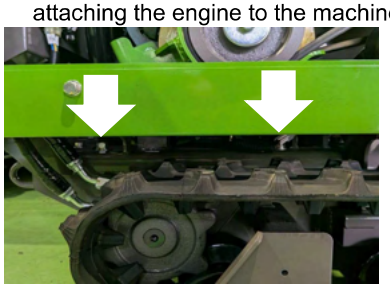
1. Check the belt's tension by putting the rotor to ON (with engine OFF) and push moderately with your finger into the middle of the belt as shown in the picture below. Movement should be 8 ~ 13mm.

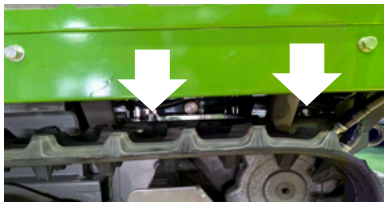


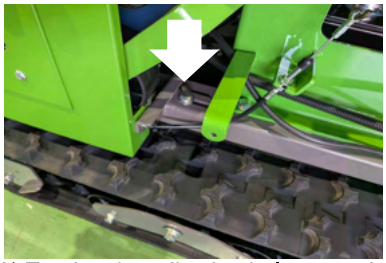
2. Re-tensing of the rotor belt

(1) Put the rotor clutch lever to OFF and adjust the rotor clutch wire adjuster nut so that the wire is as loose as possible.

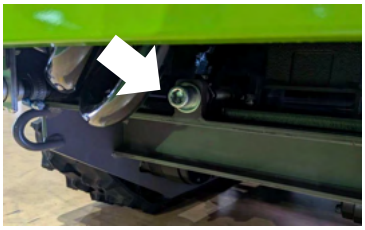
(2) Loosen and remove the M10 nut ✕ 5 attaching the engine to the machine frame.







3) Turning the adjusting bolt, move the engine base to the direction so that the rotor belt is adjusted as required.
Moderately tighten the 5 nuts to secure the engine and check the tension as per **1. Check rotor belt tension.** Loosen 5 nuts and repeat if desired tension is not achieved.



4) When desired belt tension is achieved refit and tighten the 5 nuts securing the engine to the engine frame.

5) Ensure that when the rotor clutch lever is OFF the rotor belt is not engaging the rotor.

6) If proper tension cannot be achieved please contact your dealer for further instructions.

REGULAR MAINTENANCE

RUBBER CRAWLER

Rubber crawler tension must be checked regularly. Especially, when the machine is new, the rubber crawlers can extend.

If adjustment is necessary, contact your dealer for instructions and adjust.

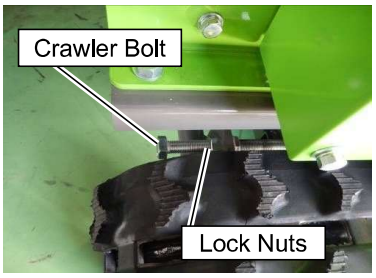
CAUTION 1

Re-tighten the crawler tension within first 10-20 hours operation.

CAUTION 2

The crawler tension on both sides should be same so that the crawler drives straight.

1. Loosen the crawler's lock nuts.



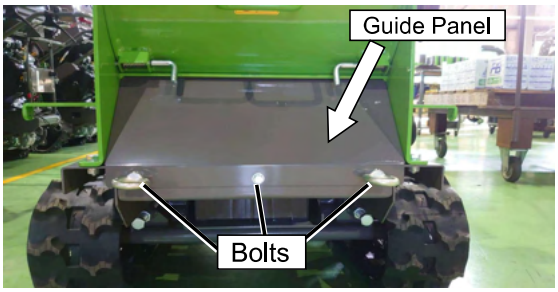
2. Turn the crawler bolt, and adjust.

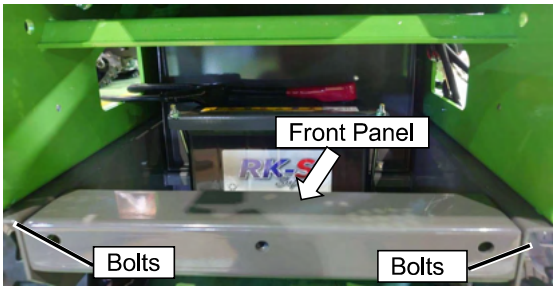
3. Tighten the lock nuts securely.

REGULAR MAINTENANCE

BATTERY

As shown below, remove the bolts securing the metal guide panel and the front panel and open it, to get access to the battery.





DANGER

1. Keep battery away from fire.
2. Keep battery away from children.
3. Securely fasten cable terminal to battery.
4. Never use corroded cable or battery terminal.
5. Wear protective eye protectors and gloves.
6. Be very careful. Electrolyte is sulfuric acid.
7. If electrolyte gets in eye, take following action:
   a) Wash eye with a lot of water.
   b) Go to see eye doctor immediately.
8. Never connect positive terminal and negative terminal with a metallic tool.
9. Never use or charge battery when electrolyte level is under LOWER LEVEL.
10. If electrolyte gets in mouth or is drunk:
    a) Gargle with a lot of water.
    b) Drink a lot of water or milk.
    c) Go to see doctor immediately.

WARNING

1. Never turn over, incline, drop or give shock to battery.
2. Be careful of static electricity. Touch a metallic thing with your hand to release static electricity before use.
3. Never clean battery with dry cloth. Use wet cloth.
4. When replacing batteries or doing maintenance, turn off engine and remove ignition key.
5. Replace batteries in correct way.
6. Never connect positive and negative in reverse.
7. Secure battery with fixing materials.
8. Never modify or dismount battery.
9. When electrolyte adheres to skin or clothes, flush with a lot of water.
10. Never connect electric devices directly to battery.
11. Never use in abnormal circumstances, like unusual Odor, liquid spill and deform in shape.
12. Never cover the 6 vent plugs.
13. Don't add purified water more than UPPER LEVEL.

CAUTION

1. Never use battery when wet.
2. Be careful. Battery is heavy.
3. Never replace batteries with different terminal position.
4. Use battery in ambient temperatures of btw 15°C ~ 60°C.
5. Never add except purified water to battery.
6. Securely fasten vent plug after adding purified water.
7. Place back terminal covers.
8. Don't throw away old battery. Give it to where you buy new battery.

REGULAR MAINTENANCE

BATTERY MAINTENANCE

When doing maintenance, stop the engine and remove the ignition key.

Battery type is **70B24R**.

1. When installing / removing battery, be careful that positive and negative terminals do not touch any metallic part at the same time. If this happens, big damage will occur. Therefore at maintenance, definitely, when connecting, connect negative earth cable at the end and when disconnecting, remove negative earth cable at first.

2. Always keep battery connecting parts clean and secured. If cables are loose, battery can have problems. Ensure battery terminals are covered correctly with the rubber terminal covers.

3. When necessary, clean battery with soap and water. However, be careful soap and water do not get inside of battery.

4. Polish terminal connecting parts with steel wool.

5. Apply a thin layer of inductive silicon grease to terminals and the end of cables. It can protect against corrosion.

6. When electrolyte level in battery is under LOWER LEVEL or close to LOWER LEVEL, loose 6 vent plugs and add purified water up to UPPER LEVEL. Wipe up any liquid on battery with wet cloth.

CHARGE BATTERY

1. Before charging battery, remove it from chipper.

2. Charge it in well-ventilated space and keep away from fire.

3. Check if battery charger is OFF.

4. Connect charger leads to battery. Connect positive connector of charger to positive terminal of battery and negative connector of charger to negative terminal of battery respectively.

DANGER

To prevent injury, keep distance from battery when charge is on. Damage or shortened out batteries can explode.

5. Remove all vent plugs.

6. Charge battery using one of the ways below. Follow the indication regards to charger in the manual provided by the battery maker:
   a) Don't charge fast when engine starter doesn't rotate.
   b) Specific weight of electrolyte when battery is fully charged is 1.280 times that of water at 20°C

7. Reduce amps or temporarily stop charging when following happens:
   - Gas is emitted enormously;
   - Battery case is hot.

8. Before removing charger lead from battery, definitely turn the charger "OFF".

CHANGE BATTERY

When noise produced by rotating engine starter motor is low and weak even soon after charging, it's time to change batteries. Replace battery.

1. Stop the engine and remove the ignition key.

2. Remove negative cable terminal.

3. Remove positive cable terminal.

4. Remove battery fixing materials.

5. Remove battery.

6. Put in new battery and secure it with fixings.

7. Connect positive cable terminal to positive terminal on battery and fasten securely.

8. Connect negative cable terminal to negative terminal on battery and fasten securely and apply a thin layer of inductive silicon grease to terminals and the end of cables.

9. Replace terminal covers.

CAUTION

Dispose of used batteries responsibly

REGULAR MAINTENANCE

ENGINE

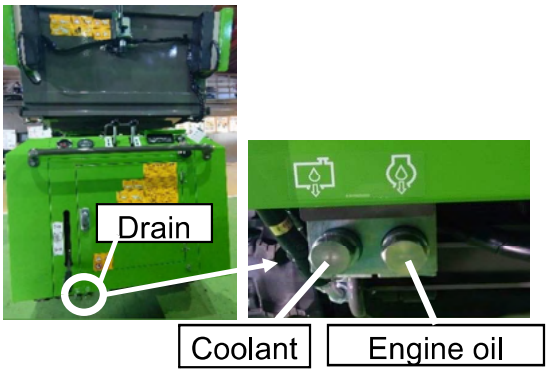
Please refer to the engine manufacturer's manual.

1. Engine oil change

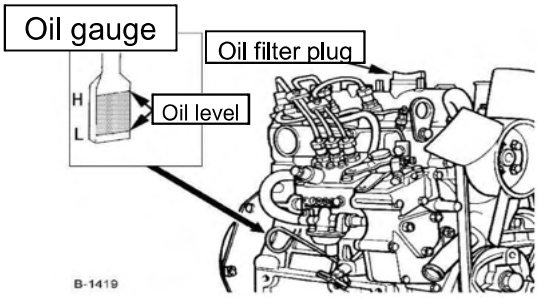
(1) Engine oil change

After first 50 hours of operation
Every 100 hours of operation

Stop the engine. Remove the drain plug at the bottom of the engine, and drain all the old oil. Oil will drain easier when the oil is warm.



Remove the oil filter plug and add new oil to the prescribed level.

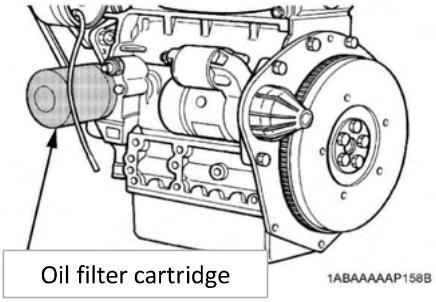


(2) Add new engine oil up to the upper limit to the level gauge. When refiling, be sure that the drain plug is fixed firmly to tank. 3.7 liters of oil can be filed in.

(3) Deteriorated engine oil causes not only a decrease in machine ability but also machine failure. Periodically drain old oil, and fill required amount of new oil (Check oil quality every time before use).

2. Replacement of oil filter cartridge

Replacement of oil filter cartridge
After first 50 hour of operation
Every 200 hours



(1) Apply a film of oil to the gasket for the new cartridge.

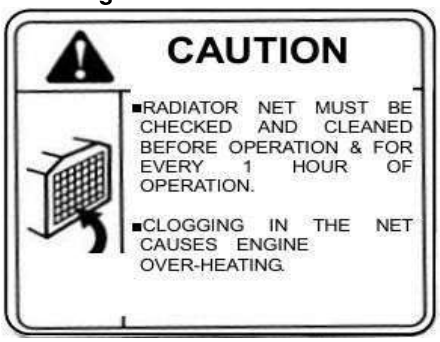
(2) Screw in the cartridge by hand. Because, if you tighten the cartridge with a wrench, it will tighten too much.

(3) After the new cartridge has been replaced, the engine oil level normally decrease a little. Thus, run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.

REGULAR MAINTENANCE

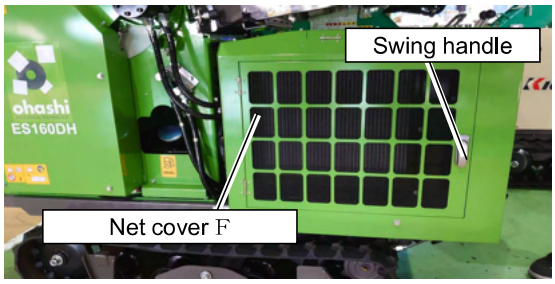
RADIATOR

1. Cleaning of the radiator net



When chips or dust clog in the radiator net or the radiator fins, clean them with a compressed air gun. Must inspect the dust in the radiator net and the fins before starting the operation and every one hour during the operation.

(1) Turn the swing handle and open the cover.

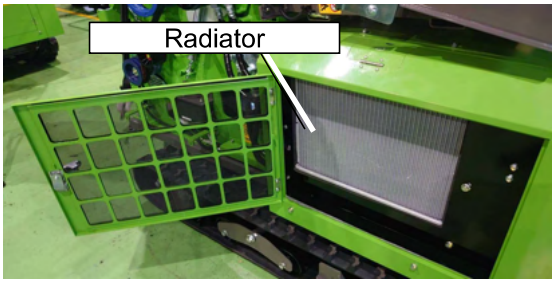


(2) Take out the radiator net and blow chips and dust from it.

(3) Apply the radiator net and close the net cover F.

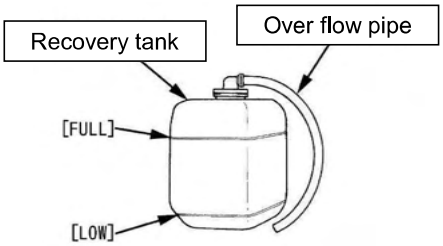
RADIATOR (cont.)

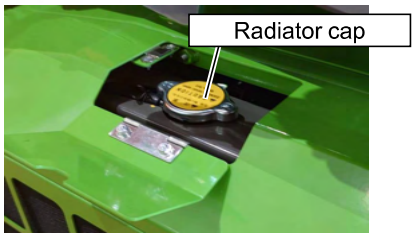
(4) Blow any chips and dust from the radiator itself.



(5) Replace the radiator net, close the cover and fasten on with swing handle.

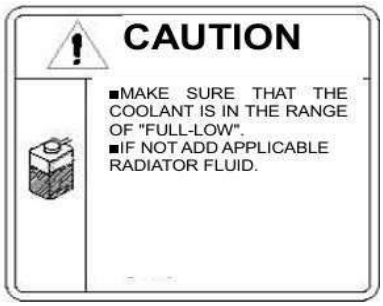
2. Inspection, refill and replacement of coolant in recovery tank.





CAUTION

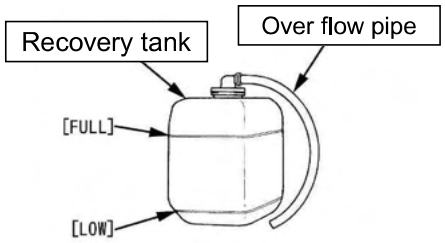
Perform only after letting the engine and radiator cool down completely (more than 30 minutes after it has been stopped). Do not remove the radiator cap while coolant is hot.



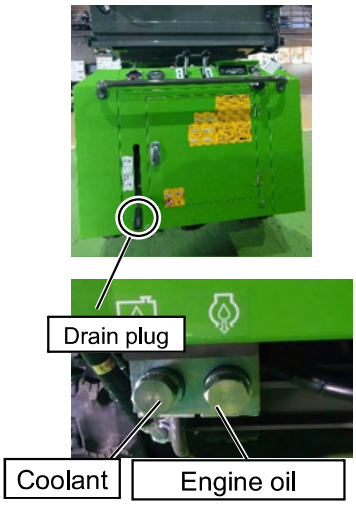
(1) Check the coolant level of the recovery tank before every operation. The coolant must be between FULL - LOW level. Do not refill over FULL level mark.
* If the fluid volume reduces due to evaporation, add clean tap water or soft water to refill.
* If the fluid volume reduces due to leaks or is drained and re-filled for maintenance, use clean, fresh water and 50% anti-freeze to fill the recovery tank.

(2) To drain coolant, always open the drain plug and simultaneously open the radiator cap as well. With the radiator cap kept closed, a complete drain of water is impossible.

(3) Remove the over flow pipe of the radiator pressure cap to drain the recovery tank.



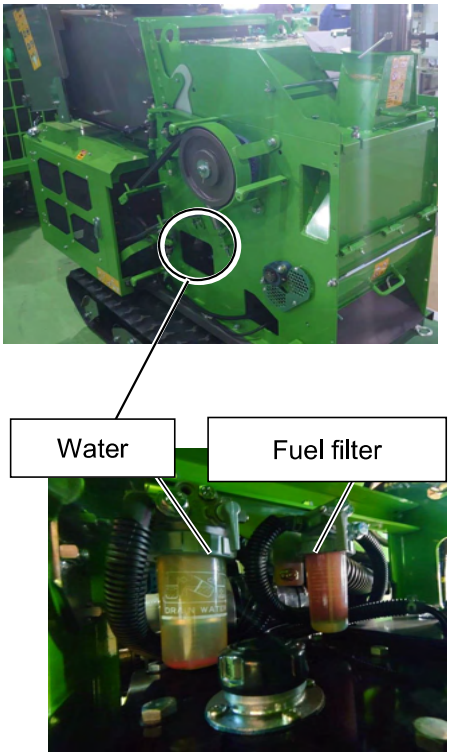
(4) Coolant volume is 3.1 L.



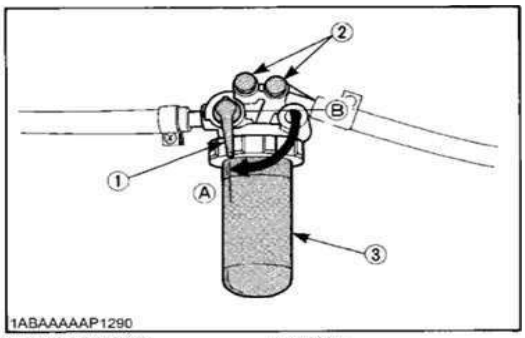
3. Fuel filter cartridge

・Cleaning of fuel filter element

Fuel filter element cleaning
After first 50 hours of operation
Every 100 hours

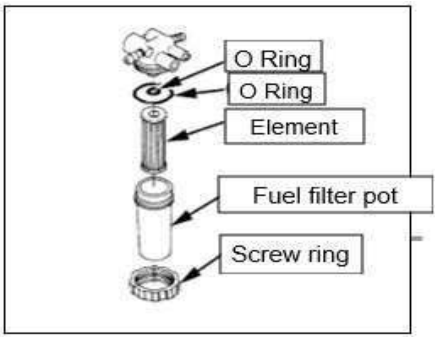


(1) Close the fuel filter lever.



(1) Fuel filter lever
(2) Air vent plug
(3) Fuel filter pot
(A) "ON"
(B) "OFF"

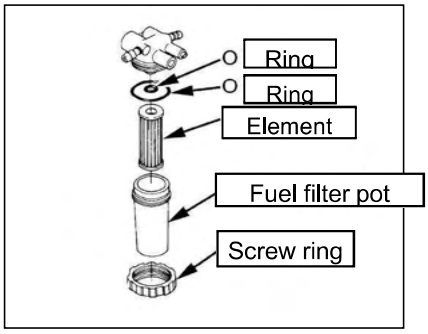
(2) Remove the screw ring and take the fuel filter lever.



(3)Rinse the element in diesel and clean the inside of the filter cup with diesel.

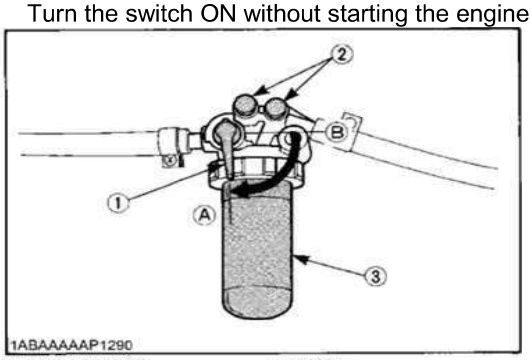
(4) After cleaning, make sure there is no dirt or dust and reassemble correctly as before.

(5) Open the fuel filter lever and carry out the air bleeding (see next section).



4. How to carry out the air bleeding

(1) Fill the fuel tank to the fullest extent and open the fuel filter lever.
Turn the switch ON without starting the engine.

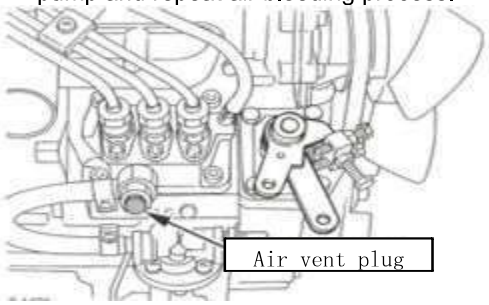


(1) Fuel filter lever
(2) Air vent plug
(3) Fuel filter pot
(A) "ON"
(B) "OFF"

(2) Loosen the air vent plugs a few turns. and allow air bubbles to be released.

(3) Screw back the plugs when bubbles do not come up anymore.

(4) Open the air vent plug on top of the fuel injection pump and repeat air bleeding process.



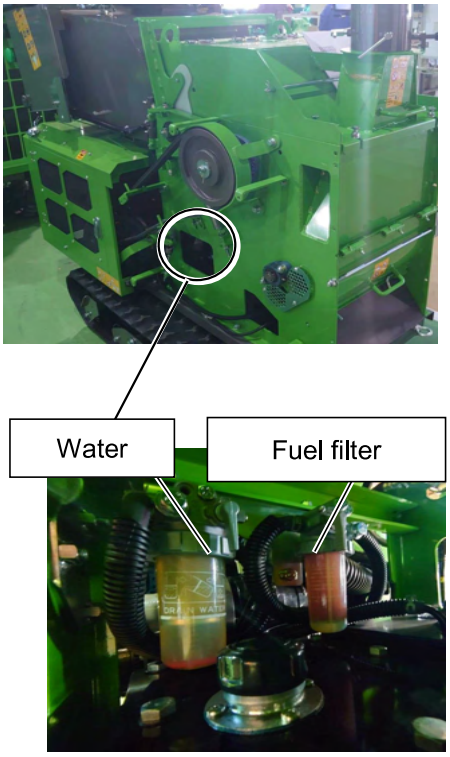
(5) Retighten the plug when bubbles do not come up anymore.

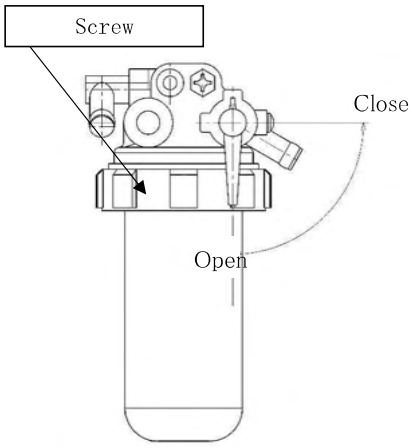
Important

Air vent plug must be closed except when carrying out the air bleeding otherwise the engine may stall.

5. Draining of the water separator

At the bottom of the water separator, water accumulates. When this occurs shut the separator lever on the water separator, loosen and remove the screws fixing the water separator cup, remove cup and discard the water inside before re-attaching.

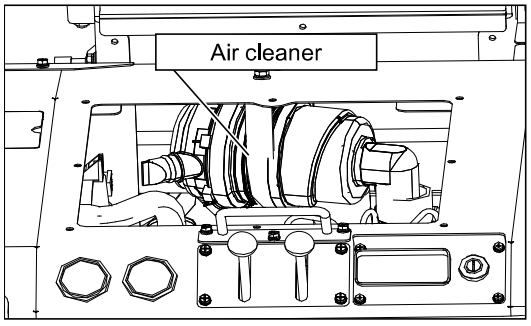




6. Cleaning the air cleaner

The air inlet in the cleaner is an important component that sucks in cooled air for the engine. Failure to clean regularly may lead to overheating of the engine and decrease engine power and life of engine. Keep it clean at all time.

Air cleaner



Remove the cover below when performing maintenance of the air cleaner element.

(1) Remove the element and use an air compressor with air pressure less than 205 kPa(2.1 kgf/cm2) to blow any dust and dirt out from the inside.

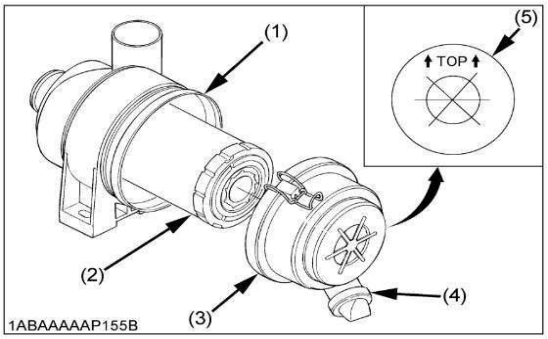
(2) As the element of the air cleaner employed on this engine is a dry type, never apply oil to it.

(3) Open the evacuator valve once a week under ordinary conditions-or daily when used in a dusty place-to get rid of large particles of dust and dirt.

(4) Avoid touching the element except when cleaning.

(5) Check and clean the element before use.

(6) If the element still remains dirty replace.



(1) Air cleaner body
(2) Element
(3) Cover
(4) Evacuator valve
(5) "TOP" mark

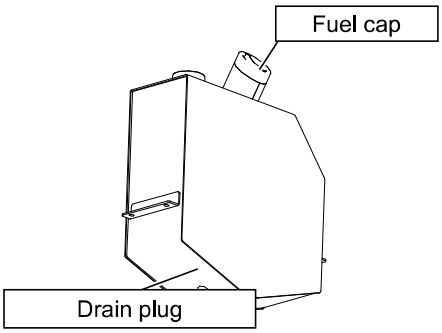
REGULAR MAINTENANCE

FUEL TANK

CAUTION
Fuel is flammable and can be dangerous. You should handle fuel with care.

1. Cleaning of fuel tank

Dust/water needs to be regularly drained from tank.
It is recommended to drain 1-2 liters of fuel.
To drain fuel from the tank, remove the drain plug from the bottom of the tank.



CAUTION 1
Dust and water accumulated in the tank cause the lack of power and also troubles in the fuel system.

3. Air bleeding the fuel system

Air bleeding of the fuel system is required if;
- after the fuel filter and pipes have been detached and refitted.
- after the fuel tank has become empty; or
- before the engine is to be used after a long storage.

REGULAR MAINTENANCE

FAN / FAN BELT

(Refer to the engine operation manual)

Be sure to stop the engine and remove the key before checking fan and fan belt.

(1) Inspect the cracks or damage in the belt. Replace it if needed.

(2) Check the belt tension. Apply modarate thumb pressure to belween the pulleys.
Proper fan belt tension:
A movement of between 7 to 9 mm when the belt is pressed lightly in the middle of the span.

(3) If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and engine block, pull the alternator out until the movement of the belt falls within acceptable limits

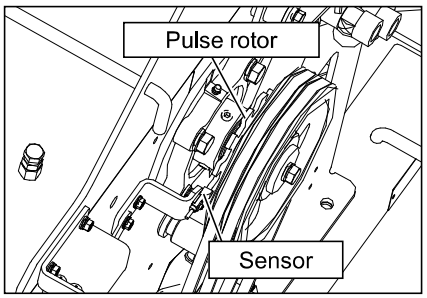
SENSOR

1) When too much load is made on the engine, the sensor detects the overload and controls the feed roller movement. Make sure that any dust is not stuck on the sensor.

2) Make sure that the clearance between sensor and pulse rotor is between 0.8 to 1.2mm. If it is incorrect, adjust it.

3) If the sensor is not fixed firmly, it cannot read the pulse correctly. Fix it firmly.

Sensor



REGULAR MAINTENANCE

EMERGENCY STOP FOR ENGINE

When there is trouble in the engine, the engine itself stops running automatically and the red lamp on the pilot box will turn on. The red lamp on the pilot box will indicate the source of the problem. Refer to engine manual.

When the Emergency Stop System is activated (10 sec. approx.)
It is suspected that over heating or abnormal hydraulic pressure occurred in the engine. Turn the engine key to the OFF position and wait until the engine cools down. Inspect a possible cause in the engine.

CAUTION

The Emergency Stop System works for about 10 seconds. Even the engine stops running, the rotor still keeps running due to inertia and sometimes the rotor makes the engine re-start. To avoid this happening, shift the rotor clutch lever to OFF position immediately when the Emergency Stop System works. For stopping the engine, turn the key switch OFF - ON - OFF.

WHEN ENGINE OVERHEATS

	CAUSES	COUNTER MEASURES
1	Engine oil insufficient	* Check oil level. Replenish oil as required.
2	Fan belt broken or elongated	* Change belt or adjust belt tension.
3	Coolant insufficient	* Replenish coolant.
4	Excessive concentration of antifreeze	* Add water only or change to coolant with the specified mixing ratio.
5	Radiator net or radiator clogged with dust	* Clean net or radiator carefully.
6	Inside of radiator or radiator cap defective	* Replace defective parts.
7	Fan of radiator or coolant flow route corroded	* Clean or replace radiator and parts.
8	Thermostat defective	* Check thermostat and replace if necessary.
9	Temperature gauge or sensor defective	* Check and replace it if necessary.
10	Overload running	* Reduce load.
11	Head gasket defective or water leakage	* Replace parts.
12	Unsuitable fuel used	* Use the specified fuel.

When a hydraulic abnormality occurs in the engine.

	CAUSES	COUNTER MEASURES
1	Engine oil insufficient	* Check oil level. Replenish oil as required.
2	Oil filter clogged	* Clean and adjust it.
3	Oil pump defective	* Clean the oil pump.
4	Relief valve defective	* Replace defective parts.
5	Hydraulic switch	* Replace defective parts.

ENGINE SERVICE INTERVALS

Interval	Part	Item	Remarks
Every 50 hrs.	Fuel, fuel pipes and clump bands	Looseness check	
First 50 hrs.	Engine oil	Change	3.7 liters
	Oil filter cartridge	Change	
	Fuel filter	Clean	
	Fan belt	Adjust	
	Battery fluid	Check	
	Fan	Check	
	Damage in electric wiring and loose connections	Check	
First 250 hrs.	Radiator hoses and clamp bands	Looseness check	
	Intake air line	Check	
Every 100 hrs.	Engine oil	Change	3.7 liters
	Fuel filter	Clean	
	Battery fluid	Check	
	Fan belt	Adjust	
	Fan	Check	
	Damage in electric wiring and loose connections	Check	
Every 200 hrs.	Oil filter cartridge	Check	
	Radiator hoses and clamp bands	Check	
	Intake air line	Check	
Every 450 hrs	Fuel filter cartridge	Change	
	Fuel tank	Clean	
	Separator	Clean	
	Radiator	Clean	
Every 800 hrs.	Clearance of the valve	Check&adjust	
Every 1500 hrs	Fuel injection nozzle	Check&clean	
Every 3000 hrs	Turbo charger	Check	
	Fuel injection pump	Check	
Every 2 years	Fuel, fuel pipes and clump bands	Change	
	Intake air line	Change	
	Radiator hoses and clamp bands	Change	
	Coolant	Change	3.1 liters (30~60% concentration)
	Battery	Change	
As appropriate	Fuel system	Air ventilation	
	Fan belt	Change	
	Air cleaner element	Clean	
	Air cleaner element	Change	
	Separator	Remove water	

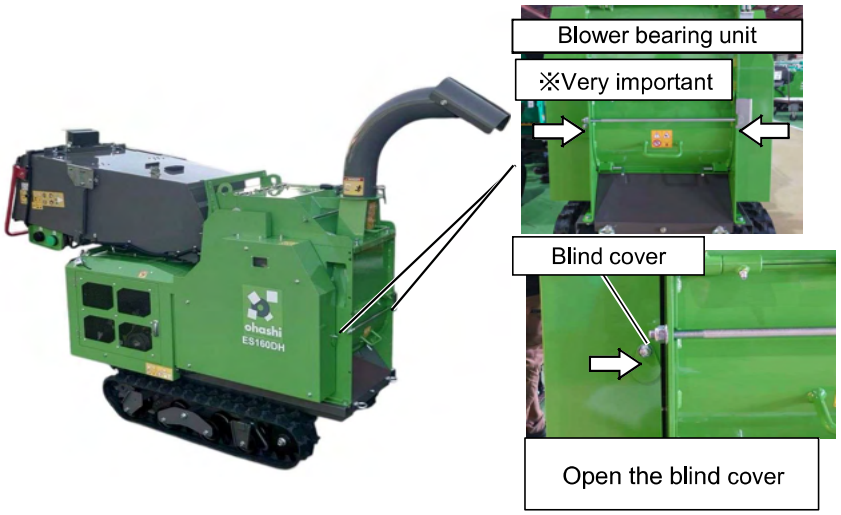
※Refer to the engine user manual for more detail.

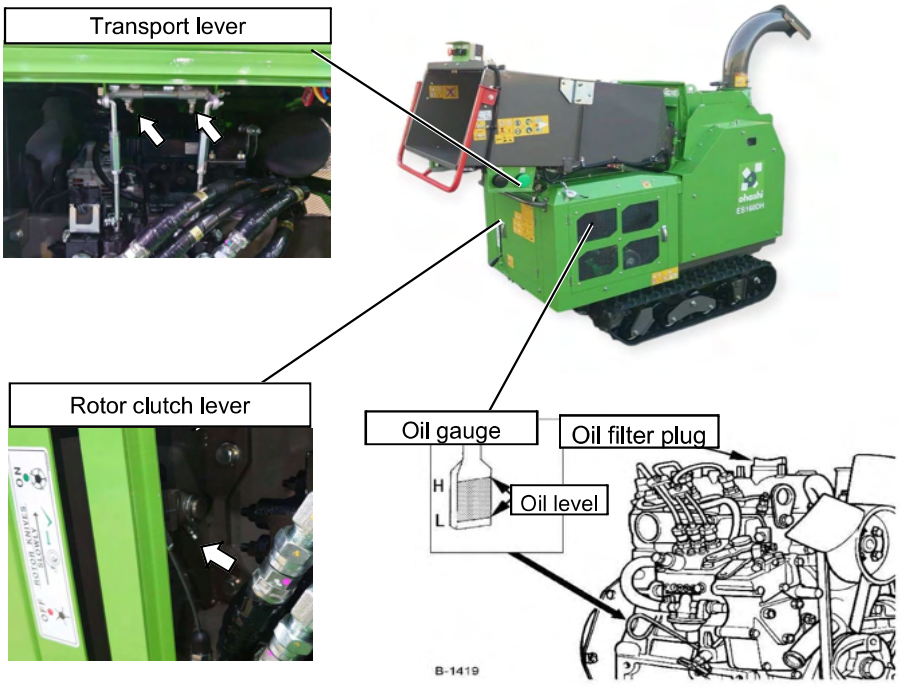
LUBRICATION CHART (Lubrication Points)

Machine oil
Lubricant SAE20

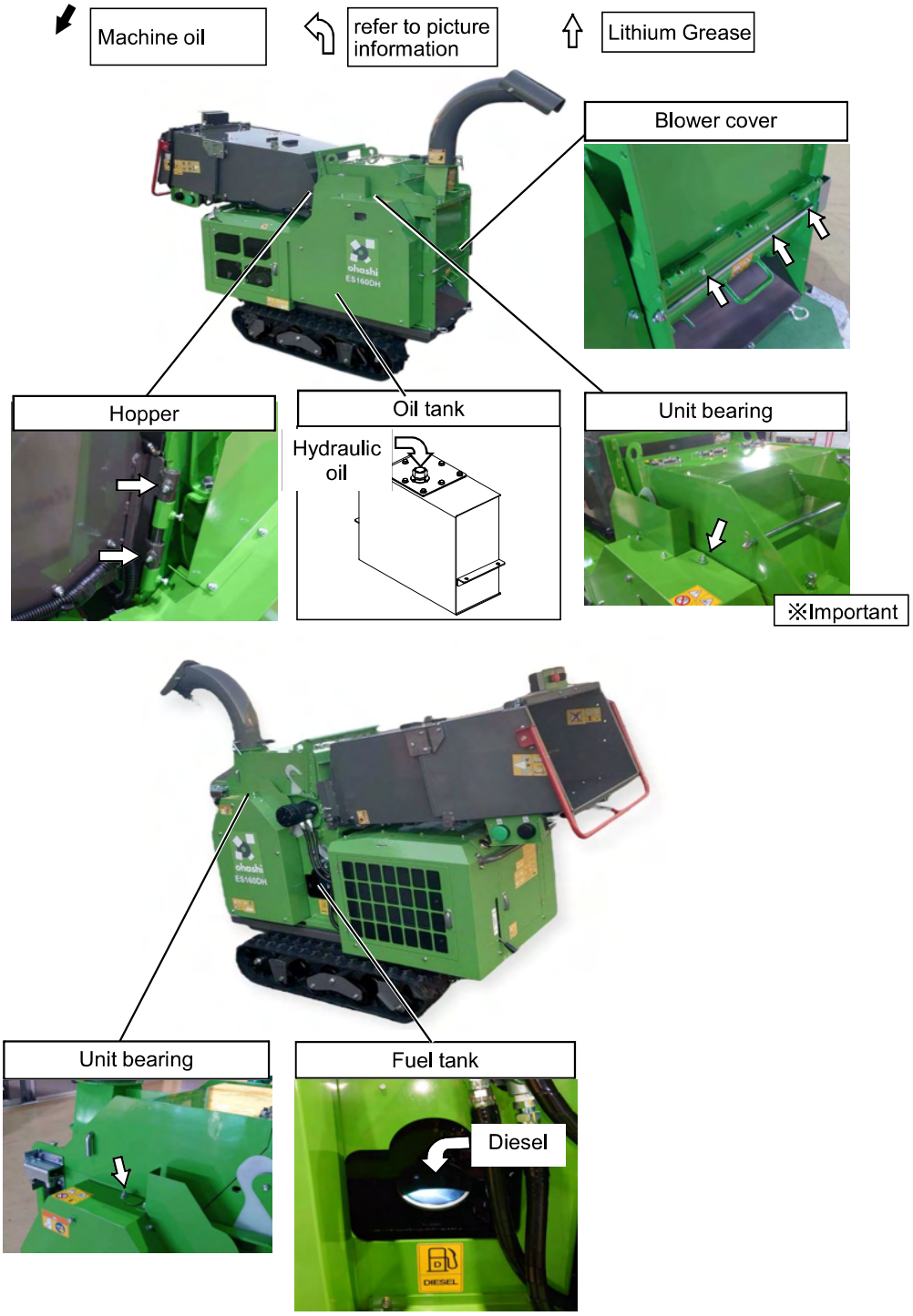
refer to picture
information

Lithium Grease





LUBRICATION CHART (Lubrication Points)

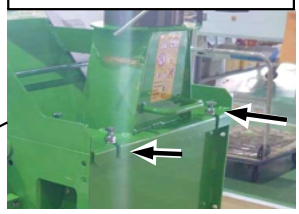


TIGHTENING NUTS & BOLTS

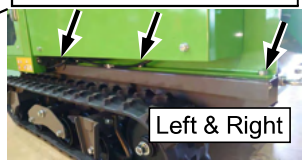
CAUTION

Before operating the machine, check if the parts are well fastened.

Rotor Cover Fixed Nuts



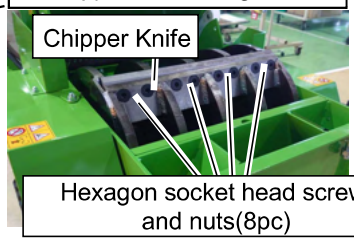
Rotor Housing Fixed Nuts



Left & Right

Chipper knife Fixing Bolts

Chipper Knife

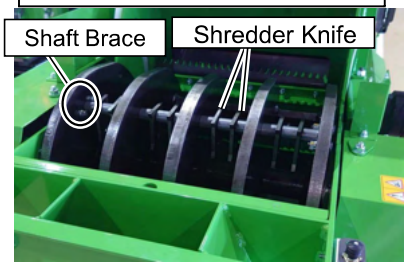


Hexagon socket head screw and nuts(8pc)

Shredder Knife Shaft Brace Fixing Bolts and Nuts (4 point)

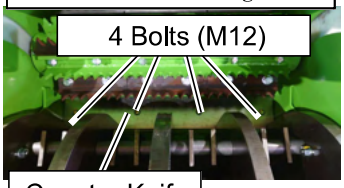
Shaft Brace

Shredder Knife



Counter Knife Fixing Bolts

4 Bolts (M12)

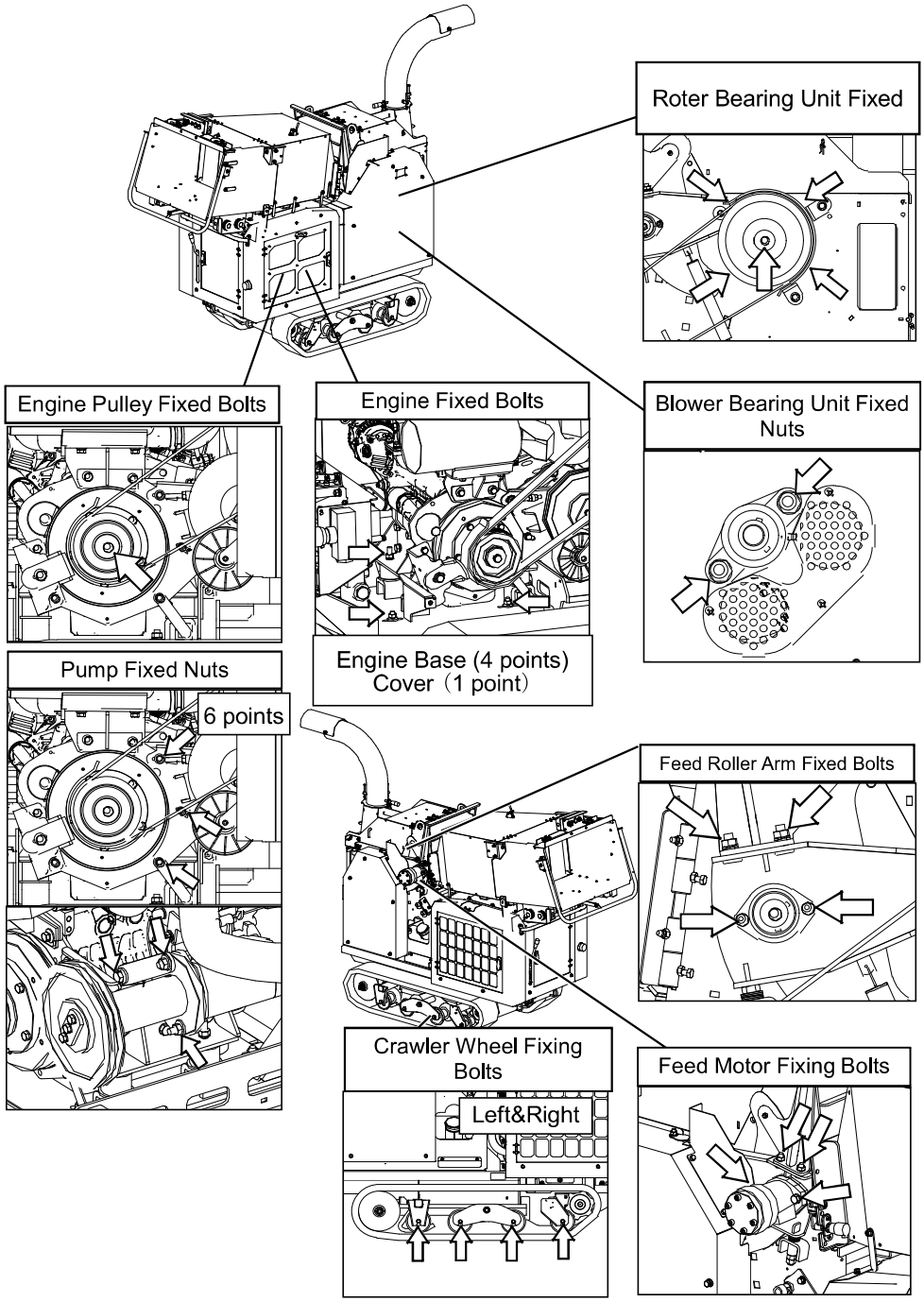


Counter Knife

TIGHTENING NUTS & BOLTS

CAUTION

Before operating the machine, check if the parts are well fastened.



SERVICING AFTER OPERATION/LONG TERM STORAGE

LONG TERM STORAGE

1. If diesel in the engine has not been treated with a fuel stabilizer, it must be drained from the tank, the carburetor and other fuel system.

Contact your dealer for instructions if necessary.

2. Pour oil and lubricant on and in all other parts of the machine that require it per the lubrication chart after washing.

3. Change the engine oil.

4. Clean the element of the air cleaner and replace it.

5. Cover the machine to protect it and keep it clean. Store the machine in a clean, dry storage area.

6. Run the engine once a month and make the lubricating oil circulate in the engine and hydraulic systems and charge the battery.

CAUTION
In a cold area, mud or other obstacles stuck on the machine must be removed immediately after finishing the operation. Frozen obstacles cause machine trouble. Store the machine on the concrete or treated wood planks. If the machine would not run due to freeze, do not try to make the machine run. Use boiled water and wait until the parts could be defrosted. If the machine is moved forcibly under the above condition and machine damage happens, we the manufacturer, do not take responsibility for the damage.

ACCESSORY TOOL LIST

Check if you have all accessory tools needed.

<< Accessory tool set No. E16109900000 >>

NO	Name	Size	Qty
1	Double Ended Spanner	8 x 10	1
2	Double Ended Spanner	10 x 13	1
3	Double Ended Spanner	12 x 14	1
4	Double Ended Spanner	13 x 17	1
5	Double Ended Spanner	17 x 19	1
6	Double Ended Spanner	22 x 24	1
7	Ring Spanner	17 x 19	1
8	Hex Key	3 mm	1
9	Hex Key	4 mm	1
10	Hex Key	5 mm	1
11	Hex Key	6 mm	1
12	Hex Key	8 mm	1
13	Hex Key	10 mm	1
14	Cross slot screwdriver	No. 2	1
15	Ultra-long combination spanner	17	1

<< Others >>

Part No.	Size	Qty
12006570001	Rotor lock pin	1
B9800150030	Scale Set	2
14502600801	Grease up bolt	1
-	Cover Key	2
E16104420000	Fuel funnel	1

LIST OF CONSUMABLE PARTS

Spare parts	Part number	Life (per unit)	Remarks
Main Body			
Chipper knife	E16106220000	300 hrs	
Chipper knife set	E16106220000S	300 hrs	Knife x2, bolt x16, spring washer x16, plain washer x16, nut x16
Counter knife	E16106320000	800 hrs	Knife x1
Shredder knife set	E161062500S0	200 hrs	knife x16 / unit
Rotor belt (3R-3V-950)	A813V030950	at proper time	
Oil pump belt (3V-375)	A813V010335	at proper time	
Blower belt (SA-45)	A81SA010045	at proper time	2 pcs /unit
Blower fin	E16106450000	300 hrs	Fin x 2, bolt x 10 / unit
Rotor bearing unit(UCFCX09)	A7020X09000	1000 hrs	2 pcs /unit
Blower bearing unit (UCFL205)	A7030C20500	500 hrs	2 pcs /unit
Feed roller bearing unit (BPFL5)	A7055205000	1000 hrs	
Stack spring	E16106640000	at proper time	
Engine			
Oil filter	HH1J0-32430	200 hrs	First time 50 hrs
Fan belt	15881-97010	at proper time	
Fuel filter element	1G313-43560	450 hrs	
Fuel hoses	E16104110000	2 years	5 pcs /unit
Air cleaner element	1G319-11212	at proper time	
Separator element	1G311-43380	at proper time	
Hydraulic System			
Hydraulic hose	E1610350000	2 years	16 pcs /unit
Line filter cartridge	11503740000	500 hrs	
Electrical System			
Battery (70B24R)	E16105110000	2 years	
Fuse A (10A) (no stress, electromagnetic valve, hour metre)	A9905212510	at proper time	
Fuse A (5A) (Engine)	A9905212505	at proper time	
Fuse B (1A) (no stress)	A9905212501	at proper time	

Estimated life time could vary on usage conditions.

Regarding oil change refer to oil change section of this manual.

TROUBLESHOOTING

Stop the engine before inspecting.

Probable cases		Remedial actions
Engine will not start	(1)The case of the starter motor does not turn and the engine does not start. ①Make sure that the hopper, rotor cover and blower cover is closed and the safety switch be kept pressed. ②Check if the battery is not dead.	① Close the hopper, rotor cover and blower cover ② Check, charge or replace the battery
	(2) Fuse is blown	Replace the fuse
	(3) Failure with Starter switch	Check and repair the connectors or contacting parts
	(4) Running speed of starter is not enough	Charge the battery Inspect and replace the starter
	(5) Viscosity of engine oil is not suitable	Replace the oil after inspection
	(6) Running parts are burnt	Repair them
	(7) Air is contained in the fuel system	Carry out the air bleeding
	(8) Empty fuel tank	Add fuel
	(9) Unsuitable fuel Viscosity is suited to the temperature	Check and replace it, if needed. Use fuel suitable to the temperature
	(10) Fuel filter is clogged	Clean or replace it
	(11) Failure with fuel injection pump	Repair or replace it
	(12) Failure with control timer unit	Replace it
	(13) Engine warning lamp turns on (Pilot box)	Check and repair if necessary the warning lamps themselves. Also check possible problems with the engine (refer to Emergency Stop for Engine section).
	(14) Air cleaner is clogged	Clean or replace it

TROUBLESHOOTING

Stop the engine before inspecting.

Probable cases		Remedial actions
Low engine power	(1) Viscosity of engine oil is unsuitable	Replace the oil after inspection
	(2) Dirty air cleaner	Clean or replace it
	(3) Fuel filter clogging	Clean or replace it
	(4) Failure with fuel injection pump	Repair or replace it
	(5) Failure with fuel injection nozzle	Repair or replace it
	(6) Timing of fuel injection is wrong	Adjust it
	(7) Unsuitable fuel	Replace the fuel after inspection
	(8) Cooling system is not functioning properly (Overheating)	Clean the cooling system inside. Replace the spare parts of cooling system.
	(9) Valve clearance is incorrect	Adjust it
	(10) Lack of compression (Cylinder, piston and rings worn)	Overhaul them Replace them.
Engine overheating	(1) Volume of coolant is not enough	Add coolant (Concentration of coolant is 30-60 %)
	(2) Coolant leaks	Retighten the bolts Replace the spare parts
	(3) Fan belt tension is loose	Adjust it
	(4) Radiator is dirty	Clean it
	(5) Failure with water pump	Replace it
	(6) Failure with thermostat	Replace it
	(7) Fan is damaged	Replace it
	(8) Coolant concentration is too high	Adjust it
	(9) Volume of engine oil is not enough	Refuel
Abnormal vibration	(1) Chipper and/or shredder knife is fitted incorrectly or insufficiently Knife fixing bolts come off or are loose	Fit the knives correctly Re-tighten the bolts firmly
	(2)Rotor housing is vibrating	Re-tighten the housing mounting bolts firmly
	(2)Bearing for the rotor shaft is damaged	Replace it

TROUBLESHOOTING

~FEED ROLLER CHECK~

FEED ROLLER DOES NOT ROTATE.

When the feed roller does not rotate forward but rotates backward:

Check points	Causes	Solutions
1) Engine power	Too low. Throttle wire loose.	Turn throttle to increase power & tighten throttle wire.
2) Sensor	Clearance is incorrect	Adjust the clearance 0.8~1.2mm
3) Sensor	Defective	Replace it
4) Feed button Green(Forward)	Defective	Replace it
5) Switch box	Defective	Replace it
6) Control box wires	Defective wiring	Re-wiring
7) Hydraulic Electromagnetic Valve	Defective	Replace it
8) No stress circuit board	Broken	Replace it
9) Safety bar	Engaged or broken	Disengage or repair
11) Rotor belt	Tension isn't enough when engaged	Adjust the belt tension

When the feed roller does not rotate backward

Check points	Causes	Solutions
1) Feed button Black(Reverse)	Defective	Replace it
2) Hydraulic electromagnetic valve	Defective	Replace it
3) Electric wiring	Defective wiring	Re-wiring

When the feed roller does not rotate in either direction:

Check points	Causes	Solutions
1) Fuse 10A	Defective	Replace it
2) Feed emergency stop button	Engaged	Disengaged
3) Safety bar release switch	The switch not switched after disengaging the buttor	Switch again
4) Hydraulic tank	Oil level low	Fill with oil
5) Converter valve in hydraulic system	Not in neutral	Re-adjust the neutral position
6) Hydraulic pump	Defective	Replace it
7) Hydraulic electromagnetic valve	Defective. Defect wiring	Replace it. Re-wiring
8) Hydraulic feed motor	Defective	Replace it
9) Feed roller	Feed roller is clogged	Unclog per "**Feed Roller Clogging Release**"
10) Electric wiring	Defective wiring	Re-wiring
11) Safety bar	Engaged or broken	Disengage or repair

Automatic control does not work (The roller does not stop automatically and engine cuts out eventually)

Check points	Causes	Solutions
1) Electric wiring	Defective wiring	Re-wiring
2) Fuse 1A	Defective	Replace it
3) No stress circuit board	Broken	Replace it

Feed Mode Switch: Fast mode works but Steady mode does not

Check points	Causes	Solutions
1) Engine power	Too low	Turn throttle to increase power
2) No stress circuit board	Broken	Replace it

Feed Mode Switch: Steady mode works but Fast mode does not

Check points	Causes	Solutions
1) Feed Mode Switch	Defective	Repair or replace
2) No stress circuit board	Broken	Replace it

Safety Bar: When engaged does not stop the feed roller

Check points	Causes	Solutions
1) Safety Bar	Sensor	Adjust or replace

REGULAR MAINTENANCE

Maintenance Schedule	Daily	100 hours	200 hours	300 hours	3 months
Check air cleaner.	✔				
Check radiator net and radiator fin.	✔				
Check coolant level.	✔				
Check engine and hydraulic oil level, cleanliness and for any spillage.	✔				
Check for cracks and / or wear on the knives.	✔				
Clean engine and rubber crawlers.	✔				
Retighten the bolts of the knives.	✔				
Check fuel level.	✔				
Grease lubrication points.	✔	(Refer to **"Lubrication Chart"**)			
Lubricate all wire and lever supporting points and any friction.	✔	(Refer to **"Lubrication Chart"**)			
Check for cracks and / or wear of belts.	✔				
Check all machine safety covers, guards and housing are closed and fitted securely.	✔				
Test Safety Bar is working properly.	✔				
Check the hydraulic system for hose wear and cracks, oil leaks, and loose connections.	✔				
Check rotor clutch wire adjustment.	✔				
Check rubber crawler tension.	✓(Adjust first 10-20hrs.)				
Check rotor belt tension	✓(Adjust first 30 hrs.)				
Check battery electrolyte level and weight	✔(Every 50 hrs.)				
Sharpen the chipper knives.	✔(Every 50 hrs.)				
Clean fuel filter.		✔			
Check fan belt tightness.		✔			
Check hydraulic oil level in tank.		✔			
Sharpen the counter knife.	Every 200 hrs.				
Change engine oil.			✔(*1)		
Change oil filter cartridge.			✔(*1)		
Replace chipper knives.				✔	
Change oil in hydraulic tank and pump.				✔	
Replace fuel filter cartridge	Every 500 hrs.				
Change fan belt.	At proper time				
Replace counter knives.	Every 800 hrs.				
Replace shredder knives.	Every 200 hrs.				
Check and tighten all nuts and bolts on engine	Every 1000 hrs.				
Check transport lever.					✔
Change air cleaner element.	At proper time				
Change hydraulic hoses	Every 2 years				
Change radiator coolant (L.L.C.).	Every 2 years				
Change battery electrolyte	Every 2 years				
Service engine.	(Refer to **the engine manufacture's manual**)				

*1 First 50 hours of operation. After every 200hrs.

NOISE TEST

CAUTION 1

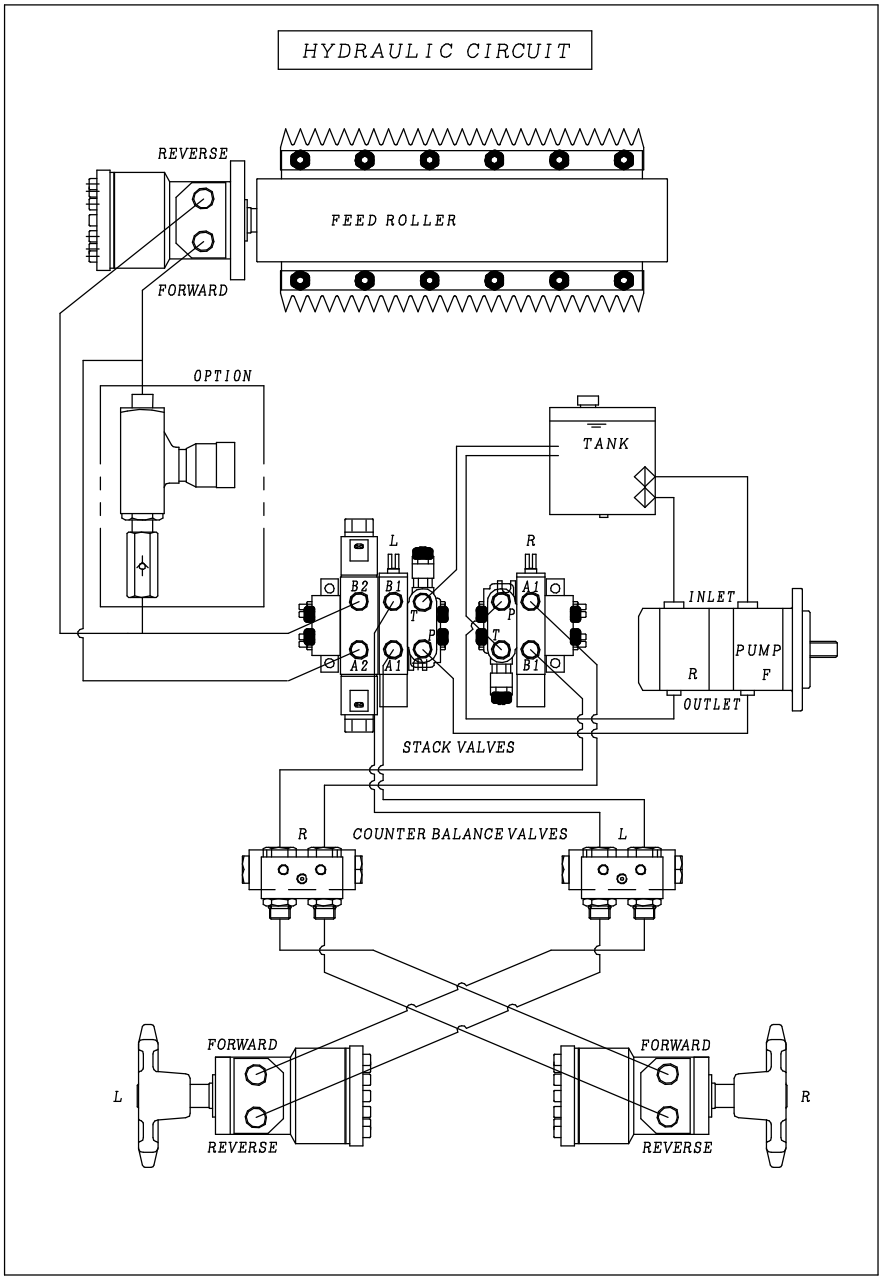
Wear ear protection at all times when using the machine.
People in close proximity to the machine should also
wear ear protection to protect from ear damage.

The Guaranteed Sound Power Level for this machine was
recorded at 113dB (Lwa).

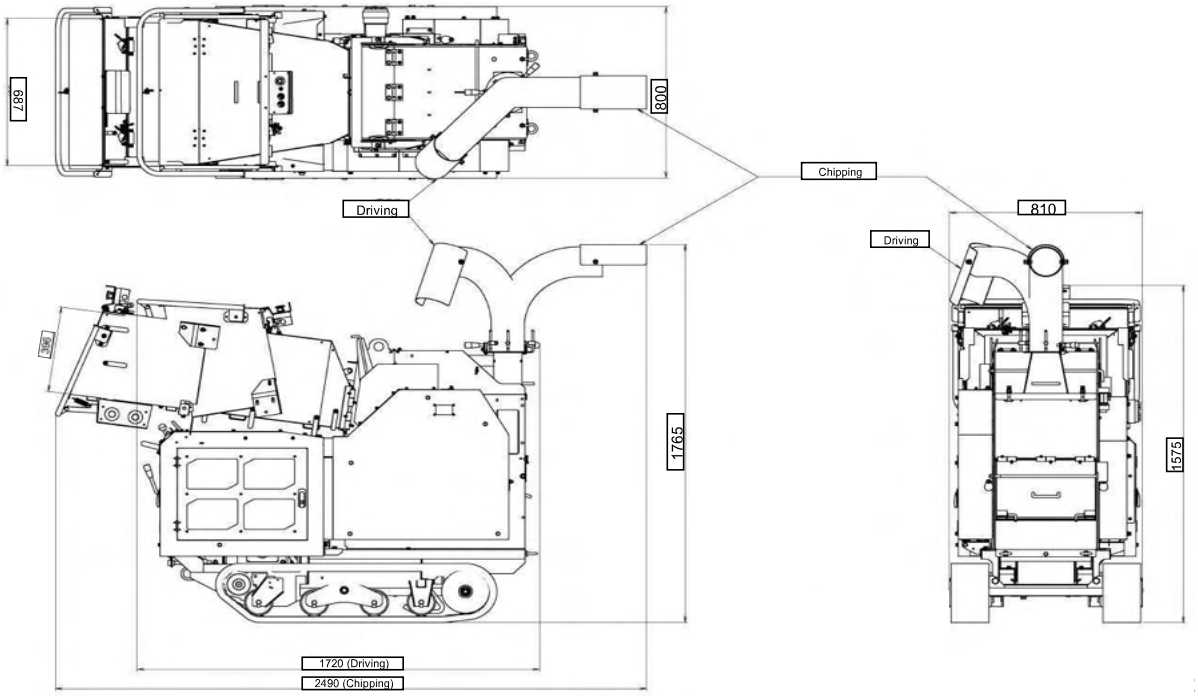
The Sound Pressure Level for this machine was
recorded at 84.7dB (Laeq).

The measurements were conducted according to:
Directive 2000/14/EC

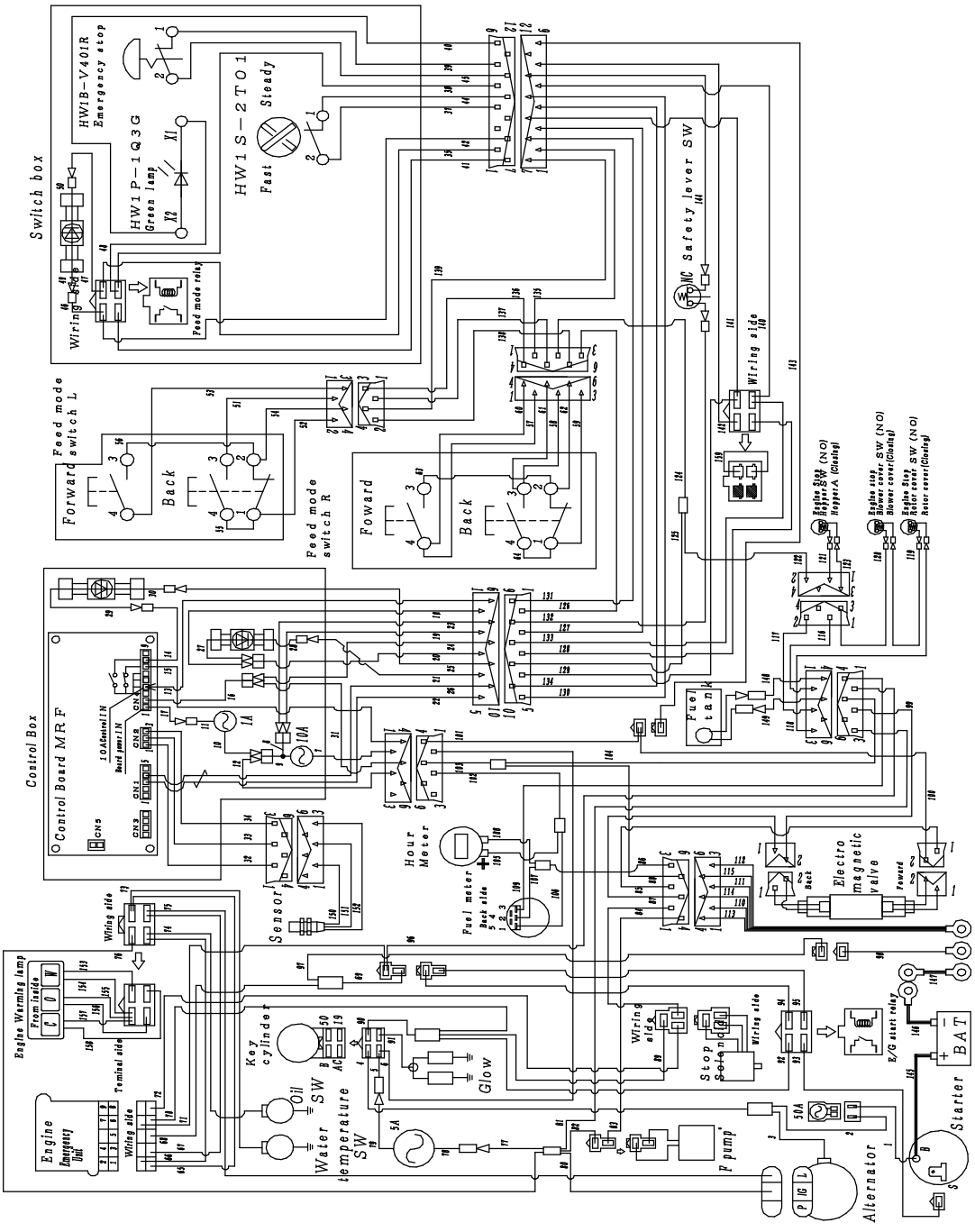
HYDRAULICS DIAGRAM



MACHINE DIMENSIONS



ELECTRONIC WIRING DIAGRAM



OH-25-1 Version 2

EC Declaration of Conformity

Ohashi Inc.

401 Sakimura, Chiyoda, Kanzaki, Saga 842-0065, Japan
TEL +81-952-44-3135
FAX +81-952-44-3137

We declare, under our solo responsibility, that the product:

Product: Wood Chipper
Model: ES160DH
Serial No. Range: 00101 ~ 00XXX

to which this declaration relates complies with the provisions of following European Directives:

- Directive 2006/42/EC on Machinery;
- Directive 2014/30/EU Electromagnetic compatibility Directives;
- Directive 2000/14/EC on Noise emission in the environment;
- The Guaranteed Sound Power Level for this machine was recorded at 113dB (Lwa);
- The Sound Pressure Level for this machine was recorded at 84.7dB (Laeq);
- Directive 2011/65/EU on the Restriction of the use of certain Hazardous;

Applied Harmonized Standards:

EN 13525:2020 Forestry machinery - Wood chippers - Safety, where applicable
EN ISO 13857:2019 Safety of Machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs.
EN ISO 12100:2010 Safety of machinery - general principles for design – Risk assessment and risk reduction;
EN ISO 14982:2009 Electromagnetic compatibility
EN ISO 3744:2010
EN ISO 50851:2012 Substances in electrical and electronic equipment

Authorized representative:
Mr. Thierry Fruhauff of Sapag Jardins at 2551 Chemin de Saint Claude, 06600 Antibes, France, can compile the technical file on request.

Signature: Yoshiaki Ohashi
Yoshiaki Ohashi
President, Ohashi Inc.

Date of issue: 29 January, 2025

WARRANTY STATEMENT

The warranty period for the wood chipper commences on the date of sale to the first end user and continues for a period of 24 months. The guarantee is to the first end user only and is not transferable. However, should any damage or fault occur from a cause for which Ohashi is not responsible, then even within the aforementioned period, Ohashi will not be responsible for any warranty obligation.

The warranty is applicable only to the following:

- Machine parts which are damaged or faulty from a cause for which Ohashi is responsible, and require replacing, as well as any other machine parts which as a consequence of the aforementioned damaged or faulty parts, require replacing for the effective operation of the machine.

The warranty is not applicable to the following:

- The entire machine as a whole.

- Faults which arise due to actions / inactions that are not part of the correct and appropriate handling of the machine guidance given by Ohashi.

- Any faults or damage attributed to the handling, assembly and / or maintenance conducted on the machine.

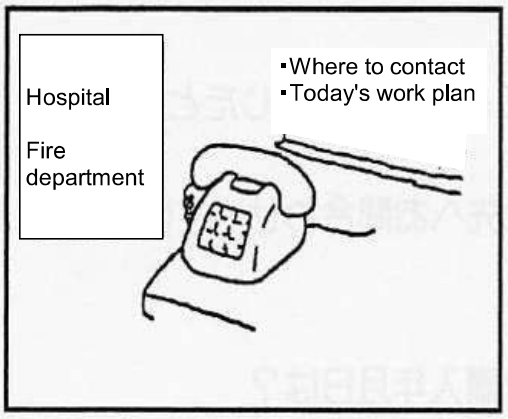
- Any faults or damage attributed to or arising as a consequence of unauthorized modifications conducted and / or the use of parts not authorized and / or supplied by Ohashi.

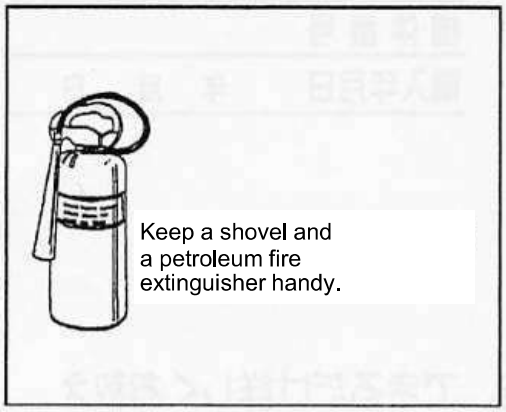
- Parts which degenerate with time and use of the machine and are generally accepted to be consumable parts which require replacing at the cost of the user.

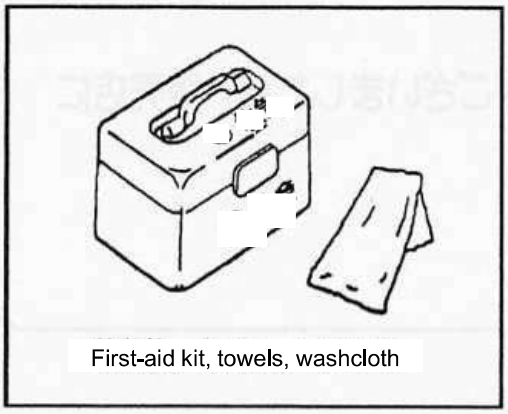
- Any faults or damage arising as a result of natural disasters or accidents and are unrelated to production errors.

Ohashi warrants to the first end user to be free from manufacturing defects both in materials and workmanship in normal service for the period mentioned above. The faulty or damaged parts should be sent to Ohashi for investigation if Ohashi requests.

JUST IN CASE OF EMERGENCY







● Preparation before starting operation

- Just in case, clearly write up telephone numbers of medical institution and fire station (also to call an ambulance) in a prominent place close to telephones. In case of an emergency call, it is useful to to write up a sketch map of work site (indicating address and land marks) to facilitate an emergency contact.
- Let other people know where the work is being done. Write where to contact and work plan up on the blackboard. This information will be useful should you get injured and become paralyzed being unable to call for help yourself.
- Bring a whistle to the work site.

● In case of fire

DANGER
If engine takes fire or emits smoke, stop the machine immediately and turn engine OFF. Extinguish the fire. Pay extreme caution to protect yourself from personal injury while fighting the fire.

- If engine takes fire or emits smoke from other sections than exhaust outlet, stop the machine immediately and turn engine OFF. Extinguish the fire.
- Pay extra caution to protect yourself from fire and personal injury.
- Do not let trees and grass become fuel for the fire.
- Smother the fire with sand using a shovel or extinguish the fire with petroleum fire extinguisher.

● In case of personal injury

- Just in case of personal injury, keep a first-aid kit handy. Just in case of injury involving bleeding, keep towels and wash cloth handy, which will be useful to stop the bleeding. It is advisable to always bring extra towels and washcloth to your work site just in case.

● First-aid

- To acquire fundamental knowledge and skills related to first-aid, it is recommended to take courses and trainings that are provided by local fire institution and organization.

Ohashi Inc.

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