



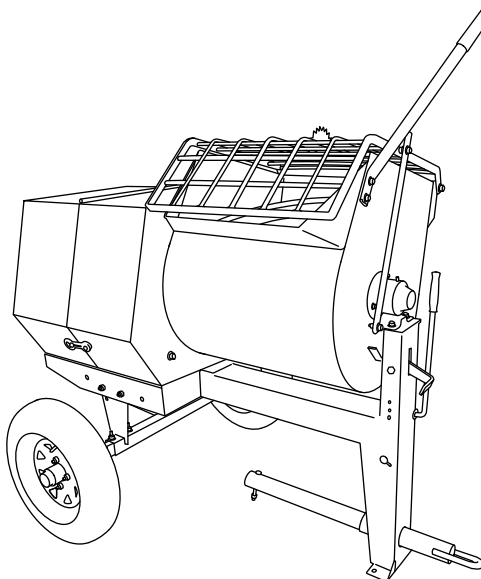
Form No. 3421-370 Rev A

Count on it.

Operator's Manual

MM-12511H-S Mortar Mixer

Model No. 68024—Serial No. 402100000 and Up



G019552



⚠ WARNING

CALIFORNIA Proposition 65 Warning

This product contains a chemical or chemicals known to the State of California to cause cancer, birth defects, or reproductive harm.

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Use of this product may cause exposure to chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

It is a violation of California Public Resource Code Section 4442 or 4443 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land unless the engine is equipped with a spark arrester, as defined in Section 4442, maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire.

Because in some areas there are local, state, or federal regulations requiring that a spark arrester be used on the engine of this machine, a spark arrester is available as an option. If you require a spark arrester, contact your Authorized Service Dealer. Genuine Toro spark arresters are approved by the USDA Forestry Service.

The enclosed *Engine Owner's Manual* is supplied for information regarding the US Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance, and warranty. Replacements may be ordered through the engine manufacturer.

Introduction

This machine is designed to mix mortar, plaster, fireproofing material, grout, and other small-grained Portland cement products. A vehicle equipped with an appropriate pintle hitch or ball hitch can tow the machine.

Read this information carefully to learn how to operate and maintain your product properly and to avoid injury and product damage. You are responsible for operating the product properly and safely.

You may contact Toro directly at www.Toro.com for product safety and operation training materials,

accessory information, help finding a dealer, or to register your product.

Whenever you need service, genuine Toro parts, or additional information, contact an Authorized Service Dealer or Toro Customer Service and have the model and serial numbers of your product ready. [Figure 1](#) identifies the location of the model and serial numbers on the product. Write the numbers in the space provided.

Important: With your mobile device, you can scan the QR code on the serial number decal (if equipped) to access warranty, parts, and other product information.

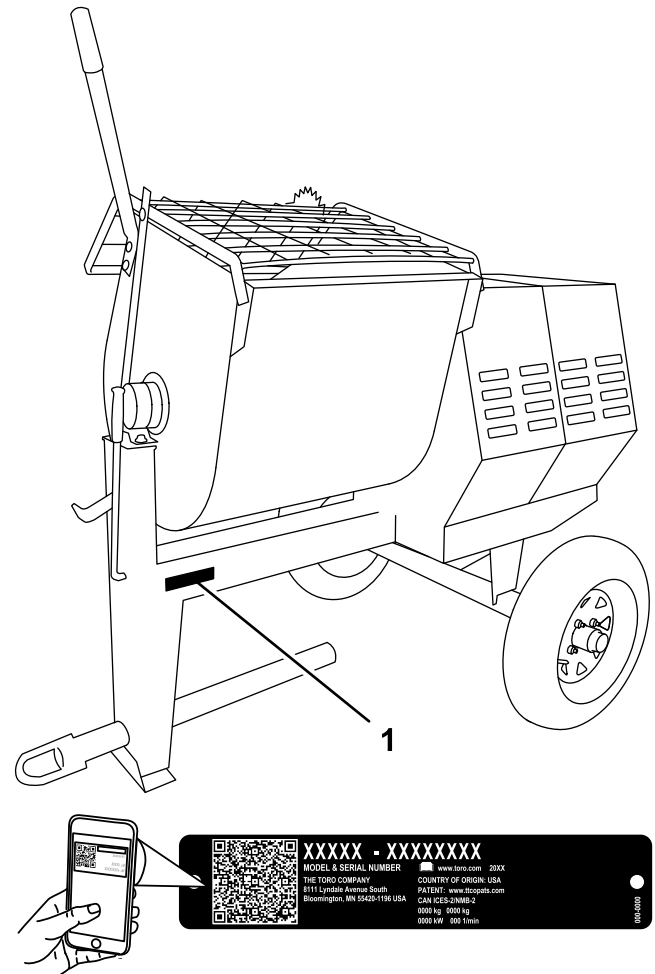


Figure 1

1. Model and serial number location

Model No. _____

Serial No. _____

This manual identifies potential hazards and has safety messages identified by the safety-alert symbol ([Figure 2](#)), which signals a hazard that may cause

serious injury or death if you do not follow the recommended precautions.



Figure 2
Safety-alert symbol

g000502

This manual uses 2 words to highlight information. **Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

Tire Information—The DOT tire information is located on the side of each tire. This information gives load and speed ratings. Replacement tires should have the same or better ratings.

Note: The various machines in this manual have different weights; refer to [Specifications \(page 16\)](#) to ensure that the tires on your machine meet or exceed the weight requirements of your machine.

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Safety

Improper use or maintenance by the operator or owner can result in injury. To reduce the potential for injury, comply with these safety instructions and always pay attention to the safety-alert symbol (Figure 2), which means: **Caution**, **Warning**, or **Danger**—personal safety instruction. Failure to comply with the instruction may result in personal injury or death.

Safe Operating Practices

This product is capable of amputating hands. Always follow all safety instructions to avoid serious injury or death.

⚠ WARNING

Machining or handling stone, masonry, concrete, metal, and other materials can generate dust, mists, and fumes containing chemicals, such as silica, known to cause serious or fatal injury or illness, such as respiratory disease, silicosis, cancer, birth defects, or other reproductive harm.

- **Control dust, mist, and fumes at the source where possible. Use water for dust suppression when feasible.**
- **Use good work practices and follow the recommendations of the manufacturer or suppliers, OSHA, and other occupational and trade associations.**
- **Always follow respiratory precautions.**
- **When you cannot eliminate the hazards from inhalation, you and any bystanders should wear a respirator approved by OSHA for the material being handled.**

⚠ WARNING

Engine exhaust contains carbon monoxide, an odorless, deadly poison that can kill you.

Do not run the engine indoors or in an enclosed area.

Training

- Read the *Operator's Manual* and other training material. If the operator(s) or mechanic(s) cannot read or understand the information, it is the owner's responsibility to explain this material to them.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.

- All operators and mechanics should be trained. The owner is responsible for training the users.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries to people or damage to property.

Towing

Check with your local county or state towing safety regulations before towing the machine.

- To reduce the possibility of an accident while transporting the machine on public roads, ensure that the towing vehicle is mechanically sound and in good operating condition.
- Shut off the engine and the fuel valve before transporting the machine.
- When towing with a ball hitch, ensure that the ball hitch you are using is the proper size for the hitch coupler on the machine.
- When towing with a pintle hitch, ensure that the eye of the tow pole is the correct dimension for the pintle hook.
- Do not tow without the safety pin inserted into the top of the receiver.
- Inspect the hitch and coupling for wear. **Never** tow the machine with damaged or defective hitches, couplings, chains, or other components.
- Check the tire air pressure on the towing vehicle and the machine.
- Check the tire tread and sidewall for damage and wear.
- Properly attach the safety chains to the towing vehicle.
- Ensure that the directional and brake lights are working properly (if the machine is equipped with the light kit).
- Ensure that the directional, backup, and brake lights of the tow vehicle are working properly (if equipped).
- Before towing, ensure that your machine is correctly and securely attached to the towing vehicle.
- Ensure that the safety chains are properly secured to the vehicle, and leave enough slack for turning.
- Do not carry any material in the machine when towing.
- Avoid sudden stops and starts. This can cause skidding, or jackknifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling. Tow only with a vehicle that has a hitch designed for towing. Do

not attach towed equipment except at the hitch point.

- Do not tow the machine faster than 88 km/h (55 mph).
- Use caution when backing up; use a spotter outside the vehicle to guide you.
- Do not allow anyone to sit or ride on the machine.
- Disconnect the machine from the tow vehicle before using it.
- Secure the machine from movement before you tow it.
- Place chock blocks underneath the tires to prevent them from rolling while the machine is parked.

Preparation

Become familiar with the safe operation of the equipment, operator controls, and safety signs.

- Use only accessories and attachments approved by the manufacturer.
- Wear personal protective equipment (PPE) and appropriate clothing, including the following:
 - Hard hat
 - Respirator or dust mask
 - Face shield
 - Safety glasses
 - Hearing protection
 - Substantial, slip-resistant footwear
 - Long pants
 - Shirt with long sleeves that are tight at the wrists
 - Tight-fitting gloves without drawstrings or loose cuffs
- Secure loose clothing, tie back long hair, and do not wear loose jewelry.
- Use extra care when handling fuels. They are flammable and the vapors are explosive. Use the following practices when handling fuel:
 - Use only an approved fuel container.
 - Never remove the fuel cap or add fuel with the engine running.
 - Allow the engine to cool before refueling.
 - Do not smoke.
 - Never refuel or drain the machine indoors.
 - Install the fuel cap and tighten it securely.
 - Keep the container nozzle in contact with the tank during filling.
 - Never fill a container while it is inside a vehicle, trunk, pickup bed, or any surface other than the ground.

- Never store the machine or fuel container inside where there is an open flame, such as near a water heater or furnace.
- If you spill fuel, wipe it off the engine and equipment.
- Ensure that the machine is on a level surface before operating the machine.
- Chock the tires of the machine to prevent unintended movement.
- Before every use, do the following:
 - Inspect the coupler, ball, and hitch.
 - Ensure that all lights are functioning properly (if equipped).
 - Ensure that the tires are properly inflated as recommended.
 - Ensure that the wheel lug nuts are tight and torqued properly.
 - Ensure that the machine is properly secured.

Operation

- Use your full attention while operating the machine. Do not engage in any activity that causes distractions; otherwise, injury or property damage may occur.
- Never run the engine in an enclosed or poorly ventilated area.
- Operate the machine only in good lighting conditions.
- Before starting the machine, ensure that there are no persons or obstacles near or under the machine.
- Shut off the engine before leaving the machine for any reason.

Never leave a running machine unattended. Always shut off the engine and verify that all moving parts have stopped.
- Chock the tires of the machine or keep it attached to the towing vehicle when it is not in use, to prevent it from rolling.
- Avoid prolonged breathing of exhaust fumes. Engine exhaust fumes can cause sickness or death.
- Keep your hands away from any moving parts. Keep your feet away from the tires and the front post.
- Do not operate the machine while ill, tired, or under the influence of alcohol or drugs.
- Keep bystanders, especially small children, out of the operating area. Stop the machine if anyone enters the area.
- Never place your hands or any solid object into the drum when the machine is in operation.

- Do not touch parts which may be hot from operation. Allow them to cool before attempting to maintain, adjust, or service the machine.
- Never move the machine while the engine is running.
- Keep the cowl closed and latched during operation.
- Ensure that all the guards and shields are securely in place before operating the machine.
- If the mixing paddles strike a foreign object or if the machine should start making an unusual noise or vibration, shut off the engine and empty the drum. Wait for all moving parts to come to a complete stop and cool. Vibration is generally a warning of trouble. Inspect for clogging or damage. Clean and repair and/or replace damaged parts.
- Do not change the engine governor setting or overspeed the engine.
- Lightning can cause severe injury or death. If you see lightning or hear thunder in the area, do not operate the machine; seek shelter.
- Secure the machine from movement and chock the tires when storing the machine.
- Keep all nuts, bolts, screws, and hose clamps securely tightened. Keep the machine in good condition.
- Use only genuine Toro replacement parts to ensure that the original standards are maintained.

Maintenance and Storage

- Before performing maintenance, do the following:
 - Park the machine on a level surface.
 - Shut off the engine and fuel valve. Wait for all movement to stop and remove the spark-plug wire before adjusting, cleaning, or repairing.
 - Allow the engine to cool before performing maintenance or storing.
 - Disengage all power and operation controls before making any repairs.
- Never lubricate, service, repair, or adjust the machine while it is running.
- Keep equipment materials clear from the muffler and engine to help prevent fires. Wipe up any spilled oil or fuel.
- Never allow untrained personnel to service the machine.
- Keep your hands, feet, and clothing away from moving parts. If possible, do not make adjustments with the engine running.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- Remove any buildup of grease, oil, or debris from the machine.
- Stop the machine, shut off the engine, and inspect the machine if a foreign object enters the drum or causes another obstruction. Make any necessary repairs before starting the machine.
- Do not tamper with safety devices.

Safety and Instructional Decals

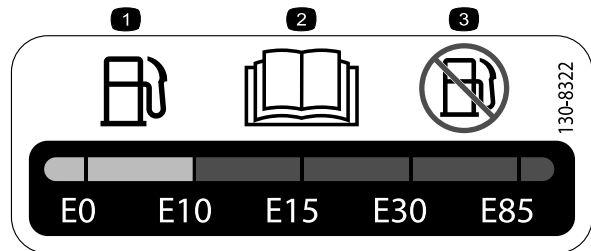


Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or missing.



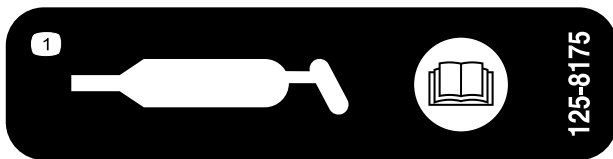
133-5619

decal133-5619



130-8322

decal130-8322

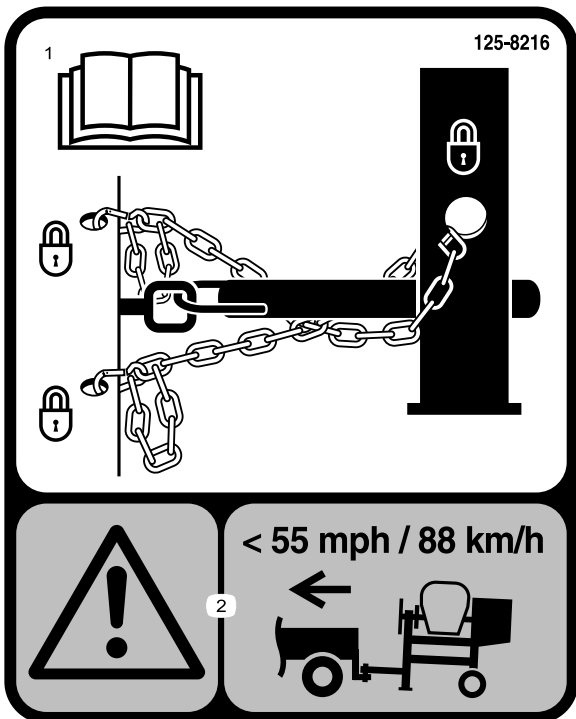


125-8175

decal125-8175

1. Only use fuel with an alcohol content by volume under 10%.
2. Read the *Operator's Manual* for more information on fuel.
3. Do not use fuel with an alcohol content by volume greater than 10%.

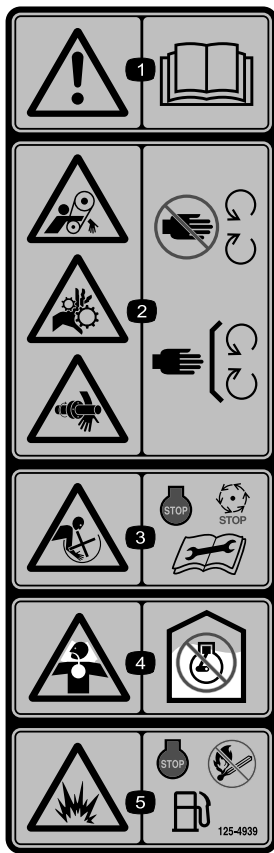
1. Read the *Operator's Manual* for information on greasing the machine.



125-8216

decal125-8216

1. Read the *Operator's Manual* for information on how to tow the machine.
2. Warning—limit towing speed to less than 55 mph / 88 km/h.

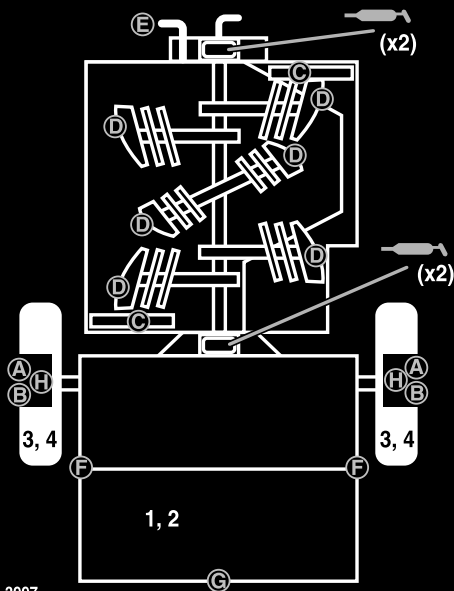


decal125-4939

125-4939

1. Warning—read the *Operator's Manual*.
2. Hand and arm entanglement at the belt drive; crushing hazard of hand; entanglement hazard of hand at the shaft—keep hands away from moving parts; keep all guards and shields in place.
3. Entanglement hazard at paddles—shut off the engine and wait for all moving parts to stop before performing maintenance.
4. Toxic gas inhalation hazard—Don't run the engine in an enclosed space.
5. Explosion hazard—shut off the engine and keep away from flames when refueling.

MORTAR MIXER MM-12511H-S MODEL 68024 / 68024C



132-3997

QUICK REFERENCE AID



CHECK/SERVICE (DAILY)

1. OIL LEVEL, ENGINE
2. AIR FILTER
3. TIRE PRESSURE: 35 PSI
4. TORQUE LUG NUTS TO 108 - 122 n-M (80 - 90 FT-LB)

5. GREASE POINTS (4) SEE OPERATOR'S MANUAL FOR 50 HR INTERVAL GREASE POINTS.
6. CLEAN MACHINE

SPECIFICATIONS/CHANGE INTERVALS

SEE OPERATOR'S MANUAL FOR INITIAL CHANGES.	FLUID TYPE	CAPACITY	CHANGE INTERVAL	
			FLUID	FILTER
ENGINE OIL	10W-30	1.20 QUARTS	100 HOURS	
PRIMARY AIR FILTER				300 HOURS
FUEL SYSTEM	87 OCTANE GASOLINE MAX 10% ETHANOL	1.61 GALLONS		

SERVICE PARTS

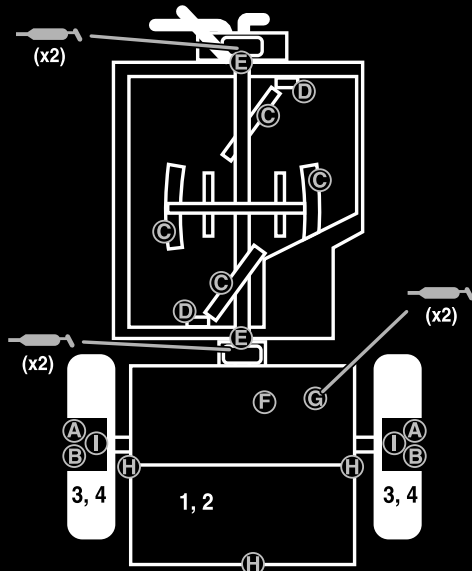
PART NO.	DESCRIPTION / LOCATION	QTY	PART NO.	DESCRIPTION / LOCATION	QTY
ST32307	TIRE & RIM ASSEMBLY (A)	2	ST35289	LATCH FLEX, DRAW (F)	2
125-8171	HUB (B)	2	ST47182	LATCH - RUBBER (G)	1
132-4144	BLADE - RUBBER, TOP (C)	2	ST32233	BEARING ROLLER - HUB ASSEMBLY (H)	2
132-4142	BLADE - RUBBER, END (D)	6	ST22133	KIT - RUBBER BLADES INCLUDES: 6 x 132-4142 2 x 131-4144	1
ST24763-01	HANDLE DUMP - DRUM (E)	1			

132-3997

decal132-3997

1. Read the *Operator's Manual* for more information on servicing the machine.

MORTAR MIXER MM-858H-P



132-4043

MODEL 68021 / 68021C

QUICK REFERENCE AID



CHECK/SERVICE (DAILY)

1. OIL LEVEL, ENGINE
2. AIR FILTER
3. TIRE PRESSURE: 35 PSI
4. TORQUE LUG NUTS TO 108 - 122 n-M (80 - 90 FT-LB)

5. GREASE POINTS (6) SEE OPERATOR'S MANUAL FOR 50 HR INTERVAL GREASE POINTS.
6. CLEAN MACHINE

SPECIFICATIONS/CHANGE INTERVALS

SEE OPERATOR'S MANUAL FOR INITIAL CHANGES.	FLUID TYPE	CAPACITY	CHANGE INTERVAL	
			FLUID	FILTER
ENGINE OIL	10W-30	1.20 QUARTS	100 HOURS	
PRIMARY AIR FILTER				300 HOURS
FUEL SYSTEM	87 OCTANE GASOLINE MAX 10% ETHANOL	1.40 GALLONS		

SERVICE PARTS

PART NO.	DESCRIPTION / LOCATION	QTY	PART NO.	DESCRIPTION / LOCATION	QTY
ST32307	TIRE & RIM ASSEMBLY (A)	2	ST34052	BELT V (F)	2
125-8171	HUB (B)	2	ST32208	BEARING BLOCK, PILLOW (G)	2
132-4142	BLADE - RUBBER, TOP (C)	4	ST47182	LATCH - RUBBER (H)	3
132-4143	BLADE - RUBBER, END (D)	2	ST32233	BEARING ROLLER - HUB ASSEMBLY (I)	2
ST32324	SEAL - DRUM (E)	8			

132-4043

decal132-4043

1. Read the *Operator's Manual* for more information on servicing the machine.

Setup

Loose Parts

Use the chart below to verify that all parts have been shipped.

Procedure	Description	Qty.	Use
1	Dump handle	1	Install the dump handle.
	Bolt	2	
	Nut	2	
2	Tow pole kit (sold separately)	1	Install the tow pole.
3	Safety chain	1	Install the safety chain.
	Connecting link	2	

1

Installing the Dump Handle

Parts needed for this procedure:

1	Dump handle
2	Bolt
2	Nut

Installing the Dump Handle to the Drum

1. Cut the cable ties to remove the dump handle from the underside of the grate.
2. Position the dump handle so that the bolt holes align with the bolt holes in the drum (Figure 3, Figure 4, or Figure 5).

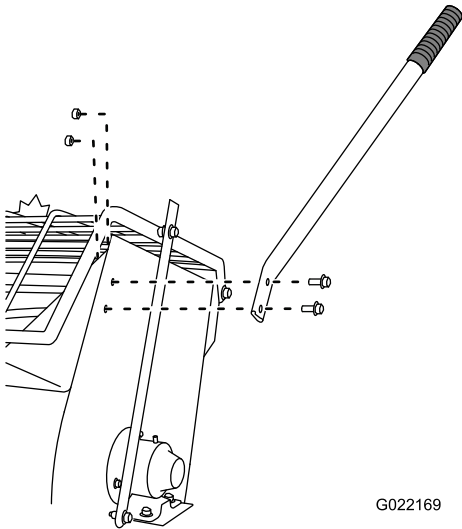


Figure 3

Models 68013, 68016, 68020

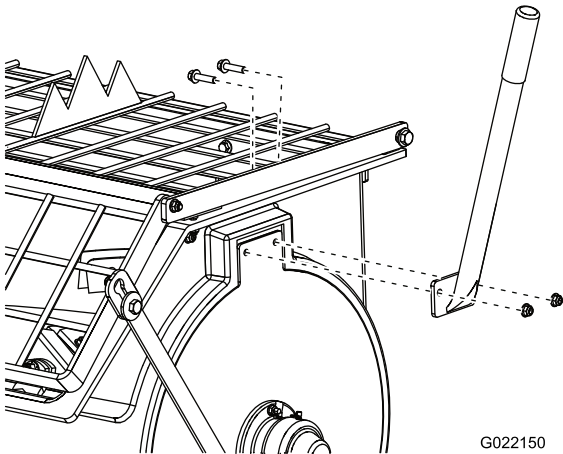


Figure 4

Models 68014, 68017, 68021

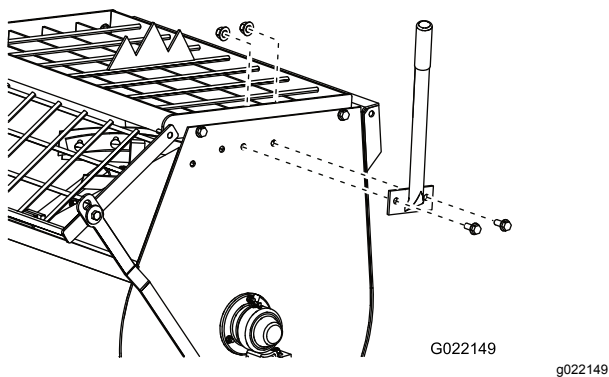


Figure 5
Model 68024

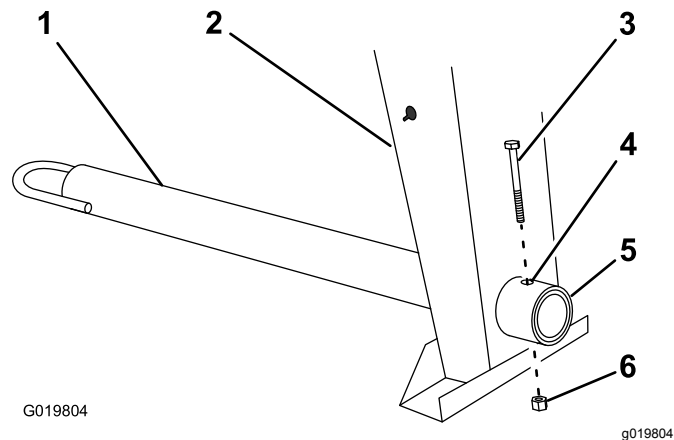


Figure 6

3. Insert the 2 bolts through the bolt holes in the dump handle and the drum (Figure 3, Figure 4, or Figure 5).
4. Install a nut onto each bolt and tighten them by hand to prevent cross-threading.
5. Tighten the nuts with a wrench while using another wrench to keep the bolts from spinning.

1. Tow pole
 2. Front post
 3. Bolt
 4. Bolt hole
 5. Frame fitting
 6. Nut
2. Slide the tow pole forward and align the hole in the pole with the hole in the frame fitting (Figure 6).
 3. Insert the bolt through the holes in the fitting and the pole (Figure 6).
 4. Thread the nut onto the bolt and tighten them until they are tight against the frame fitting (Figure 6).

Note: If the self-locking nylon insert in the locknut wears with use, replace the nut with a new Grade 5 or Grade 8 locknut.

2

Installing the Tow Pole

Parts needed for this procedure:

1	Tow pole kit (sold separately)
---	--------------------------------

Installing the Tow Pole to the Machine

Note: The tow pole is purchased separately and includes the nut and bolt needed for installation.

The machine has the following tow pole options:

Hitch Type	Length
50 mm (2 inch) ball—stamped	78.7 cm (31 inches) or 127 cm (50 inches)
50 mm (2 inch) ball—forged	78.7 cm (31 inches) or 127 cm (50 inches)
Pintle	78.7 cm (31 inches) or 127 cm (50 inches)

1. Remove the bolt and nut from the tow pole (Figure 6).

3

Installing the Safety Chain

Parts needed for this procedure:

1	Safety chain
2	Connecting link

Procedure

Form a hook on the end of a bendable piece of rod or stiff wire (not included) and install the safety chain as shown in [Figure 7](#).

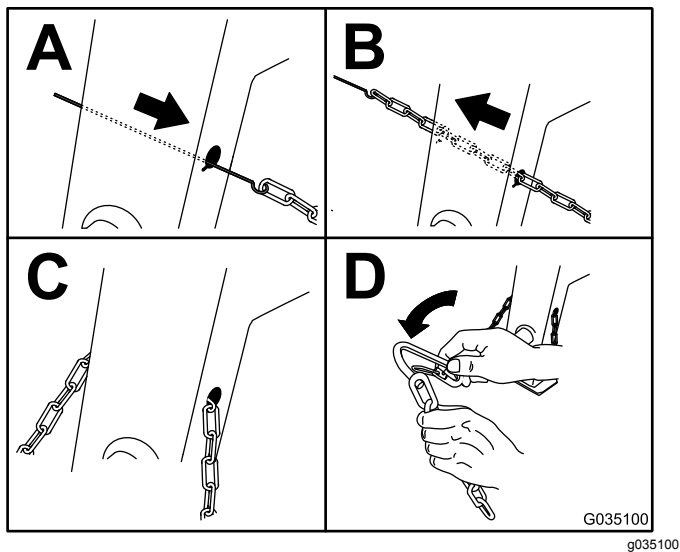


Figure 7

Note: Ensure that approximately equal lengths of safety chain extend from either side of the front post.

Product Overview

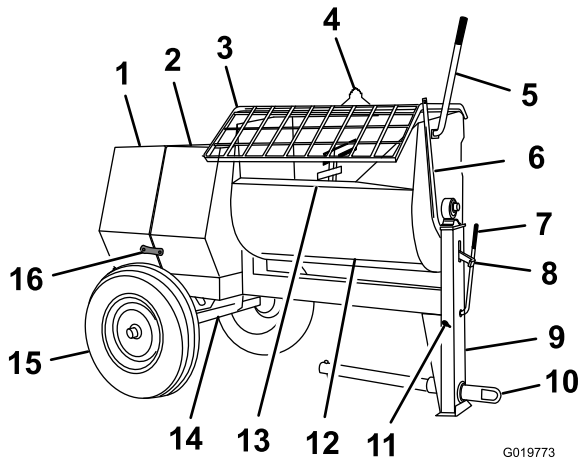


Figure 8

Right Side (Belt-Drive Models)

- | | | |
|-------------------|--------------------------|--------------------|
| 1. Rear cowl | 7. Clutch lever | 13. Chute |
| 2. Front cowl | 8. Drum latch | 14. Axle |
| 3. Grate | 9. Front post | 15. Wheel assembly |
| 4. Bag splitter | 10. Tow pole | 16. Cowl latch |
| 5. Dump handle | 11. Safety-chain keyhole | |
| 6. Grate lift arm | 12. Drum | |

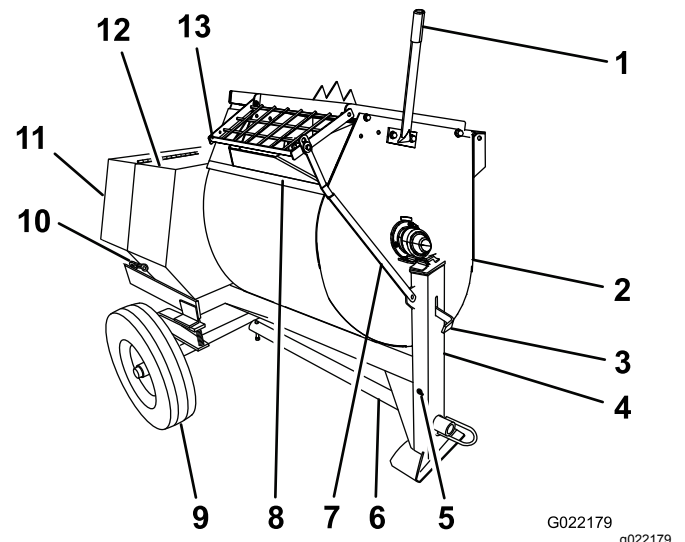


Figure 9

Right Side (Gearbox Model)

- | | | |
|-------------------------|-------------------|----------------|
| 1. Dump handle | 6. Tow pole | 11. Rear cowl |
| 2. Drum | 7. Grate lift arm | 12. Front cowl |
| 3. Drum latch | 8. Chute | 13. Grate |
| 4. Front post | 9. Wheel assembly | |
| 5. Safety-chain keyhole | 10. Cowl latch | |

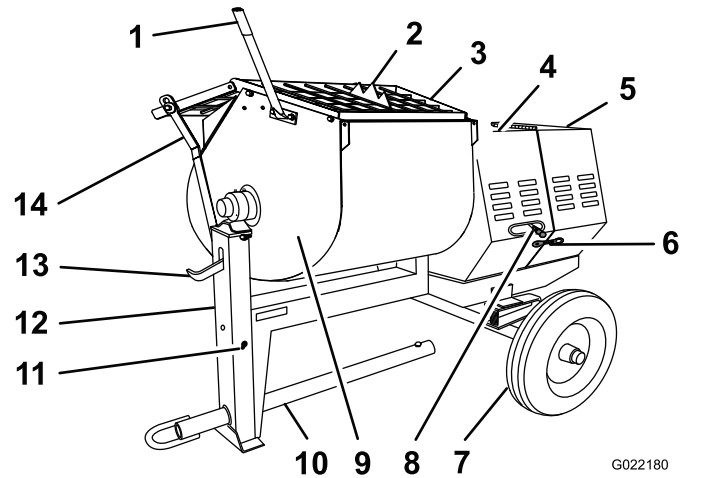


Figure 10

Left Side (Gearbox Model)

- | | | |
|-----------------|-------------------|--------------------------|
| 1. Dump handle | 6. Cowl latch | 11. Safety-chain keyhole |
| 2. Bag splitter | 7. Wheel assembly | 12. Front post |
| 3. Grate | 8. Clutch lever | 13. Drum latch |
| 4. Front cowl | 9. Drum | 14. Grate lift arm |
| 5. Rear cowl | 10. Tow pole | |

Controls

Become familiar with all the controls before you start the engine and operate the machine.

Clutch Lever

The clutch lever engages and disengages engine power to the paddles.

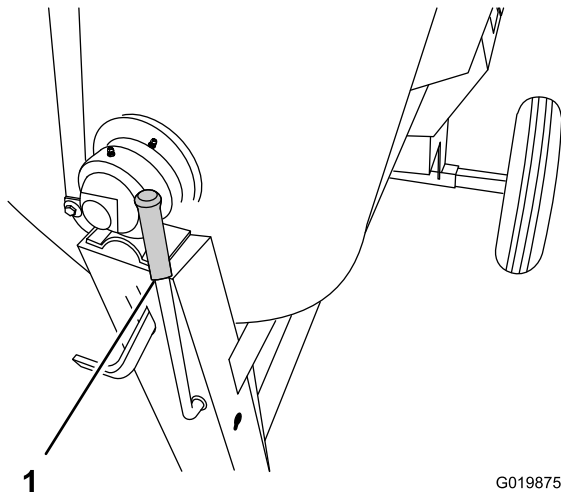


Figure 11
Belt-Drive Models

1. Clutch lever

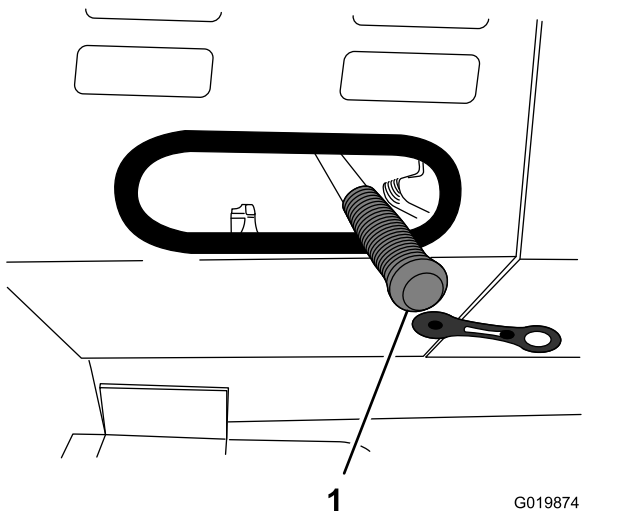


Figure 12
Gearbox Model

1. Clutch lever

Drum Latch

The drum latch secures the drum to the mix position (upright) for mixing operations and when transporting the machine.

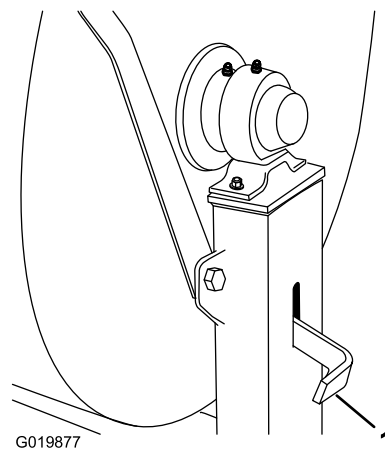


Figure 13

1. Drum latch

Dump Handle

Use the dump handle to rotate the drum to the dump position and to rotate the drum to the mix position (upright).

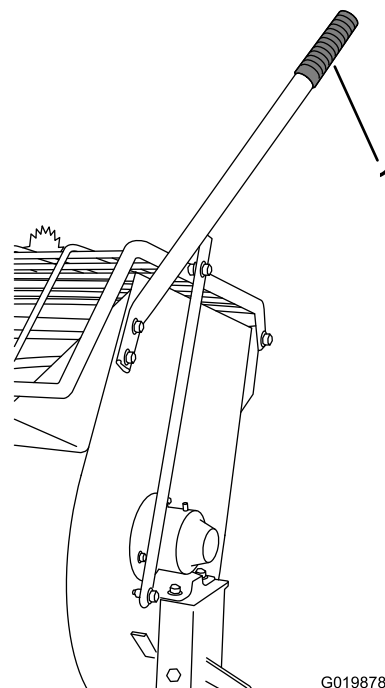
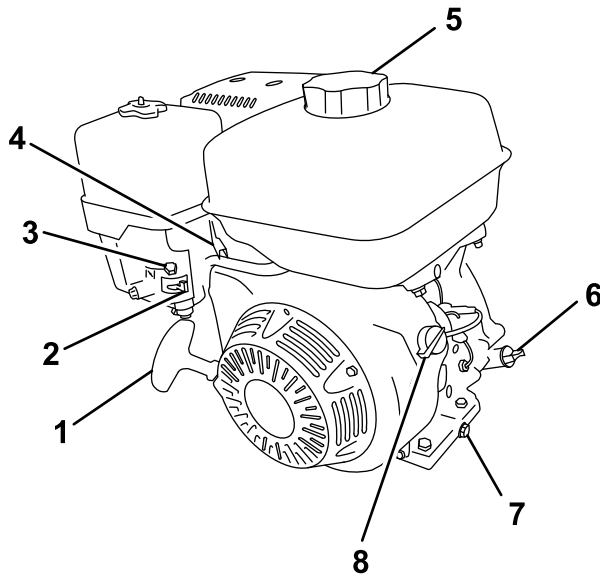


Figure 14

Models 68013, 68016, and 68020 shown

1. Dump handle

Engine Controls



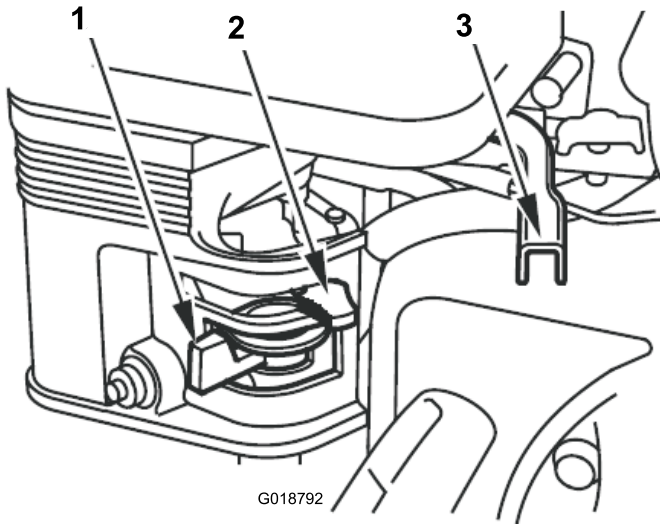
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Figure 15

- | | |
|------------------------|-------------------|
| 1. Recoil-start handle | 5. Fuel cap |
| 2. Fuel valve | 6. Dipstick |
| 3. Choke lever | 7. Oil-drain plug |
| 4. Throttle lever | 8. On/Off switch |

Fuel Valve

The fuel valve (Figure 16) is located underneath the choke lever. Move the lever for the fuel valve to the ON position before attempting to start the engine. When you have finished mixing, shut off the engine and move the fuel valve lever to the OFF position.



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Figure 16

- | | |
|----------------|-------------------|
| 1. Fuel valve | 3. Throttle lever |
| 2. Choke lever | |

Choke Lever

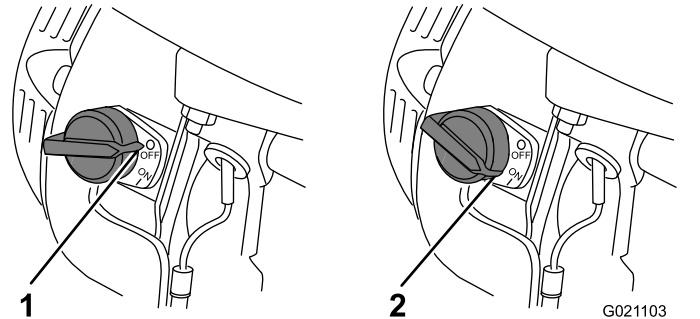
Use the choke lever (Figure 16) to start a cold engine. Before pulling the recoil-start handle, move the choke lever to the CLOSED position. Once the engine is running, move the choke lever to the OPEN position. Do not use the choke if the engine is already warmed up or if the air temperature is high.

Throttle Lever

The throttle lever (Figure 16) controls the speed (rpm) of the engine. It is located next to the choke lever. It sets the engine speed and therefore can increase and decrease the rotation speed of the mixing paddles. For best performance, set this control to the FAST position when mixing material.

Engine On/Off Switch

Use the On/Off switch (Figure 17) to start and shut off the engine. This switch is located on the front of the engine. Rotate the On/Off switch to the ON position to start and run the engine. Rotate the On/Off switch to the OFF position to shut off the engine.



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Figure 17

- | | |
|-----------------|----------------|
| 1. OFF position | 2. ON position |
|-----------------|----------------|

Recoil-Start Handle

To start the engine, pull the recoil-start handle (Figure 15) quickly to turn the engine over. The engine controls described above must all be set correctly for the engine to start.

Oil-Level Switch

The oil-level switch is located inside the engine, and it does not allow the engine to run in the event the oil level is below the safe operating limit.

Specifications

Note: Specifications and design are subject to change without notice.

Machine Specifications

Model	68013	68014	68016	68017	68020	68021	68024
Batch Capacity	0.17 m ³ (6.0 ft ³)	0.17 m ³ (6.0 ft ³)	0.17 m ³ (6.0 ft ³)	0.17 m ³ (6.0 ft ³)	0.23 m ³ (8.0 ft ³)	0.23 m ³ (8.0 ft ³)	0.34 m ³ (12.0 ft ³)
Total Volume	0.20 m ³ (6.9 ft ³)	0.20 m ³ (6.9 ft ³)	0.20 m ³ (6.9 ft ³)	0.20 m ³ (6.9 ft ³)	0.25 m ³ (9.0 ft ³)	0.25 m ³ (9.0 ft ³)	0.42 m ³ (14.8 ft ³)
Drum Material	Steel	Polyethylene	Steel	Polyethylene	Steel	Polyethylene	Steel
Length (without tow pole)	163 cm (64 inches)	163 cm (64 inches)	163 cm (64 inches)	163 cm (64 inches)	193 cm (86 inches)	193 cm (86 inches)	205.7 cm (81 inches)
Width	86 cm (34 inches)	86 cm (34 inches)	86 cm (34 inches)	86 cm (34 inches)	86 cm (34 inches)	86 cm (34 inches)	142.2 cm (50 inches)
Height	137 cm (54 inches)	137 cm (54 inches)	137 cm (54 inches)	137 cm (54 inches)	137 cm (54 inches)	137 cm (54 inches)	150 cm (59 inches)
Weight	250 kg (550 lb)	241 kg (530 lb)	250 kg (550 lb)	241 kg (530 lb)	275 kg (605 lb)	266 kg (585 lb)	508 kg (1120 lb)
Axle	86 to 117 cm (34 to 46 inches) extendable	86 to 117 cm (34 to 46 inches) extendable	86 to 117 cm (34 to 46 inches) extendable	86 to 117 cm (34 to 46 inches) extendable	86 to 117 cm (34 to 46 inches) extendable	86 to 117 cm (34 to 46 inches) extendable	142 cm (56 inches) fixed
Engine	Honda® GX160	Honda® GX160	Honda® GX240	Honda® GX240	Honda® GX240	Honda® GX240	Honda® GX340
Drive	Belt	Belt	Belt	Belt	Belt	Belt	Gearbox

Operation

Preparing to Tow the Machine

Important: Ensure that your tow vehicle has towing capacity for the weight of the machine.

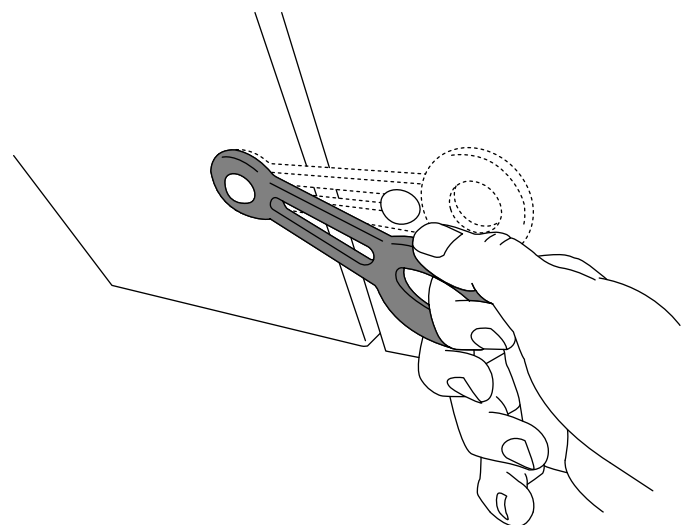
Important: Use a Class 2 or larger receiver.

Note: Ensure that your tow vehicle has the appropriate hitch to tow the machine; options include a 50 mm (2 inch) ball hitch or a pintle hitch.

Note: If the machine is equipped with a trailer-light kit, ensure that the electrical connector of the tow vehicle is compatible with the electrical connector of the machine. The machine uses a standard 4-flat plug. If your tow vehicle has a different type of plug, obtain an adapter from an automotive parts store.

1. Ensure that the engine is shut off, the fuel valve is in the OFF position, and the drum is empty.
2. If the drum has accumulated any water, dump the drum; refer to [Dumping the Drum \(page 26\)](#), steps 1, 3, 4, and 5.

3. Using the dump lever, position the drum so that it is in the mix position (upright) and locked.
4. Close the engine cowl and secure the cowl latches ([Figure 18](#)).



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Figure 18

5. Extend the axle (belt-drive models only); refer to [Extending the Axle \(page 19\)](#).

Checking the Tires and Wheels

Service Interval: Before each use or daily—Inspect the tires and wheels.

⚠ WARNING

Failure to maintain correct tire pressure may result in tire failure and loss of control, resulting in property damage and serious injury or death.

- **Check the tire pressure frequently to ensure proper inflation. If the tires are not inflated to the correct pressure, they will wear prematurely.**
- **Inspect the tire condition before towing and after any operating accident.**

The DOT tire information is located on the side of each tire. This information gives load and speed ratings. Replacement tires should have the same or better ratings. For more information go to <http://www.nhtsa.gov/Vehicle+Safety/Tires>.

Note: The various machines in this manual have different weights; refer to [Specifications \(page 16\)](#) to ensure that the tires on your machine meet or exceed the weight requirements of your machine.

1. Visually inspect the tires for damage and wear ([Figure 19](#) and [Figure 20](#)).

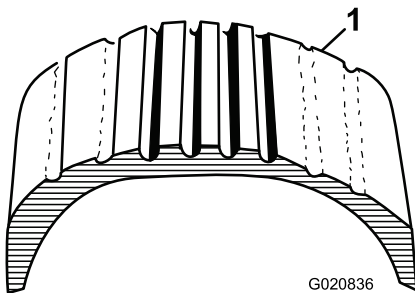


Figure 19

1. Example of tire wear caused by underinflation

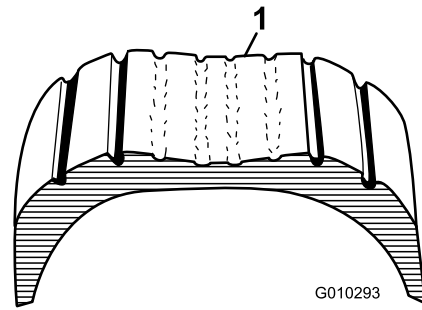


Figure 20

1. Example of tire wear caused by overinflation

2. Ensure that the tires are inflated to the correct air pressure. The following table shows the appropriate air pressure for the tires as installed at the factory.

Important: Always check the information on the actual tires for the correct air pressure requirement.

Important: The most common cause of tire trouble is under-inflation. Maintain full air pressure.

Tire Air Pressure

Model	Tire pressure
68013, 68014, 68016, and 68017	Max 414 kPa (60 psi)
68020, 68021, and 68024	Max 241 kPa (35 psi)

3. Ensure that the wheel lug nuts are torqued to 108 to 122 N·m (80 to 90 ft-lb).

Note: Check the torque of the wheel lug nuts initially and after towing.

Note: Torque the lug nuts in the sequence shown in [Figure 21](#).

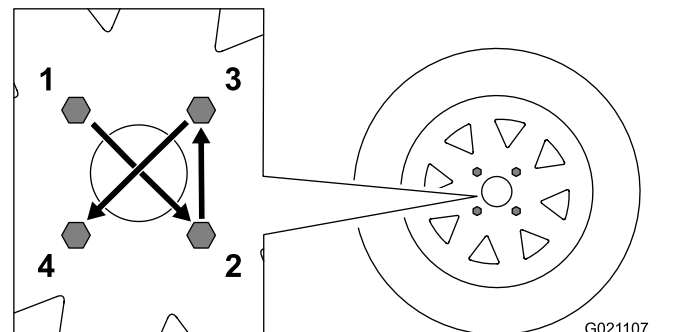


Figure 21

Hitching a Machine with a Stamped Ball Coupler

1. Apply chassis grease to the socket of the coupler and the area of the clamp that contacts the ball.
2. Oil the pivot points and sliding surfaces of the coupler with SAE 30 motor oil.
3. Hitch the machine as shown in [Figure 22](#).

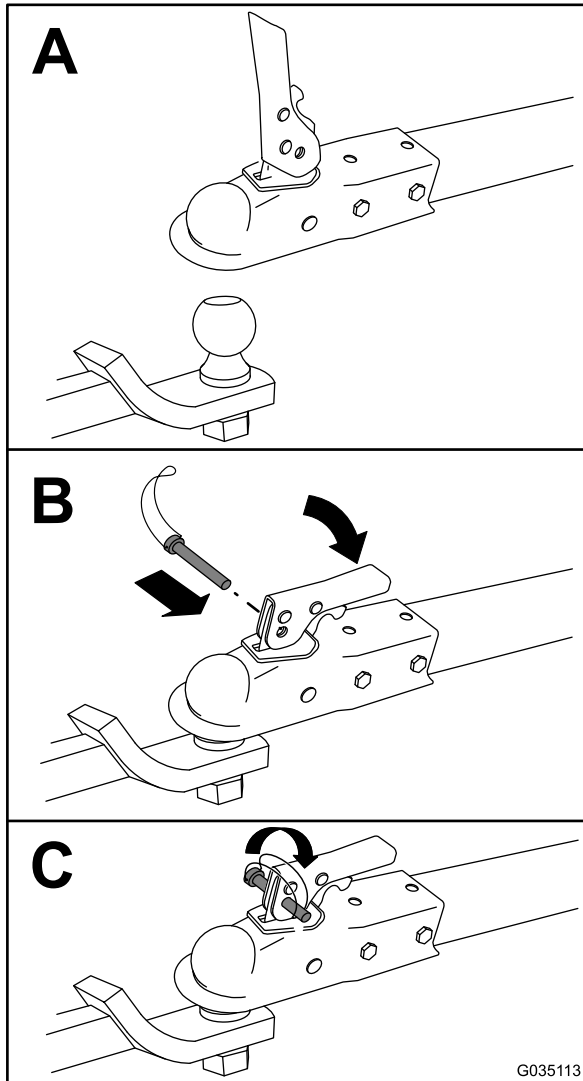


Figure 22

4. If the machine is equipped with a trailer-light kit, connect the wire plug of the tow vehicle to the wire plug of the machine.

Hitching a Machine with a Forged Ball Coupler

1. Apply removable thread-locking compound to the threads of the coupler bolt to prevent the coupler handle from coming loose.

Important: Apply thread-locking compound as needed in the future.

2. Apply chassis grease to the socket of the coupler and the area of the clamp that contacts the ball.
3. Install hitch the machine as shown in [Figure 23](#).

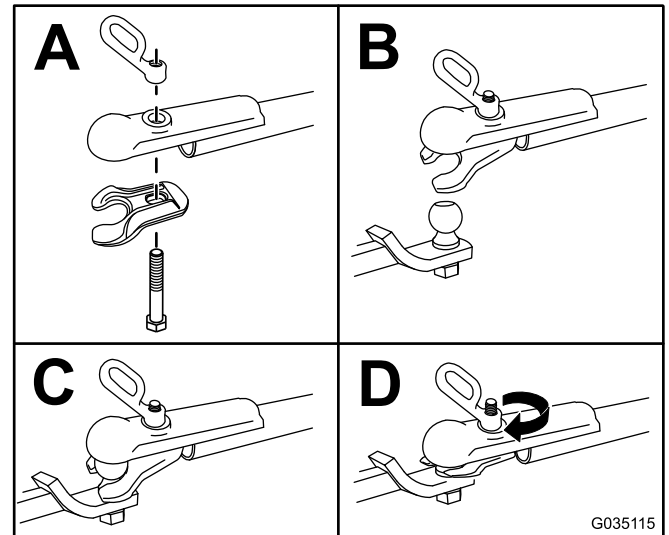


Figure 23

Note: Use a wrench to keep the bolt from spinning.

4. If the machine is equipped with a trailer-light kit, connect the wire plug of the tow vehicle to the wire plug of the machine.

Hitching a Machine with a Pintle Hitch Coupler

1. Hitch the machine as shown in [Figure 24](#).

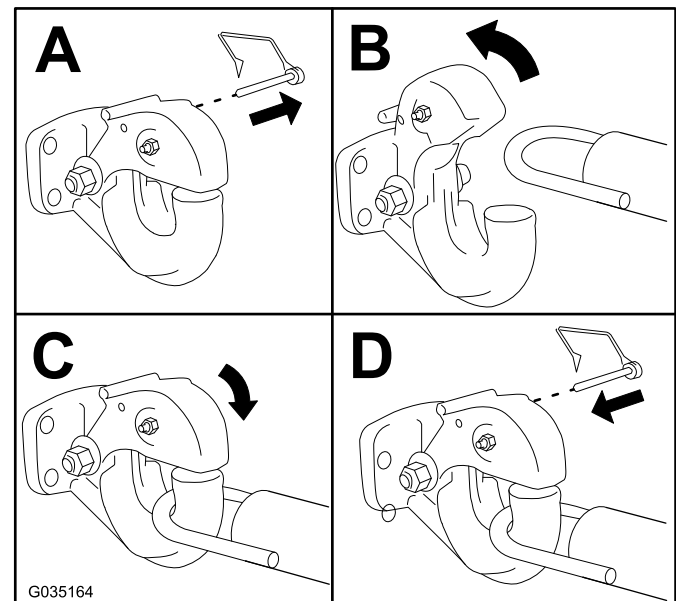


Figure 24

2. If the machine is equipped with a trailer-light kit, connect the wire plug of the tow vehicle to the wire plug of the machine.

Connecting the Safety Chains to the Tow Vehicle

1. Pull the safety chain through the slots in the keyholes, so that the lengths on each side are equal.
2. Cross both lengths of chain **under** the tow pole.

Note: Crossing the chains decreases the chances of the front of the machine dropping to the ground if the hitch does not hold the connection.

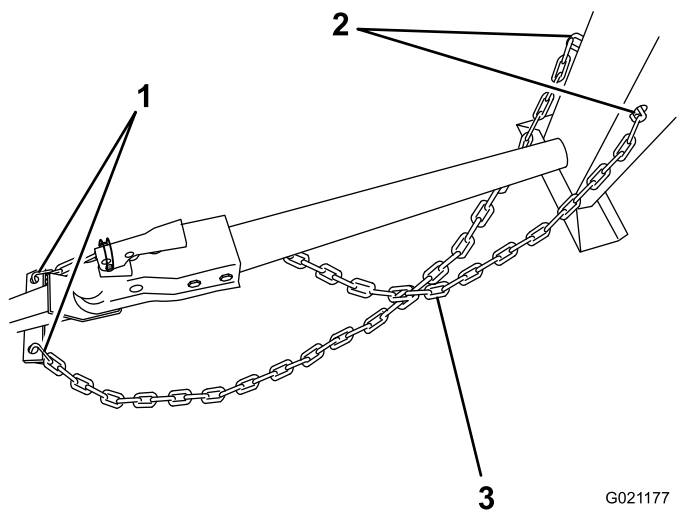


Figure 25

1. Connecting links
2. Keyholes in front post
3. Chain crossed under tow pole

3. Connect each length of chain to the safety chain mounting point on the tow vehicle with the connecting links (Figure 26).

Important: Ensure that the chain has enough slack for turning around corners when towing the machine.

Note: Stow the excess chain inside the bottom of the front post by pushing it into the keyholes and latching the appropriate links into the keyhole slots.

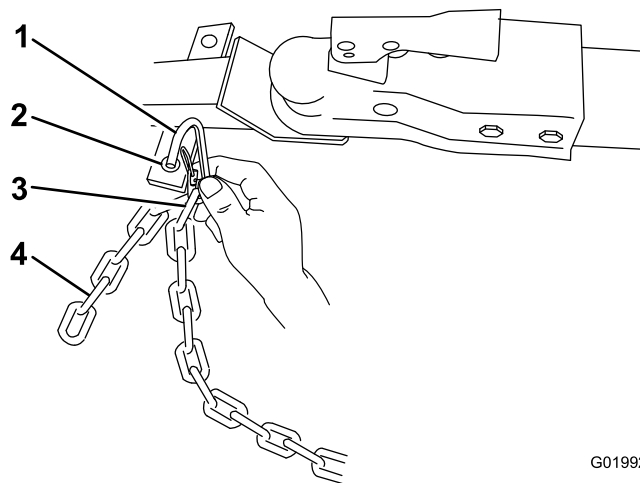


Figure 26

1. Connecting link
2. Safety chain mounting point on tow vehicle
3. Chain link
4. Chain

Extending the Axle Belt-Drive Models Only

⚠ WARNING

The machine is not stable when towed with the axle in the narrow position.

Tow the machine with the axle in the wide position.

Important: Adjust the axle to the narrow position only to move the machine through a narrow access point, such as the gate of a fence or the doorway of a building.

Preparing to Change the Axle Width

1. Move the machine to a level surface.
2. Disconnect the machine from the tow vehicle.
3. Secure the machine from movement.
4. Ensure that the drum is empty and in the mix position (upright).
5. Ensure that the drum latch is engaged and that the drum does not rotate toward the dump position.

Adjusting the Axle Width

⚠ WARNING

Mechanical or hydraulic jacks may fail to support the machine and cause serious injury.

Use jack stands when supporting the machine.

1. Align a jack with an adequate lift height and weight capacity under the axle; refer to [Specifications](#) (page 16).
2. Lift the machine until the tires are off the ground.
3. Use a jack stand at each support point on the rear frame extension ([Figure 27](#)).

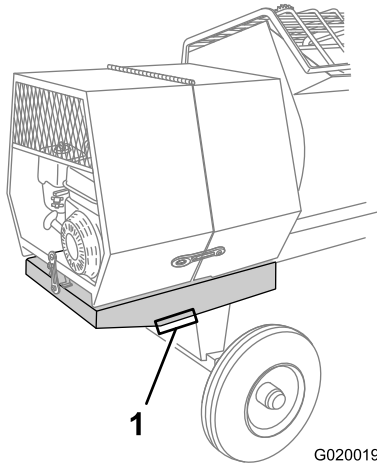


Figure 27

1. Support point (2)

4. Remove the bolts and nuts that secure the inner axle to the outer axle ([Figure 28](#)).

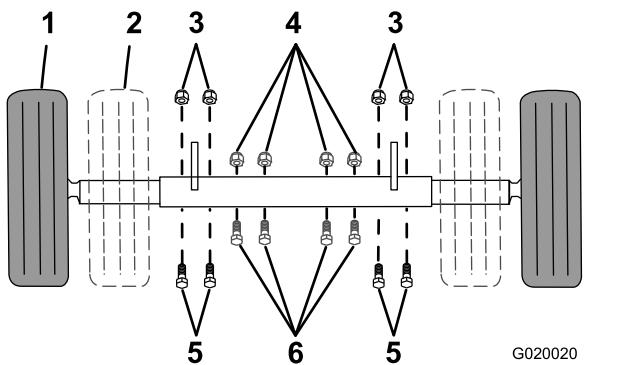


Figure 28

- | | |
|---------------------------|-------------------------|
| 1. Wide position (towing) | 4. Nut—narrow position |
| 2. Narrow position | 5. Bolt—wide position |
| 3. Nut—wide position | 6. Bolt—narrow position |

5. Align the inner axle to the desired position as follows:

- Slide each side of the axle inward to the narrow position ([Figure 28](#)).
 - Slide each side of the axle outward to the wide (tow) position ([Figure 28](#)).
6. Align the holes of the inner axle with the holes of the outer axle.
 7. Insert the bolts through the axle holes ([Figure 28](#)).
 8. Thread the nuts onto the bolts, and torque the nuts to 87 N·m (64 ft-lb).

Towing the Machine

⚠ WARNING

Towing the machine at high speed increases the risk of a hitch malfunction and tire failure. Higher speeds also increase the momentum of the machine and braking distance. If the machine detaches from the tow vehicle at high speed, it could cause damage to property, or injury or death to bystanders.

Do not exceed 88 km/h (55 mph) when towing the machine. For poor road conditions or inclement weather, reduce speed accordingly.

⚠ WARNING

Towing the machine with material in the drum increases the risk of a hitch malfunction and tire failure. In addition, material could bounce out of the drum and hit other vehicles and/or people. Material in the drum increases the weight, which affects momentum and braking distance.

Do not tow the machine with material in the drum.

- Review and understand [Safe Operating Practices](#) (page 4).
- Test the brakes of the tow vehicle before towing.
- Avoid sudden starts and stops while towing the machine.

Preparing to Use the Machine

- Review all of the safety decals on the machine.
- Use a hard-hat, hearing protection, a shirt with long sleeves that are tight at the wrists, tight-fitting gloves without drawstrings or loose cuffs, eye protection, and a dust mask or respirator. A

mesh visor alone does not provide sufficient eye protection; supplement with protective glasses.

- Ensure that you are familiar with safety regulations and shutdown procedures described in this *Operator's Manual* and the engine owner's manual.
- Ensure that all guards are in place and in good condition.
- Ensure that the paddles are in place and in good condition.
- Check the fuel and oil levels of the engine.
- When preparing to mix material:
 1. Move the machine to a level job-site surface.
 2. Remove the machine from the tow vehicle.
 3. Secure the machine from movement before you use it.
 4. Ensure that the drum is in the mix position (upright).
 5. Ensure that the drum latch is engaged and that the drum does not rotate toward the dump position.

Closing the Cowl

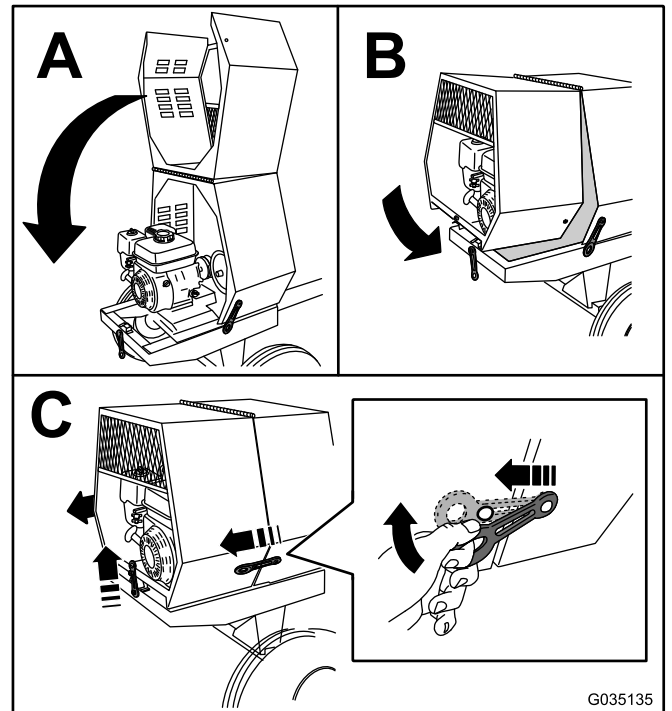


Figure 30

Opening and Closing the Cowl

Opening the Cowl

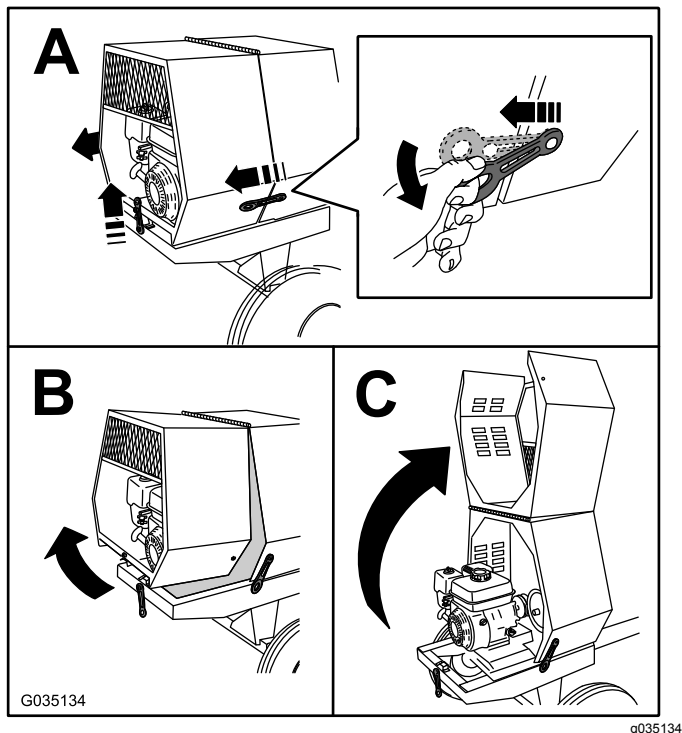


Figure 29

Adding Fuel

- For best results, use only clean, fresh (less than 30 days old), unleaded gasoline with an octane rating of 87 or higher ((R+M)/2 rating method).
- **Ethanol:** Gasoline with up to 10% ethanol (gasohol) or 15% MTBE (methyl tertiary butyl ether) by volume is acceptable. Ethanol and MTBE are not the same. Gasoline with 15% ethanol (E15) by volume is not approved for use. **Never use gasoline that contains more than 10% ethanol by volume**, such as E15 (contains 15% ethanol), E20 (contains 20% ethanol), or E85 (contains up to 85% ethanol). Using unapproved gasoline may cause performance problems and/or engine damage which may not be covered under warranty.
- **Do not** use gasoline containing methanol.
- **Do not** store fuel either in the fuel tank or fuel containers over the winter unless a fuel stabilizer is used.
- **Do not** add oil to gasoline.

⚠ DANGER

In certain conditions, fuel is extremely flammable and highly explosive. A fire or explosion from fuel can burn you and others and can damage property.

- Fill the fuel tank outdoors, in an open area, when the engine is cold. Wipe up any gasoline that spills.
- Never fill the fuel tank inside an enclosed trailer.
- Do not fill the fuel tank completely full. Add fuel to the fuel tank until the level is 6 to 13 mm (1/4 to 1/2 inch) below the bottom of the filler neck. This empty space in the tank allows fuel to expand.
- Never smoke when handling fuel and stay away from an open flame or where fuel fumes may be ignited by a spark.
- Store fuel in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of fuel.
- Do not operate without entire exhaust system in place and in proper working condition.

⚠ DANGER

In certain conditions during fueling, static electricity can be released, causing a spark that can ignite the gasoline vapors. A fire or explosion from fuel can burn you and others and can damage property.

- Always place fuel containers on the ground away from your vehicle before filling.
- Do not fill fuel containers inside a vehicle or on a truck or trailer bed, because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a fuel-dispenser nozzle.
- If you must use a fuel-dispenser nozzle, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

⚠ WARNING

Fuel is harmful or fatal if swallowed. Long-term exposure to vapors can cause serious injury and illness.

- Avoid prolonged breathing of vapors.
- Keep your face away from nozzle and fuel tank or conditioner bottle opening.
- Avoid contact with skin; wash off spills with soap and water.

Using Stabilizer/Conditioner

Use a fuel stabilizer/conditioner in the machine to provide the following benefits:

- Keeps fuel fresh during storage of 90 days or less. For longer storage drain the fuel tank.
- Cleans the engine while it runs
- Eliminates gum-like varnish buildup in the fuel system, which causes hard starting

Important: Do not use fuel additives containing methanol or ethanol.

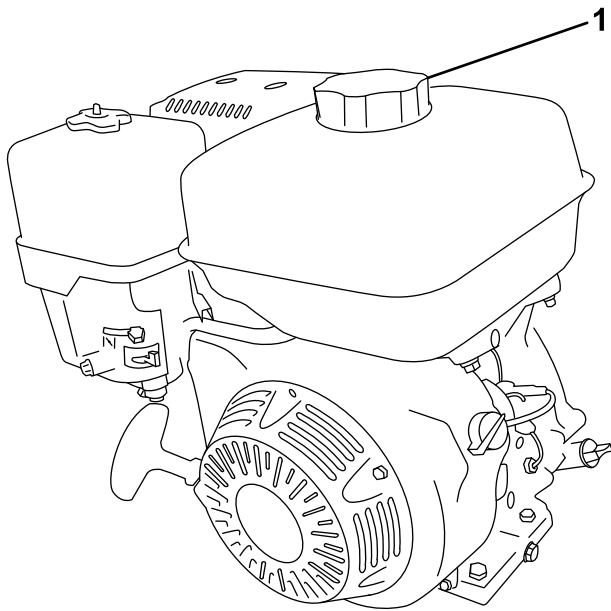
Add the correct amount of fuel stabilizer/conditioner to the fuel.

Note: A fuel stabilizer/conditioner is most effective when mixed with fresh fuel. To minimize the chance of varnish deposits in the fuel system, use fuel stabilizer at all times.

Filling the Fuel Tank

Model(s)	Fuel tank capacity
68013 and 68014	3.1 L (0.82 US gallons)
68016, 68017, 68020, 68021	5.3 L (1.40 US gallons)
68024	6.1 L (1.61 US gallons)

1. Park the machine on a level surface, shut off the engine, and allow the engine to cool.
2. Clean around the fuel cap and remove it (Figure 31).



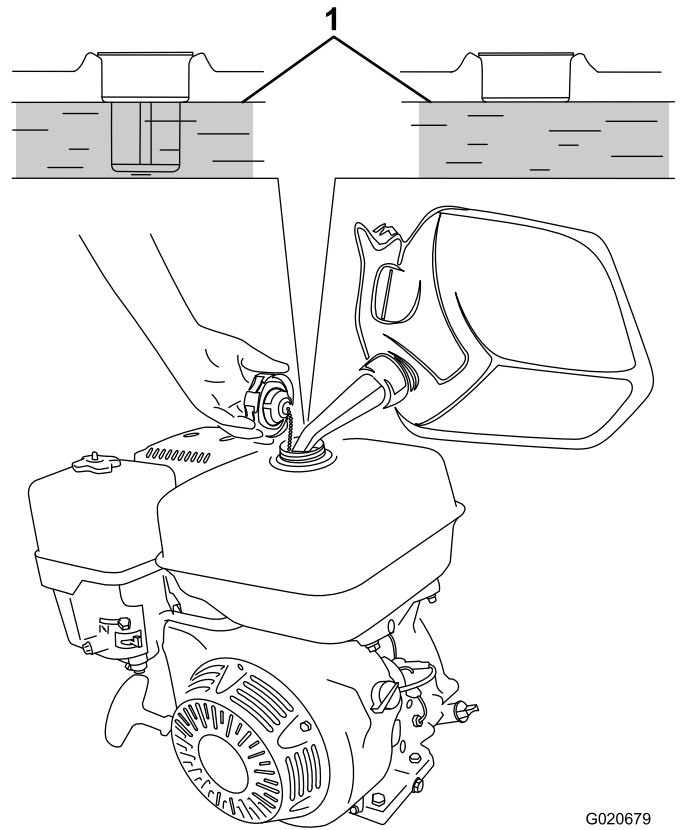
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Figure 31

1. Fuel cap

3. Add fuel to the fuel tank, until the level is at the bottom of the maximum fuel level, as shown in [Figure 32](#).

Important: This space in the tank allows the fuel to expand. Do not fill the fuel tank completely full.



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Figure 32

1. Maximum fuel level

4. Install the fuel cap securely ([Figure 31](#)).
5. Wipe up any spilled fuel.

Checking the Engine-Oil Level

Before you start the engine and use the machine, check the oil level in the engine crankcase; refer to [Checking the Engine-Oil Level \(page 34\)](#).

Starting the Engine

1. On the engine, move the throttle lever away from the MIN position, 1/3 of the way toward the MAX position (Figure 33).

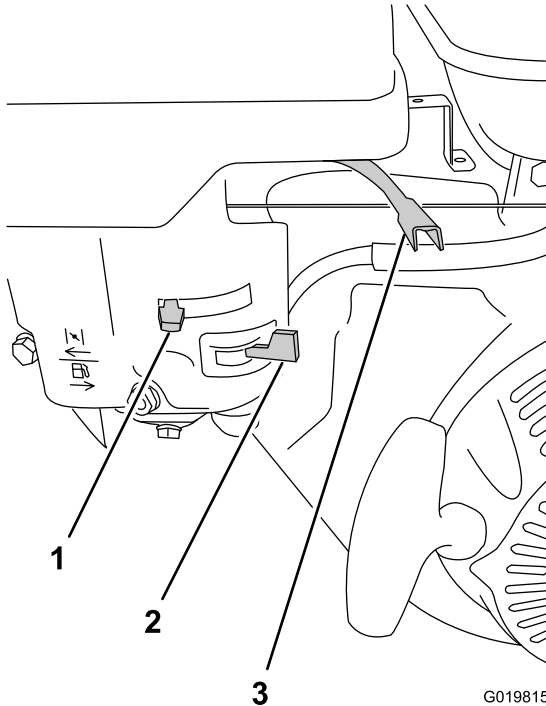


Figure 33

1. Choke lever
2. Fuel valve
3. Throttle lever

2. Move the lever of the fuel valve to the ON position, all the way to the right (Figure 33).
3. Position the choke lever as follows:
 - To start a cold engine, move the choke lever to the CLOSED position, all the way to the left (Figure 33).
 - To start a warm engine, move the choke lever in the OPEN position, all the way to the right.
4. Rotate the engine switch to the ON position (Figure 33).
5. Pull the recoil-start handle lightly until you feel resistance, then pull the handle briskly. Return the recoil-start handle gently (Figure 34).

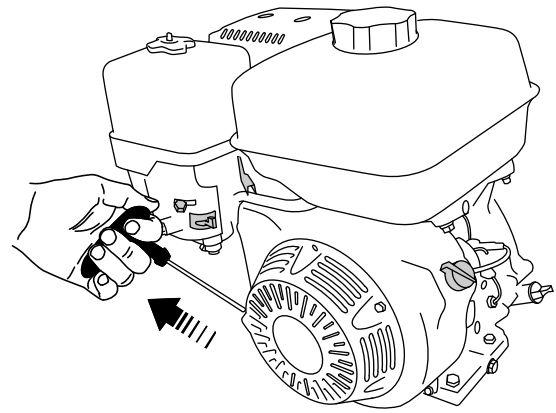


Figure 34

Note: If the choke lever is set to the CLOSED position to start the engine, gradually move the choke lever back toward the OPEN position as the engine warms up. If the engine stalls or hesitates, move the choke lever back toward the CLOSED position until the engine runs smooth. Allow the engine to warm up, then move the choke lever to the OPEN position.

Shutting Off the Engine

Important: During normal operation, if the engine has been working hard or is hot, let it idle for a minute before shutting off the engine. This helps to cool the engine before stopping.

1. Ensure that the choke lever is in the OFF position (Figure 33).
2. Move the throttle lever to the MIN position (Figure 33).
3. Rotate the engine switch to the OFF position.

Controlling the Paddles

⚠ DANGER

This machine is capable of amputating hands.

- Stay in the operator's position while the machine is running.
- Keep all bystanders a safe distance from the machine.
- Stop the machine immediately if any people or animals enter the work area.
- Never place any part of your body into a position that causes an unsafe operating condition.

Important: Ensure that the paddles do not turn when clutch is in the OFF position.

Use the clutch lever to control the power transmission to the paddles of the machine ([Figure 35](#) or [Figure 36](#)).

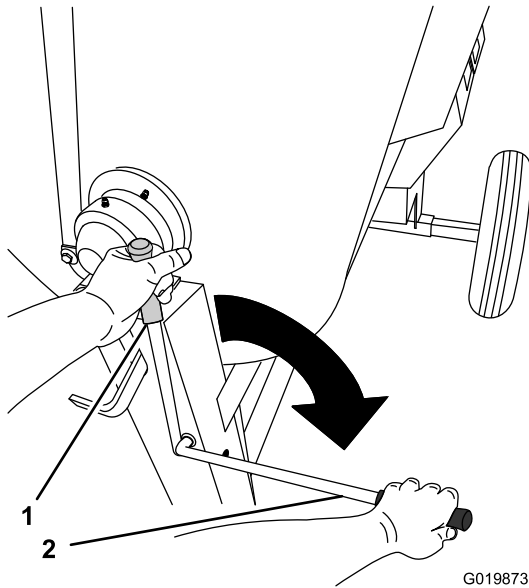


Figure 35
Belt-Drive Models

1. OFF position 2. ON position

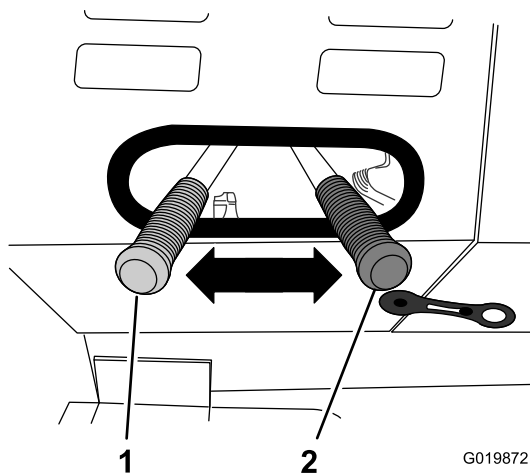


Figure 36
Gearbox Models

1. ON position 2. OFF position

Mixing the Material

⚠ DANGER

Eye and skin contact with concrete materials and breathing the dust involved is hazardous to your health.

- Ensure that there is adequate air ventilation.
- Wear a dust mask to prevent inhalation of dust while using the machine; refer to [Safe Operating Practices \(page 4\)](#).
- Avoid direct contact of cement and concrete materials with skin and eyes.

⚠ DANGER

Contact with the mixing paddles could cause damage or injury.

Never put your hands or tools inside the drum while the engine is running.

Important: Do not add more material than the batch capacity of the machine; refer to [Specifications \(page 16\)](#).

Note: Follow the manufacturer's instructions that are printed on the packaging of the product you are using.

Mixing a Batch of Material in the Machine

1. Ensure that there is no old, loose material in the drum that can contaminate the batch of material; refer to [Cleaning the Drum \(page 27\)](#) and [Dumping the Drum \(page 26\)](#), then return the drum to the upright position.

Note: Ensure that the drum is in the mix position (upright) and the drum latch is engaged.

2. Move the clutch lever to the OFF position.
3. Start the engine.

Note: Allow the engine to warm up at 2/3 throttle for 1 to 2 minutes.

4. Set the throttle lever on the engine to the MAX position.
5. Move the clutch lever to the ON position.
6. Add the ingredients for the batch as follows:
 - A. Pour water into the drum through the grate.
 - B. Add the plaster, cement, or other binding material.

Note: You can open bags of cement, plaster, and binding materials by lowering the bag onto the bag splitter ([Figure 37](#)).

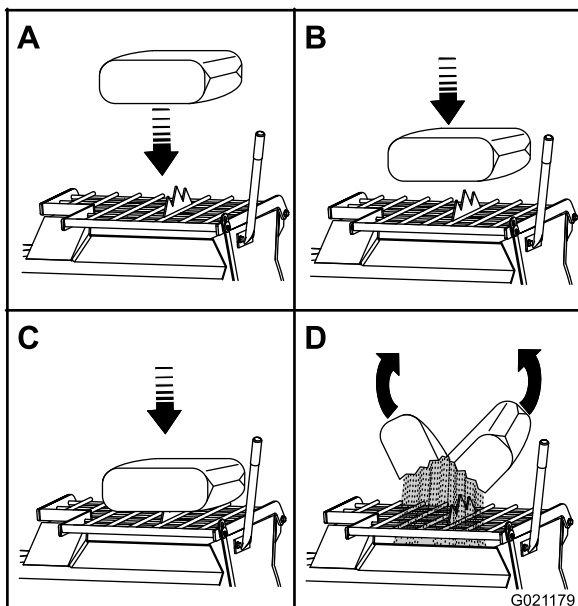


Figure 37

- C. If you are using sand and/or other reinforcing materials, add them into the drum.
7. Allow the paddles to mix the material until the ingredients have a uniform appearance.

Note: If needed, add water or plaster, cement, or other binding material until the consistency of the batch is correct.

8. Release the drum latch and dump the drum; refer to [Dumping the Drum \(page 26\)](#).

Using the Drum

⚠ DANGER

Contact with the mixing paddles could cause damage or injury.

Never put your hands inside the drum while the engine is running.

Dumping the Drum

Note: When dumping a batch of material, leave the engine running and the clutch in the ON position so the rotating paddles help discharge the material.

1. Align a wheelbarrow or similar container of adequate capacity in the path of the drum opening.
2. Grasp the dump handle with your left hand ([Figure 38](#)).

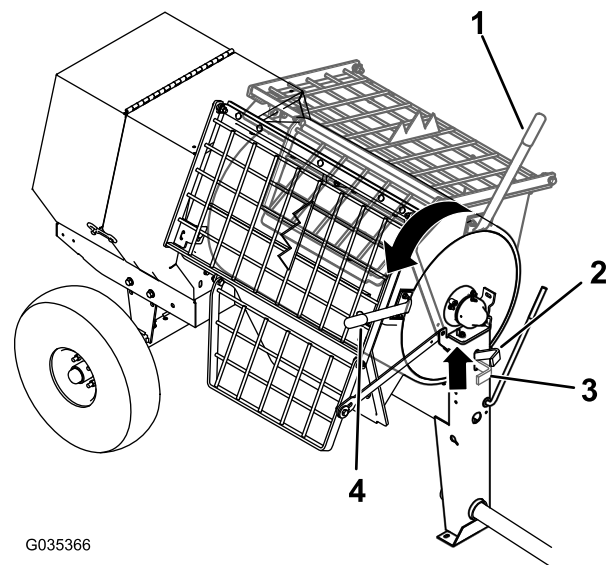


Figure 38

- | | |
|--------------------------------|-------------------------------|
| 1. Dump handle—Mix position | 3. Drum latch—Locked position |
| 2. Drum latch—Release position | 4. Dump handle—Dump position |

Note: When dumping a batch of material, align a wheelbarrow or a similar container of adequate capacity beneath the chute.

3. Lift the handle of the drum latch ([Figure 38](#)).
4. With both hands on the dump handle, rotate it counterclockwise to discharge the contents of the drum ([Figure 38](#)).
- Note:** Allow the machine to completely discharge the contents of the drum.
5. Rotate the dump handle **clockwise** until the drum latch locks the drum in the upright position ([Figure 38](#)).
6. After discharging a batch of material, clean the drum; refer to [Cleaning the Drum](#) (page 27).

Note: This step cleans the paddles and drum between batches and prevents dried material from forming and contaminating the next batch of material.

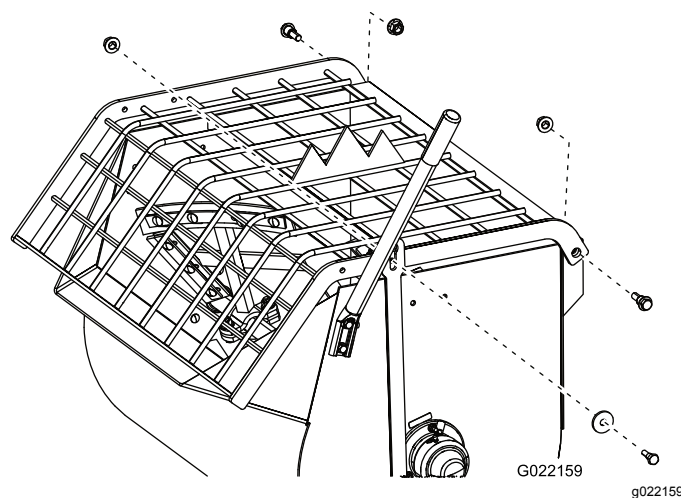


Figure 39
Models 68013, 68016, 68020

Cleaning the Drum

Important: Do not strike on the drum with a shovel, hammer, or any other device to loosen any accumulated dried materials.

1. Stop the rotation of the paddles by moving the clutch lever to the OFF position.
2. Rotate the engine On/Off switch to the OFF position.
3. Ensure that the drum is in the mix position (upright).
4. Spray the machine with water to remove any accumulated material.
5. Start the engine.
6. Start the rotation of the paddles by moving the clutch lever to the ON position.
7. Dump the drum.

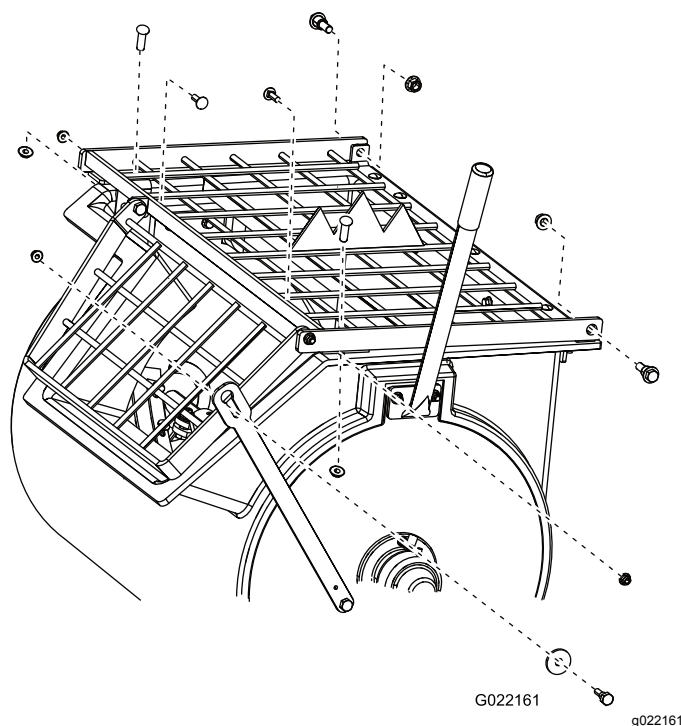
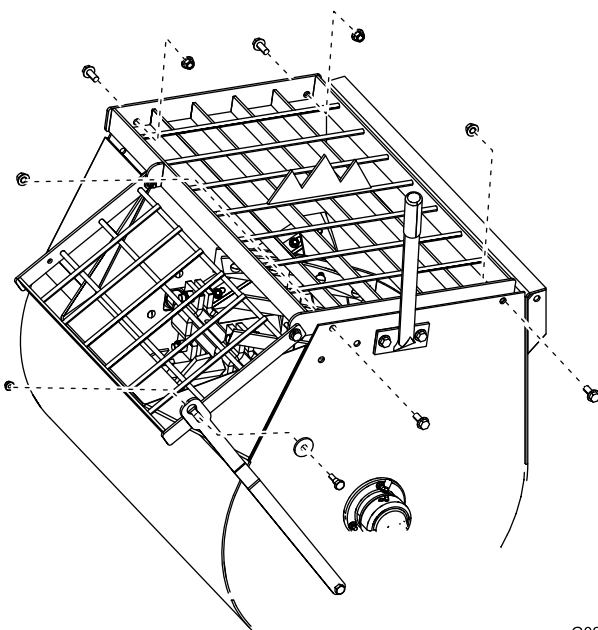


Figure 40
Models 68014, 68017, 68021

Adjusting the Paddle Blades

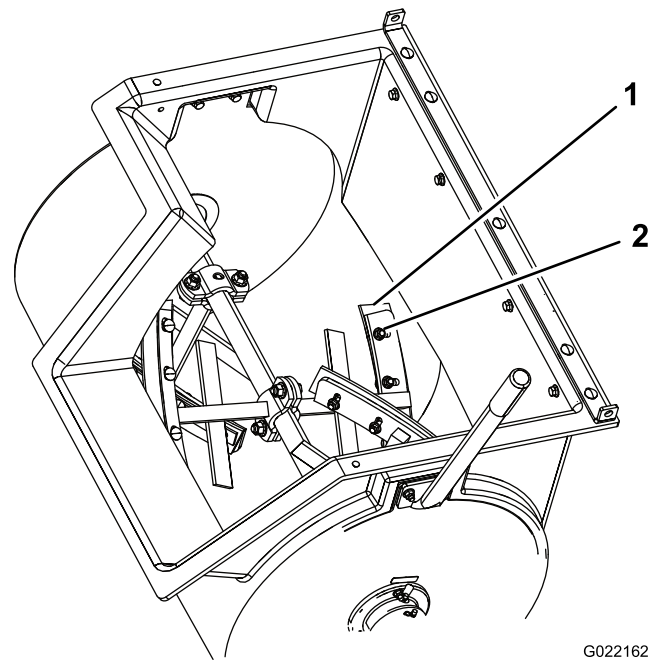
Note: Adjusting the paddle blades is optional.

1. Shut off the engine and wait for all moving parts to stop.
2. Disconnect the wire from the spark plug; refer to [Disconnecting the Spark-Plug Wire](#) (page 31).
3. Remove the nuts and bolts that secure the grate to the drum, and remove the grate ([Figure 39](#), [Figure 40](#), or [Figure 41](#)).



G022163
g022163

Figure 41
Model 68024



G022162

Figure 43

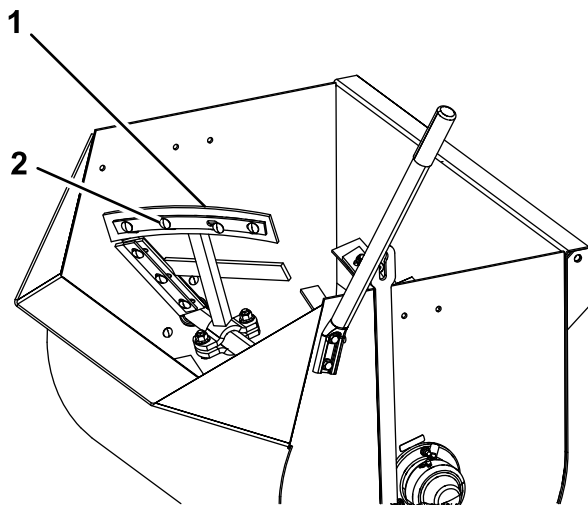
Models 68014, 68017, 68021

1. Paddle blade 2. Nut and bolt

g022162

4. Loosen the nuts and bolts that secure the paddle blades to the paddles (Figure 42, Figure 43, or Figure 44).

Note: If necessary, tip the drum to the dump position to access the paddles.

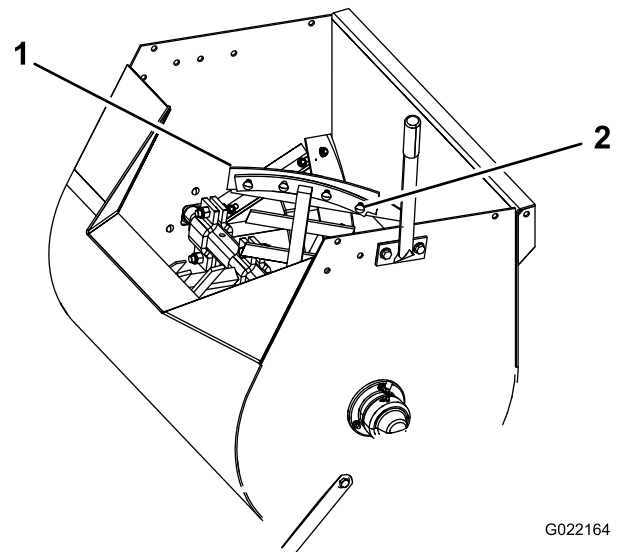


G022160
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Figure 42

Models 68013, 68016, 68020

1. Paddle blade 2. Nut and bolt



G022164

g022164

Figure 44

Model 68024

1. Paddle blade 2. Nut and bolt

5. Adjust the rubber wipers to be close to the drum wall and position the metal paddle blades so that the outer edge is 3 to 6 mm (1/8 to 1/4 inch) from the outer edge of the wipers (Figure 45). Tighten the nuts and bolts to secure the blades to the paddles.

Note: Ensure that the clutch lever is in the OFF position and rotate the paddles as needed.

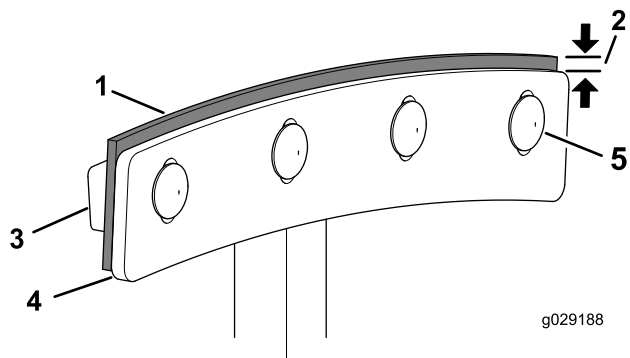


Figure 45

- | | |
|--------------------------------|------------------|
| 1. Wiper | 4. Paddle blade |
| 2. 3 to 6 mm (1/8 to 1/4 inch) | 5. Carriage bolt |
| 3. Wiper bar | |
-
6. Install the grate with the nuts and bolts that you removed in step 3, and tighten the nuts and bolts until they are secure.

Maintenance

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 20 hours	• Change the reduction-case oil (Models 68013 and 68014 only).
After the first 25 hours	• Change the engine oil. • Check the gearbox clutch (gearbox model only). • Inspect the belts and adjust as necessary (belt-drive models only).
Before each use or daily	• Inspect the tires and wheels. • Inspect the air-cleaner elements. • Check the engine-oil level. • Check the reduction-case oil (Models 68013 and 68014 only). • Check the clutch operation (gearbox model only).
After each use	• Torque the lug nuts to 108 to 122 N·m (80 to 90 ft-lb) after towing. • Clean the drum between mixing batches of material. • Lubricate the trunnions.
Every 40 hours	• Check the gearbox oil (gearbox model only). • Inspect the belts and adjust as necessary (belt-drive models only). • Check the clutch operation
Every 50 hours	• Clean the air-cleaner elements. Clean them more frequently in dusty operating conditions.
Every 100 hours	• Change the engine oil. • Check the spark plug. • Clean the spark arrester. • Clean the fuel-sediment cup. • Change the reduction-case oil (Models 68013 and 68014 only).
Every 300 hours	• Replace the paper air-cleaner element. Replace it more frequently in dusty operating conditions. • Replace the spark plug.
Every 800 hours	• Replace the gearbox oil (gearbox models only).
Monthly	• Lubricate the pillow-block bearings.
Yearly or before storage	• Clean the fuel-sediment cup.
Every 2 years	• Replace the belts (belt-drive models only).

Important: Refer to your engine owner's manual for additional maintenance procedures.

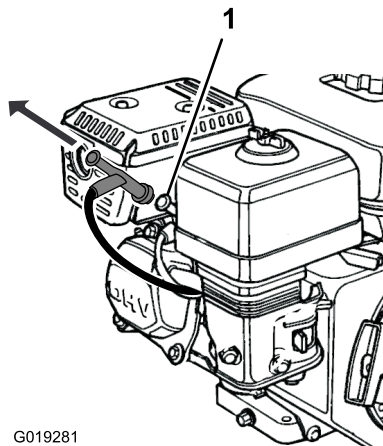
Pre-Maintenance Procedures

Preparing the Machine for Maintenance

1. Park the machine on a level surface and shut off the engine.
2. Remove the machine from the tow vehicle.
3. Secure the machine from movement.
4. Open the rear cowl; refer to [Opening the Cowl \(page 21\)](#).
5. Ensure that the engine and muffler are cool.
6. Disconnect the spark-plug wire; refer to [Figure 46](#).

Disconnecting the Spark-Plug Wire

Pull the spark-plug wire off the terminal of the spark plug ([Figure 46](#)).



G019281

Figure 46

g019281

1. Spark plug

Removing and Installing the Divider Plate

You need to remove the divider plate to provide access before performing some maintenance procedures.

Note: Model 68024 does not have a divider plate.

Removing the Divider Plate

1. Unlatch and open the cowl; refer to [Opening the Cowl \(page 21\)](#).

2. Use a wrench to remove the 4 bolts that secure the divider plate to the front cowl.

Note: Retain the bolts for installing the divider plate.

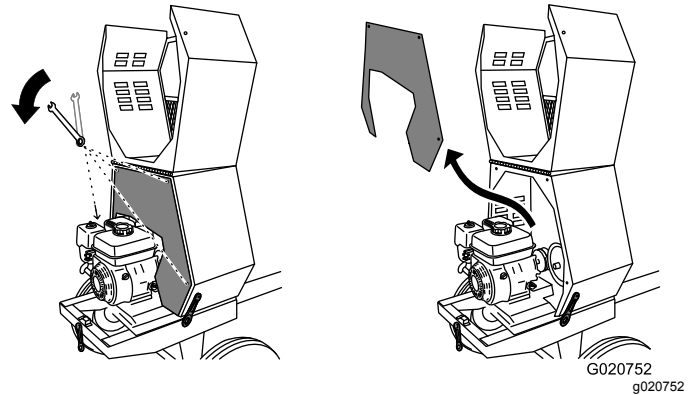


Figure 47

3. To remove the divider plate, lift it upward and rotate it counterclockwise so that it clears various engine components.

Installing the Divider Plate

1. Guide the divider plate into position against the front cowl.

Note: Start with the divider plate rotated slightly counterclockwise, and then rotate it clockwise while lowering it into position.

Ensure that the divider plate is not backward.

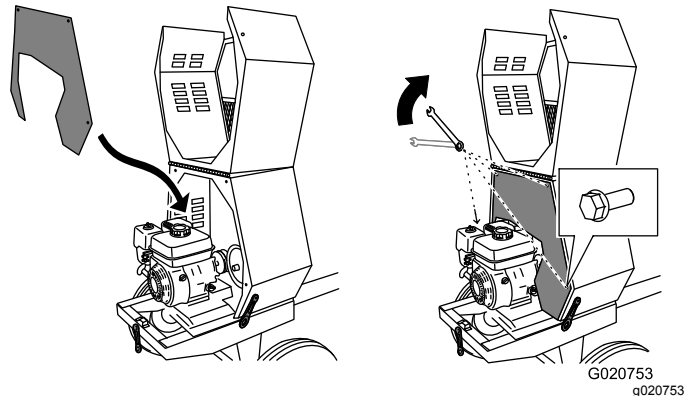


Figure 48

2. Align the bolt holes in the divider plate and the front cowl.
3. Install the 4 bolts and hand-tighten them to prevent cross-threading.
4. Tighten the bolts with a wrench until they are secure.

Lubrication

Lubricating the Bearings and Seals

Service Interval: After each use—Lubricate the trunnions.

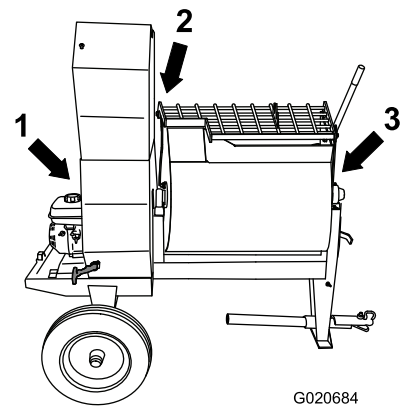
Monthly—Lubricate the pillow-block bearings.

Note: The pillow-block bearings are inside the cowl—remove the divider plate to access them; refer to [Removing the Divider Plate \(page 31\)](#).

Model 68024 does not have a divider plate.

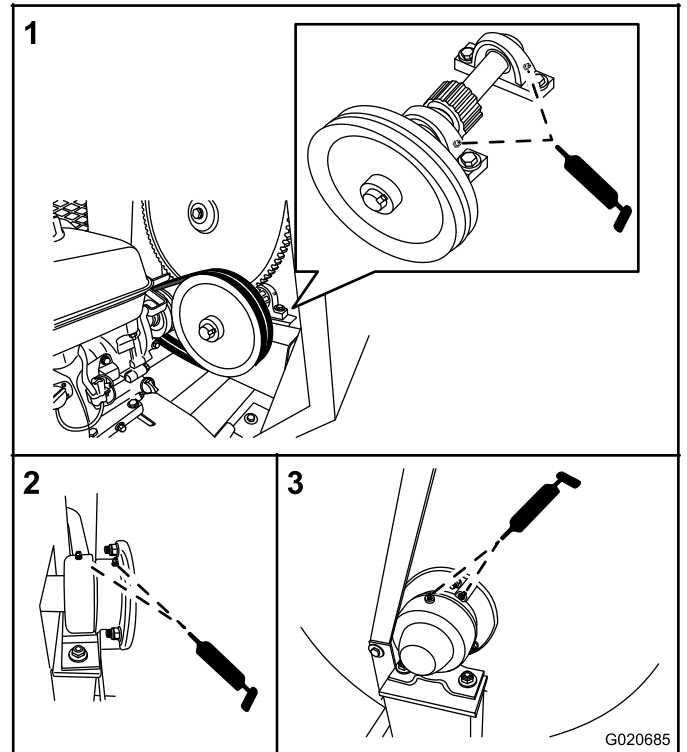
Grease Type: No. 2 lithium grease.

1. Clean around each grease fitting with a rag and lift the plastic cap off the grease fitting ([Figure 49](#)).



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G020685

g020685

Figure 49

1. Pillow-block bearings
2. Rear trunnion
3. Front trunnion

2. Pump grease into each fitting as follows:

- For the pillow-block bearings, pump 1 shot of grease into each fitting ([Figure 49](#)).
- For the trunnions, pump several shots of grease into each fitting until it starts to ooze out of the bearing housing ([Figure 49](#)).

Important: Pump grease in slowly and carefully to prevent damage to the bearing seals.

3. Wipe up any excess grease.

Engine Maintenance

Servicing the Air Cleaner

Service Interval: Before each use or daily—Inspect the air-cleaner elements.

Every 50 hours—Clean the air-cleaner elements. Clean them more frequently in dusty operating conditions.

Every 300 hours/Yearly (whichever comes first)—Replace the paper air-cleaner element. Replace it more frequently in dusty operating conditions.

Important: Do not operate the engine without the air-filter assembly; extreme engine damage will occur.

1. Shut off the engine and wait for all moving parts to stop.
2. Disconnect the wire from the spark plug; refer to [Disconnecting the Spark-Plug Wire \(page 31\)](#).
3. Remove the nut that secures the cover ([Figure 50](#)).

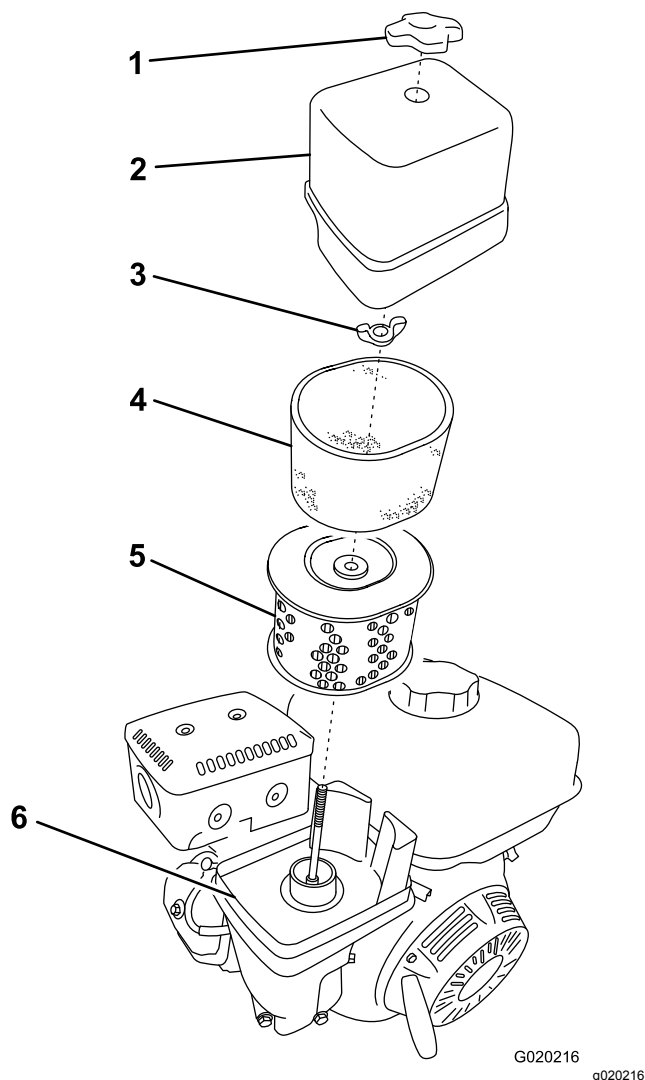


Figure 50

- | | |
|--------------|------------------|
| 1. Cover nut | 4. Foam element |
| 2. Cover | 5. Paper element |
| 3. Wing nut | 6. Base |

4. Remove the cover.

Note: Be careful to prevent dirt and debris from falling into the base.

5. Remove the foam and paper elements from the base ([Figure 50](#)).
6. Remove the foam element from the paper element ([Figure 50](#)).
7. Inspect the foam and paper elements and replace them if they are damaged or excessively dirty.

Note: Never try to brush dirt off the paper element; brushing forces the dirt into the fibers.

8. Clean the foam element in warm, soapy water or in a **nonflammable** solvent.

Note: Do not use fuel to clean the foam element because it could create a risk of fire or explosion.

9. Rinse and dry the foam element thoroughly.
10. Dip the foam element in clean engine oil, then squeeze out the excess oil.
Note: Excess oil in the foam element restricts the air flow through the element and may reach the paper filter and clog it.
11. Wipe dirt from the base and the cover with a moist rag.
Note: Be careful to prevent dirt and debris from entering the air duct leading to the carburetor.
12. Install the air-cleaner elements and ensure that they are properly positioned.
13. Securely install the cover with the nut.

Servicing the Engine Oil

Toro Premium Engine Oil is available from your Authorized Service Dealer.

Important: Use 4-cycle engine oil that meets or exceeds the requirements for API service category **SJ, SL, SM, or higher**.

Model(s)	Crankcase capacity
68013 and 68014	0.58 L (0.61 US qt)
68016, 68017, 68020, 68021, 68024	1.1 L (1.2 US qt)

Important: If the oil level in the crankcase is too low or too high and you run the engine, you may damage the engine. This type of damage is not covered by the warranty.

Note: Use SAE 10W-30 for general use. You can use the other viscosities shown in the chart when the average temperature in your area is within the indicated range (Figure 51).

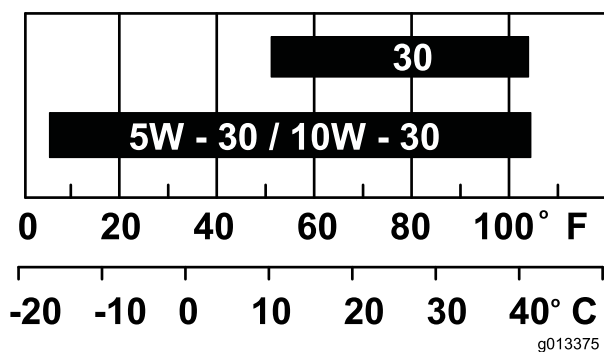


Figure 51

Checking the Engine-Oil Level

Service Interval: Before each use or daily

1. Place the machine on a flat, level surface, and shut off the engine.
2. Allow the engine to cool.
3. Clean around the dipstick.
4. Check the oil level as shown in Figure 52.

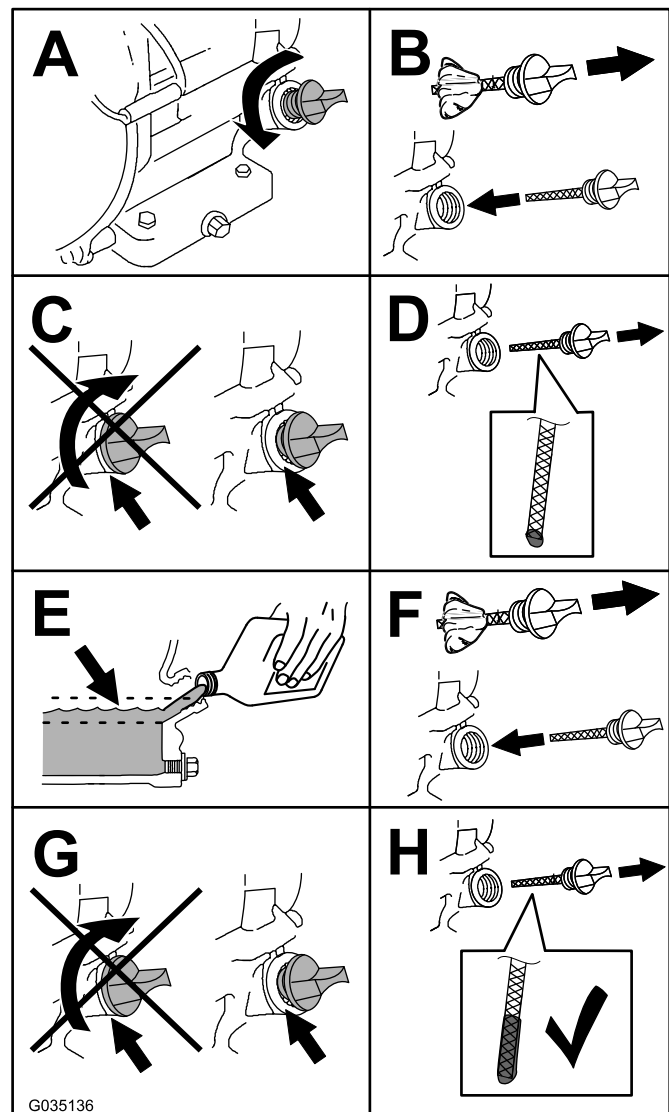


Figure 52

Changing the Engine Oil

Service Interval: After the first 25 hours
Every 100 hours

⚠ WARNING

Oil may be hot after the engine has been run, and contact with hot oil can cause severe personal injury.

Avoid contacting the hot engine oil when you drain it.

1. Shut off the engine and wait for all moving parts to stop.
2. Disconnect the wire from the spark plug; refer to [Disconnecting the Spark-Plug Wire \(page 31\)](#).
3. Place a drain pan under the oil-drain hole of the engine ([Figure 53](#)).

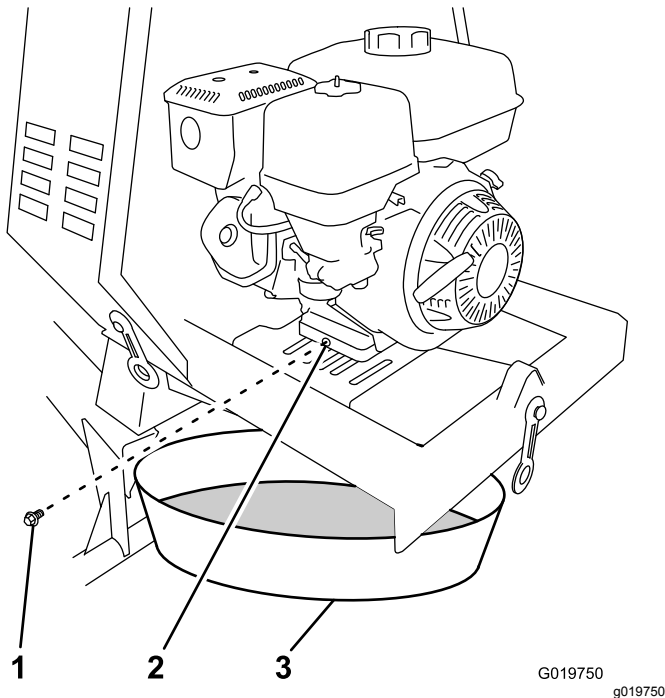


Figure 53

1. Oil-drain plug
2. Oil-drain hole
3. Oil-drain pan

4. Remove the drain plug and catch the oil in the oil-drain pan ([Figure 53](#)).
 5. When the oil has drained completely, install the drain plug with a new washer ([Figure 53](#)).
- Note:** Dispose of the used oil at a certified recycling center.
6. Remove the dipstick ([Figure 52](#)) and slowly pour oil into the fill hole until the oil reaches the upper-limit mark (bottom edge of the oil-fill hole) on the dipstick.

7. Replace and secure the dipstick.
8. Wipe up any spilled oil.

Servicing the Spark Plug

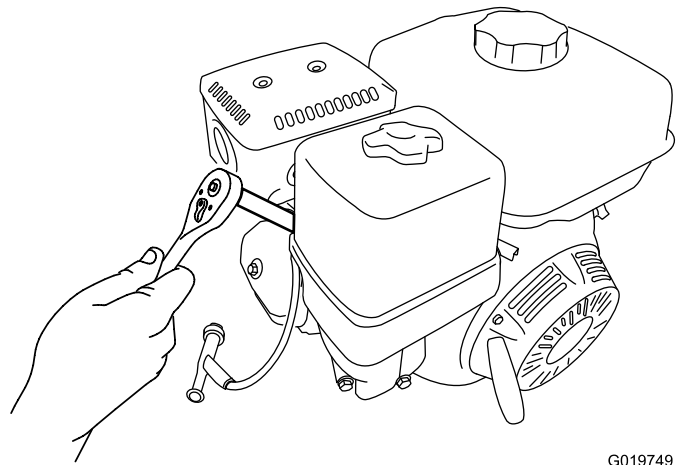
Service Interval: Every 100 hours/Every 6 months (whichever comes first)—Check the spark plug.

Every 300 hours/Yearly (whichever comes first)—Replace the spark plug.

Type: NGK BPR6ES or equivalent

Gap: 0.7 to 0.8 mm (0.028 to 0.031 inch)

Note: Use a 21 mm (13/16 inch) spark-plug wrench for removing and installing the spark plug.

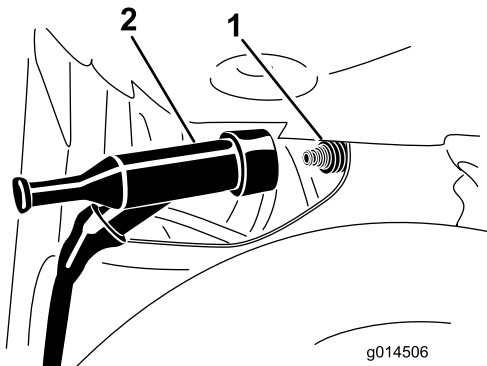


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g019749

Figure 55

Removing the Spark Plug

1. Park the machine on a level surface and shut off the engine.
2. Ensure that the machine surfaces are cool.
3. Pull the spark-plug wire off the terminal of the spark plug ([Figure 54](#)).



g014506

g014506

Figure 54

1. Spark plug
2. Wire

4. Clean around the spark plug.
5. Rotate the spark plug counterclockwise using a 21 mm (13/16 inch) spark-plug wrench to remove the plug and the sealing washer ([Figure 55](#)).

Checking the Spark Plug

Important: Do not clean the spark plug. Always replace the spark plug when it has: a black coating, worn electrodes, and oily film, or cracks.

Note: If you see light brown or gray on the insulator, the engine is operating properly. A black coating on the insulator usually means that the air cleaner is dirty.

Set the gap to 0.7 to 0.8 mm (0.028 to 0.031 inch).

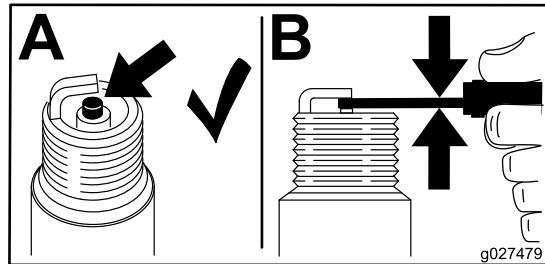


Figure 56

g027479

Installing the Spark Plug

Important: Ensure that the gap between the side and center electrodes is correct before installing the spark plug.

1. Thread the spark plug clockwise into the spark-plug hole by hand.

Note: Avoid cross-threading the spark plug with the threads of the spark-plug hole.

2. Rotate the spark plug clockwise using a 21 mm (13/16 inch) spark-plug wrench until the plug and sealing washer are seated (Figure 55).
3. Tighten the spark plug as follows:
 - When installing an **in-service** spark plug, tighten the plug an additional 1/8 to 1/4 turn.
 - When installing a **new** spark plug, tighten the plug an additional 1/2 turn.
4. Push the spark-plug wire onto the terminal of the spark plug (Figure 54).

Servicing the Spark Arrester

Cleaning the Spark Arrester

Service Interval: Every 100 hours

Note: A spark arrester is available as an option. If you require a spark arrester, contact your Authorized Service Dealer. Genuine Toro spark arresters are approved by the USDA Forestry Service.

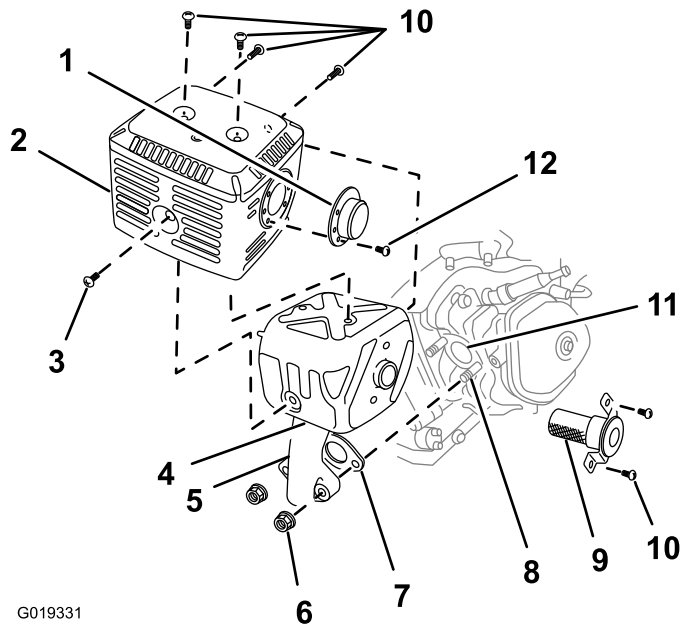
⚠ WARNING

If the engine has been running, the muffler will be hot.

1. Remove the divider plate; refer to [Removing the Divider Plate \(page 31\)](#).

Note: Model 68024 does not have a divider plate.

2. Remove the 2 nuts (8 mm) and remove the muffler from the cylinder (Figure 57).



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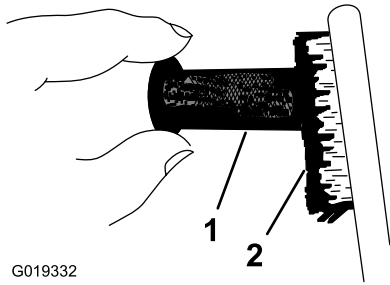
Figure 57

- | | | |
|------------------------------|-----------------|-------------------|
| 1. Deflector (if applicable) | 5. Exhaust pipe | 9. Spark arrester |
| 2. Protector | 6. Nut (8 mm) | 10. Screws (5 mm) |
| 3. Screw (6 mm) | 7. Gasket | 11. Exhaust port |
| 4. Muffler | 8. Bolt (8 mm) | 12. Screw (4 mm) |

3. Remove the 3 screws (4 mm) from the exhaust deflector and remove the deflector (Figure 57).
4. Remove the screws (5 mm and 6 mm) from the muffler protector, and remove the muffler protector (Figure 57).

5. Remove the screw (4 mm) from the spark arrester and remove the spark arrester from the muffler ([Figure 57](#)).
6. Use a brush to carefully remove carbon deposits from the spark-arrester screen ([Figure 58](#)).

Note: Replace the spark arrester if it has breaks or holes.



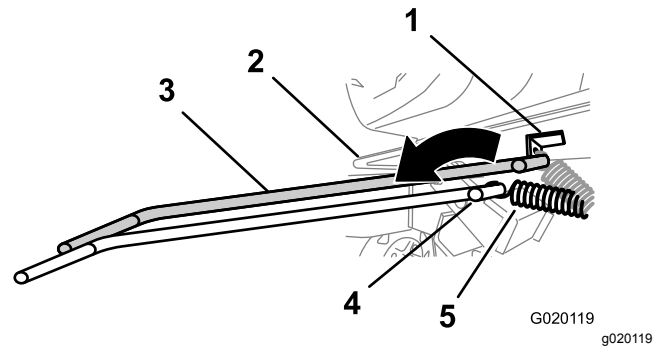
G019332

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Figure 58

1. Screen
2. Brush

Note: Leave the other end of the spring attached to the frame of the machine.



G020119

g020119

Figure 59

1. Anchor bracket
2. Engine deck
3. Spring-removal tool (Toro Part No. 92-5771)
4. Spring-removal tool (spring removed)
5. Spring (spring removed)

7. Install the spark arrester, muffler protector, exhaust deflector, and muffler in the reverse order of disassembly.
8. Install the divider plate; refer to [Installing the Divider Plate](#) (page 31).

Removing and Installing the Engine

Belt-Drive Models Only

Removing the Engine

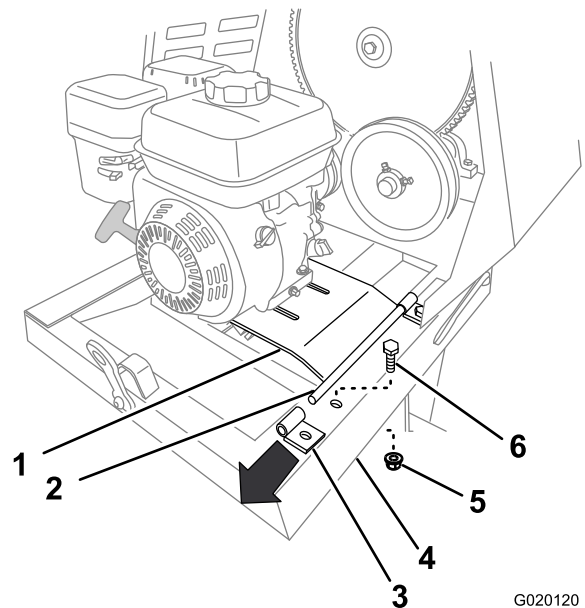
⚠ WARNING

The spring is under tension when installed and can cause personal injury.

Be careful when removing the spring.

1. Park the machine on a level surface and shut off the engine.
2. Ensure that the engine and the exhaust system surfaces are cool.
3. Remove the divider plate; refer to [Removing the Divider Plate](#) (page 31).
4. Remove the belt guide; refer to [Removing the Belts](#) (page 45).
5. Remove the belts; refer to [Removing the Belts](#) (page 45).
6. Using a spring-removal tool (Toro Part No. 92-5771), remove the spring from the anchor bracket on the engine deck ([Figure 59](#)).

7. Remove the bolt and nut that secure the rear bracket for the engine deck hinge to the frame of the machine ([Figure 60](#)).



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Figure 60

1. Engine deck
2. Pivot
3. Rear hinge bracket
4. Frame
5. Nut
6. Bolt

8. Lift up the rear edge of the engine deck and remove the hinge bracket ([Figure 60](#)).
9. Slide the engine deck rearward and out from the forward hinge bracket ([Figure 61](#)).

Note: Do not remove the forward hinge bracket.

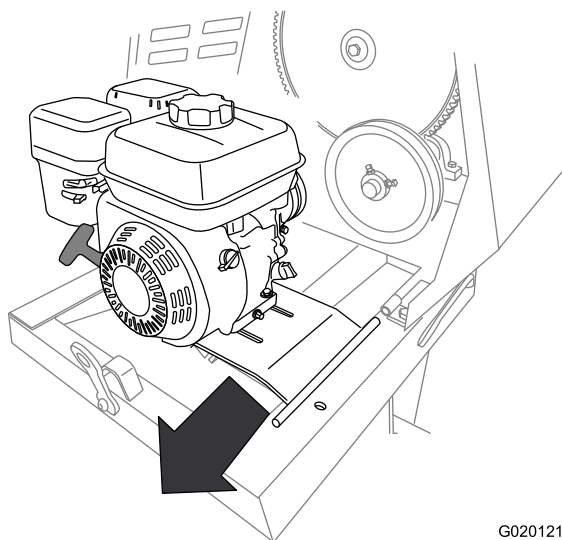


Figure 61

G020121

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10. Remove the engine and engine deck from the machine ([Figure 61](#)).

Installing the Engine

1. Align the engine and engine deck to the rear frame of the machine.

Note: The drive pulley on the engine must align forward.
2. Align the pivot on the engine deck with the forward hinge bracket ([Figure 61](#)).
3. Slide the engine deck forward and the pivot into the forward hinge bracket ([Figure 61](#)).
4. Align the rear hinge bracket with the pivot on the engine-deck hinge ([Figure 61](#)).
5. Lift up on the rear edge of the engine deck and slip the hinge bracket onto the pivot.
6. Secure the rear bracket to the frame of the machine using the bolt and nut ([Figure 60](#)) removed in step 7 of [Removing the Engine](#) ([page 38](#)).
7. Using a spring-removal tool (Toro Part No. 92-5771), install the tension spring to the anchor bracket on the engine deck ([Figure 59](#)).
8. Install the belts and belt guide; refer to [Installing the Belts](#) ([page 45](#)).
9. Adjust the belt guide; refer to [Adjusting the Belt Guide](#) ([page 46](#)).
10. Install the divider plate; refer to [Installing the Divider Plate](#) ([page 31](#)).

Fuel System Maintenance

Cleaning the Fuel-Sediment Cup

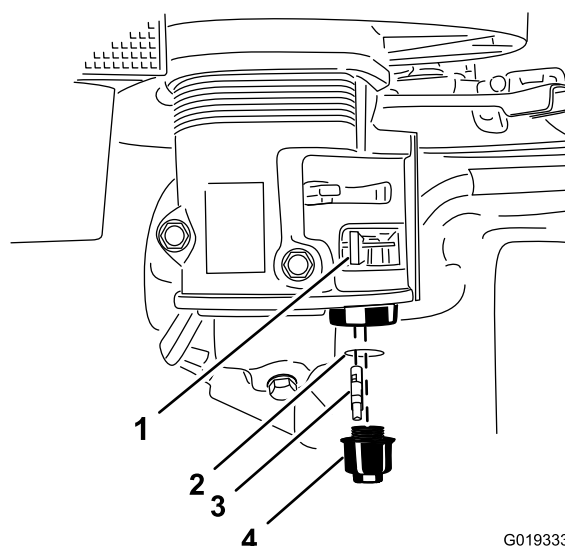
Service Interval: Every 100 hours/Every 6 months (whichever comes first)—Clean the fuel-sediment cup.

Yearly or before storage—Clean the fuel-sediment cup.

Underneath the fuel valve is a sediment cup to catch dirt in the fuel.

1. Park the machine on a level surface and shut off the engine.
2. Ensure that the engine and the exhaust system surfaces are cool.
3. Move the lever of the fuel valve to the OFF position, all the way to the left ([Figure 62](#)).
4. Unscrew the sediment cup ([Figure 62](#)).
5. Remove and retain the fuel filter and O-ring ([Figure 62](#)).

Note: Do not clean the O-ring in solvent.



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Figure 62

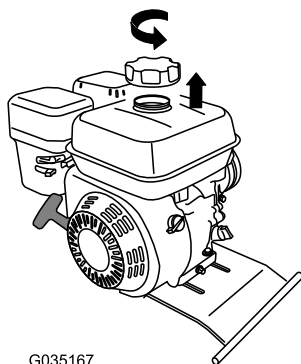
- | | |
|----------------------------|-----------------|
| 1. Fuel valve—Off position | 3. Fuel filter |
| 2. O-ring | 4. Sediment cup |

6. Clean the fuel filter and sediment cup using a nonflammable solvent, and dry it carefully.
7. Wipe the O-ring with a clean, dry cloth.
8. Install the fuel filter in the bottom of the carburetor ([Figure 62](#)).

9. Align the O-ring in to the groove in the sediment cup and install the sediment cup to the fuel-valve housing.
10. Move the lever of the fuel valve to the ON position (all the way to the right) and check for leaks. If it leaks, replace the O-ring.

Draining the Fuel Tank

1. Remove the engine; refer to [Removing the Engine](#) (page 38).
2. Remove the fuel cap by rotating it counterclockwise ([Figure 63](#)).

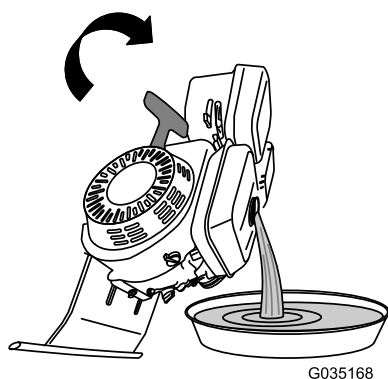


G035167

g035167

Figure 63

3. Align a drain pan to the hinge of the engine deck.
4. Rotate the engine on the hinge side of the engine deck and drain the fuel from the tank ([Figure 64](#)).



G035168

g035168

Figure 64

5. Carefully lower the engine and engine deck.
6. Install the fuel cap.
7. Install the engine; refer to [Installing the Engine](#) (page 39).

Drive System Maintenance

Servicing the Reduction Case

Models 68013 and 68014 Only

Important: Use 4-cycle motor oil that meets or exceeds the requirements for API service category **SJ, SL, SM, or higher**.

Important: If the oil level in the reduction case is too low or too high and you run the engine, you may damage the engine or the reduction case. This type of damage is not covered by the warranty.

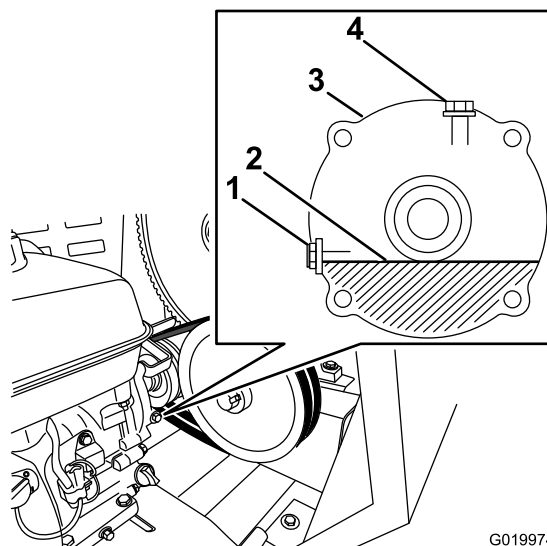
Oil type: SAE 10W-30 motor oil

Reduction case capacity: 1.2 L (40 fl oz)

Checking the Reduction-Case Oil

Service Interval: Before each use or daily—Check the reduction-case oil (Models 68013 and 68014 only).

1. Remove the divider plate; refer to [Removing the Divider Plate](#) (page 31).
2. Locate the reduction case between the engine and the engine pulley ([Figure 65](#)).



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g019974

Figure 65

1. Oil-level-check bolt and washer
2. Oil level (normal)
3. Reduction case
4. Filler bolt and washer

3. Align a rag below the oil-level port in the side of the reduction case.

4. Remove the oil-level-check bolt and washer from the oil-level port ([Figure 65](#)).
 - If the oil level is below the threads in the oil-level port, add oil as follows:
 - A. Remove the filler bolt and washer from the filler port on the top of the reduction case ([Figure 65](#)).
 - B. Slowly add the specified oil into the fill port until the oil level is level with the threads at the bottom of the oil-level port.
 - C. Install the filler bolt and the washer to the filler port of the reduction case, and tighten the filler bolt ([Figure 65](#)).
 - If the oil level is too high, allow the oil to flow out until it is flush with the threads at the bottom of the oil-level port.
5. When the oil level is flush with the threads at the bottom of the oil-level port, install the oil-level-check bolt and the washer to the port and tighten the oil-level-check bolt ([Figure 65](#)).
6. Install the divider plate; refer to [Installing the Divider Plate \(page 31\)](#).

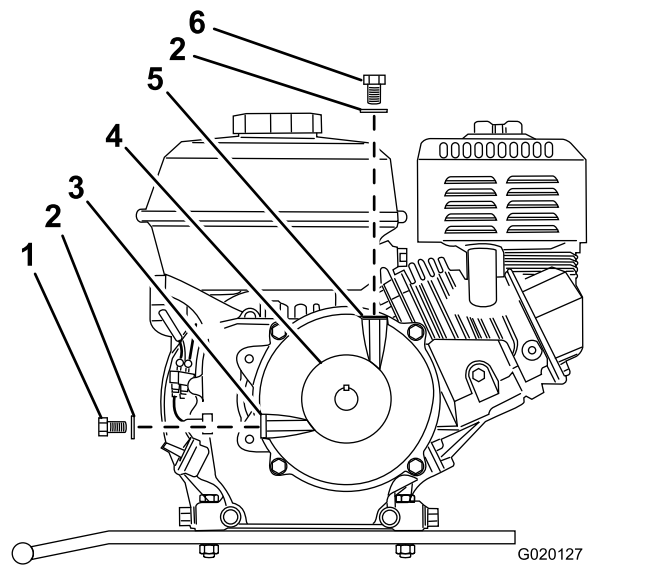


Figure 66

- | | | |
|-------------------------|-------------------|---------------------|
| 1. Oil-level-check bolt | 3. Oil-level port | 5. Filler port bolt |
| 2. Washer | 4. Pulley | 6. Filler bolt |

Changing the Reduction-Case Oil

Service Interval: After the first 20 hours—Change the reduction-case oil (Models 68013 and 68014 only).

Every 100 hours/Every 6 months (whichever comes first)—Change the reduction-case oil (Models 68013 and 68014 only).

1. Remove the engine; refer to [Removing the Engine \(page 38\)](#).
2. Drain the fuel tank; refer to [Draining the Fuel Tank \(page 40\)](#).
3. Remove the filler bolt and washer from the filler port on the top of the reduction case ([Figure 66](#)).

4. Remove the oil-level-check bolt and washer from the oil-level port in the side of the reduction case ([Figure 66](#)).
5. Align a drain pan to the hinge of the engine deck ([Figure 67](#)).

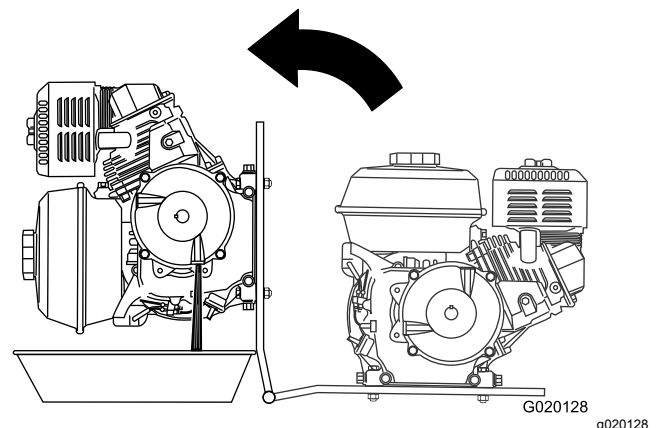


Figure 67

6. Rotate the engine on the hinge side of the engine deck, and drain the oil from the reduction case ([Figure 67](#)).
7. Carefully lower the engine and engine deck.
8. Slowly add the specified oil into the fill port until the oil level is level with the threads at the bottom of the oil-level port ([Figure 65](#)).
9. Install the oil-level-check bolt and washer to the oil-level port of the reduction case and tighten the oil-level-check bolt ([Figure 66](#)).

10. Install the filler bolt and washer to the filler port of the reduction case and tighten the filler bolt ([Figure 66](#)).
11. Install the engine; refer to [Installing the Engine \(page 39\)](#).

Servicing the Gearbox

Gearbox Model Only

Checking the Clutch Operation

Service Interval: Before each use or daily—Check the clutch operation (gearbox model only).

1. Move the clutch lever to the OFF position.
2. Start the engine.
3. Ensure that the engine throttle is set to the 2/3 position.
4. If the paddles rotate with the clutch lever to the OFF position do the following:
 - A. Shut off the engine.
 - B. Check the clutch lever force; refer to [Checking the Clutch Lever \(page 42\)](#).

Checking the Clutch Lever

Service Interval: After the first 25 hours—Check the gearbox clutch (gearbox model only).

Important: Check the gearbox clutch if the paddles rotate when the clutch lever is in the OFF position, if the paddles rotate slowly, or if the clutch begins to slip.

1. Shut off the engine.
2. Locate the clutch lever at the back of the machine; refer to [Clutch Lever \(page 14\)](#).
3. Move the clutch lever to the OFF position.
4. Attach a spring scale with a range of 15 to 30 kg (35 to 55 lb) to the grip of the clutch lever ([Figure 68](#)).

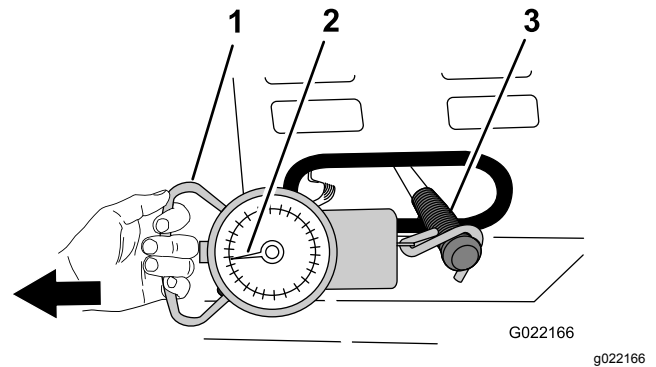


Figure 68

- | | |
|------------------------------|-----------------|
| 1. Spring scale | 3. Clutch lever |
| 2. 15 to 30 kg (35 to 55 lb) | |

5. Using the spring scale, pull the clutch handle to the ON position as shown in [Figure 68](#).
6. Observe the spring scale while pulling to see what the highest pressure is when moving the clutch handle from the OFF position to the ON position ([Figure 68](#)).

Note: Normal clutch pressure is 15 to 30 kg (35 to 55 lb).

7. If the clutch pressure is **greater than** or **less than** 15 to 30 kg (35 to 55 lb), contact an Authorized Service Dealer.

Checking the Gearbox Oil

Service Interval: Every 40 hours—Check the gearbox oil (gearbox model only).

Important: If the oil level in the gearbox is too low or too high and you run the engine, you may damage the engine or the gearbox. This type of damage is not covered by the warranty.

Oil type: SAE 90 gear oil

Gearbox capacity: 2.13 L (72 fl oz)

1. Locate the gearbox between the engine and the front cowl.
2. At the right side of the gearbox, examine the oil level in the sight glass ([Figure 69](#)).

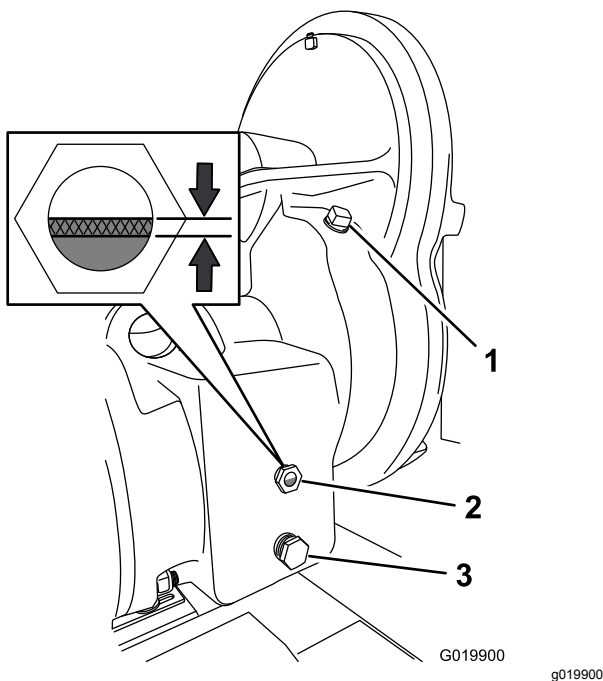


Figure 69

1. Fill plug
2. Sight glass

3. Drain plug

3. If the oil level is below the bottom 1/3 of the sight glass, add oil as follows:
 - A. Remove the fill plug from the fill port in the housing of the gearbox (Figure 69).
 - B. Slowly add the specified oil into the fill port until the oil level is between 1/3 and 1/2 of the sight glass (Figure 69).
 - C. Clean the fill plug.
 - D. Apply PTFE thread-sealing tape to the threads of the plug.
 - E. Install the plug into the fill port in the housing (Figure 69).

Replacing the Gearbox Oil

Service Interval: Every 800 hours—Replace the gearbox oil (gearbox models only).

1. Align a drain pan with a 2.8 L (3 US qt) capacity under the drain plug (Figure 69).
2. Remove the drain plug from the drain port and completely drain the gearbox oil (Figure 69).
3. Remove the fill plug (Figure 69).
4. Clean the drain and fill plugs and apply PTFE thread-sealing tape to the plug threads.
5. Install the drain plug in the drain port (Figure 69).
6. Slowly add the specified oil into the fill port until the oil level is between 1/3 and 1/2 of the sight glass (Figure 69).
7. Install the fill plug in the fill port (Figure 69).

Belt Maintenance

Servicing the Belts Belt-Drive Models Only

Inspecting the Belts

Service Interval: After the first 25 hours—Inspect the belts and adjust as necessary (belt-drive models only).

Every 40 hours—Inspect the belts and adjust as necessary (belt-drive models only).

1. Remove the divider plate; refer to [Removing the Divider Plate](#) (page 31).
2. Move the clutch lever to the OFF position.
3. Examine the belts for wear or damage. If the belts are worn or damaged, replace them; refer to [Replacing the Belts](#) (page 45).
4. Examine the pulleys for wear, damage, and misalignment; refer to [Aligning the Pulleys](#) (page 47).
5. Install the divider plate; refer to [Installing the Divider Plate](#) (page 31).

Adjusting the Belt Tension

Clutch air gap: 2.5 to 6.5 mm (3/32 to 1/4 inch)

1. Move the clutch lever to the ON position.
2. Measure the air gap between the engine deck and the roller on the clutch (Figure 70).

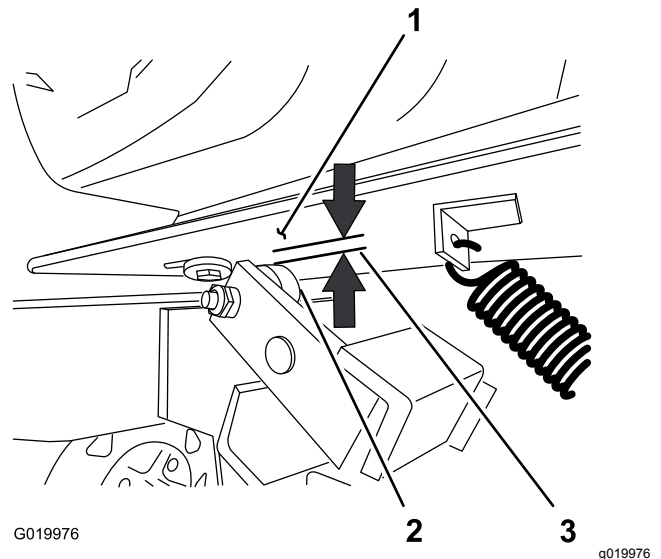


Figure 70

1. Engine deck
2. Clutch roller

3. Clutch air gap: 2.5 to 6.5 mm (3/32 to 1/4 inch)

3. If the measured air gap is not within the specified range, adjust the gap as follows:
 - A. Move the clutch lever to the OFF position.
 - B. Loosen the nuts and bolts that secure the engine to the engine deck ([Figure 71](#)).

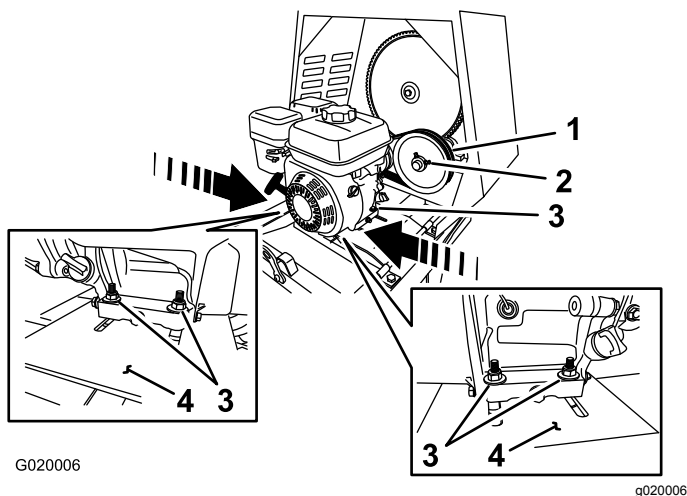


Figure 71

- | | |
|-----------------|-----------------|
| 1. Idler pulley | 3. Nut and bolt |
| 2. Setscrew | 4. Engine deck |

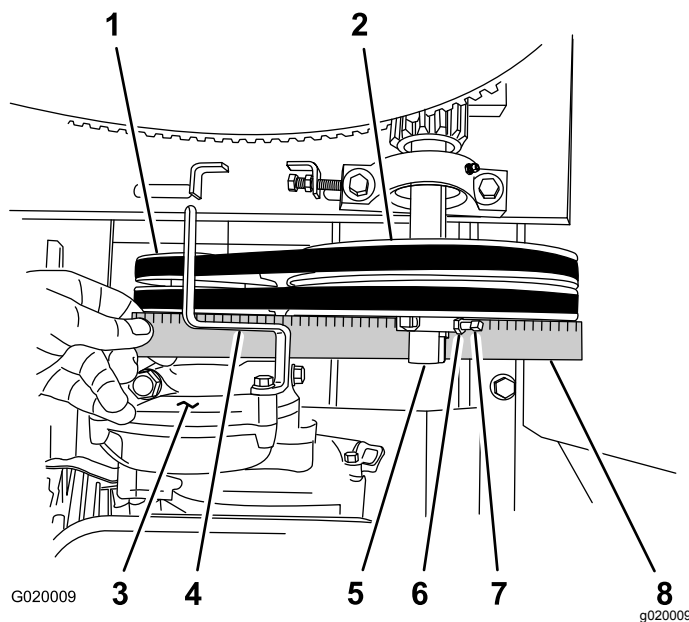


Figure 72

- | | |
|----------------------------|-----------------|
| 1. Engine pulley | 5. Idler shaft |
| 2. Idler pulley | 6. Jam nut |
| 3. Reduction case (engine) | 7. Setscrew |
| 4. Belt guide | 8. Straightedge |

- C. Move the engine position as follows:
 - **Increase the air gap**—move the engine **away** from the idler pulley ([Figure 71](#)).
 - **Decrease the air gap**—move the engine **toward** the idler pulley ([Figure 71](#)).
- D. Align a straightedge across the engine pulley and the idler pulley ([Figure 72](#)).

- E. If needed, pivot the engine on the engine deck until the engine pulley and the idler pulley are aligned to the straightedge ([Figure 72](#)).
- F. Tighten the nuts and bolts that secure the engine to the engine deck to a torque of 18 N·m (13 ft-lb).
- G. Check the air gap between the engine deck and the roller on the clutch. If the air gap is not within the specified range, repeat step 3 until the air gap measurement is within the specified range.
- H. Install the divider plate; refer to [Installing the Divider Plate](#) (page 31).

Replacing the Belts

Service Interval: Every 2 years—Replace the belts (belt-drive models only).

Removing the Belts

1. Move the clutch lever to the OFF position.
2. Remove the divider plate; refer to [Removing the Divider Plate \(page 31\)](#).
3. Remove the bolt that secures the belt guide to the engine and remove the belt guide ([Figure 73](#)).

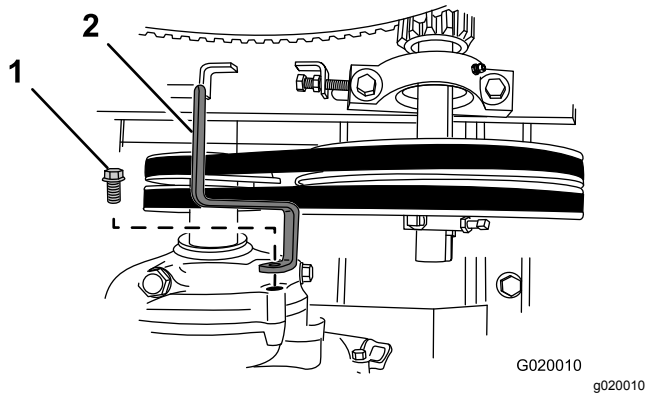


Figure 73

- | | |
|---------|---------------|
| 1. Bolt | 2. Belt guide |
|---------|---------------|

4. Slip the forward belt forward and off the idler pulley ([Figure 74](#)).

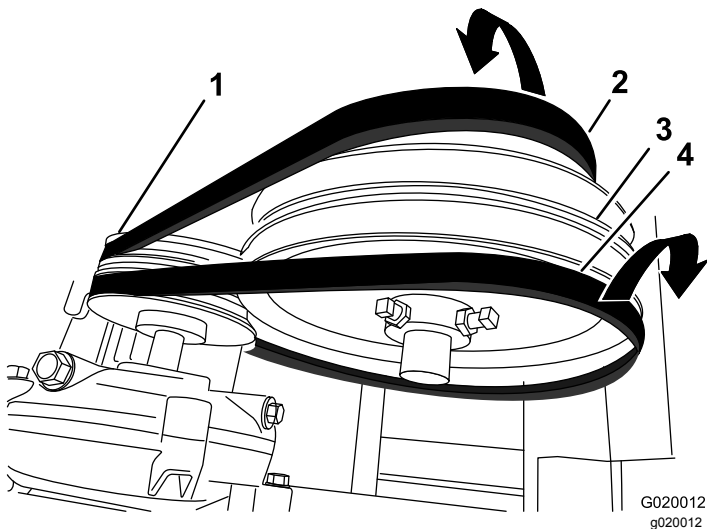


Figure 74

- | | |
|------------------|-----------------|
| 1. Engine pulley | 3. Idler pulley |
| 2. Forward belt | 4. Rear belt |

5. Slip the rear belt rearward and off the idler pulley ([Figure 74](#)).
6. Slip the belts off the engine pulley.
7. Remove the belts from the machine.

Installing the Belts

1. Ensure that the clutch lever is in the OFF position.
2. Align the rear belt to the rear groove in the engine pulley.
Note: Do not align the rear belt to the idler pulley.
3. Align the forward belt to the forward groove of the idler pulley.
4. Slip the rear belt over the idler pulley and align the belt to the rear pulley groove.
5. Slip the forward belt over the engine pulley and align the belt to the forward pulley groove.
6. Check the belt tension; refer to step 1, step 2, and step 3 in [Adjusting the Belt Tension \(page 43\)](#).
7. Loosely secure the belt guide to the engine ([Figure 73](#)) with the bolt that was removed in step 3 of [Removing the Belts \(page 45\)](#).
8. Adjust the belt guide; refer to [Adjusting the Belt Guide \(page 46\)](#).
9. Install the divider plate; refer to [Installing the Divider Plate \(page 31\)](#).

Adjusting the Belt Guide

Note: To access the belt guide, remove the divider plate; refer to [Removing the Divider Plate \(page 31\)](#).

Guide air gap: 2.5 to 4.0 mm (3/32 to 5/32 inch)

1. Ensure that the clutch lever is in the ON position.
2. Ensure that the belt tension is correct; refer to [Adjusting the Belt Tension \(page 43\)](#).
3. Check that the air gap between the belt guide and the belts is 2.5 to 4.0 mm (3/32 to 5/32 inch); refer to [Figure 75](#).

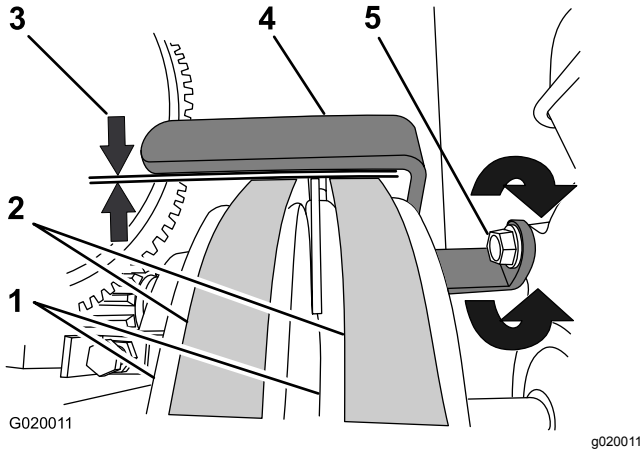


Figure 75

- | | |
|---|---------------|
| 1. Engine pulleys | 4. Belt guide |
| 2. Belts | 5. Bolt |
| 3. Guide air gap: 2.5 to 4.0 mm (3/32 to 5/32 inch) | |

4. If the air gap is not within the specified range, do the following:
 - A. Loosen the bolt that secures the belt guide to the engine ([Figure 75](#)).

Important: Ensure that the belt guide is toward the engine pulley.

- B. Rotate the belt guide up or down until there is an air gap of 2.5 to 4.0 mm (3/32 to 5/32 inch) between the guide and each belt ([Figure 75](#)).

Important: The belt guide should not contact the belts with the clutch lever in the ON position.

Note: If the air gap between the belt guide and both belts cannot be attained, then one of the belts is too long.

- C. Tighten the bolt that secures the belt guide to the engine ([Figure 75](#)).
 - D. Check the clutch operation; refer to [Checking the Clutch Operation \(page 46\)](#).
5. Install the divider plate; refer to [Installing the Divider Plate \(page 31\)](#).

Checking the Clutch Operation

Service Interval: Every 40 hours—Check the clutch operation

Important: The paddles must not rotate in an empty drum when the clutch lever is in the OFF position.

1. Move the clutch lever to the OFF position.
2. Start the engine.
3. If the paddles rotate with the clutch lever to the OFF position do the following:
 - A. Shut off the engine.
 - B. Check the air gap between the belt guide and the belts.

Note: If the air gap is larger than 4.0 mm (5/32 inch), decrease the gap between the belt guide and the belts; refer to [Adjusting the Belt Guide \(page 46\)](#).

4. Repeat steps 1, 2, and 3 until all the following conditions are met:
 - The engine is run at 2/3 throttle.
 - The clutch lever is in the OFF position.
 - The paddles do not rotate in an empty drum.

Aligning the Pulleys

Belt-Drive Models Only

1. Remove the divider plate; refer to [Removing the Divider Plate \(page 31\)](#).
2. Place a straightedge across the face of the engine pulley and the idler pulley ([Figure 76](#)).

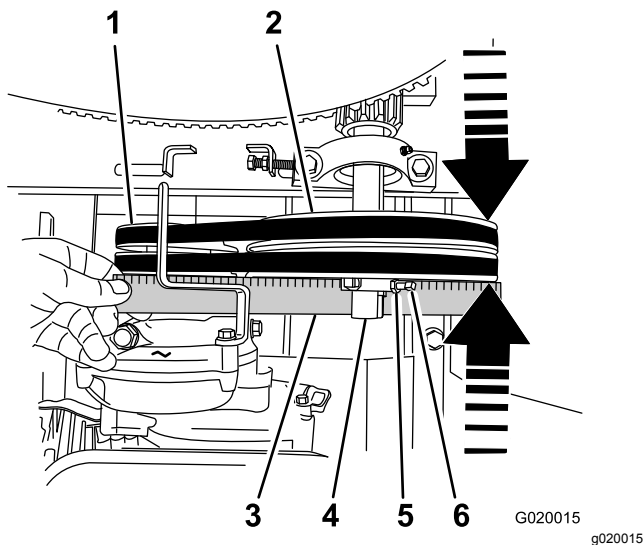


Figure 76

- | | |
|------------------|----------------|
| 1. Engine pulley | 4. Idler shaft |
| 2. Idler pulley | 5. Locknut |
| 3. Straightedge | 6. Setscrew |

Note: Both pulleys must be aligned flush with the straightedge.

3. If the pulleys are not aligned do the following:
 - A. Move the clutch lever to the OFF position.
 - B. Loosen the locknuts and setscrews that secure the idler pulley to the idler shaft ([Figure 76](#)).
 - C. Using a soft-face mallet, tap the idler pulley forward or backward along the idler shaft until the engine pulley and the idler pulley are aligned to the straight edge ([Figure 76](#)).
 - D. Tighten the setscrews and locknuts that secure the idler pulley to the idler shaft ([Figure 76](#)).
4. Install the divider plate; refer to [Installing the Divider Plate \(page 31\)](#).

Cleaning

Cleaning the Machine

Regular cleaning and washing with mild detergent and water increases the life span of the machine. Clean the machine after each use before the dirt hardens.

Remove dirt and grime from the external parts of the entire machine, especially the engine. Clean dirt and concrete materials from the outside of the engine.

Ensure that the fuel cap and the oil-fill cap/dipstick are secure to avoid getting water in the engine.

Use care when using a high-pressure sprayer because it can damage safety decals, instruction signs, and the engine.

Important: Lubricate the trunnions after cleaning; refer to [Lubricating the Bearings and Seals \(page 32\)](#).

Storage

Storing the Machine

For storage over 30 days, prepare the machine as follows:

1. Remove dirt and grime from the external parts of the entire machine, especially the engine. Clean dirt and debris from the outside of the engine cylinder-head fins and blower housing.

Important: You can wash the machine with mild detergent and water.

2. Condition the fuel system as follows:

- A. Add a petroleum-based stabilizer/conditioner to fuel in the tank. Follow the mixing instructions from the stabilizer manufacturer. **Do not** use an alcohol-based stabilizer (ethanol or methanol).

Important: Do not store stabilizer/conditioned fuel over 90 days.

Note: Fuel stabilizer/conditioner is most effective when mixed with fresh fuel and used at all times.

- B. Run the engine for 5 minutes to distribute the conditioned fuel through the fuel system.
 - C. Shut off the engine, allow it to cool, and drain the fuel tank using a pump-type siphon. Dispose of fuel properly; recycle it according to local codes.
 - D. Start the engine and run it until it stops.
 - E. Choke the engine.
 - F. Start and run the engine until it does not start again.
3. Clean the sediment cup; refer to [Cleaning the Fuel-Sediment Cup \(page 39\)](#).
 4. Service the air cleaner; refer to [Servicing the Air Cleaner \(page 33\)](#).
 5. Change the engine crankcase oil; refer to [Changing the Engine Oil \(page 35\)](#).
 6. Remove the spark plug and check the condition; refer to [Removing the Spark Plug \(page 36\)](#).
 7. Condition the engine as follows:
 - A. Remove the spark plug and pour 2 tablespoons of engine oil into the spark-plug hole; refer to [Removing the Spark Plug \(page 36\)](#).
 - B. Pull the recoil-start handle slowly to crank the engine and distribute the oil inside the cylinder.

- C. Install the spark plug; refer to [Installing the Spark Plug \(page 37\)](#).

Note: Do not install the wire on the spark plug.

8. Grease the machine; refer to [Lubricating the Bearings and Seals \(page 32\)](#).
9. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
10. Paint all scratched or bare metal surfaces with paint available from your Authorized Service Dealer.
11. Store the machine in a clean, dry garage or storage area.
12. Cover the machine to protect it and keep it clean.

Troubleshooting

Problem	Possible Cause	Corrective Action
The engine does not start.	1. The fuel-valve lever is in the OFF position. 2. The choke is closed 3. The choke is open. 4. The engine On/Off switch is in the OFF position. 5. The engine oil level is low (engines with the oil-level switch). 6. The fuel tank is empty. 7. The engine contains bad/old fuel. 8. The spark plug is fouled or improperly gapped. 9. The spark plug is wet with fuel (flooded engine). 10. The spark-plug wire is loose or disconnected.	1. Move the fuel-valve lever to the ON position. 2. Open the choke when starting a hot engine. 3. Close the choke when starting a cold engine. 4. Rotate the switch to the ON position. 5. Fill the engine, with the recommended oil, to the proper level. 6. Fill the fuel tank with fresh fuel. 7. Drain the fuel tank and carburetor. Refuel with fresh gasoline. 8. Gap or replace the spark plug. 9. Remove the spark plug, dry it, and install the plug. Start the engine with the throttle in the MAX position. 10. Remove the spark-plug wire, clean the spark-plug terminal and the terminal socket in the boot of the spark-plug wire, and reinstall the spark-plug wire.
The engine lacks power or runs rough.	1. The air filter is restricted. 2. The engine contains bad/old fuel. 3. There is water or contamination in the fuel. 4. The fuel line is restricted. 5. The choke is closed 6. The spark plug is worn or has buildup on the electrodes. 7. There is too much oil in the engine crankcase.	1. Clean or replace the air filter element(s). 2. Drain the fuel tank and carburetor. Refuel with fresh gasoline. 3. Drain the fuel tank and carburetor. Refuel with fresh gasoline. 4. Clean the fuel filter and sediment cup. 5. Open the choke. 6. Check the electrode gap and adjust or replace the spark plug. 7. Drain the oil to the proper level.
The belts slip or come off the pulleys (belt-drive models only).	1. The belt tension is insufficient. 2. The belts are worn. 3. The pulley(s) are worn. 4. The pulley(s) are misaligned.	1. Adjust the belt tension. 2. Replace the belts. 3. Contact your Authorized Service Dealer. 4. Align the pulley(s).
The paddles rotate when the clutch lever is in the OFF position (belt-drive models only).	1. The clutch lever is not adjusted correctly. 2. The belt guide is not adjusted correctly.	1. Adjust the belt tension. 2. Adjust the belt guide.
The paddles rotate when the clutch lever is in the OFF position (gearbox model only).	1. The clutch is not adjusted correctly.	1. Contact your Authorized Service Dealer.
The paddles do not rotate when the clutch lever is in the ON position (belt-drive models only).	1. The clutch lever is not adjusted correctly. 2. The paddles are stuck in the drum	1. Adjust the belt tension. 2. Clean the paddles and drum.
The paddles do not rotate when the clutch lever is in the ON position (gearbox model only).	1. The clutch is not adjusted correctly.	1. Contact your Authorized Service Dealer.

Problem	Possible Cause	Corrective Action
The paddles rotate slowly when the clutch lever is in the ON position (belt-drive models only).	1. The clutch lever is not adjusted correctly.	1. Adjust the belt tension.
The paddles rotate slowly when the clutch lever is in the ON position (gearbox model only).	1. The clutch is not adjusted correctly.	1. Contact your Authorized Service Dealer.

Notes:

California Proposition 65 Warning Information

What is this warning?

You may see a product for sale that has a warning label like the following:



WARNING: Cancer and Reproductive Harm—www.p65Warnings.ca.gov.

What is Prop 65?

Prop 65 applies to any company operating in California, selling products in California, or manufacturing products that may be sold in or brought into California. It mandates that the Governor of California maintain and publish a list of chemicals known to cause cancer, birth defects, and/or other reproductive harm. The list, which is updated annually, includes hundreds of chemicals found in many everyday items. The purpose of Prop 65 is to inform the public about exposure to these chemicals.

Prop 65 does not ban the sale of products containing these chemicals but instead requires warnings on any product, product packaging, or literature with the product. Moreover, a Prop 65 warning does not mean that a product is in violation of any product safety standards or requirements. In fact, the California government has clarified that a Prop 65 warning "is not the same as a regulatory decision that a product is 'safe' or 'unsafe.'" Many of these chemicals have been used in everyday products for years without documented harm. For more information, go to <https://oag.ca.gov/prop65/faqs-view-all>.

A Prop 65 warning means that a company has either (1) evaluated the exposure and has concluded that it exceeds the "no significant risk level"; or (2) has chosen to provide a warning based on its understanding about the presence of a listed chemical without attempting to evaluate the exposure.

Does this law apply everywhere?

Prop 65 warnings are required under California law only. These warnings are seen throughout California in a wide range of settings, including but not limited to restaurants, grocery stores, hotels, schools, and hospitals, and on a wide variety of products. Additionally, some online and mail order retailers provide Prop 65 warnings on their websites or in catalogs.

How do the California warnings compare to federal limits?

Prop 65 standards are often more stringent than federal and international standards. There are various substances that require a Prop 65 warning at levels that are far lower than federal action limits. For example, the Prop 65 standard for warnings for lead is 0.5 µg/day, which is well below the federal and international standards.

Why don't all similar products carry the warning?

- Products sold in California require Prop 65 labelling while similar products sold elsewhere do not.
- A company involved in a Prop 65 lawsuit reaching a settlement may be required to use Prop 65 warnings for its products, but other companies making similar products may have no such requirement.
- The enforcement of Prop 65 is inconsistent.
- Companies may elect not to provide warnings because they conclude that they are not required to do so under Prop 65; a lack of warnings for a product does not mean that the product is free of listed chemicals at similar levels.

Why does Toro include this warning?

Toro has chosen to provide consumer with as much information as possible so that they can make informed decisions about the products they buy and use. Toro provides warnings in certain cases based on its knowledge of the presence of one or more listed chemicals without evaluating the level of exposure, as not all the listed chemical provide exposure limit requirements. While the exposure from Toro products may be negligible or well within the "no significant risk" range, out of an abundance of caution, Toro has elected to provide the Prop 65 warnings. Moreover, if Toro does not provide these warnings, it could be sued by the State of California or by private parties seeking to enforce Prop 65 and subject to substantial penalties.