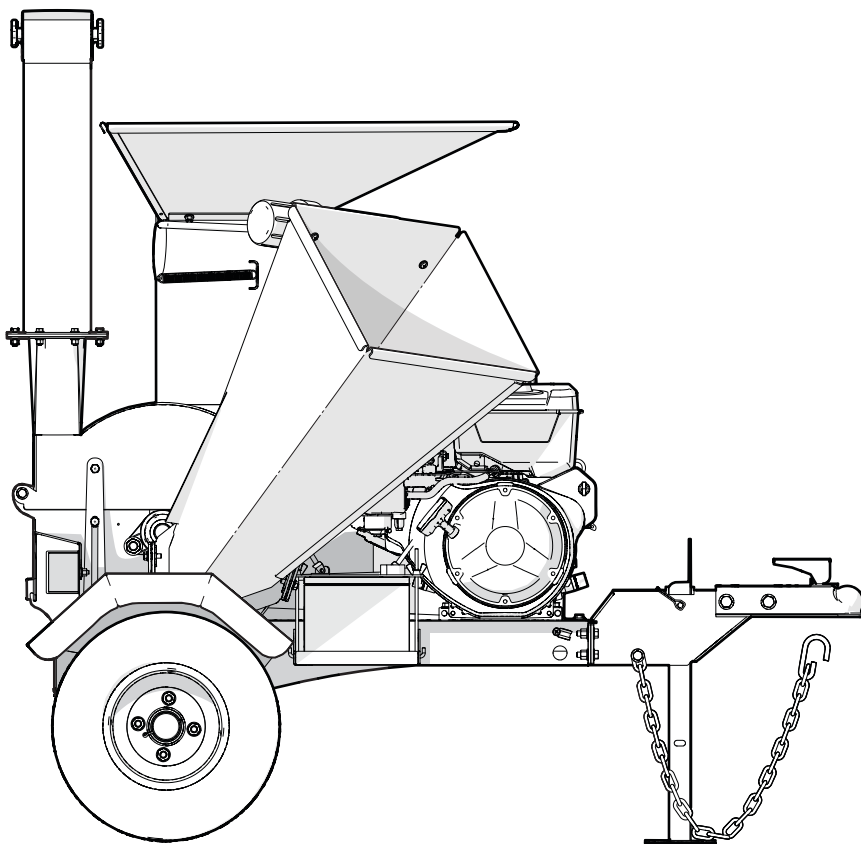


# OPERATOR'S MANUAL

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Serial number 2E9US111XMS040746 to 2E9US1119NS040804,  
100137 to 100163, 1100000 and up.

## **BXMT3213** **Chipper / Shredder**



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# 1. Introduction

## WARNING!

**Do not start or operate the machine before you read this manual. Make sure that you fully understand all the safety, operation, and maintenance information before you operate the machine.**

**Keep this manual with the machine at all times and available for frequent reference.**

W034

### **Congratulations on your choice of a Wallenstein BXMT3213 Trailer Chipper/Shredder!**

BXMT3213 chipper/shredders are strong, rugged machines that provide consistent chipping or shredding of limbs, branches, bark, or leaves. The machine is powered by a Vanguard© 400 14 hp (10.3 kW) engine.

Safe, efficient, and trouble-free operation of this Wallenstein product requires that anyone using or maintaining the machine reads and understands the safety, operation, and maintenance information in this manual and the engine manufacturer's manual.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your local Wallenstein dealer or the distributor if you need assistance, information, or additional copies of the manuals.

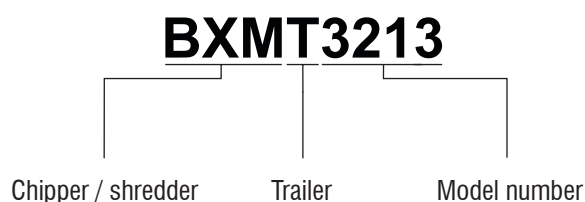
Units of measurement in Wallenstein Equipment technical manuals are written as: US Customary (SI metric).

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This manual is subject to change without notice. For the most current information, go to [WallensteinEquipment.com](https://www.WallensteinEquipment.com).

## 1.1 Model Configuration



## 1.2 Delivery Inspection Report

### Wallenstein BXMT3213 Chipper/Shredder

To activate the warranty, register your product through the Support page at [WallensteinEquipment.com](http://WallensteinEquipment.com).

This form must be completed by the dealer at the time of delivery, and then signed by the dealer and customer.

I received the product manuals and was thoroughly instructed about the care, adjustments, safe operation, and applicable warranty policy.

I thoroughly instructed the customer about the equipment care, adjustments, safe operation, and applicable warranty policy, and reviewed the manuals with them.

Customer
Address
City, State/Province, ZIP/Postal Code
(       )
Phone Number
Contact Name
Model
Serial Number
Delivery date

Dealer
Address
City, State/Province, ZIP/Postal Code
(       )
Phone Number

### Dealer Inspection Checklist

- \_\_\_\_\_ Engine starts and runs, and fluid levels are correct.
- \_\_\_\_\_ Rotor turns freely and the blade clearance is correct.
- \_\_\_\_\_ All cutting edges are sharp and in good condition.
- \_\_\_\_\_ Discharge chute and deflector move freely.
- \_\_\_\_\_ All belts are aligned and the tension is correct.
- \_\_\_\_\_ Chop block and shredder knives function correctly.
- \_\_\_\_\_ Spring-loaded shredder gate moves freely.
- \_\_\_\_\_ All fasteners are tightened to the correct torque.
- \_\_\_\_\_ All grease points are lubricated.
- \_\_\_\_\_ Purchased accessories are included, if applicable.

- \_\_\_\_\_ Operator's Manual is in the storage tube.
- \_\_\_\_\_ Tire pressure is correct (see the tire sidewall).
- \_\_\_\_\_ Tires are in good condition.

#### Safety Checks

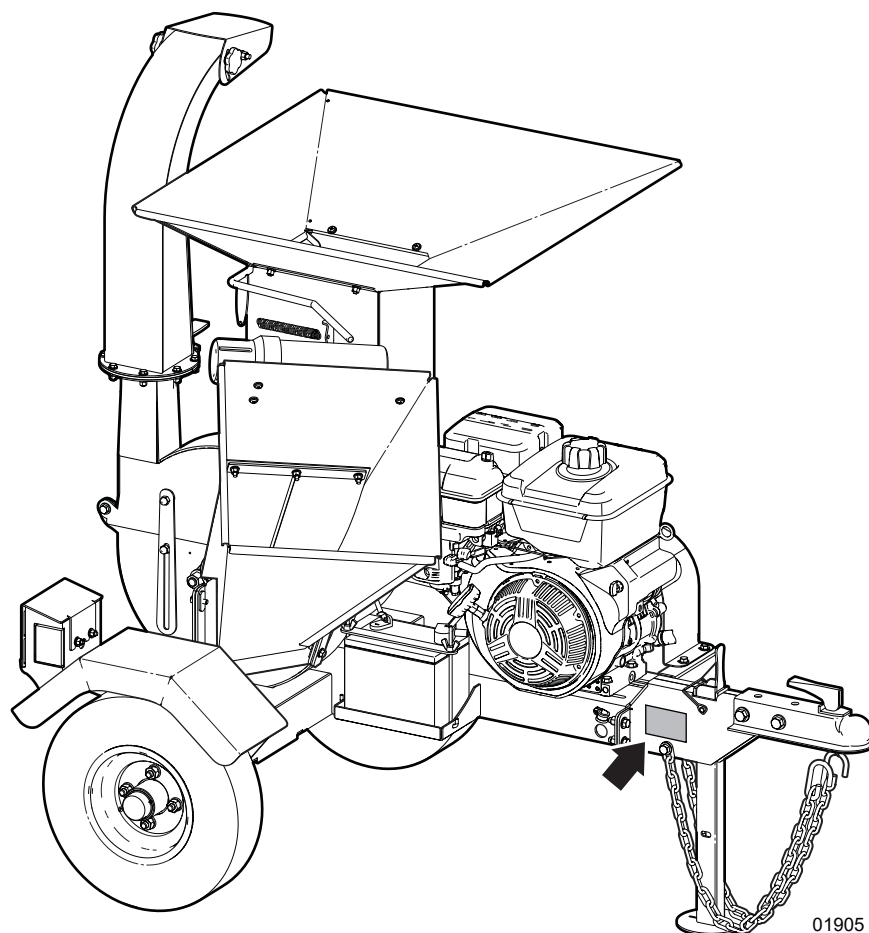
- \_\_\_\_\_ All safety sign decals are applied and legible.
- \_\_\_\_\_ Operating and safety instructions were reviewed.
- \_\_\_\_\_ All guards, shields, and covers are installed and secure.
- \_\_\_\_\_ A retainer is installed through each hitch point.
- \_\_\_\_\_ All lights operate correctly (for example; running, brake, turn signal, license plate).

## 1.3 Serial Number Location

Always provide the model and serial number of your Wallenstein product when ordering parts or requesting service or other information. The product information plate location is shown in the following illustration.

**Record your product's serial number in the following table for future reference.**

Record Product Information Here	
Model:	<b>BXMT3213</b>
Serial Number:	

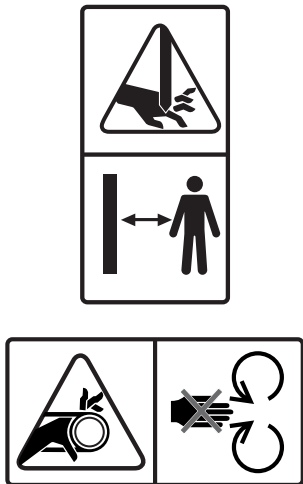


**Fig. 1** – Product information plate location

# 1.4 Types of Decals on the Machine

When getting familiar with the Wallenstein product, notice that there are numerous decals located on the machine. There are different types of decals for safety, information, and product identification. The following section explains what they are for and how to read them.

**Safety Sign Decals** have a yellow background and are generally two panel. They can be either vertical or horizontal.



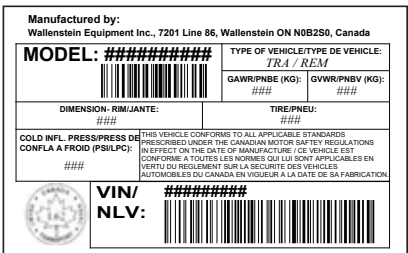
**Safety Notice Decals** are pictorial with a blue background and generally rectangular with single or multiple symbols. This decal informs what Personal Protective Equipment is required for safe operation.



**Informative Decals** are generally pictorial with a white background and can vary in the number of panels. This type of decal provides information about the machine noise level.



**Product Decals** indicate machine model and serial number, and other important information.



**Maintenance Decals** have a green background and can vary to the number of panels. This decal shows a type maintenance required and frequency interval.



For safety sign decal definitions, see *Safety Sign Explanations* on page 14. For a complete illustration of decals and decal locations, download the parts manual for your Wallenstein product at [WallensteinEquipment.com](http://WallensteinEquipment.com).

## 2. Safety

### 2.1 Safety Alert Symbol

This Safety Alert Symbol means:

**ATTENTION! BE ALERT!**

**YOUR SAFETY IS INVOLVED!**

The Safety Alert Symbol identifies important safety messages on the Wallenstein chipper/shredder and in the manual.

When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.



### 2.2 Signal Words

The signal words **DANGER**, **WARNING** and **CAUTION** determine the seriousness level of the warning messages in this manual. The appropriate signal word for each message in this manual has been selected using the following guidelines:

#### **DANGER –**

Indicates an imminently hazardous situation that, if not avoided, **will** result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.

#### **WARNING –**

Indicates a potentially hazardous situation that, if not avoided, **could** result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

#### **CAUTION –**

Indicates a potentially hazardous situation that, if not avoided, **may** result in minor or moderate injury. It may also be used to alert against unsafe practices.

**IMPORTANT –** To avoid confusing equipment protection with personal safety messages, a signal word **IMPORTANT** indicates a situation that if not avoided, could result in damage to the machine.



*Provides additional information that is helpful.*

### 2.3 Why SAFETY is Important

- **Accidents disable and kill people.**
- **Accidents cost money.**
- **Accidents are preventable**

**YOU** are responsible for the SAFE operation and maintenance of your Wallenstein trailer chipper / shredder. **YOU** must ensure that you and anyone else who is going to use, maintain or work around the chipper / shredder be familiar with the operating and maintenance procedures and related **SAFETY** information contained in this manual. This manual provides good safety practices that should be followed while using this machine.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** using this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented.

**Do not risk injury or death by ignoring good safety practices.**

## 2.4 Safety Rules

### **WARNING!**



**Wear the necessary hearing protection when you operate this machine. Prolonged exposure to loud noise can cause permanent hearing loss.**

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Safety is a primary concern in the design and manufacture of Wallenstein products. Unfortunately, efforts to provide safe equipment can be wiped out by a single careless act.

For safety information that is specific to machine operation, service, or maintenance, see the applicable section in this manual.

- It is the operator's responsibility to read, understand, and follow ALL safety and operating instructions in this manual.
- If you do not understand any part of this manual or require assistance, contact your local dealer, the distributor, or Wallenstein Equipment.
- Do not allow anyone to use this machine until they have read this manual. Operator's must have a thorough understanding of the safety precautions and how the machine works. Review the safety instructions with all users annually.
- Operators of this machine must be responsible, physically able people who are familiar with machinery and trained in the operation of this equipment. If an elderly person is assisting with the work, their physical limitations need to be recognized and accommodated.
- Make sure that all users understand the safety signs on the machine before operating, servicing, adjusting, or cleaning it. For safety sign decal definitions, see *Safety Sign Explanations on page 14*.
- Learn the controls and how to stop the machine quickly in the event of an emergency. For instructions, see *Emergency Stop on page 28*.
- Keep a first-aid kit available for use, should the need arise, and know how to use the contents.
- Keep a fire extinguisher available for use, should the need arise, and know how to use it.



- Wear the appropriate PPE when operating, servicing, or maintaining the machine. This includes, but is not limited to:
  - A hard hat.
  - Heavy gloves.
  - Hearing protection.
  - Protective shoes with steel toes and slip resistant soles.
  - Protective glasses, goggles, or a face shield.

- Prolonged exposure to loud noise may cause permanent hearing loss. Power equipment with or without a vehicle attached can often be noisy enough to cause permanent, partial hearing loss.



- Wear hearing protection on a full-time basis if the noise in the operator's position exceeds 80 dB. Noise over 85 dB on a long-term basis can cause severe hearing loss. Noise over 90 dB adjacent to the operator on a long-term basis may cause permanent, total hearing loss.
- Avoid wearing loose fitting clothing, loose or uncovered long hair, jewelry, and loose personal articles. These can get caught in moving parts and cause injury. Jewelry may also ground a live electrical circuit causing injury and machine damage.
- Never consume alcohol or drugs before or during machine operation. Alertness or coordination can be affected. Consult your doctor about operating this machine while taking prescription medications.
- Only use the machine in daylight or good artificial light.
- Keep all guards, shields, and covers in place. If removal is necessary for repair, replace them before using the machine.
- Never allow anyone to ride on the machine during transport.
- Keep bystanders at least 20 ft (6 m) from the discharge area. Mark the discharge area with safety cones.
- Before starting the engine, make sure the machine is clear of debris.
- Do not touch hot engine parts, the muffler cover, hoses, engine body, or engine oil during operation or after the engine is turned off. Contact with hot surfaces may cause burns.

## 2.5 Equipment Safety Guidelines

Safety is one of the main concerns in designing and developing equipment. However, every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment.

Avoid hazards by observing the following precautions. Insist anyone working with you follow them as well.

- Replace safety or instruction signs (decals) that are not readable or missing. For locations and explanations, see *Safety Signs on page 11*.
- Do not modify the equipment in any way. Unauthorized modification may result in serious injury or death and may impair the function and life of the equipment. Unapproved modifications void warranty.
- Make sure that the machine is correctly stationed, adjusted, and in good operating condition.
- Keep the machine free of accumulated trash, grease, and debris to prevent fires.
- Determine where wood chips will be piled and make sure it does not interfere with safe operation of the machine.
- Be aware of overhead hazards (for example; branches, cables, and electrical wires).
- Never exceed the limitations of the machine. If its ability to do the job, or to do it safely is in question—**STOP!**

## 2.6 Safe Condition

References are made to **safe condition** throughout this manual. Safe condition means putting the machine in a state that makes it safe to service or maintain.

**Before starting any service or maintenance, complete the following:**

### **SAFE CONDITION**

1. If the machine is connected to a tow vehicle, set the tow vehicle's parking brake, turn off the engine, and remove the ignition key.
2. Stop the machine.  
For instructions, see *Stop the Machine on page 27*.
3. Disconnect the engine spark-plug wire and keep it away from the spark plug.
4. Remove all material from the two feed hoppers.
5. Wait for the engine and machine to cool down.

## 2.7 Safety Training

An untrained operator can cause serious injury or death to themselves or others. Review the safety instructions with all users annually. The *Sign-Off Form on page 10* can be used to keep a training record.

- An employer has the responsibility to train employees how to operate the equipment they are using. When someone does not understand the basic operation of a piece of equipment, they can create dangerous situations very quickly. Operators must completely understand the safety information in this manual and the safety decals on the machine
- Provide instruction to anyone else who is going to operate the machine. This equipment is dangerous to anyone who is unfamiliar with its operation.
- If the machine is loaned or rented, it is the owner's responsibility to make sure that, before using the machine, every operator:
  - Reads and understands this manual.
  - Is instructed in the safe and correct use of the machine and related equipment.
  - Understands and knows how to set the machine to a **Safe Condition**.  
For instructions, see *Safe Condition*.

## 2.8 Sign-Off Form

Everyone who uses this machine must read and thoroughly understand all safety, operation, and maintenance information in this manual. An untrained operator should never use this machine.

Make periodic review of machine safety and operation a standard practice for all operators. Operators should review these topics at the start of each season.

The following sign-off form can be used to record the completed training.

The design and manufacture of this product conforms to the applicable provisions in the following standards:

- ISO 11448:1997 Powered shredders and chippers — Definitions, safety requirements and test procedures.
- ISO 3600 Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Operator’s manuals – Content and format.

[illegible]

### 3. Safety Signs

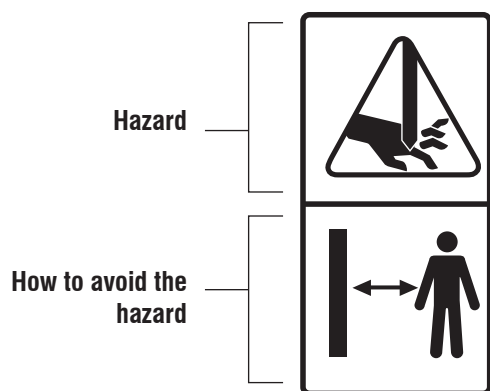
#### WARNING!

Replace all safety labels that are missing, damaged, or illegible. If a component is replaced and it has a safety label on it, apply a safety label to the new component. Operating the machine with missing, damaged, or illegible safety labels puts the operator at risk of serious injury or death.

W100

Practicing good safety means becoming familiar with safety signs (decals) and warnings and being aware of situations that require alertness.

The top panel (or left-hand panel for horizontal signs) shows the safety alert (potential hazard), and the bottom (or right-hand) panel shows the message (how to avoid the hazard).



**Think SAFETY! Work SAFELY!**

## 3.1 Safety Sign Locations

Numbers correspond with the *Safety Sign Explanations on page 14*.

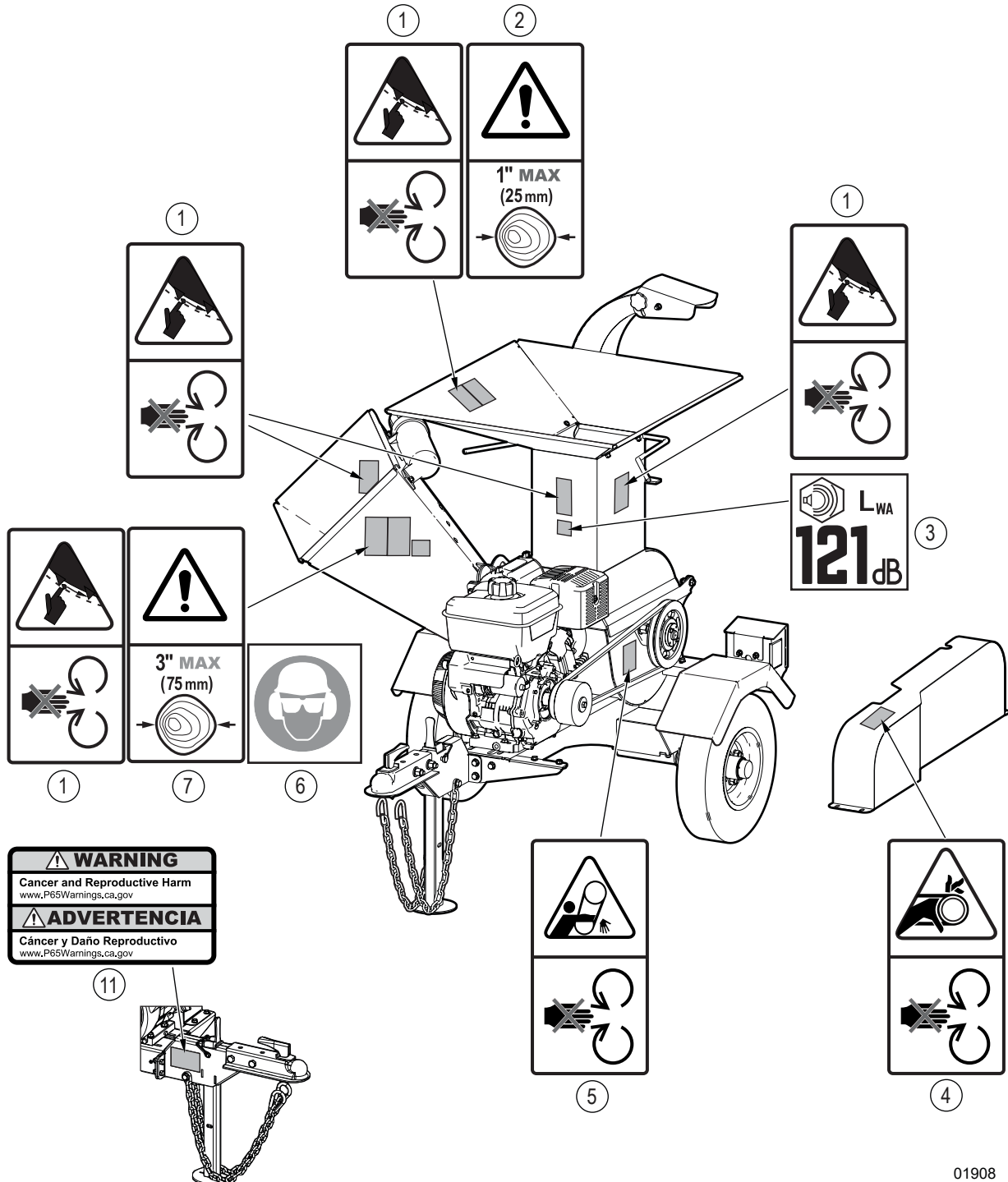


Fig. 2–Safety sign locations - front

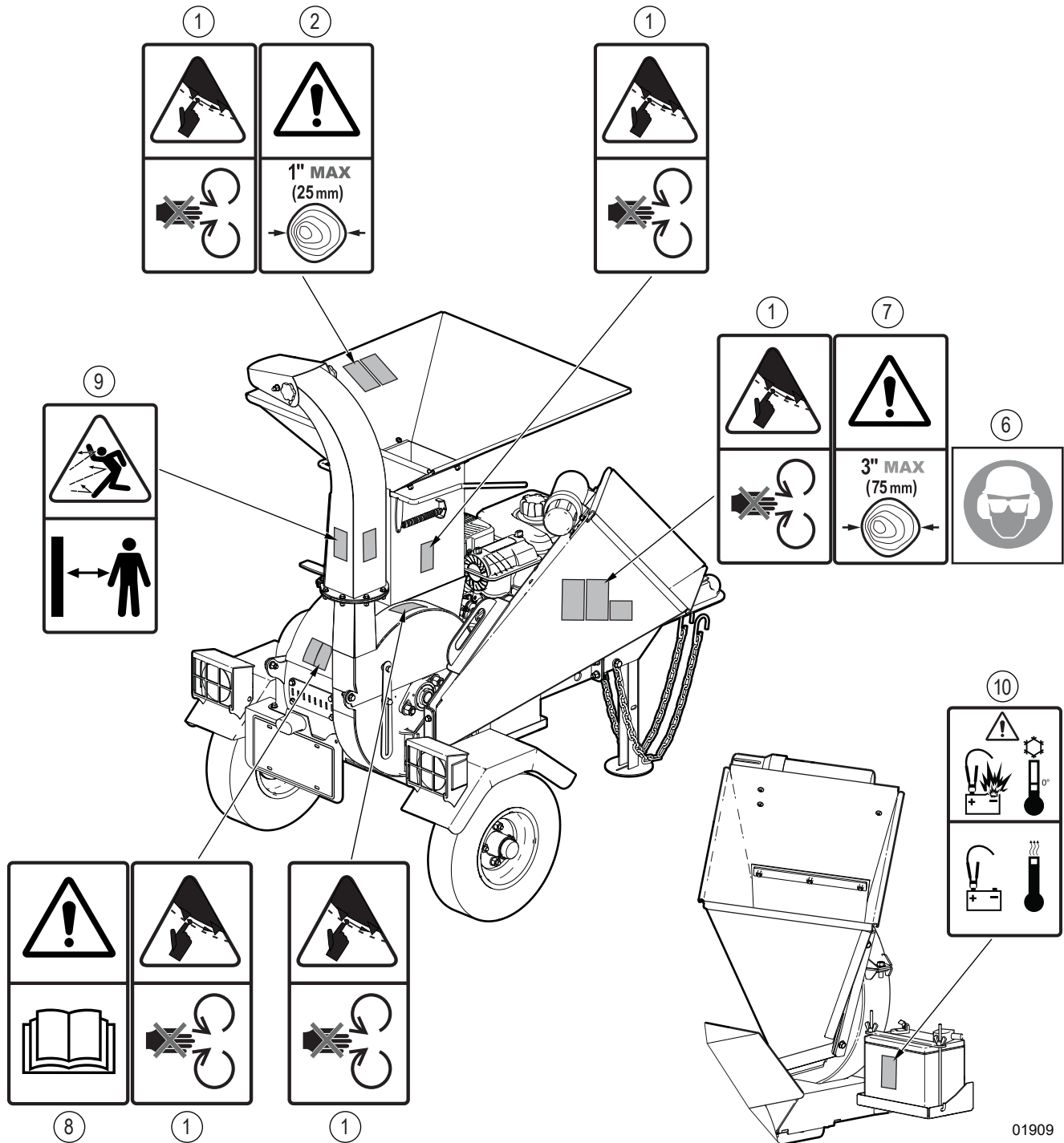


Fig. 3—Safety sign locations - back

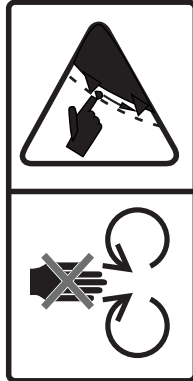
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## 3.2 Safety Sign Explanations

### 1. Warning!

**Risk of fingers being severed or serious injury to hands.**

Keep hands and feet out of inlet and discharge openings while machine is operating.



### 2. Caution!

**Risk of personal injury.**

Do not overload the shredder by placing material into the feed hopper larger than the size stated on the decal, for example 1" (25 mm) in diameter.

Machine damage could also result.



### 3. Caution!

**Noise level hazard.**

The noise declaration decal indicates the sound power (L<sub>WA</sub>) emitted by the machine when it is operating. For this machine, the noise level can be up to 87 decibels at close range.

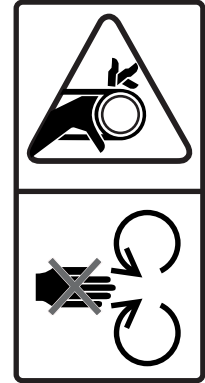
Noise exposure over 85 dB on a long-term basis can cause severe hearing loss. Exposure over 90 dB on a long-term basis may cause permanent, total hearing loss.



### 4. Warning!

**Risk of serious injury if caught in drive belt.**

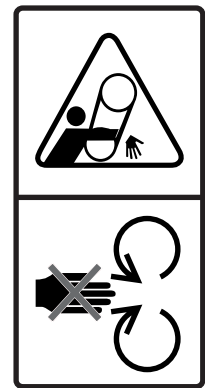
Never operate the machine with guard cover removed. Always keep guards and covers in place when machine is in operation. Keep hands clear of this area.



### 5. Warning!

**Risk of serious injury if caught in drive belt.**

Never operate the machine with guard cover removed. Always keep guards and covers in place when machine is in operation. Keep hands clear of this area.



### 6. Caution!

**Always wear the appropriate PPE during operation:**

- A hard hat.
- Heavy gloves.
- Hearing protection.
- Protective footwear with steel toes and slip resistant soles.
- Protective glasses, goggles, or a face shield.



## 7. Caution!

### Risk of personal injury!

Do not overload the chipper by placing material into the feed hopper larger than the size stated on the decal, for example 3" (75 mm) in diameter.

Machine damage could result.

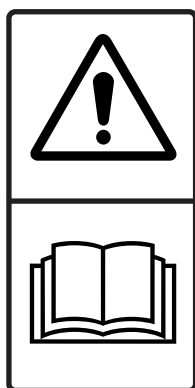


## 8. Caution!

### Read the Operator's Manual

Read ALL operating instructions and safety information in the manual. Learn the meaning of ALL safety signs on the machine.

The best safety feature is an informed operator.



## 9. Caution!

### Risk of injury from flying debris!

Stay clear of material discharge chute. Machine can expel wood chips fast enough to cause injury.

Do not point discharge at people, animals or buildings. Point chipper discharge away from work area and bystanders. Keep a safe distance from discharge.

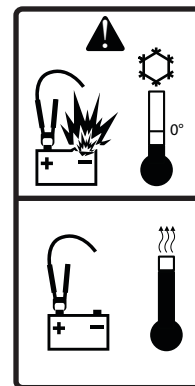


## 10. Warning!

### Risk of explosion.

Charging a frozen battery can cause it to explode.

Warm the battery to 60 °F (16 °C) before charging it.



## 11. Warning!

### Risk of cancer and reproductive harm

The machine materials contain chemicals or machine operation may produce gases or dust that are identified by the state of California as causes of cancer, birth defects, or other reproductive harm.

This warning is required by the state of California, USA to comply with Proposition 65: the Safe Drinking Water and Toxic Enforcement Act of 1986.



### 3.3 Replace Safety Signs

- Always replace safety signs that are missing or have become illegible. Replacement safety signs are available from your authorized distributor, dealer parts department, or Wallenstein Equipment.
- Keep the safety signs clean and legible at all times.
- Parts replaced that had a safety sign (decal) on them must also have the safety sign replaced.

#### Requirements

- The installation area must be clean and dry.
- The application surface must be clean and free of grease or oil.
- The ambient temperature must be above 50 °F (10 °C).
- A squeegee, plastic bank card, or similar tool is required to smooth out the decal.

#### Procedure



*Determine the exact position for the decal before removing the backing paper. If possible, align the decal with an edge on the machine.*

1. Peel the decal off the backing paper.
2. Position the decal above the location where it is being applied to the machine.
3. Starting at one edge, carefully press the center of the exposed sticky-backing in place, smoothing it out as you work from one side to the other.
4. Use an appropriate tool to smooth out the decal, working from one end to the other.  
Small air pockets can be pierced with a pin and smoothed out using a piece of the decal backing paper.

## 4. Familiarization

BXMT3213 chipper/shredders chip or shred limbs, branches, bark, or leaves into wood chips or mulch. Power to operate the machine is provided by a gas engine.

### 4.1 New Operator

#### WARNING!

**Make sure all operators understand how to set the machine to a safe condition before performing any service, maintenance, or storage preparation. For instructions, see *Safe Condition* on page 9.**

**It is the responsibility of the owner and the operator to read this manual, and to train all other operators before they work with the machine. Follow all safety instructions.**

**Untrained operators are not qualified to use the machine.**  
They can endanger themselves and others or damage property.

### 4.2 Training

Each operator must be trained in the correct operating procedures before using the machine. The *Sign-Off Form* on page 10 can be used to keep a training record.

1. Review control locations, functions, and movement directions.
2. Move the machine to a large open area and allow the new operator to become familiar with control functions and machine responses.
3. When the new operator is familiar and comfortable with the machine, they can proceed with the work.

### 4.3 Work Site Familiarization

It is the responsibility of the operator to be thoroughly familiar with the work site before starting work. Avoid unsafe situations and make every effort to prevent accidents.

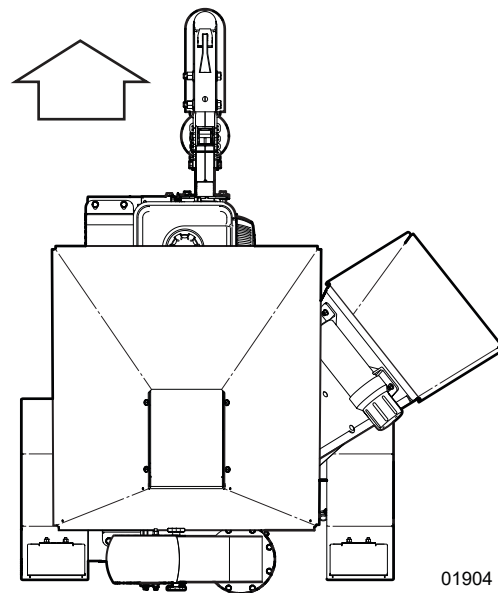
When you set up a work site, consider the following things:

- Avoid close or cramped workspaces. Make sure there is enough space and clearance for the machine and discharge material.
- Position the machine so prevailing winds blow engine exhaust fumes away from operator's location.
- Choose flat, level ground, and make sure the machine is level before operating it.

- Avoid muddy or soft ground where the jack stand will sink. If soft ground is unavoidable, place boards or plates under the jack stand to increase the surface area.

### 4.4 Operator Orientation

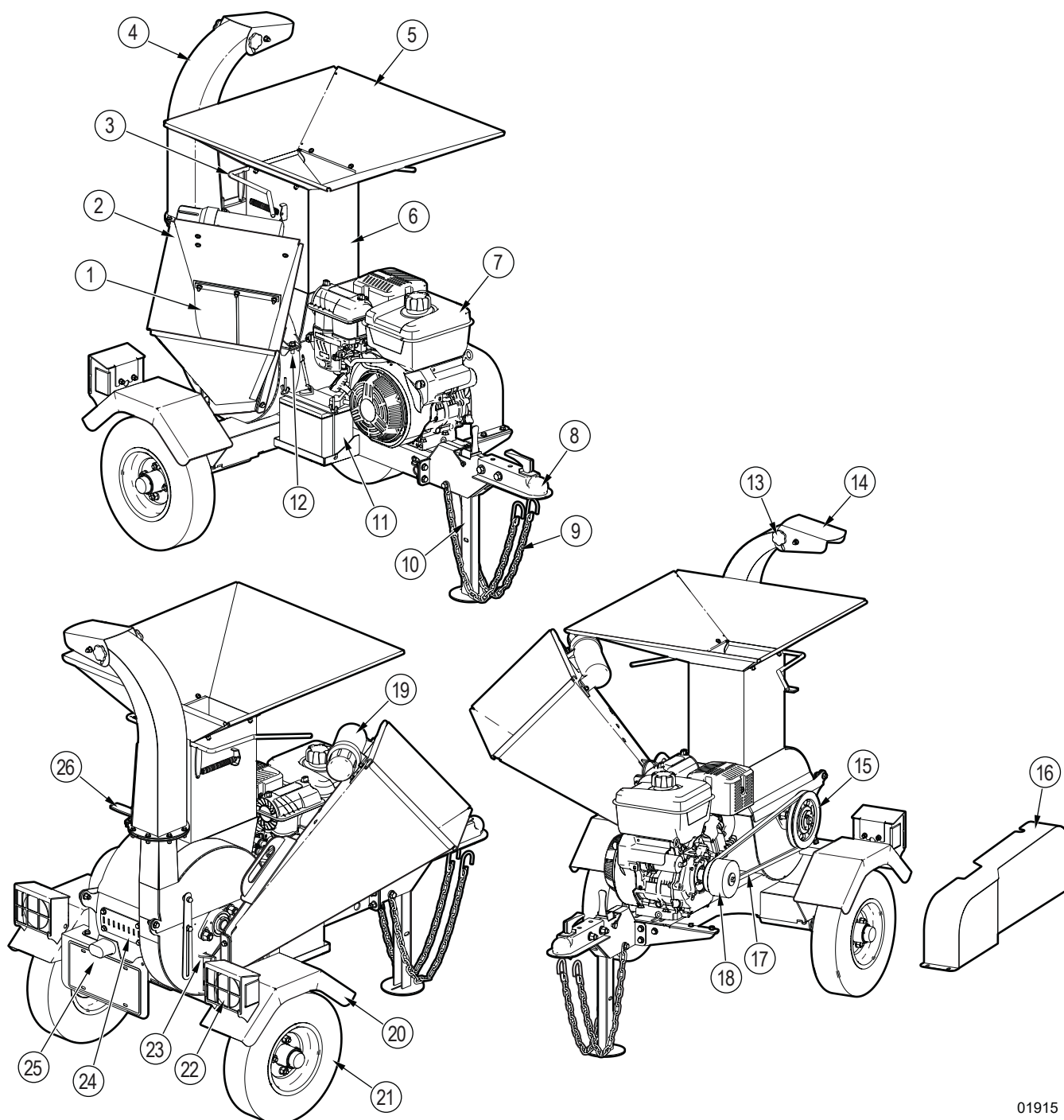
**IMPORTANT!** When describing controls throughout this manual, the directions for left hand (LH), right hand (RH), backward, and forward are determined when standing at the operator controls facing the direction of forward machine travel.



01904

**Fig. 4 – Direction of forward travel**

## 4.5 Machine Components



01915

**Fig. 5—Machine components**

- |                             |                                 |  |
|-----------------------------|---------------------------------|--|
| 1. Feed hopper flap         | 10. Jack stand                  | 19. Operator's Manual tube                     |
| 2. Chipper feed hopper      | 11. Battery (250 cc)            | 20. Fender (1 of 2)                            |
| 3. Shredder feed-gate lever | 12. Upper-housing retainer bolt | 21. Tires, 4.80-8 LRB SportTrail 4on4 (1 of 2) |
| 4. Discharge chute          | 13. Hood-deflector knob         | 22. Tail light, stop and turn (1 of 2)         |
| 5. Shredder feed hopper     | 14. Hood deflector              | 23. Ledger knife                               |
| 6. Upper housing            | 15. Rotor sheave                | 24. Chop block                                 |
| 7. Engine                   | 16. Belt guard                  | 25. License plate bracket and light            |
| 8. Ball-mount hitch coupler | 17. Drive belt                  | 26. Discharge-chute handle                     |
| 9. Safety chains            | 18. Engine clutch               |  |

## 5. Controls

### **WARNING!**

Do not operate the machine until you are thoroughly familiar with the position and function of the various controls. Read the operator's manual thoroughly. Your safety is involved!

W065

## 5.1 Engine Controls

### **WARNING!**

Before starting the engine, read and understand the safety and operating information under *Engine Operation on page 24.*

**IMPORTANT!** For complete information about the engine controls, see the engine manufacturer's manual.

The following symbols apply to the engine controls:



**Fast**  
Engine speed is fast.



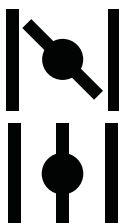
**Slow**  
Engine speed is slow.



**Fuel shut-off closed**



**STOP**  
The engine is stopped.



**Choke is closed**  
Engine start.



**Choke is open**  
Engine operation.



**Start**  
Engine ignition.

### 5.1.1 Throttle Control and Fuel Shutoff

The throttle control and fuel shutoff lever has the following functions:

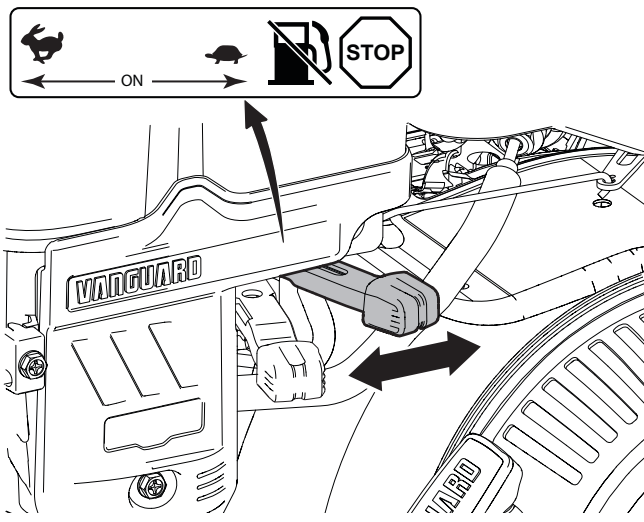


Fig. 6—Engine throttle control and fuel shutoff

### 5.1.2 Choke Control

The choke control lever has the following functions:

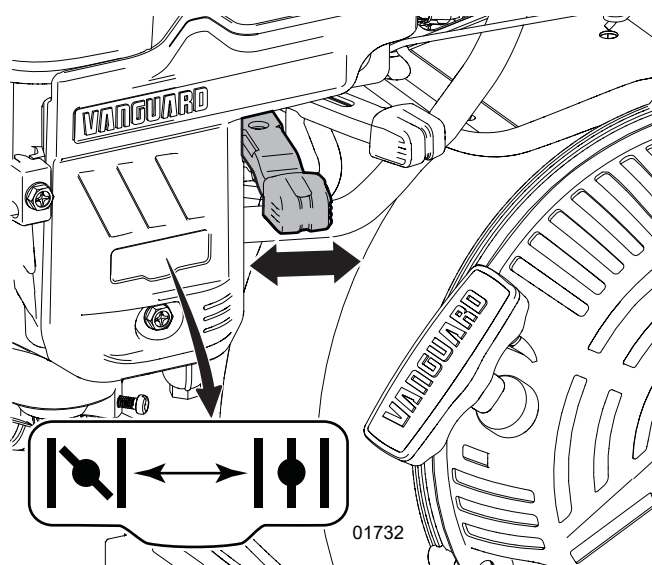


Fig. 7—Engine choke control

### 5.1.3 Electric Start

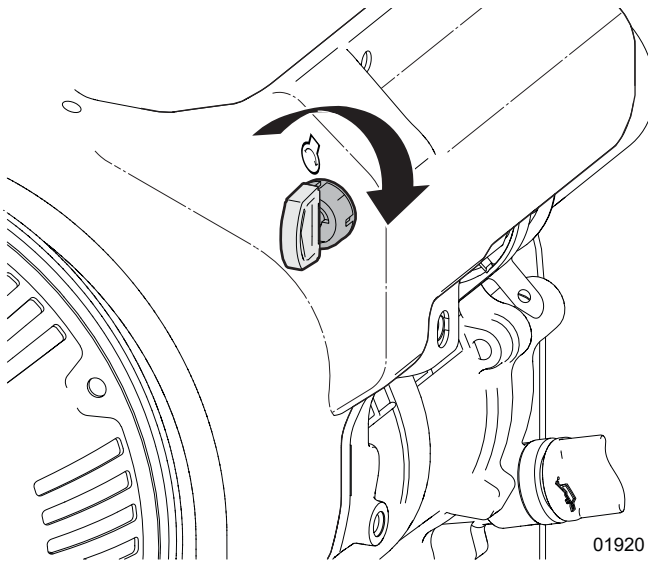
#### **! WARNING!**

The engine can cause serious bodily harm or death to a person who is not trained in the correct operation. Always remove the key and keep it in a secure location to prevent an unauthorized person from starting the engine.

**IMPORTANT!** Long start cycles may reduce the life of the starter. Use short start cycles (five seconds maximum) and wait one minute between cycles.



*The engine key does not stop the engine, it only starts the engine.*



**Fig. 8**—Electric start control

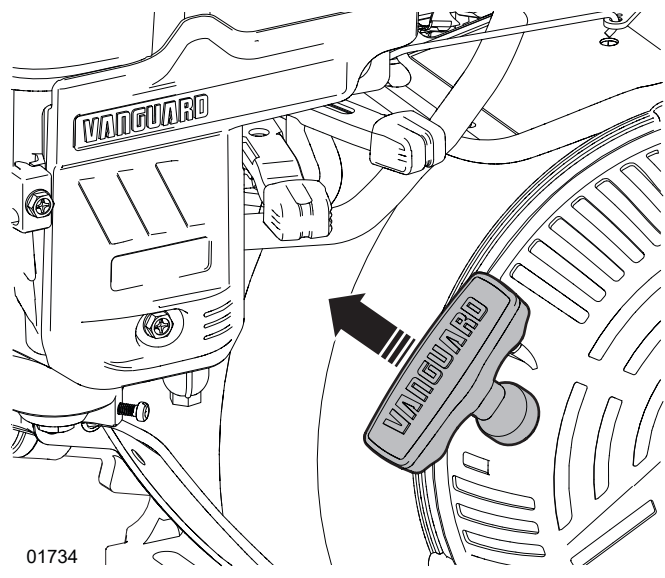
### 5.1.4 Rewind Start

#### **! WARNING!**

Fast retraction of the starter cord (called kickback) pulls your hand and arm toward the engine faster than you can let go of the handle. Serious bodily harm (for example; bruises, sprains, fractures, and broken bones) can result.

When you start the engine, pull the starter cord slowly until you feel resistance, and then pull it rapidly to avoid kickback.

W102



**Fig. 9**—Rewind-start handle

## 5.2 Shredder Feed-Gate Levers

The shredder has a spring-loaded feed gate. Press down on one of the levers to open the feed gate and transfer material from the hopper to the shredder rotor. The spring closes the feed gate when the lever is released.

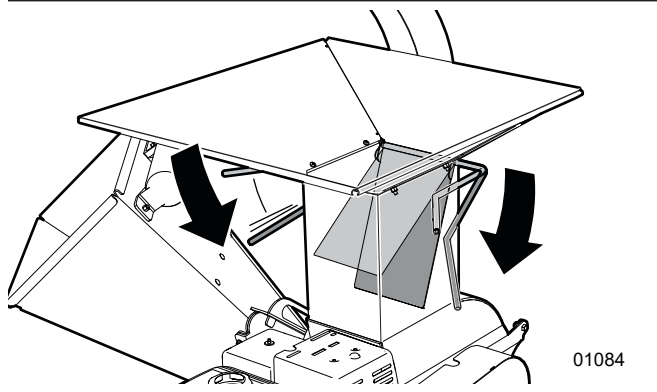


Fig. 10—Feed gate levers

## 5.3 Discharge Chute

The discharge chute can rotate 360°. A spring-loaded latch handle locks it in position when released.

1. Lift the latch handle up until the chute lock pin disengages.
2. Rotate the chute to the required position.
3. Release the latch handle.  
Make sure that the latch handle locks the discharge chute into position at the nearest lock point.

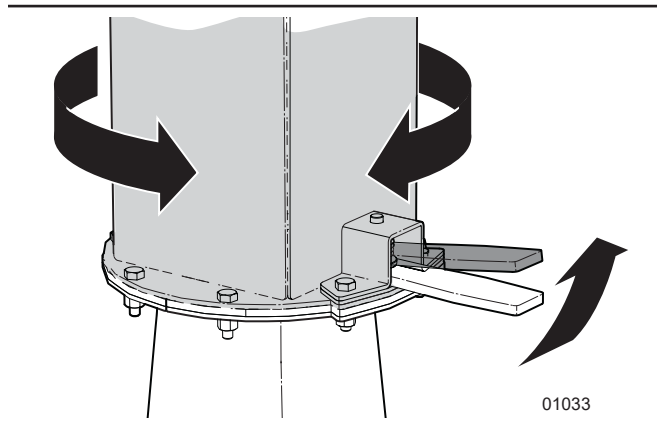


Fig. 11—Rotate the discharge chute

## 5.4 Hood Deflector

The discharge chute has a deflector on the end to direct wood chips. Use the hand knobs on each side to change the position.

1. Loosen the two hand knobs (turn them counterclockwise).
2. Rotate the deflector.
3. Tighten the hand knobs (turn them clockwise).

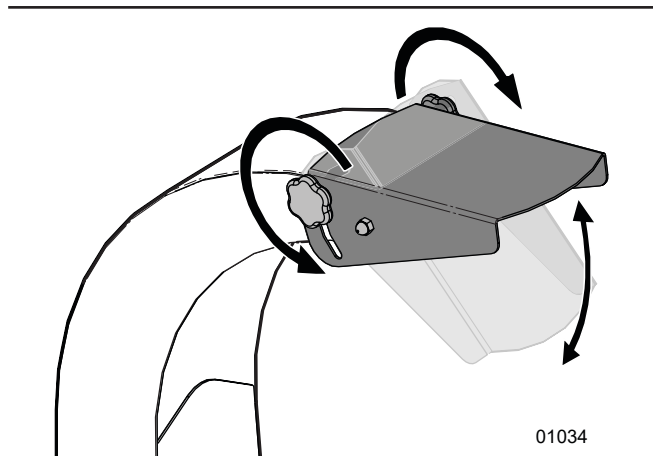


Fig. 12—Rotate the hood deflector

## 6. Operating Instructions

Read and understand the operating instructions before using the machine.

### 6.1 Operating Safety

#### **WARNING!**

**Wear the personal protective equipment (PPE) that is necessary to do the work safely.**

**This includes, but is not limited to, a hard hat, hearing protection, a face shield, protective footwear, a respirator, and heavy gloves.**

W101

#### **WARNING!**

**Do not reach into the chipper hopper. There are sharp knives that can trap, cut, and/or sever your fingers or hand. Use a stick or branch to pull material that does not move out of the discharge chute.**

**If there is a blockage, set the machine to a safe condition, and then remove the material.**

W004

#### **WARNING!**

**Always use the machine outdoors and park the machine in a position where the prevailing winds blow the engine exhaust away from the operator. Exhaust from the engine contains carbon monoxide (CO) that can accumulate to a dangerous level, even in an area with good air flow.**

W006

#### **CAUTION!**

**Maintain a safe distance from the area where the machine expels the wood chips. Use the discharge chute and/or hood deflector to direct the expelled material away from the work area, all people, animals, and objects.**

**The machine can expel wood chips fast enough to cause eye, cut, and impact injuries and/or property damage.**

W024

**IMPORTANT! Do not put metal objects, bottles, cans, rocks, glass, or other foreign material into the wood chipper. These items will damage the machine.**

**If such items get into the wood chipper, stop the machine and set it to a safe condition before removing them. Inspect the machine for damage and loose parts before resuming operation.**

- Read and understand this manual before starting the machine. Review all safety instructions annually.
- Park the machine in a clear location on dry, level ground. Do not operate the machine on a hillside or area that is cluttered, wet, muddy, or icy to prevent slips and trips.
- Keep the working area clean and free of debris.
- Never operate an engine inside a closed building. The exhaust fumes may cause asphyxiation.
- Close and secure all guards, shields, and covers before starting the machine. If a guard, shield, or cover is removed, replace it.
- Do not operate the machine with the safety curtain removed or in poor condition. It prevents material (that may cause injury) from coming out of the feed hopper.
- Do not move or transport the wood chipper when the engine is running.
- Turn off the engine before leaving the machine unattended.
- Be aware of the size and shape of the wood material. Crotchety branches and brush can move in unpredictable ways when they pass through the feed rollers and could cause injuries. Cut large curved pieces into smaller, straighter sections.
- Never stand, sit, or climb on any part of the wood chipper, especially while the engine is on.
- **Never operate the machine alone!** Always have at least two fully trained people present.
  - It is recommended that there be one operator and one spotter present during machine operation. Both the operator and spotter must be completely familiar with all the machine safety, controls, and operating functions.
  - **The operator must be in control of the machine at all times. The spotter must remain outside of the hazard zone, while the machine is in operation.**
- Keep bystanders at least 20 ft (6 m) from the machine and wood chip discharge area. Mark the safe zone with safety cones.
- Before operation, complete the tasks described in the *Pre-Start Checklist* on page 23.

## 6.2 Pre-Start Checklist

Complete the following before you start the machine the first time and every time thereafter:

Items to Complete	✓
Review the <i>Operating Safety</i> on page 22.	
Check the tension and alignment of the belt. Adjust as required.	
Check the condition and clearance of the twig breaker, rotor knives, and ledger knife. Adjust or replace them, as required.	
Check the engine oil level. For instructions, see <i>Check the Engine Oil Level</i> on page 26. If required, add oil.	
Check the engine fuel level. For instructions, see <i>Check the Engine Fuel Level</i> on page 25. If required, add fuel.	
Check the engine air filter. For instructions, see <i>Clean the Engine Air Filter</i> on page 39. Clean or replace the filter if it is full of dirt or debris.	
Check the condition of the battery and electrical components. Make sure that all the electrical components are in good working condition and the cable connections are secure. Replace damaged or corroded components.	
Make sure the machine is lubricated as specified in the <i>Maintenance Schedule</i> on page 37.	
Make sure the rotor housing and discharge chute are clear. Remove any blockages, twine, wire, or other material that is entangled in the machine.	
Make sure the rotor bearings turn freely. If the bearings are damaged or do not turn freely after they are lubricated, contact your dealer to have them replaced.	
Make sure all guards, shields, and covers are installed, secure, and in good condition. Replace missing or damaged guards, shields, or covers.	
Check the condition of the feed hopper safety curtain. Replace the safety curtain if it is damaged.	
Check the tires, wheels, and hubs. Inflate, repair, or replace, as required.	
Make sure all the fasteners are installed and tightened to the correct torque. For more information, see <i>Bolt Torque</i> on page 48.	
Make sure the operator and spotter are wearing the required PPE (including hard hat, safety eye wear, safety footwear, safety vest, hearing protection, and work gloves). Make sure the PPE is clean and in good repair.	
Make sure the operator and spotter are not wearing loose-fitting clothing or jewelry, and long hair is tied up.	
Make sure there are no bystanders inside the work zone and the spotter is outside the hazard zone.	

## 6.3 Machine Break-In

Although there are no operational restrictions on the wood chipper when used for the first time, it is recommended that the following mechanical items be checked:

### After 1–5 hours of operation

1. Review the engine operator's manual for break-in information.
2. Inspect the axle, tires, and wheel hubs.
3. Check tire pressure. Inflate as indicated on the tire sidewall.
4. Check drive belt alignment. Re-align if required. See *page 40*.
5. Check belt tension. Adjust if required. See *page 40*.
6. Check condition of rotor bearings. Make sure they are not overheated and turn freely.
7. Check the condition and clearance of the twig-breaker, rotor and ledger knives. Adjust as required.
8. Check for entangled material. Remove before resuming work.
9. Check that all fasteners and hardware are tight.

### After 8 hours of operation

1. Complete the tasks listed under *After 1–5 hours of operation*.
2. Change the engine oil.  
For instructions, see the engine manufacturer's manual.
3. Continue with the regular *Maintenance Schedule* on page 37.

## 6.4 Engine Operation

### CAUTION!

**Before you start the engine, review the safety, operating, and maintenance instructions in the engine manual.**

W019

### 6.4.1 Engine Safety

#### WARNING!

**Do not operate the engine indoors. Park the machine outdoors in a position where the prevailing winds blow the exhaust away from you.**

**Engine exhaust contains carbon monoxide (CO) that can quickly accumulate to a dangerous level. Carbon monoxide can cause illness, unconsciousness, or death.**

W072

- Remove the wire from the spark plug before servicing the engine or equipment to prevent accidental starting.
- Keep cylinder fins and governor parts free of grass and other debris that can affect the engine speed.
- Examine the muffler periodically to make sure it is functioning effectively. Repair or replace a worn or leaking muffler, as required.
- Use fresh gasoline (less than three months old). Stale fuel creates insoluble solids (deposits) that clog the carburetor and cause leaks.
- Before storage, replace fuel that contains ethanol with an alkylate or appropriate engineered fuel to prevent the buildup of deposits.
- Check fuel lines and fittings frequently for cracks or leaks. Replace if necessary.
- Store fuel well away from all wood material.
- Do not place hands or feet near moving or rotating parts.
- Do not operate the engine in an area where fuel is spilled. Move the machine away from the spill until the fuel evaporates. Do not create any sources of ignition in the spill area.
- Do not choke the carburetor to stop the engine. Whenever possible, gradually reduce the engine speed before stopping.
- Do not tamper with governor springs, governor links or other parts that may increase the governed speed. Engine speed is selected by the original equipment manufacturer.

- Do not check for spark with the spark plug or spark plug wire removed.
- Do not attempt to start the engine with the spark plug removed. If the engine floods, set the choke control to OPEN, set the throttle control to FAST, then try to start the engine again.
- Do not strike the flywheel with a hard object or metal tool. This may cause the flywheel to shatter during operation. Use the correct tools to service the engine.
- Do not operate the engine without a muffler or heat shield. Inspect them periodically and replace if damaged.
- Do not operate the engine with an accumulation of wood chips, dirt, or other combustible materials in the muffler area.
- Do not use the engine on any forest covered, brush covered, or grass covered unimproved land unless a spark arrester is installed on the muffler. The arrester must be maintained in effective working order by the operator. In the state of California, the previous statement is required by law (Section 4442 of the California Public Resources Code). Other states may have similar laws. Federal laws apply on federal land.
- Do not touch a hot muffler, cylinder, or fins. Contact may cause burns.
- Do not run the engine with the air cleaner or air cleaner cover removed. Doing this can damage the engine.

### 6.4.2 Battery Safety

#### WARNING!



**Warm the battery to a minimum of 60 °F (16 °C) before charging it. Attempting to charge a frozen battery can cause it to explode. An explosion can cause serious injury or death from projectiles, extreme heat, chemicals, and loud noise.**

W030

#### WARNING!

**Do not let metal objects touch the battery terminals. Cover the battery terminals when servicing the battery or the drive belt guard is removed. Electricity can arc from the battery terminal to the metal object and cause a fire or explosion. An explosion can cause serious injury or death from heat, impact, and chemical hazards.**

W021

### CAUTION!

**Risk of burns! Battery electrolyte is extremely corrosive and poisonous. Contact with the eyes, skin or clothing can result in severe burns or other serious personal injury. If contact occurs seek medical attention immediately. Handle batteries carefully.**

W029

### CAUTION!

**Wash your hands thoroughly after handling a battery. Avoid contact with the battery posts, terminals, and related accessories. They contain lead and lead compounds that are known to cause cancer and birth defects or other reproductive harm.**

W031

- Wear gloves and safety glasses or face shield when working on or near batteries.
- Use a battery carrier to lift the battery or place hands at opposite corners to avoid spilling acid through the vents.
- Avoid contact with battery electrolyte:
  - **External Contact:** Flush immediately with water.
  - **Eye Contact:** Flush with water for 15 minutes. Get prompt medical attention. Clean up any spilled electrolyte immediately.
- Keep all sparks and flames away from batteries. Gases given off by electrolyte is explosive.
- To avoid injury from spark or short circuit, disconnect battery ground cable before servicing any part of the electrical system.

## 6.4.3 Check the Engine Fuel Level

### WARNING!

**Fuel and vapors are extremely flammable and explosive. Fire or explosion can cause severe burns, bodily harm, or death. Keep fuel away from sparks, open flame, pilot lights, heat, and any other source of ignition.**

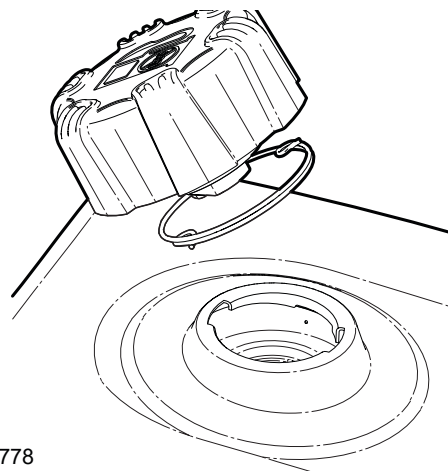
### CAUTION!

**Fuel vapors are very toxic. Breathing fuel vapors can cause irritation, illness, or unconsciousness. Check the fuel level outdoors or in a well-ventilated area.**

**Check the engine fuel level before each use.**

Starting work with a full tank helps to eliminate or reduce operating interruptions for refueling. Avoid running the tank dry.

1. Park the machine on level ground.
2. Stop the machine.  
For instructions, see *Stop the Machine on page 27*.
3. Wait a minimum of five minutes for the engine to cool.
4. Turn the fuel cap counterclockwise to remove it.
5. Check the fuel level. The fuel tank is full when the fuel level is visible 1/2 inch (12 mm) below the filler neck. There must be room for fuel expansion.
6. Do one of the following:
  - If there is enough fuel in the tank, install and secure the fuel cap to prevent spillage.
  - If there is not enough fuel in the tank, add fuel. For instructions, see *Add Fuel to the Engine*.



01778

**Fig. 13—Fuel cap**

## 6.4.4 Add Fuel to the Engine

### ! WARNING!



Do not smoke or vape when you handle fuel. Fuel vapours can explode causing serious injury or death. Keep sparks, flames, or hot components away from fuel.

W027

### ! CAUTION!

Fuel vapors are very toxic. Breathing fuel vapors can cause irritation, illness, or unconsciousness. Fill the fuel tank outdoors or in a well-ventilated area.

The engine requires clean, fresh, unleaded gasoline with a pump octane rating of 87 or higher (research octane number [RON] of 91 or higher). Gasoline with up to 10% ethanol (gasohol) is acceptable. For more information, see *Engine Fuel* on page 36.

For information about use at high altitudes, see the engine manufacturer's manual.

Fuel tank capacity: **1.52 US gal (5.74 L)**.

1. Stop the machine.  
For instructions, see *Stop the Machine* on page 27.
2. Wait a minimum of five minutes for the engine to cool.
3. Turn the fuel cap counterclockwise to remove it.
4. Add the correct type and amount of fuel to the tank until the fuel level is visible 1/2 inch (12 mm) below the filler neck. Leave room for expansion. **Do not overfill the tank.**
5. If fuel is spilled, carefully clean it up and wait until the fuel dries before starting the engine.
6. Install and secure the fuel cap to prevent spillage.

## 6.4.5 Check the Engine Oil Level

**IMPORTANT!** For more information about engine oil, see the engine manufacturer's manual and *Engine Oil* on page 36.

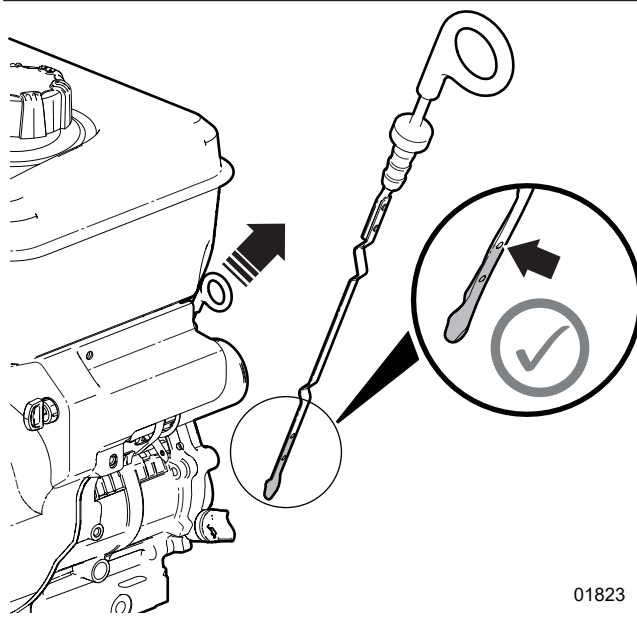
Operating the engine with a low oil level can cause engine damage that is not covered by the warranty.



*The engine must be in a level position for the dipstick to show the oil level correctly.*

Check the engine oil level before each use.

1. Park the machine on level ground.
2. Stop the machine.  
For instructions, see *Stop the Machine* on page 27.
3. Pull out the oil-level dipstick and wipe it clean.
4. Fully reinsert the oil-level dipstick.
5. Pull out the oil-level dipstick and check the oil level.  
The oil level is correct when oil is visible on the dipstick from the end to the full (upper) mark.
6. Do one of the following:
  - If the oil level is correct, continue with Step 8.
  - If the oil level is low, add oil until the oil-level is at the full (upper) mark. For instructions, see *Add Oil to the Engine* on page 27.
7. Insert and secure the oil-level dipstick.



01823

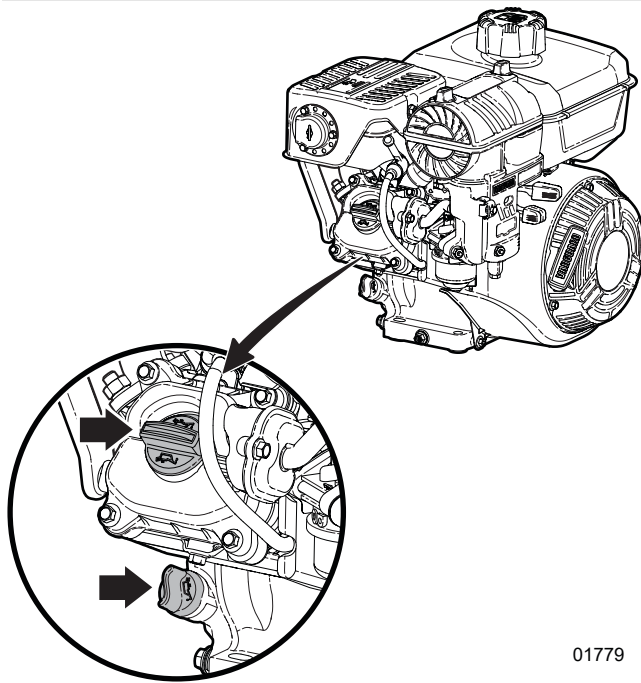
**Fig. 14**—Check the engine oil level

## 6.4.6 Add Oil to the Engine

**IMPORTANT!** For more information about engine oil, see the engine manufacturer's manual and *Engine Oil* on page 36.

The engine has three oil-fill locations. The two most accessible locations are shown in the following image. The third location is on the opposite side of the engine, below the dipstick.

1. Check the engine oil level to make sure that the oil level is low. For instructions, see *Check the Engine Oil Level* on page 26.
2. Turn an oil-fill cap counterclockwise to remove it.
3. Slowly, add the correct type and amount of oil. **Do not overfill.**
4. Wait a minimum of one minute.
5. Check the engine oil level.
6. Install and secure the oil-fill cap to prevent spillage.



01779

Fig. 15—Engine oil-fill locations

## 6.5 Start the Machine

### **WARNING!**

**Before you start the machine, read and understand all of the safety information in this manual and the engine manufacturer's manual.**

**IMPORTANT!** Use short starting cycles (maximum five seconds) and wait one minute between cycles. If the engine does not start after repeated attempts, contact your local dealer or go to [VanguardPower.com](http://VanguardPower.com).

Before you start the machine, see the information under *Controls* on page 19.

1. Complete the tasks described in the *Pre-Start Checklist* on page 23.
2. Make sure that the machine is level and in a stable position.
3. Move the choke control to the **Closed** position.
4. Move the throttle control to the **Fast** position.
5. Insert the key, and then turn the ignition switch clockwise to the **Start** position. When the engine starts or after five seconds, release the key.  
The ignition switch automatically rotates counterclockwise to the **Run** position.
6. Do one of the following:
  - If the engine started, continue with Step 7.
  - If the engine did not start, wait a minimum of one minute, and then repeat steps 5 and 6.
7. As the engine warms up, move the choke control to the **Open** position.

## 6.6 Stop the Machine

**IMPORTANT!** Do not choke the carburetor to stop the engine.

1. Stop loading material into the machine.
2. Move the throttle control to the **Slow** position.
3. Wait one minute for the engine to slow down the machine.
4. Move the throttle control to the **STOP** position to turn off the engine and close the fuel shut-off valve.

## 6.7 Emergency Stop

### In the event of an emergency:

1. Stop loading material into the machine.
2. Move the throttle control to the **STOP** position to turn off the engine and close the fuel shut-off valve.
3. Remove the cause of the emergency before starting the engine and resuming work.

## 6.8 Machine Setup

### **WARNING!**

Always use the machine outdoors and park the machine in a position where the prevailing winds blow the engine exhaust away from the operator. Exhaust from the engine contains carbon monoxide (CO) that can accumulate to a dangerous level, even in an area with good air flow.

W006

Use the tow vehicle to position the chipper / shredder at the work area.

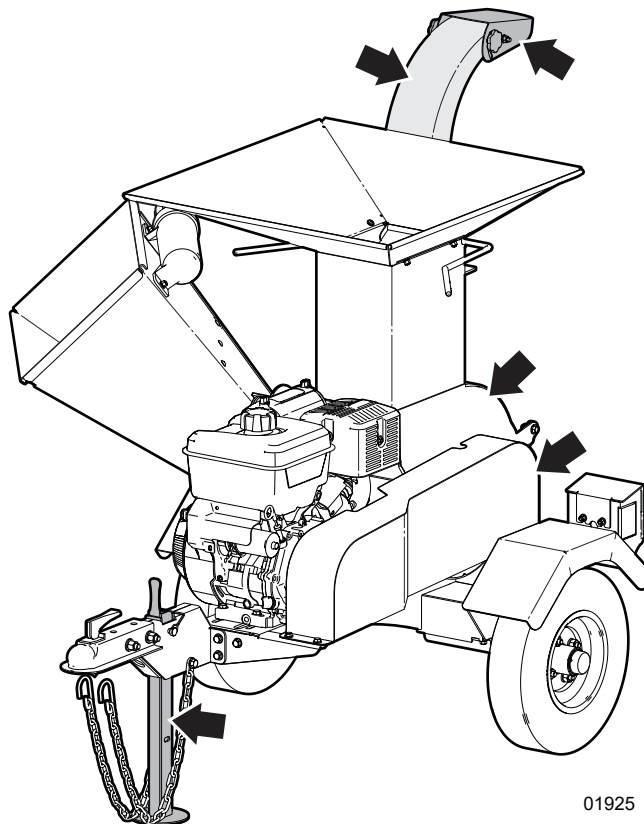
- **Select a safe work area and machine location:**
  - Ground should be firm and level.
  - Area must be clear of stones, branches, or hidden obstacles that might cause a tripping, hooking, or snagging hazard.
  - There must be no overhead hazards such as branches, cables, and electrical wires.
- **Identify a safe wood-chip discharge location. Make sure the wood-chip pile does not interfere with safe operation of the machine.**

Set up the machine:

1. Complete one (1) of the following:
  - Disconnect the machine from the tow vehicle.  
For instructions, see *Connect to a Ball-Mount Hitch* on page 32.
  - If extra stability is required, leave the machine attached to the tow vehicle. Set the tow vehicle's parking break, turn off the engine, and remove the key from the ignition.
2. Lower the jack stand to support the machine. The machine should be as level with the ground as possible.
3. Adjust the discharge chute to direct the wood chips away from the operator's location and down wind.  
For instructions, see *Discharge Chute* on page 21.

4. Adjust the hood deflector to direct the wood chips further from or closer to the machine.  
For instructions, see *Hood Deflector* on page 21.

5. Make sure that the upper housing is closed and secure.
6. Make sure that all of the guards are installed and secure.



01925

Fig. 16—Machine setup

## 6.9 Shredder Operation

### CAUTION!

Only open the shredder gate to let material fall into the machine. Do not use an object to hold the shredder gate open. The machine can release material fast enough to cause personal injury and property damage.

W071

### WARNING!

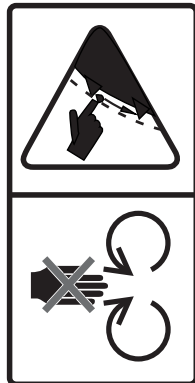
Do not reach into the chipper hopper. There are sharp knives that can trap, cut, and/or sever your fingers or hand. Use a stick or branch to pull material that does not move out of the discharge chute.

If there is a blockage, set the machine to a safe condition, and then remove the material.

W004

**Shredder maximum material diameter: 1" (2.5 cm).**

- Never reach into the shredder feed hopper farther than the feed gate. The knives on the rotor are sharp.

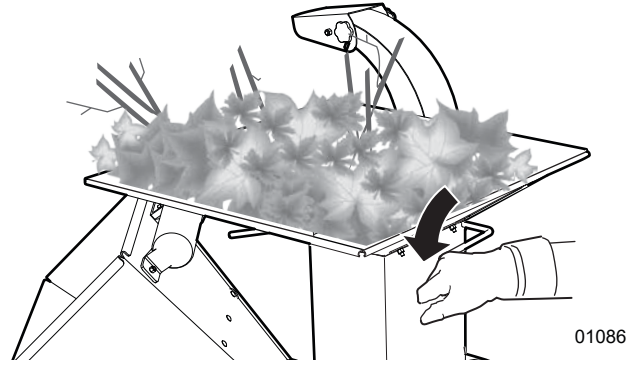


- Use a stick or branch to push in material that does not move from the feed hopper into the shredder on its own.
- Close the feed gate every time you add material. The feed gate keeps flying material contained in the shredder housing. Never prop open the feed gate.
- If a jam occurs, stop adding material to the feed hopper, and then clear the jam.  
For instructions, see *Clear a Jam*.

Procedure:

1. Place leaf filled or small diameter wood material into the shredder hopper.  
Do not overfill the hopper. Material falls into the shredder easier when the hopper is not overfull.
2. Press down on one of the feed-gate levers to open the feed gate.

3. After the material enters the shredder, release the feed-gate lever.
4. Be aware of how much material you feed in. Slow down or stop if the engine begins to slow. Wait for the shredder to return to full speed.
5. Repeat steps 1 to 4, as required.



**Fig. 17—Shredder feed-gate lever**

## 6.10 Chipper Operation

### **WARNING!**

Do not reach into the chipper hopper. There are sharp knives that can trap, cut, and/or sever your fingers or hand. Use a stick or branch to pull material that does not move out of the discharge chute.

If there is a blockage, set the machine to a safe condition, and then remove the material.

W004

### **CAUTION!**

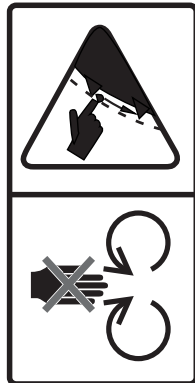
**Risk of personal injury! Do not overload the machine by placing material into the feed hopper larger than the size stated on the decal.**

**Machine damage could also result.**

W063

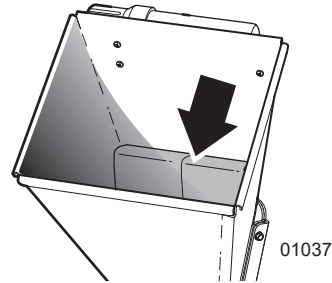
**Chipper maximum material diameter: 3" (7.5 cm).**

- Never reach into the chipper feed hopper farther than the safety curtain. The knives on the rotor are sharp.



- Use a stick or branch to push in material that does not move from the feed hopper into the chipper on its own.
- Make sure that the wood-chip pile is contained and does not affect the immediate work area.
- If a jam occurs, stop adding material to the feed hopper, and then clear the jam.

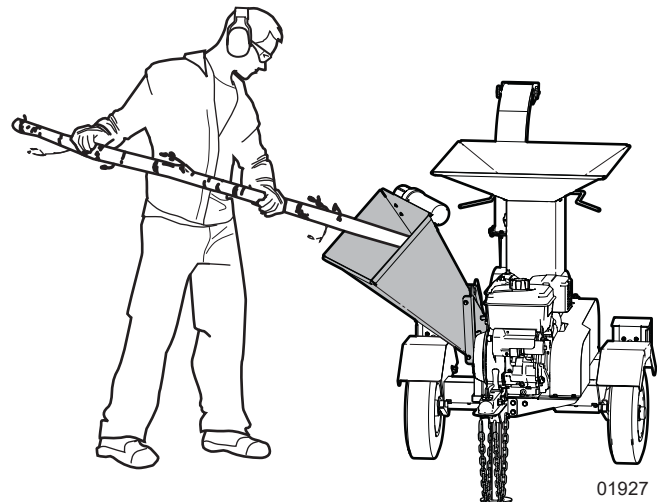
For instructions, see *Clear a Jam* on page 31.



**Fig. 18**—Feed hopper safety curtain

Procedure:

1. Make sure that the engine is warm and the rotor is up to speed.
2. Slowly slide material into the chipper feed hopper. Do not force the material. It is drawn in when it engages with the rotor. Use continuous, light pressure to guide it.
3. Be aware of how much material you feed in. Slow down or stop if the engine begins to slow. Wait for the chipper to return to full speed.
4. Repeat steps 2 and 3, as required.



**Fig. 19**—Chipper operation

## 6.11 Clear a Jam

### **WARNING!**

Do not reach into the chipper hopper. There are sharp knives that can trap, cut, and/or sever your fingers or hand. Use a stick or branch to pull material that does not move out of the discharge chute.

If there is a blockage, set the machine to a safe condition, and then remove the material.

W004

### **WARNING!**

Do not reach into the rotor housing. The rotor and ledger knives are very sharp. If it is necessary to reach into the rotor housing, set the machine to a safe condition, wear heavy gloves, and be very careful.

W003

The machine is designed to handle a wide range of materials. However, in the event that material gets lodged in the machine, follow this procedure to clear the jam:

1. Stop the machine.  
For instructions, see *Stop the Machine* on page 27.
2. Wait for all moving parts to stop.
3. Pull all of the material out of the two hoppers.
4. Make sure that nothing is jammed or wedged between the input opening and the rotor.
5. Pull all of the material out of the discharge hood.  
Use a stick to poke any jammed material loose. Make sure that the discharge chute is clear.
6. Try to operate the machine to see if the jam is cleared.  
**If the machine does not operate, the jammed material must be removed from inside the machine.**

#### Remove an internal jam:

1. Set the machine to a safe condition.  
For instructions, see *Safe Condition* on page 9.
2. Remove the upper-housing retainer bolt, and then open the upper housing.

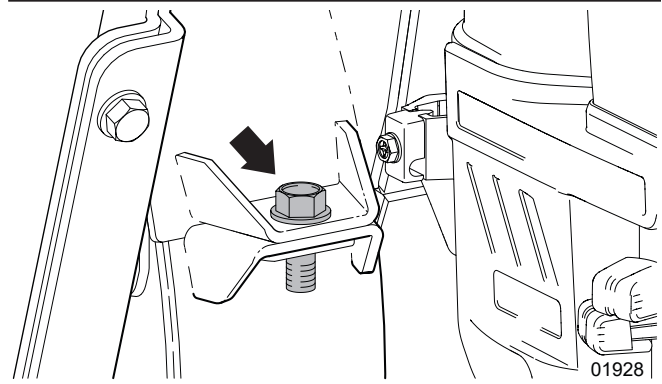


Fig. 20—Upper-rotor-housing bolt

3. Use a tool or stick to remove the jammed material from inside the chipper rotor and shredder compartment.
4. Clean out the discharge area rotor paddles.
5. Turn the rotor by hand to make sure that there is nothing jammed between the rotor and ledger knife.

### **WARNING!**

Do not operate the machine with any of the guards or shields removed. The machine is shown with guards or shields removed for illustrative purposes only.

W001

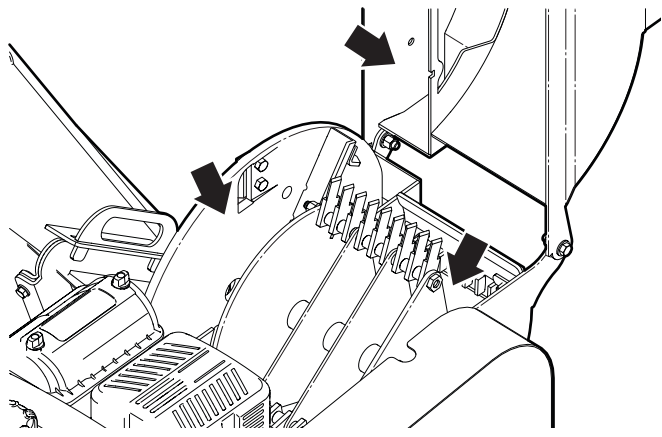


Fig. 21—Clear the areas inside the machine

6. After the jam is cleared, close the upper housing.
7. Install the upper-housing retainer bolt. See Fig. 20.
8. Make sure that everyone is clear of the machine and discharge area, and then start the machine.

## 7. Transport

**IMPORTANT!** Equipment that is transported on a public roadway must comply with the local laws that govern the safety and transport of machinery.

Before taking the machine on a public roadway, make sure it has the required lighting, reflectors, and markings, and that they are in good, working condition.

For specific requirements, contact your local transportation authority.

### 7.1 Transport Safety

- Make sure that the machine is securely attached to the tow vehicle with a retainer through the hitch.
- Always attach the safety chains between the machine and the tow vehicle.
- Never allow riders on the machine.
- Do not exceed a safe travel speed. Slow down for rough terrain and cornering.
- Plan your route to avoid heavy traffic.
- Do not transport or move the machine with the engine running.
- Inspect the wheel rims for dents or damage and tighten the wheel lug nuts to the specified torque.  
For more information, see *Wheel Lug Nut Torque on page 49*.
- Inspect the tires for cuts or damage.
- Make sure the tires are filled to the specified pressure. For correct tire pressure, see the tire sidewall.
- Make sure the tow vehicle is fitted with the correct size ball-mount hitch (2 inches).
- Secure all the machine guards, shields, and covers.
- Make sure that the engine fuel cap is installed and secure (to prevent spills during transport).
- Remove all debris from the machine.
- After the machine is prepared for transport, complete a circle check to make sure everything is safe, secure, and functions correctly.

### 7.2 Prepare the Machine for Transport

1. Stop the machine.  
For instructions, see *Stop the Machine on page 27*.
2. Remove all material from the hoppers.
3. Turn the discharge chute and position it over the machine to reduce the machine width.  
For instructions, see *Discharge Chute on page 21*.
4. Make sure that the upper housing is closed and secured with the upper-housing retainer bolt.
5. Attach the machine to a tow vehicle.  
For instructions, see *Attach to a Tow Vehicle*.

### 7.3 Attach to a Tow Vehicle



#### WARNING!

**Before you tow the machine, make sure that the safety chains are correctly attached.**

W103

Always park the machine on a level, dry area that is free of debris and other foreign objects before connecting or disconnecting a hitch.

The machine has a trailer tongue with a two-inch ball-mount hitch coupler.

#### 7.3.1 Connect to a Ball-Mount Hitch

Make sure there is enough room and clearance to safely reverse the tow vehicle to the machine.

1. Reverse the tow vehicle to the machine. Stop about 1 ft (30 cm) away from the hitch coupler. If a back-up camera is not available, have another person guide you.
2. Use the trailer jack to raise the trailer tongue until the hitch coupler is higher than the ball-mount hitch.  
For instructions, see *Lower the Trailer Jack on page 33*.
3. Remove the snap-lock pin from the hitch-coupler latch. Raise the latch to the upright (unlocked) position.
4. Slowly, reverse the tow vehicle until the ball-mount hitch is below the hitch coupler.
5. Stop the tow vehicle and apply the parking brake.
6. Use the trailer jack to lower the machine and install the hitch coupler over the ball-mount hitch.  
For instructions, see *Lower the Trailer Jack on page 33*.

7. Lower the hitch-coupler latch to the locked position. Install the snap-lock pin through the latch to secure the hitch coupler to the ball-mount hitch.
8. Raise and stow the trailer jack.  
For instructions, see *Raise the Trailer Jack*.
9. Cross the two safety chains below the tongue, and then attach them to the tow vehicle (one on each side of the ball-mount hitch).
10. Connect the light-bar cable harness to the tow vehicle. Make sure the cables are long enough to make turns without tension, but do not drag on the ground.
11. Check the function of all the lights. Activate each light and have another person call out to confirm that it functions correctly.
12. If required, remove chocks or blocks from the machine wheels.

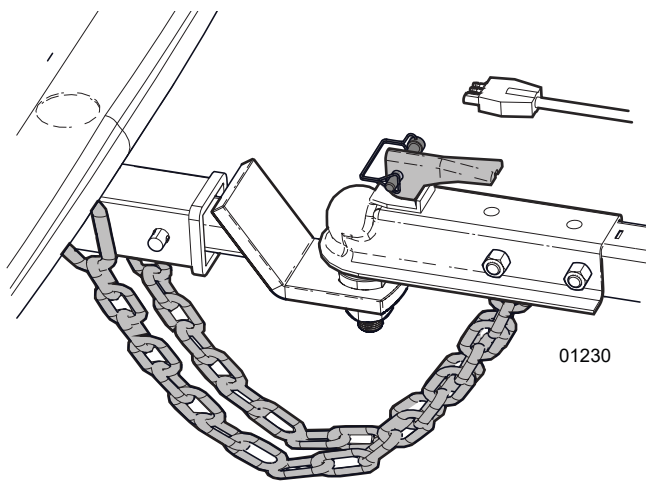


Fig. 22—Ball-mount hitch connection

### 7.3.2 Disconnect from a Ball-Mount Hitch

Make sure there is enough room and clearance to safely drive the tow vehicle forward, away from the machine.

1. Stop the tow vehicle in a location where it and the machine are on level ground. Turn off the engine and apply the parking brake.
2. Block or chock the machine wheels to prevent movement.
3. Rotate and lower the trailer jack to support the machine.  
For instructions, see *Lower the Trailer Jack*.
4. Disconnect the light-bar cable harness from the tow vehicle. Stow the cable harness safely on the machine.
5. Remove the two safety chains from the tow vehicle and stow them safely on the machine.
6. Remove the snap-lock pin from the hitch-coupler latch. Raise the latch to the upright (unlocked) position.

7. Use the trailer jack to raise the trailer tongue until the hitch coupler is higher than the ball-mount hitch.
8. Slowly, drive the tow vehicle forward until the ball-mount hitch is clear of the hitch coupler. Stop the tow vehicle and apply the parking brake.
9. Use the trailer jack to lower the machine until it is level with the ground.
10. Lower the hitch-coupler latch to the locked position. Install the snapper pin through the latch.

## 7.4 Trailer Jack

Use the trailer jack to support the front of the machine when the machine is not attached to a tow vehicle.

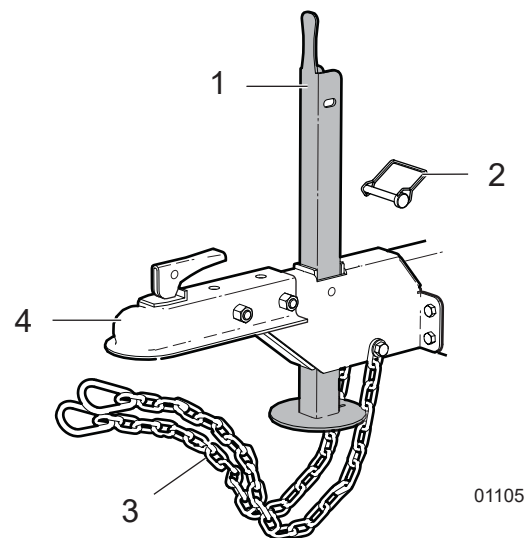


Fig. 23—Hitch coupler

- |                  |                             |
|------------------|-----------------------------|
| 1. Jack stand    | 3. Safety chains            |
| 2. Snap-lock pin | 4. Ball-mount hitch coupler |

### 7.4.1 Lower the Trailer Jack

1. Remove the snap-lock pin from the frame and jack stand.
2. Lower the jack stand to the ground.
3. Insert the snap-lock pin through the frame and top hole on the jack-stand.

### 7.4.2 Raise the Trailer Jack

1. Attach the machine to a tow vehicle.  
For instructions, see *Attach to a Tow Vehicle on page 32*.
2. Remove the snap-lock pin from the frame and jack stand.
3. Raise the jack stand.
4. Insert the snap-lock pin through the frame and bottom hole on the jack-stand.

## 8. Storage

At the end of the season or when the machine is not going to be used for an extended length of time, store the machine correctly to prevent damage.

### 8.1 Storage Safety

#### **WARNING!**

**Do not let children play on or around the stored machine. If children play on or around the machine, it can result in serious injury or death.**

W105

#### **CAUTION!**

**Store the machine away from furnaces, stoves, water heaters, or other appliances that have a pilot light or other ignition source. A pilot light or other source of ignition can ignite fuel vapors.**

**IMPORTANT!** A pressure washer can damage the machine's product identification plate and make it unreadable. Do not direct the spray from a pressure washer onto the product identification plate. Use a clean, soft cloth that is dampened with water to remove dirt.

- Store the machine in a dry, level location away from human activity.
- Store the machine indoors, if possible.
- If necessary, support the machine with blocks for stability.

### 8.2 Place the Machine in Storage

For information about engine storage, see the engine manufacturer's manual.

1. Set the machine to a safe condition.  
For instructions, see *Safe Condition* on page 9.
2. Check all of the moving parts and remove all entangled material.
3. Use a pressure washer or water hose to thoroughly wash the machine. Remove all dirt, mud, and debris.
4. Start the machine, let it run for a few minutes to remove any moisture, and then stop the machine.
5. Thoroughly inspect the machine, including the drive belt and pulley. Replace or repair any worn or damaged parts.
6. Do one of the following:

- If the machine will be in storage for one to three months, add stabilizer to the engine fuel and drain the carburetor.
- If the machine will be in storage for longer than three months, replace the engine fuel with an alkylate or appropriate engineered fuel. These fuel types prevent the buildup of insoluble solids (deposits) in the engine. For more information, see *Engine Fuel* on page 36. For instructions, see *Replace the Engine Fuel*.

7. Park the machine in the storage location.
8. Disconnect the tow vehicle.  
For instructions, see *Disconnect from a Ball-Mount Hitch* on page 33.
9. Lower the jack stand. The machine should be as level with the ground as possible.  
If soft ground is unavoidable, place boards or plates under the jack stand to increase the surface area.
10. Block the machine wheels to prevent accidental movement and increase the wheel bearing life.
11. If indoor storage is not possible, cover the machine with a waterproof tarp. It is recommended that the machine be stored indoors.

#### 8.2.1 Replace the Engine Fuel

1. Remove the current fuel from the engine.  
Operate the machine until the fuel tank is empty or drain the fuel tank and properly dispose of the fuel.
2. Add new fuel to the engine.  
For instructions, see *Add Fuel to the Engine* on page 26.
3. Start the machine.  
For instructions, see *Start the Machine* on page 27.
4. Wait five to 10 minutes for the fuel to flush the carburetor.
5. Stop the machine.  
For instructions, see *Stop the Machine* on page 27.

### 8.3 Remove the Machine from Storage

1. Complete the *Pre-Start Checklist* on page 23.
2. Complete the required maintenance.  
For maintenance requirements, see the *Maintenance Schedule* on page 37.

## 9. Service and Maintenance

Regular preventive maintenance can improve performance and prolong the life of the machine. Machine maintenance is your responsibility.

### 9.1 Service and Maintenance Safety

#### **WARNING!**

**Risk of serious personal injury. Stop engine before performing ANY service or maintenance procedure. Reinstall all covers and shields removed before putting machine back into service.**

W033

#### **WARNING!**

**Before you start service or maintenance work:**

- **Set the machine to a safe condition.**
- **Wait for the machine to cool down. Engine components and fluids may be hot enough to cause burns.**
- **Read and understand all of the service and maintenance safety information.**

W041

#### **WARNING!**

**Wear the personal protective equipment (PPE) that is necessary to do the work safely.**

**This includes, but is not limited to, a hard hat, hearing protection, a face shield, protective footwear, a respirator, and heavy gloves.**

W101

**Set the machine to a safe condition before you start any service or maintenance:**

#### **SAFE CONDITION**

1. If the machine is connected to a tow vehicle, set the tow vehicle's parking brake, turn off the engine, and remove the ignition key.
  2. Stop the machine.  
For instructions, see *Stop the Machine* on page 27.
  3. Disconnect the engine spark-plug wire and keep it away from the spark plug.
  4. Remove all material from the two feed hoppers.
  5. Wait for the engine and machine to cool down.
- 
- Follow good shop practices:
    - Keep the work area clean and dry.
    - Ground electrical outlets and tools.
    - Have adequate light for good visibility.
  - Never operate an engine inside a closed building. The exhaust fumes may cause asphyxiation.
  - Never work under equipment unless it is securely supported with blocks.
  - Always have a minimum of two people present during maintenance or service. Do not work alone in case an emergency situation occurs.
  - Keep a fire extinguisher and first aid kit readily accessible at all times.
  - Do not use gasoline or diesel fuel to clean parts. Use a regular cleanser.
  - When replacement parts are necessary, use genuine factory replacement parts to restore your equipment to original specifications. The manufacturer cannot be responsible for injuries or damages caused by use of unapproved parts or accessories.
  - Check all of the fasteners after the work is complete. Tighten any loose bolts, nuts, or screws.
  - Check all electrical and fuel connections to make sure that they are secure and the machine is in a safe working condition.
  - Use tools that are in good condition and correct for the task. Make sure that you understand how to use the tools before performing any service work.

## 9.2 Fluids and Lubricants

The machine requires various fluids and lubricants for operation and maintenance.

### 9.2.1 Lubricant Handling and Storage

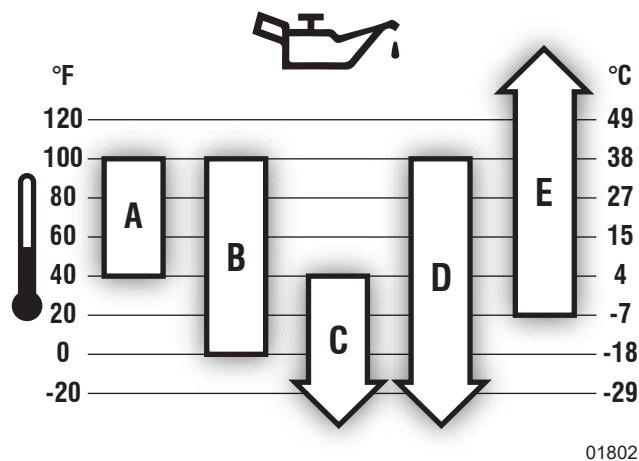
For optimum machine efficiency, use clean lubricants and clean containers to handle all lubricants. Store lubricants in an area that is protected from dust, moisture, and other contaminants.

### 9.2.2 Engine Oil

**For engine maintenance and service information, see the engine manufacturer's manual.**

Briggs & Stratton® Warranty Certified oils are recommended for the best engine performance. However, other high-quality detergent oils are permitted if they are classified for service SF, SG, SH, SJ, or higher. Do not use special additives.

Outdoor temperatures determine the required engine oil viscosity. Select the best oil viscosity for the expected outdoor temperature range. Use the following chart as a guide:



- A SAE 30** – Below 40 °F (4 °C) the use of SAE 30 results in hard starting.
- B 10W-30** – Above 80 °F (27 °C) the use of 10W-30 may cause increased oil consumption. Check the oil level frequently.
- C 5W-30**
- D Synthetic 5W-30**
- E Vanguard® Synthetic 15W-50**

### 9.2.3 Engine Fuel

**For complete fuel information and use at high altitudes, see the engine manufacturer's manual.**

Fuel must meet the following specifications:

- Clean, fresh, unleaded gasoline.
- Minimum of 87 octane / 87 AKI (91 RON).
- Gasoline with up to 10% ethanol (gasohol) is acceptable if the fuel is fresh (less than three months old).

If the machine will be in storage for longer than three months, replace the fuel with one of the following fuel types:

- An alkylate fuel
- An engineered fuel that is high octane, ethanol-free, and formulated with power detergent to prevent the buildup of insoluble solids (deposits).

For instructions, see *Replace the Engine Fuel* on page 34.

### 9.2.4 Grease

Use an SAE multi-purpose high temperature grease with extreme pressure (EP) performance. An SAE multipurpose lithium-based grease is an acceptable substitute.

## 9.3 Maintenance Schedule

Complete maintenance tasks at the specified time or hour interval, whichever comes first.

**IMPORTANT!** For more information, see the engine manufacturer's manual.

Task	8 hours or daily	50 hours or annually	100 hours or annually	200 hours or annually	Annually	600 hours or every three years	Reference
Check the engine oil level and quality.	●						See page 26
Check the engine fuel level.	●						See page 25
Clean the engine air-intake grille, and around the muffler and controls.	●						See the engine manual
Check that all fasteners are tightened to the specified torque.	●						See page 48
Check that the wheel lug nuts are tightened to the specified torque.	●						See page 49
Remove all debris and entangled material.	●						N/A <sup>1</sup>
Check the shredder knife function.	●						See page 44
Check the drive belt operation.	●						See page 39
Check the rotor knife sharpness.		●					See page 42
Check the ledger knife sharpness.		●					See page 43
Check the shredder knife sharpness.		●					See page 44
Check the chop block for damage.		●					See page 43
Lubricate pivot points and hinges.		●					N/A
Grease the machine.			●				See page 38
Check the tire pressure.			●				See the tire sidewall.
Wash the machine.			●				N/A
Check the drive belt tension.			●				See page 40
Service the engine exhaust system.			●				See the engine manual
Clean the engine air filter. <sup>2</sup>				●			See page 39
Change the engine oil.				●			See the engine manual
Replace the engine spark plug.					●		See the engine manual
Service the engine cooling and fuel systems.					●		See the engine manual
Replace the engine air filter.						●	See page 39

<sup>1</sup> N/A indicates that a reference is not applicable.

<sup>2</sup> In dusty conditions or when airborne debris is present, clean more often.

# 9.4 Grease Points

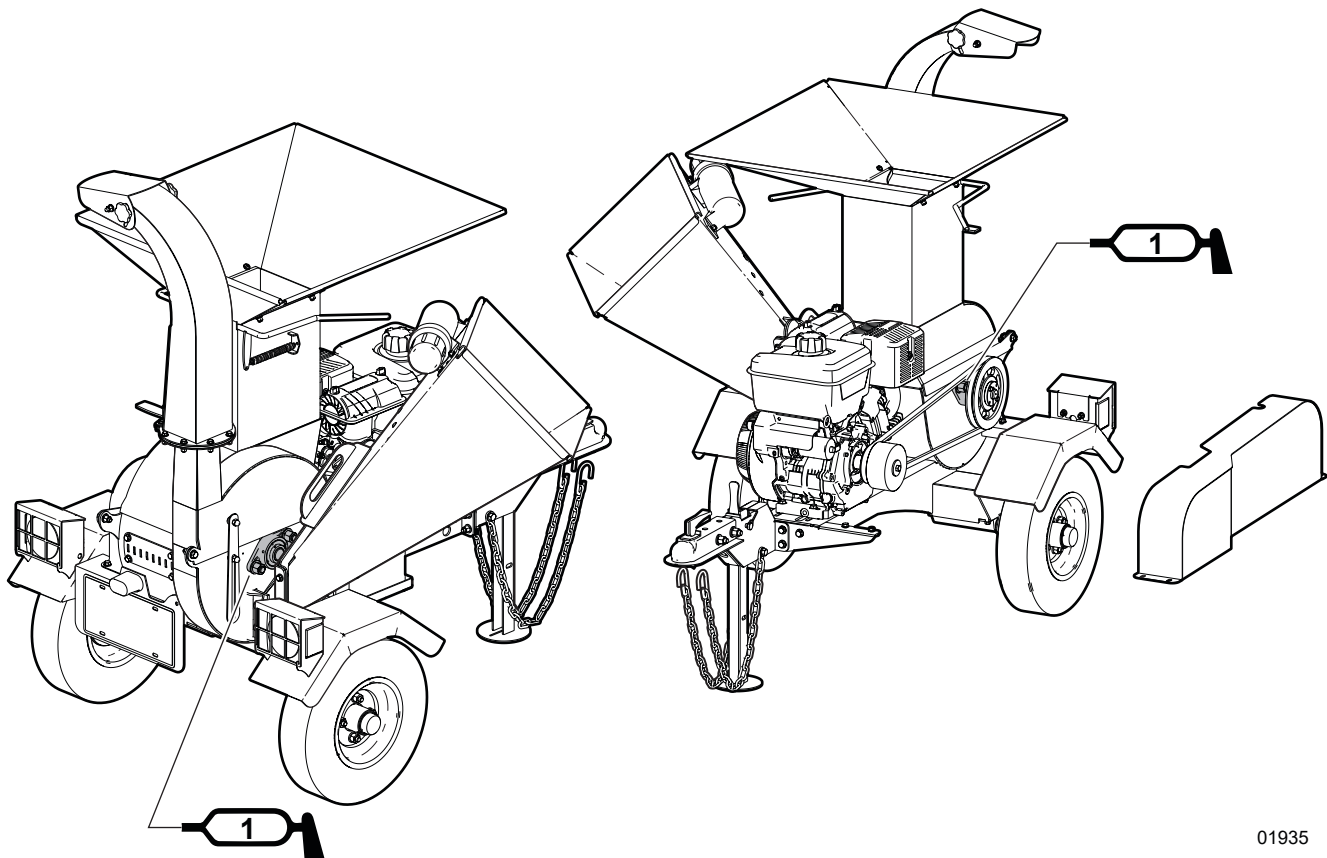
**IMPORTANT!** Do not over grease. Too much grease can cause the bearing seals to fail.



Look for this decal on the machine. It indicates a grease point and the interval in hours.

- Use a hand-held grease gun for all greasing. Apply one pump per location.
- Wipe each grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.
- Replace or repair broken fittings immediately.
- If a fitting does not take grease, remove and clean the fitting thoroughly. Also, clean the lubricant passageway. If required, replace the fitting.

Location	Every 100 hours of operation or annually
1	Rotor bearings, one pump on each side.



01935

Fig. 37 – Grease points

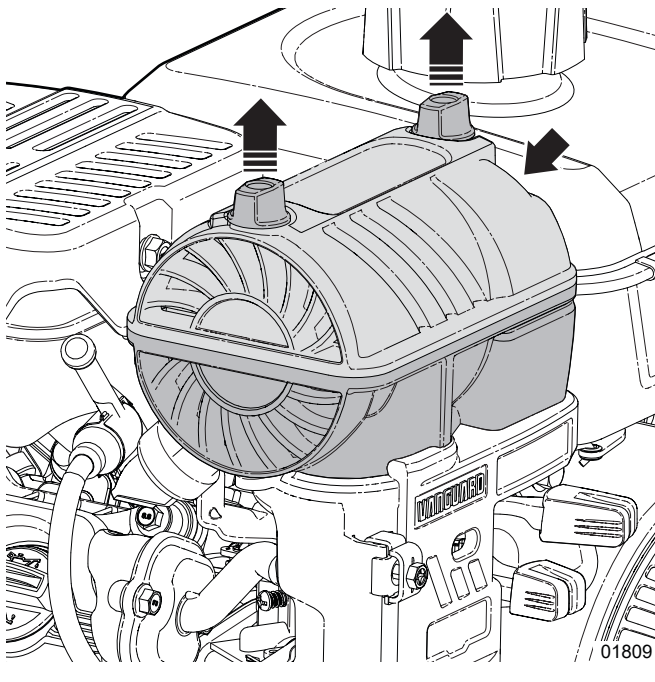
## 9.5 Clean the Engine Air Filter

**IMPORTANT!** Operating the engine without an air filter, or with a damaged air filter, can allow dirt to enter the engine, causing rapid engine wear. This type of damage is not covered by warranty.

**Clean the air filter after every 200 hours of operation or annually.**

A dirty air filter can restrict air flow to the carburetor, reducing the engine performance. If the engine is operated in very dusty areas, clean the air filter more often than specified.

1. Loosen the two air-filter cover fasteners.
2. Remove the cover.
3. Remove the air filter.
4. Gently tap the air filter on a hard surface to loosen and remove dust and debris.
5. If the air filter is excessively dirty or damaged, replace it with a new air filter.
6. Install the air filter in the engine.
7. Install the cover.
8. Tighten the two air-filter cover fasteners.



**Fig. 24**—Engine air filter

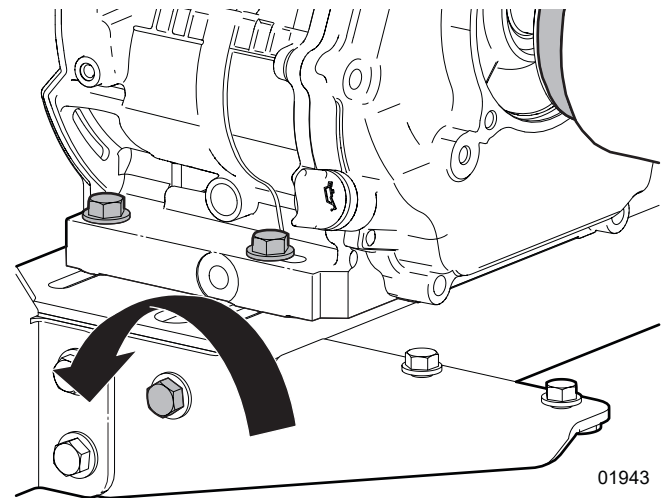
## 9.6 Replace the Drive Belt

**IMPORTANT!** After the drive belt is replaced, set the correct tension, and align the engine and rotor sheave.

**Check the drive belt tension after every 100 hours of operation.**

The machine has a centrifugal clutch mounted on the engine shaft that drives the rotor sheave. When the drive belt is loose or in disrepair, the ability of the engine to efficiently drive the rotor may be affected. Therefore, it is important to check the drive belt condition and tension on a regular basis. Replace the drive belt if it is frayed, cracked, or worn.

1. Set the machine to a safe condition.  
For instructions, see *Safe Condition* on page 9.
2. On the side of the machine, remove the drive-belt guard.
3. Loosen (do not remove) the four engine mount bolts (two on each side).
4. Turn the belt tensioning bolt counterclockwise to loosen the drive belt tension.
5. Loosen the tension until you can slide the engine back and remove the belt.
6. Install the new drive belt, and then slide the engine forward.
7. Set the drive belt tension.  
For instructions, see *Set the Drive Belt Tension* on page 40.
8. Align the drive belt.  
For instructions, see *Align the Drive Belt* on page 40.



**Fig. 25**—Drive belt tension adjustment bolt

## 9.6.1 Set the Drive Belt Tension

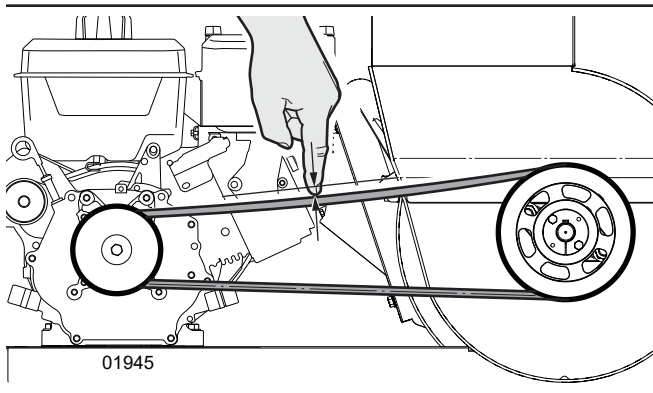
### WARNING!

**Do not operate the machine with any of the guards or shields removed. The machine is shown with guards or shields removed for illustrative purposes only.**

W001

For accurate measurement use a drive-belt tension gauge. If a gauge is not available, the following method can be used.

1. Turn the drive-belt tension bolt clockwise pulling the engine to tighten the belt.
2. Use your hand to check the drive-belt deflection. Press on the top, center of the drive belt (*Fig. 26*).  
The drive-belt tension is correct when it does not deflect more than 1/2" to 5/8" (12 mm to 16 mm). Adjust the tension accordingly.
3. Turn the drive-belt tension bolt accordingly. Be aware of the drive-belt alignment while adjusting the drive-belt tension. For more information, see *Align the Drive Belt*.
4. When the drive-belt tension is correct, check belt alignment.
5. Do one of the following:
  - If the drive-belt alignment is correct, use a calibrated torque wrench to tighten the four engine mount bolts to **33 lbf•ft (45 N•m)**, and then continue with step 6.
  - If the drive-belt alignment is not correct, align the drive belt.
6. Install the drive-belt guard.
7. Check the drive-belt tension after 10 hours of operation.



**Fig. 26**—Check the drive-belt tension

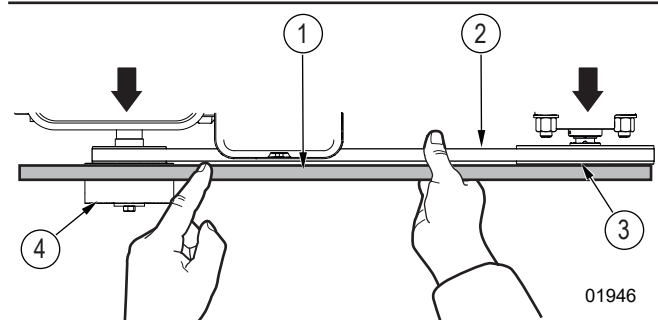
## 9.6.2 Align the Drive Belt

**Check the drive belt alignment after every 8 hours of operation.**

For accurate measurement use a laser alignment tool. If a laser alignment tool is not available, the following method can be used.

**The maximum offset (misalignment) is 1/32" (1 mm).**

1. On the side of the machine, remove the drive-belt guard.
2. Place a straight edge along the inner face of the engine clutch and back side of the rotor sheave (*Fig. 27*). Check the space between the drive belt and the straight edge. The gap should be even along the length of the straight edge. See .
3. Do one of the following:
  - If the gap is even along the length of the straight edge, install the drive-belt guard.
  - If the gap is not even along the length of the straight edge, determine which is the best way to align the drive belt. There are two ways to correct the drive-belt alignment:
    - If the engine is not square to the chipper frame, turn the engine on the mount.  
For instructions, see *Align the Engine Mount on page 41*.
    - If the rotor sheave has moved in or out on the shaft, adjust the rotor sheave on the shaft.  
For instructions, see *Align the Rotor Sheave on page 41*.



**Fig. 27**—Drive belt alignment

- |                  |                  |
|------------------|------------------|
| 1. Straight edge | 3. Rotor sheave  |
| 2. Drive belt    | 4. Engine clutch |

### 9.6.3 Align the Engine Mount

After changing the drive belt or loosening the engine mounts, the drive belt may become misaligned.

1. Loosen the four engine mount bolts. If one corner of the engine mount does not need to move, leave the bolt snug.

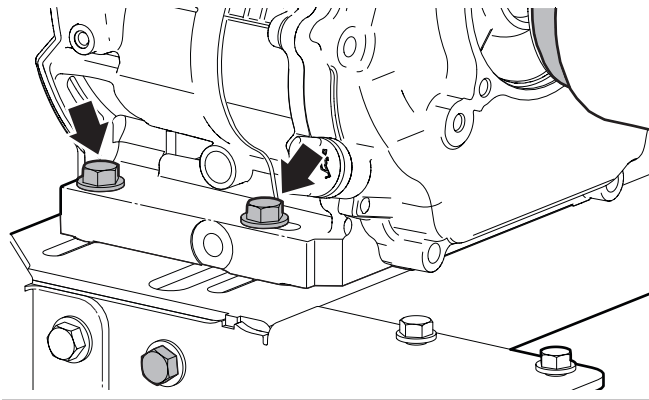


Fig. 28—Engine mount bolts (two of four)

2. Turn the engine to one side or the other on the base to adjust its position.
3. Use a straight edge to check the drive-belt and sheave alignment (Fig. 29).
4. For the best results, repeat step 3.
5. Use a calibrated torque wrench to tighten the four engine mount bolts to **33 lbf•ft (45 N•m)**.
6. Check the drive-belt tension. If required, set the tension.
7. Install the drive-belt guard.

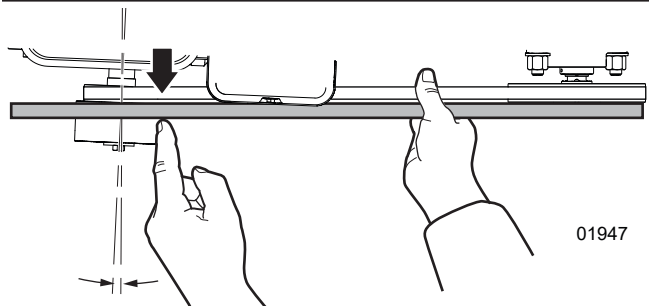
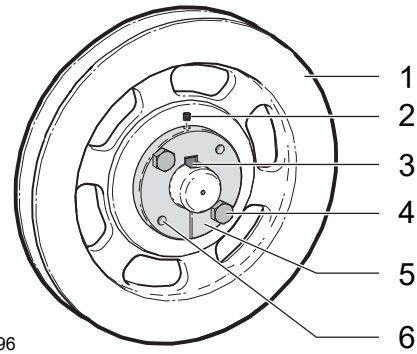


Fig. 29—Engine mount alignment

### 9.6.4 Align the Rotor Sheave

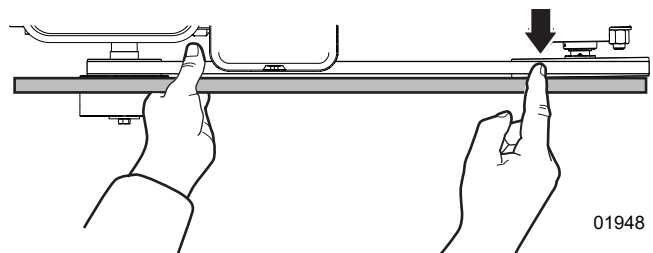
If the rotor sheave loosens on the shaft, it can become misaligned with the engine clutch and result in poor belt alignment.



01096

Fig. 30—Rotor sheave

1. Remove the drive belt.
2. Remove the set screw from the sheave (2).
3. Remove the sheave bolts (4), and then thread them into the puller holes on the sheave hub (5).
4. Slightly separate the hub and the sheave, so that they can move on the shaft. Turn in both bolts evenly in 1/4-turn increments.
5. Lightly tap the sheave hub with a block of wood to move it in or out on the shaft until it aligns with engine clutch sheave.
6. Place a straight edge along the face of the engine clutch and rotor sheave to make sure that they are aligned.
7. After the rotor sheave is aligned, insert the hub bolts and snug them up to the sheave. Repeat step 6 to check the alignment.
8. Tighten the hub bolts evenly in 1/4-turn increments until they are firmly seated.
9. Install and tighten the set screw. Repeat step 6 to check the alignment.
10. Check the drive-belt tension. If required, set the tension.
11. Install the drive-belt guard.



01948

Fig. 31—Rotor sheave alignment

## 9.7 Rotor Knife Maintenance

### CAUTION!

Wear heavy gloves, turn the rotor slowly, and be aware of your hand positions. The rotor knives are sharp and can cause cuts. Finger and hands can become pinched or wedged between the rotor and the rotor housing.

W032

**IMPORTANT!** Rotor knives can be sharpened on both sides, as long as the correct clearance between the rotor knife and the ledger knife is maintained.

**IMPORTANT!** If replacing or sharpening a blade, do the opposite one on the rotor as well to maintain rotor balance. The clearance must be the same for each blade as it passes the ledger knife.

**IMPORTANT!** When sharpening a rotor knife, make sure that an equal amount of material is removed from each knife to maintain the correct rotor balance.

Inspect the rotor knives for sharpness before each use. Sharpen the rotor knives after every 50 hours of operation.

The rotor knives and ledger knife need to be sharp for the best performance. Keep the knives sharp to reduce the amount of power required during operation.

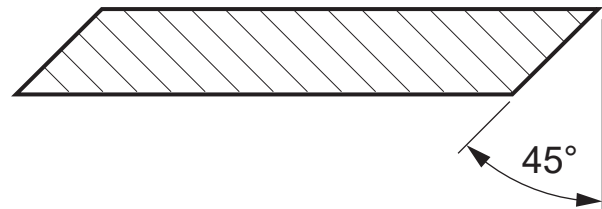
Check the knife sharpness more often if you are processing material with a lot of sand, soil, or dirt in it. **If the chipper is not pulling the material or the material must be pushed into the chipper, the rotor knife edges may be rounded over (are likely dull).**

Reverse, sharpen, or replace the knives if a cutting edge becomes dull. Always replace, reverse, or sharpen both knives at the same time.

Procedure:

1. Open the upper housing.
2. Carefully, turn the rotor to access the knives.
3. Check whether the knives can be reversed, need to be removed for sharpening, or must be replaced.
4. To sharpen or replace the knives, remove both knives from the rotor.

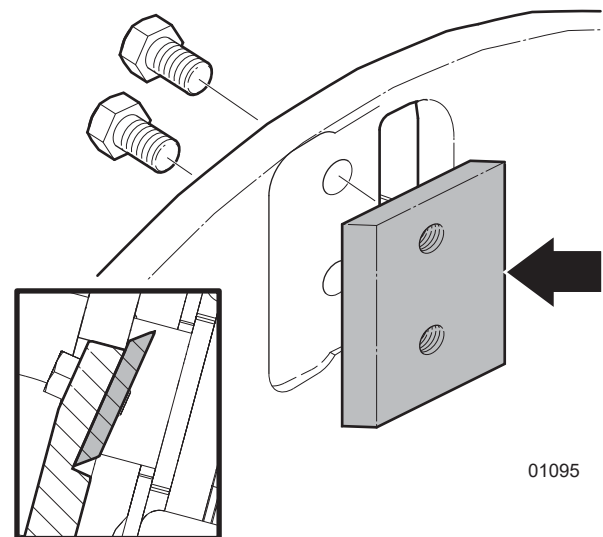
5. Sharpen or get replacement knives. Sharpen each knife at a 45° angle to provide the best cutting effect.



01097

**Fig. 32**—Sharpen rotor knives to a 45° angle

6. Install the knives with the leading edge out, toward the ledger knife (as shown).
7. Use a calibrated torque wrench to tighten the mounting bolts to **45 lbf•ft (63 N•m)**.



01095

**Fig. 33**—Rotor knife leading edge outward

## 9.8 Ledger Knife Maintenance



### WARNING!

**Do not operate the machine with any of the guards or shields removed. The machine is shown with guards or shields removed for illustrative purposes only.**

W001

**Inspect the ledger knife for sharpness before each use. Sharpen the ledger knife after every 50 hours of operation.**

Material in the chipper is sheared off at the stationary ledger knife when the rotor knives pass by.

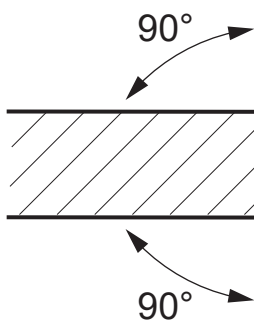
The ledger knife can be turned or rotated, so that all four edges on the long sides can be used. When the edge facing the rotor knives becomes rounded over, remove the ledger knife, and then install it with a different long edge facing the rotor knives.

When all four edges of the knife are rounded over, remove the knife and sharpen it.

### 9.8.1 Sharpen the Ledger Knife

If the ledger knife has been sharpened on all corners and it is no longer possible to set the correct clearance with the rotor knives, replace the ledger knife.

1. Sharpen both long edges of the knife at a 90° angle.
2. Install the ledger knife and use the ledger knife clearance gauge to set the correct clearance.
3. Use a calibrated torque wrench to tighten the bolts to **33 lbf•ft (45 N•m)**.



01098

**Fig. 34**—Sharpen a ledger knife

### 9.8.2 Set the Ledger Knife Clearance

1. Loosen the ledger knife bolts.
2. Move the ledger knife forward (toward the rotor knives). Snug the bolts by hand.
3. Turn the rotor until one of the rotor knives is directly aligned with the ledger knife.
4. Use the ledger knife clearance gauge to set the clearance between the two knives. Tap the ledger knife toward the rotor blade.  
If a ledger knife clearance gauge is not available, set the clearance between 1/32 and 1/16" (1 to 1-1/2 mm).
5. Use a calibrated torque wrench to tighten the bolts to **33 lbf•ft (45 N•m)**.

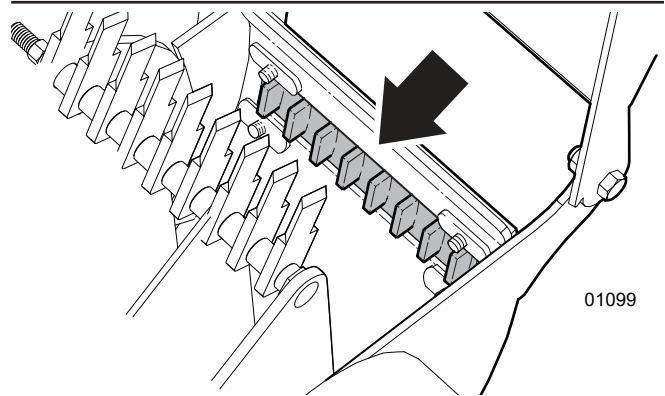
## 9.9 Chop Block Maintenance

**Inspect the chop block for wear or damage before each use. Rotate or replace the chop block after every 50 hours of operation.**

The chop block is bolted to the bottom of the rotor housing. The purpose of the chop block is to help the shredder knives break material into smaller pieces and turn it into mulch.

Inspect the chop block for damage, such as gouges, and bent or missing teeth.

- If the chop block teeth are worn on one side, turn the chop block around and install it the opposite way.
- If both sides of the teeth are worn or the chop block is damaged, replace it.



01099

**Fig. 35**—Chop block in the rotor housing

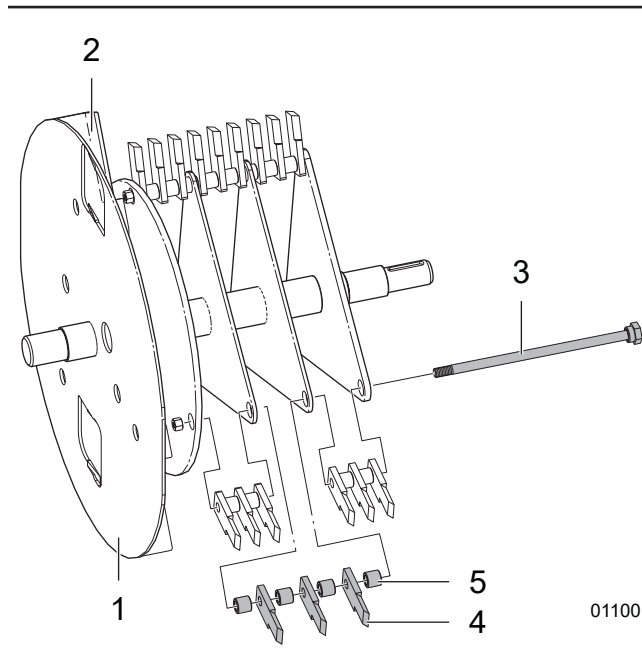
## 9.10 Shredder Knife Maintenance

**Observe shredder knife operation at each use. Sharpen every 50 hours of operation.**

The shredder rotor has three sets of swinging knives. Each knife has a beveled edge that cuts, chops and mulches material as it moves around the rotor compartment through the chop block. The chop block helps to break the material into smaller pieces and turn it into mulch.

The sized opening in the divider at the top of the rotor keeps the material inside the rotor housing until it becomes fine enough to move through to the rotor paddles and expelled out the discharge chute.

The shredder knives need to be sharp for the best performance. Periodic inspection is recommended.



**Fig. 36—Rotor Assembly**

- |                        |                   |
|------------------------|-------------------|
| 1. Rotor               | 4. Shredder knife |
| 2. Rotor paddle        | 5. Spacer         |
| 3. Hammer-retainer pin |                   |

### 9.10.1 Change the Shredder Knives

**IMPORTANT! Make sure that the knives and spacers are installed in the correct sequence. Incorrect installation decreases the shredder performance.**

1. Open the upper housing.
2. Manually turn the chipper rotor until one set of shredder knives is fully exposed.
3. Hold the hammer-retainer pin (3) in position and remove the nut. Each hammer-retainer pin secures one set of shredder knives and spacers to the shredder plate.
4. Slowly remove the pin, while catching the knives and spacers as they become free.
5. Reverse each knife or replace it with a new or sharpened knife.
6. Use the pin to install the knives and spacers. Make sure that the sharpened knife edges face the direction of rotation (indicated by a decal on the upper housing).
7. Install and tighten a new hammer-retainer pin nut (do not reuse the hammer-retainer pin nut that was removed). Make sure that the knives rotate freely.
8. Repeat steps 2 through 7 for the second and third sets of shredder knives.

## 9.11 Tire Maintenance and Safety

### **! WARNING!**

**Failure to follow the correct procedures when mounting a tire on a wheel or rim can produce an explosion, which may result in serious injury or death. Do not attempt to mount a tire unless you have the correct equipment and experience. Have a qualified tire dealer or repair service perform tire maintenance.**

**IMPORTANT! Replace worn tires with tires that meet the original tire specifications. Never undersize tires.**

- Tighten the wheel lug nuts to the correct torque daily. For torque specifications, see *Wheel Lug Nut Torque* on page 49.
- Check the tire pressure before towing the machine on a roadway. See the tire sidewall for the correct pressure.
- At a minimum, check the tire pressure after every 100 hours of operation or annually.

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## 9.12 Wash the Machine

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**IMPORTANT!** Using harsh chemicals can damage the machine finish. Do not use gasoline, diesel fuel, or thinners for cleaning.

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**IMPORTANT!** A pressure washer can damage the machine's product identification plate and make it unreadable. Do not direct the spray from a pressure washer onto the product identification plate.

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**IMPORTANT!** A pressure washer can damage the bearings. Do not direct the spray from a pressure washer directly onto the bearings.

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1. Use a hose or pressure washer and mild detergent to remove dust, dirt, and debris.
2. Use a clean, soft cloth, that is dampened with water to remove dirt from the product identification plate.
3. Apply grease to the rotor bearings.
4. Start the machine, let the engine run for a few minutes to dry, and then stop the machine.

## 10. Troubleshooting



### WARNING!

**Before troubleshooting, read and understand the Service and Maintenance Safety on page 35. Set the machine to a safe condition.**

The following table lists some of the problems that you may encounter and provides possible causes and solutions.

If you encounter a problem that is difficult to solve, even after reading this information, please contact your local dealer, the distributor, or Wallenstein Equipment. Before you call, please have the serial number for your product handy.

To find the serial number on your machine, see *Serial Number Location on page 5*.

For engine troubleshooting, see the engine manufacturer's manual.

Problem	Possible cause	Solution
<b>The rotor does not turn.</b>	The discharge chute is obstructed.	Clear debris from the discharge chute.
	The rotor is plugged.	Inspect and clear the chipper infeed hopper, lower rotor housing, and rotor.
	The clutch is seized.	Replace the clutch.
	The drive belt is loose or broken.	Set the tension or replace the drive belt.
<b>Material is moving into the machine too slowly.</b>	The engine or rotor speed is too low.	Make sure choke is off. Set throttle to increase rotor rpm.
	The rotor knives, ledger knife, or shredder knives are dull.	Rotate, sharpen, or replace the knives, as required.
	The ledger knife clearance is incorrect.	Set the ledger knife clearance.
	A rotor knife edge angle is incorrect.	Sharpen the two rotor knives to the specified 45° angle and make sure that the knives are installed correctly.
	The discharge chute is obstructed.	Clear debris from the discharge chute.
<b>There is unusual machine vibration during operation.</b>	A rotor knife is broken or missing.	Check the rotor knives. Rotate, sharpen, or replace the knives, as required.
	The rotor may be bent.	Check the rotor rotation to see if there is wobble. If the rotor wobbles, replace the rotor.
	The rotor bearings failed.	Replace the rotor bearings.
	Fasteners are loose.	Use a calibrated torque wrench to tighten the fasteners to the specified torque. For specifications, see <i>Bolt Torque on page 48</i> .
<b>The mulch is too course.</b>	The chop block or twig breaker may be damaged.	Inspect the chop block and twig breaker. If there is damage, replace the component.
	One or more shredder knives are broken or missing.	Check the shredder knives. Sharpen or replace the knives, as required.
	Shredder knives are installed incorrectly.	Check the shredder knife installation. Correct the installation, as required.
<b>The machine requires excessive power or the engine stalls.</b>	The discharge chute is obstructed.	Clear debris from the discharge chute.
	The operator is feeding in too much material.	Feed smaller amounts of material into chipper and/or shredder hoppers.
	The operator is feeding material in too quickly.	Feed larger material slowly into the chipper hopper.
	The rotor is plugged.	Inspect and clear the chipper infeed hopper, lower rotor housing, and rotor.
	Green material does not discharge.	Wait for the material to dry or alternate between placing dry and wet material in the machine.
	The ledger knife clearance is incorrect (too large).	Set the ledger knife clearance.
	The rotor knives, ledger knife, or shredder knives are dull.	Rotate, sharpen, or replace the knives, as required.

# 11. Specifications

For engine specifications, see the engine manufacturer's manual

## 11.1 Machine Specifications<sup>1</sup>

Model	BXMT3213
Chipping capacity	3" (8 cm)
Shredding capacity	1" (3 cm)
Chipper type	Disc
Feed system	Gravity / self feed
Shredder type	Hammer mill
Engine	Vanguard® 400 electric start / 408 cc / 14 hp (10.44 kW)
Chipper feed hopper opening	10" x 13" (29 cm x 32 cm)
Chipper housing opening	3" x 6" (8 cm x 15 cm)
Shredder feed hopper opening	28" x 30" (71 cm x 76 cm)
Shredder housing opening	10" x 10" (25 cm x 25 cm)
Number of chipper knives	2
Number of shredder knives	27
Rotor diameter	18" (45 cm)
Rotor weight	70 lb (32 kg)
Discharge chute height	58" (147 cm)
Discharge chute rotation	360°
Drive system	Centrifugal clutch, belt drive
Engine speed	3600 rpm
Rotor speed	1600 rpm
Tires	4.80 X 8
Total weight	520 lb (236 kg)
Dimensions (L x W x H)	44" x 60" x 58" (112 cm x 152 cm x 147 cm)
Fuel tank capacity	1.59 US gal (6 L)
Accessories	Hitch extension (W4202)
	Ledger knife (1056M304)
	Ledger knife clearance gauge (1012L269)
	Reversible rotor knife (1056M303)
	Shredder knife (1056M108)

<sup>1</sup> Specifications are subject to change without notice.

## 11.2 Bolt Torque

### Checking Bolt Torque

The tables shown give correct torque values for various bolts and capscrews. Tighten all bolts to the torque values specified in the table, unless indicated otherwise. Check tightness of bolts periodically.

**IMPORTANT!** If replacing hardware, use fasteners of the same grade.

**IMPORTANT!** Torque figures indicated in the table are for non-greased or non-oiled threads. Do not grease or oil threads unless indicated otherwise. When using a thread locker, increase torque values by 5%.



*Bolt grades are identified by their head markings.*

Imperial Bolt Torque Specifications						
Bolt Diameter	Torque Value					
	SAE Gr. 2		SAE Gr. 5		SAE Gr. 8	
	lbf•ft	N•m	lbf•ft	N•m	lbf•ft	N•m
1/4"	6	8	9	12	12	17
5/16"	10	13	19	25	27	36
3/8"	20	27	33	45	45	63
7/16"	30	41	53	72	75	100
1/2"	45	61	80	110	115	155
9/16"	60	95	115	155	165	220
5/8"	95	128	160	215	220	305
3/4"	165	225	290	390	400	540
7/8"	170	230	420	570	650	880
1"	225	345	630	850	970	1320



SAE Gr. 2



SAE Gr. 5



SAE Gr. 8

Metric Bolt Torque Specifications				
Bolt Diameter	Torque Value			
	Gr. 8.8		Gr. 10.9	
	lbf•ft	N•m	lbf•ft	N•m
M3	0.4	0.5	1.3	1.8
M4	2.2	3	3.3	4.5
M6	7	10	11	15
M8	18	25	26	35
M10	37	50	52	70
M12	66	90	92	125
M14	83	112	116	158
M16	166	225	229	310
M20	321	435	450	610
M30	1,103	1 495	1,550	2 100



8.8



10.9

## 11.3 Wheel Lug Nut Torque

It is extremely important safety procedure to apply and maintain proper wheel mounting torque on your trailer axle. Torque wrenches are the best method to assure the proper amount of torque is being applied to a fastener.

Wheel lugs should be torqued before first road use and after each wheel removal. Check and re torque after the first 10 miles (16 km), 25 miles (40 km), and again at 50 miles (80 km). Check periodically thereafter.



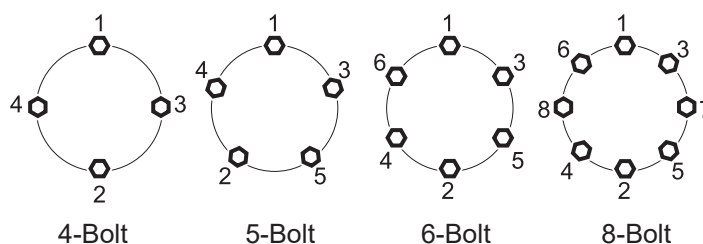
### WARNING!

**Wheel lug nuts must be installed and kept at the proper torque value to prevent loose wheels, broken studs, or possible separation of wheels from axle.**

- Start all lug nuts onto the threads by hand.
- Tighten lug nuts in stages, following the pattern shown in the Wheel Lug Nut Torque table.

Wheel Lug Nut Torque				
Wheel Size	Units	1st Stage	2nd Stage	3rd Stage
8"	lbf•ft N•m	12–20 16–26	30–35 39–45.5	45–55 58.5–71.5
12"	lbf•ft N•m	20–25 26–32.5	35–40 45.5–52	50–60 65–78
13"	lbf•ft N•m	20–25 26–32.5	35–40 45.5–52	50–60 65–78
14"	lbf•ft N•m	20–25 26–32.5	50–60 65–78	90–120 117–156
15"	lbf•ft N•m	20–25 26–32.5	50–60 65–78	90–120 117–156
16"	lbf•ft N•m	20–25 26–32.5	50–60 65–78	90–120 117–156

Wheel Lug Torque Pattern



## 12. Product Warranty



### LIMITED WARRANTY

Wallenstein products are warranted to be free of defects in materials and workmanship under normal use and service, for a period of

**Five Years for Consumer Use**

**Two Years for Commercial/Rental Use**

from the date of purchase, when operated and maintained in accordance with the operating and maintenance instructions supplied with the unit. Warranty is limited to the repair of the product and/or replacement of parts.

This warranty is extended only to the original purchaser and is not transferable.

Repairs must be done by an authorized dealer. Products will be returned to the dealer at the customer's expense. Include the original purchase receipt with any claim.

**This warranty does not cover the following:**

- 1) Normal maintenance or adjustments
- 2) Normal replacement of wearable and service parts
- 3) Consequential damage, indirect damage, or loss of profits
- 4) Damages resulting from:
  - Misuse, negligence, accident, theft or fire
  - Use of improper or insufficient fuel, fluids or lubricants
  - Use of parts or aftermarket accessories other than genuine Wallenstein parts
  - Modifications, alteration, tampering or improper repair performed by parties other than an authorized dealer
  - Any device or accessories installed by parties other than an authorized dealer
- 5) Engines. Engines are covered by the manufacturer of the engine for the warranty period they specify. For the details of your engine warranty, see your engine owner's manual. Information about engine warranty and service is also available in the FAQ section at [www.wallensteinequipment.com](http://www.wallensteinequipment.com)

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