Form No. 3395-328 Rev A

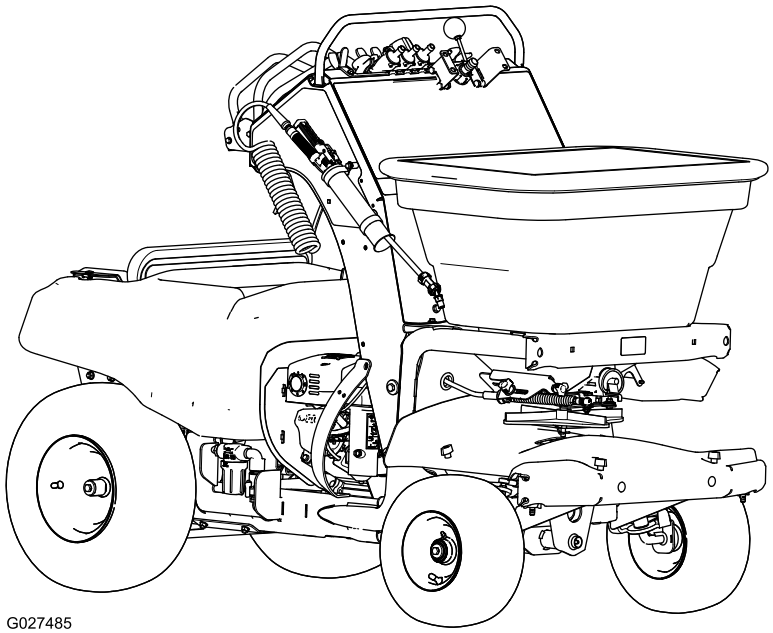
TORO®

Count on it.

Operator's Manual

Stand-On Spreader Sprayer

Model No. 34215—Serial No. 315000001 and Up



G027485

Register at www.Toro.com.
Original Instructions (EN)

3395-328 A

⚠ 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.

This spark ignition system complies with Canadian ICES-002.

Important: This engine is not equipped with a spark arrester muffler. It is a violation of California Public Resource Code Section 4442 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land. Other states or federal areas may have similar laws.

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 stand-on spreader sprayer is intended to be used by trained operators in residential and commercial applications. The machine is primarily designed for chemical distribution used for turf care or snow/ice removal at residential grounds, parks, sports fields, and on commercial grounds.

Read the information in the manual 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 illustrates the location of the model and serial numbers on the product. Write the numbers in the space provided.

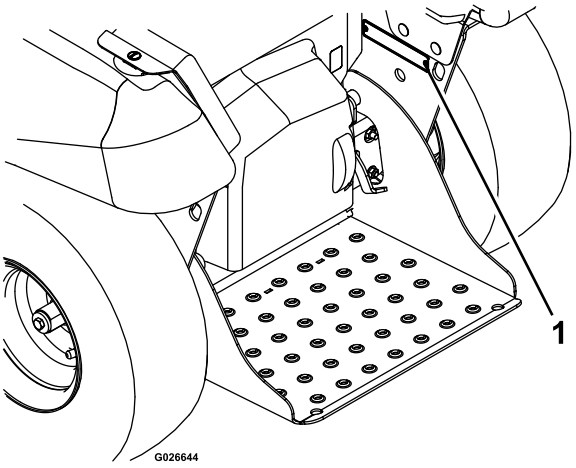


Figure 1

1. Location of the model and serial numbers

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

1. Safety alert symbol

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

8111 Lyndale Avenue South
Bloomington, MN 55420

Contents

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 pay attention to the safety alert symbol , which means **Caution, Warning,** or **Danger**—"personal safety instruction." **Failure to comply with the instructions may result in personal injury or death.**

⚠ WARNING

Removal or modification of original equipment, parts and/or accessories may alter the warranty, controllability, and safety of the machine. Unauthorized modifications to the original equipment or failure to use original Toro parts could lead to serious injury or death. Unauthorized changes to the machine, engine, fuel or venting system, may violate applicable safety standards such as: ANSI, OSHA and NFPA and/or government regulations such as EPA and CARB.

Replace all parts including, but not limited to, tires, belts, and fuel system components with original Toro parts.

Important: This machine was manufactured according to the appropriate regulatory standards in effect at the time of manufacture. Modifying this machine in any way may cause it to be out of compliance with those standards and with the instructions in this *Operator's Manual*. Modifications to this machine should only be made by either the manufacturer or an Authorized Toro Dealer.

This product is capable of injuring your hands and feet. Follow all safety instructions to avoid serious injury or death.

The owner/user can prevent and is responsible for accidents or injuries occurring to people, or damage to property.

Any use of this machine other than spreading or spraying chemicals on turf grass could prove dangerous to the user and bystanders.

Important: The addition of attachments made by other manufacturers that do not meet ANSI certification may cause noncompliance of this machine.

Safe Operating Practices

The following instructions are from ANSI standard B71.4-2012.

Training

- Read the *Operator's Manual* and other training material.

  Note: If the operator(s) or mechanic(s) cannot read the manual language, 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.

  Note: Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries occurring to himself or herself, other people, or damage to property.

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing; including a hard hat, safety glasses, long pants, safety shoes (rubber boots, gloves, and hearing protection.

⚠ CAUTION

This machine produces sound levels in excess of 85 dBA at the operator's ear and can cause hearing loss through extended periods of exposure.

Wear hearing protection when operating this machine.

Important: Long hair, loose clothing or jewelry may get tangled in moving parts.

- Inspect the area where the equipment is to be used and ensure that all objects are removed from the area before use.
- Use extra care when handling fuels. They are flammable and vapors are explosive.
  - Use only an approved container.
  - Do not remove the fuel cap or add fuel with the engine running. Allow the engine to cool before refueling. Do not smoke near the machine when the engine is running.
  - Do not refuel or drain the machine indoors.
- Check that the operator's presence controls, safety switches, and shields are attached and functioning properly. Do not operate the machine unless they are functioning properly.

- Check all sprayer components for wear and leaks before applying pressure to the system. Do not use the sprayer if it is leaking or damaged.
- Make sure the operator platform is clean and free from chemical residue and debris buildup.

Chemical Safety

⚠ WARNING

Chemical substances used in the spreader-sprayer system may be hazardous and toxic to you, bystanders, animals, plants, soils or other property.

- **Carefully read and follow the chemical warning labels and Material Safety Data Sheets (MSDS) for all chemicals used and protect yourself according to the chemical manufacturer's recommendations. Ensure that as little skin as possible is exposed while using chemicals. Use appropriate Personal Protective Equipment (PPE) to guard against personal contact with chemicals, such as:**
  - **safety glasses, goggles, and/or face shield**
  - **respirator or filter mask**
  - **chemical resistant gloves**
  - **rubber boots or other substantial footwear**
  - **hearing protection**
  - **clean change of clothes, soap, and disposable towels, to be kept on-hand, in the event of a chemical spill.**
- **Keep in mind that there may be more than one chemical used, and information on each chemical should be assessed.**
- **Refuse to operate or work on the spreader-sprayer if this information is not available!**
- **Before working on a spreader-sprayer system, make sure that the system has been triple rinsed and neutralized according to the recommendations of the chemical manufacturer(s) and all of the valves have been cycled 3 times.**
- **Verify there is an adequate supply of clean water and soap nearby, and immediately wash off any chemicals that contact you.**
- Obtain proper training before using or handling chemicals.
- Use the correct chemical for the job.
- Follow the chemical manufacturer's instructions for the safe application of the chemical. Do not exceed recommended system application pressure.
- Do not fill, calibrate, or clean the unit when people, especially children, or pets are in the area.
- Handle chemicals in a well ventilated area.
- Have clean water available especially when filling the spray tank.
- Do not eat, drink, or smoke while working with chemicals.
- Do not clean spray nozzles by blowing through them or placing in mouth.
- Always wash your hands and other exposed areas as soon as possible after you finish the working with chemicals.
- Keep chemicals in their original packages and stored in a safe location.
- Properly dispose of unused chemicals and chemical containers as instructed by the chemical manufacturer and your local codes.
- Chemicals and fumes are dangerous; never enter the tank, hopper, or place your head over or in the opening for a tank or hopper.
- Follow all local, state, federal regulations for spreading or spraying chemicals.

Operation

⚠ WARNING

Operating engine parts, especially the muffler, become extremely hot. Severe burns can occur on contact and debris, such as leaves, grass, brush, etc. can catch fire.

- **Allow engine parts, especially the muffler, to cool before touching.**
- **Remove accumulated debris from muffler and engine area.**

⚠ WARNING

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

Do not run engine indoors or in a small confined area where dangerous carbon monoxide fumes can collect.

⚠ WARNING

Hands, feet, hair, clothing, or accessories can become entangled in rotating parts. Contact with the rotating parts can cause traumatic amputation or severe lacerations.

- **Do not operate the machine without guards, shields, and safety devices in place and working properly.**
- **Keep hands, feet, hair, jewelry, or clothing away from rotating parts.**

- Do not operate the machine under the influence of alcohol or drugs.
- Keep pets and bystanders away from an operating machine.

  Stop the machine if anyone enters the area.
- Make sure that you have good footing while using this machine, especially when backing up.

  Note: Reduced footing could cause slipping.
- Stop on level ground, disengage drives, engage the parking brake (if provided), shut off the engine before leaving the operator's position for any reason.
- Do not run an engine in an enclosed area.
- Lightning can cause severe injury or death. If lightning is seen, or thunder is heard in the area, do not operate the machine; seek shelter.
- Only operate in well-lit areas, keeping away from holes and hidden hazards.
- Slow down and use extra care on hillsides. Be sure to travel side to side on hillsides. Turf conditions can affect the stability of the machine. Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes.
- Look behind and down before backing up to ensure a clear path.
- Slow down and use caution when making turns and crossing roads and sidewalks.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.
- Allow engine parts, especially the muffler, to cool before touching.
- Remove accumulated debris from muffler and engine area.
- Ensure that motion control is in the Neutral position and that the parking brake is set before starting engine. Only start the engine from the operator's position.
- Do not operate the machine without the shields or other guards securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not change the engine governor setting or overspeed the engine.
- Stop the machine after striking objects or if an abnormal vibration occurs. Make the necessary repairs before resuming operations.

Safe Handling of Fuel

- To avoid personal injury or property damage, use extreme care in handling gasoline. Gasoline is extremely flammable and the vapors are explosive.
- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container.
- Do not remove the fuel cap or add fuel with the engine running.
- Allow the engine to cool before fueling.
- Do not fuel the machine indoors.
- Do not store the machine or fuel container where there is an open flame, spark, or pilot light such as on a water heater or on other appliances.
- Do not fill containers inside a vehicle, on a truck, or on a trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before filling.
- Remove equipment from the truck or trailer and fuel it on the ground. If this is not possible, then add fuel with such equipment as a portable container, rather than from 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. Do not use a nozzle lock open device.
- If fuel is spilled on clothing, change your clothing immediately.
- Do not overfill fuel tank. Replace fuel cap and tighten securely.

Maintenance and Storage

- Do not allow untrained personnel to service machine.
- Do not touch equipment or attachment parts which may be hot from operation. Allow all of the parts of the machine to cool before attempting to maintain, adjust, or service the machine.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Move the motion control lever to the Neutral position, set the parking brake, stop engine, and remove key or disconnect spark-plug wire. Wait for all movement to stop before adjusting, cleaning or repairing.
- Disconnect the battery or remove the spark-plug wire before making any repairs. Disconnect the negative terminal first and the positive terminal last. Reconnect the positive first and negative last.
- Clean grass, dirt, and debris from the drives, mufflers, and engine to help prevent fires.

- Clean up oil or fuel spillage.
- Park machine on level, hard ground. Never allow untrained personnel to service machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Do not store fuel near flames or drain indoors.
- Let the engine cool before storing.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.

Hauling

- Use care when loading or unloading the machine into a trailer or a truck.
- Use full-width ramps for loading machine into a trailer or a truck.
- Tie the machine down securely using straps, chains, cable, or ropes. Both front and rear straps should be directed down and outward from the machine.

Toro Spreader Sprayer Safety

The following list contains safety information specific to Toro products and other safety information you must know.

General Operation

- Check carefully for overhead clearances (i.e. branches, doorways, electrical wires, etc.) before operating under any objects, and do not contact them.
- Use caution when you are riding on the platform and driving the machine over curbs, rocks, roots, or other obstructions.
- Do not jerk the controls; use a steady motion.
- Do not carry passengers.
- Do not carry equipment on the machine.

Sprayer and Spreader Operation

⚠ WARNING

Spray wand traps liquids under high pressure, even when engine is off. High pressure spray discharge could cause serious injury or death.

- **Keep clear of nozzle and do not direct spray or stream at people, pets, or non-work area property.**
- **Do not direct spray on or near electrical power components or source.**
- **Do not attach hoses or other components to the end of the spray wand nozzle.**
- **Do not attempt to disconnect the spray wand from the unit while the system is pressurized.**
- **Do not use spray wand if trigger lock is damaged or missing.**
- **Do not keep spray wand in locked-open position when job is complete.**
- Do not touch the impeller for the spreader while the inpeller is rotating.
- Stop spreading/spraying when making tight turns to minimize uneven distribution pattern, application rate, and chemical drift.
- Chemicals may drift and cause injury to people and animals; it may also damage plants, soil, or other property.
- Liquid loads and granular materials can shift. This shifting happens most often while turning, going up or down hills, suddenly changing speeds, or while driving over rough surfaces. Shifting loads can cause the unit to tip over.
- Safely relieve pressure from spray wand every time engine is turned off.
- When draining or relieving system, do not let anyone stand in front of nozzles and do not drain on a person's feet.
- Do not repair spray wand, hoses, seals, nozzle, or other wand components; replace them.

Slope Operation

Use extreme caution when spreading or spraying chemicals and/or turning on slopes as loss of traction and/or tip-over could occur. The operator is responsible for safe operation on slopes.

- Remove or mark obstacles such as rocks, tree limbs, etc. from the area on which you are spreading or spraying chemicals.
- Watch for holes, ruts or bumps.

  Note: Tall grass can hide obstacles.
- Use caution near drop-offs, ditches, or embankments.

Note: The machine could suddenly turn over if a wheel goes over the edge of a cliff or ditch, or if an edge caves in.

- Be aware that operating on wet grass, across steep slopes or downhill may cause the machine to lose traction. Loss of traction to the drive wheels may result in sliding and a loss of braking and steering.
- Do not spread or spray chemicals on slopes greater than 15 degrees; refer to Figure 3 to determine the approximate slope angle of the work area.
- Avoid sudden starts and stops when spreading or spraying chemicals uphill because the machine may tip backward.

Note: The machine is more stable driving uphill.

- Keep all movement on slopes slow and gradual.
- Do not make sudden changes in speed or direction.
- Follow the manufacturer's recommendations for wheel weights or counter weights to improve stability.
- Use extra care with attachments.

Note: Use of attachments can change the stability of the machine.

Service

- To best protect your investment and maintain optimal performance of your Toro equipment, count on Toro genuine parts. When it comes to reliability, Toro delivers replacement parts designed to the exact engineering specifications of our equipment. For peace of mind, insist on Toro genuine parts.
- Never remove or tamper with safety devices. Check their proper operation regularly. Never do anything to interfere with the intended function of a safety device or to reduce the protection provided by a safety device.
- Check brake operation frequently. Adjust and service as required.

Slope Indicator

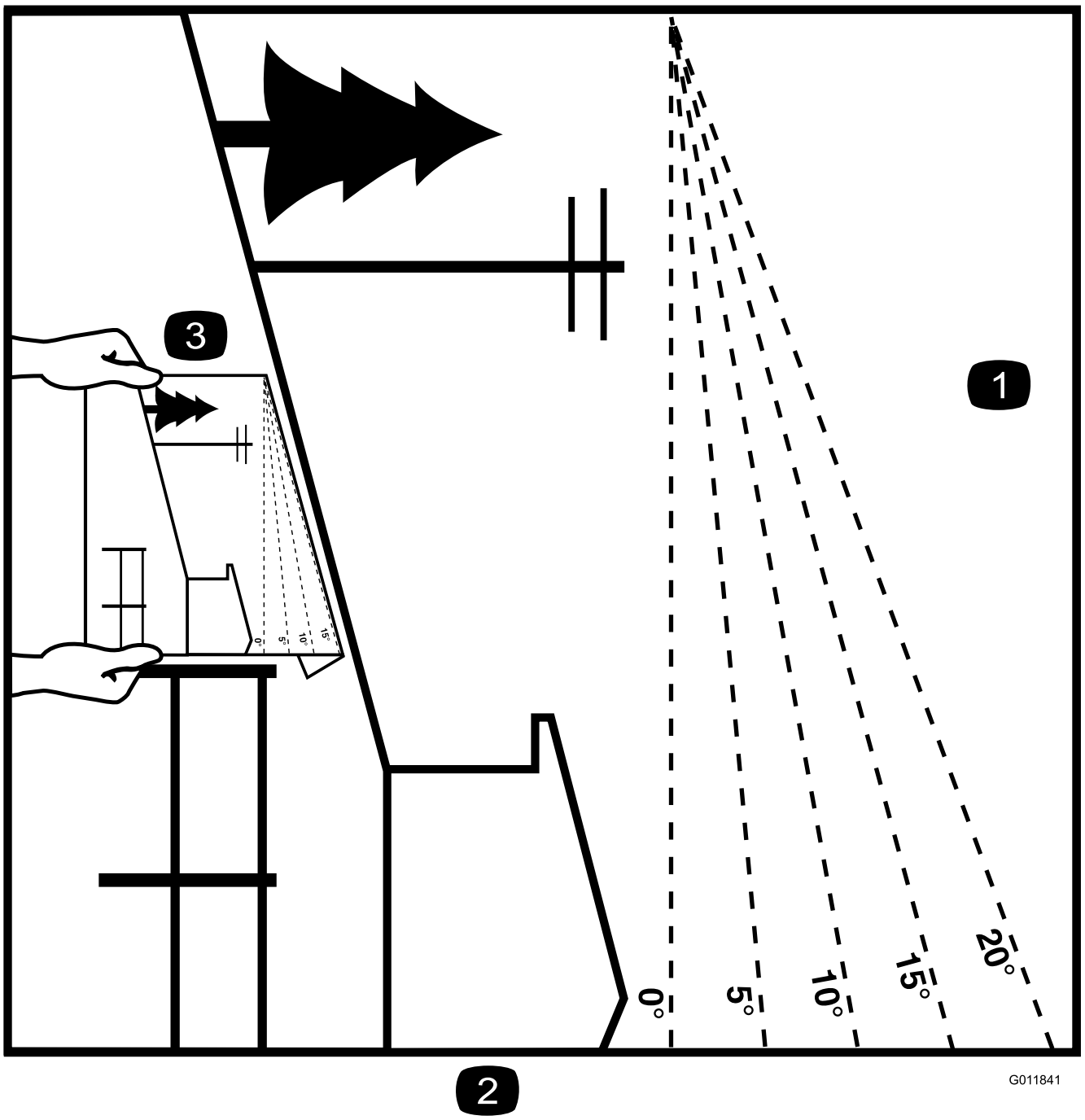


Figure 3

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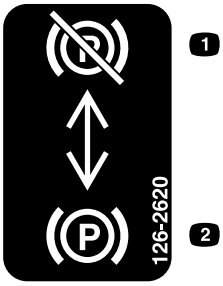
1. The maximum slope you can safely operate the machine on is **15 degrees**. Use the slope chart to determine the degree of slope of hills before operating. **Do not operate this machine on a slope greater than 15 degrees.** Fold along the appropriate line to match the recommended slope.
2. Align this edge with a vertical surface, a tree, building, fence pole, etc.
3. Example of how to compare slope with folded edge.

Safety and Instructional Decals

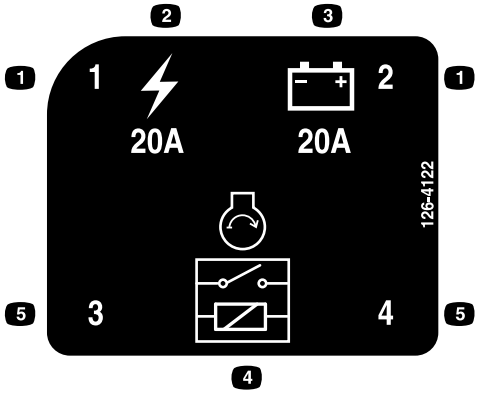
Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost.

117–2718



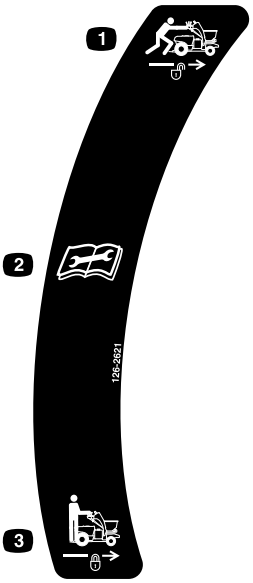
126-2620

1. Pull lever up to disengage the brake.
2. Push lever down to engage the brake.



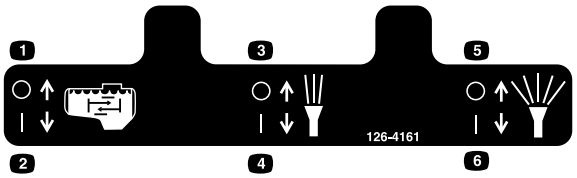
126-4122

1. Fuse location
2. Main, 20A
3. Regulator, 20A
4. Start relay
5. Relay location



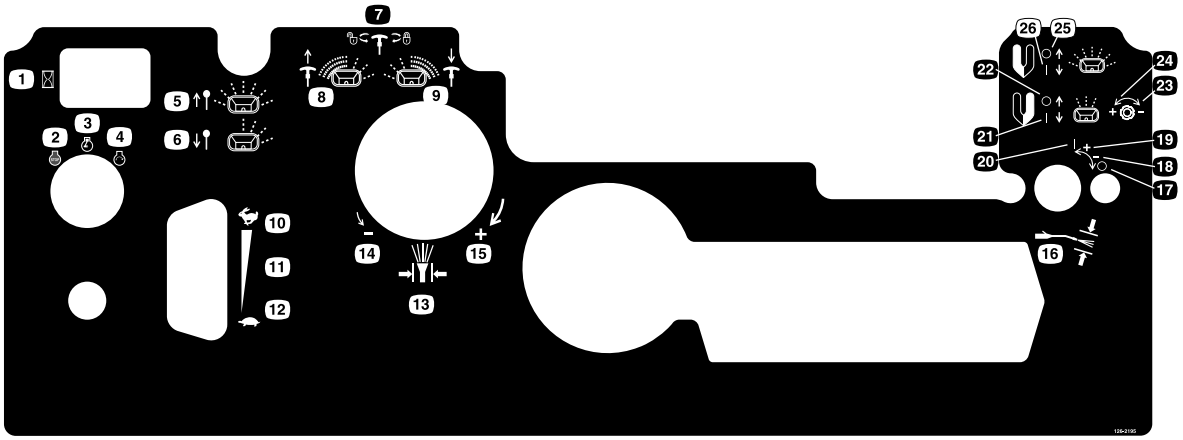
126-2621

1. Unlock to push machine.
2. Read the instructions before servicing or performing maintenance.
3. Lock to drive machine.



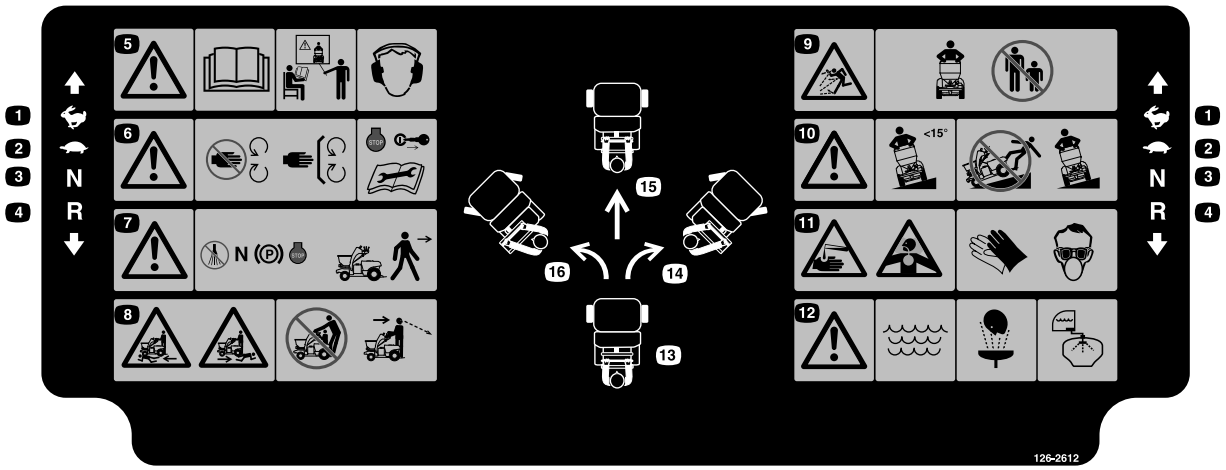
126-4161

1. Agitation-Off
2. Agitation-On
3. Narrow spray-Off
4. Narrow spray-On
5. Wide spray-Off
6. Wide spray-On



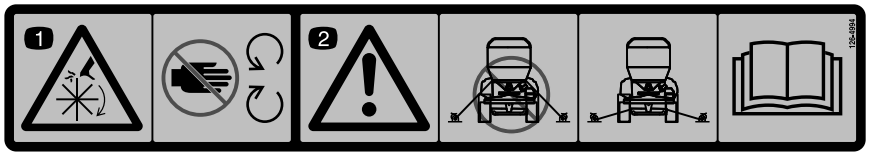
126-2195

1. Hour meter
2. Engine-Off
3. Engine-On
4. Engine-Start
5. Granular side deflector control-Pull up to raise.
6. Granular side deflector control-Push down to lower.
7. Spreader pattern control-Rotate counterclockwise to unlock; rotate clockwise to lock.
8. Spread pattern control-Pull up if heavy on left side.
9. Spread pattern control-Push down if heavy on right side.
10. Throttle-Fast
11. Continuous variable setting
12. Throttle-Slow
13. Spray pressure control
14. Spray pressure-Decrease
15. Spray pressure-Increase
16. Spray wand flow valve
17. Spray wand flow-Off
18. Spray wand flow-Decrease
19. Spray wand flow-Increase
20. Spray wand flow-On
21. Granular gate RH lever-Narrow distribution-On
22. Granular gate RH lever-Narrow distribution-Off
23. Granular gate adjustable stop control-Narrow distribution-Decrease
24. Granular gate adjustable stop control-Narrow distribution-Increase
25. Granular gate LH lever-Wide distribution-Off
26. Granular gate LH lever-Wide distribution-On



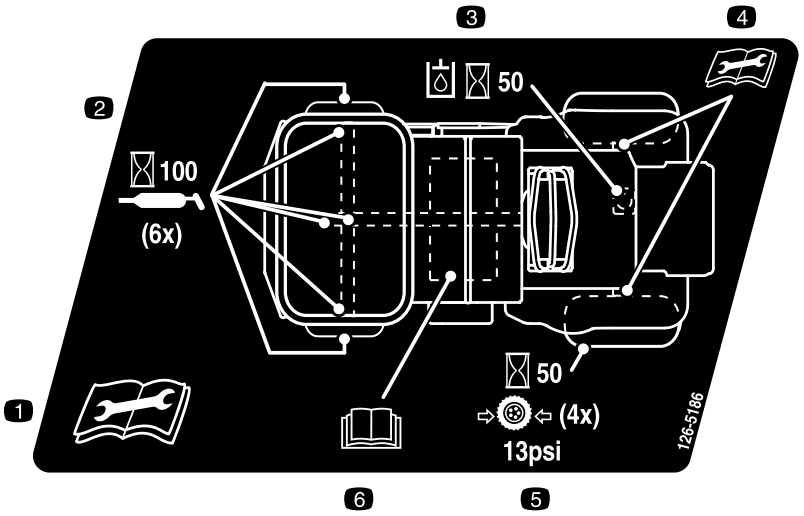
126-2612

1. Fast
2. Slow
3. Neutral
4. Reverse
5. Warning-Read the *Operator's Manual*. Do not operate this machine unless you are trained. Wear hearing protection.
6. Warning-Stay away from moving parts; keep all guards in place. Stop engine and remove key before adjusting, servicing, or cleaning.
7. Warning-Disengage sprayer controls, move drive lever to neutral position, engage parking brake, and stop engine before leaving the operator's position.
8. Crushing/dismemberment hazard of bystanders - do not carry passengers, look forward and down when operating the machine, look behind and down when reversing.
9. Thrown object hazard-do not operate when people and pets are in the area.
10. Warning-do hot operate on slopes greater than 15 degrees. Do not operate on wet slopes–use extreme caution when operating on slopes; operate across slopes not up and down. Loads may shift on slopes or when turning.
11. Caustic liquid/chemical burn and toxic gas inhalation hazards - wear hand, skin, eye, and respiratory protection.
12. Warning-Use fresh, clean water:
    - for first-aid washing
    - for rinsing the tank.
13. Neutral
14. Move steering control right to turn right.
15. Move steering control to center to go straight.
16. Move steering control left to turn left.



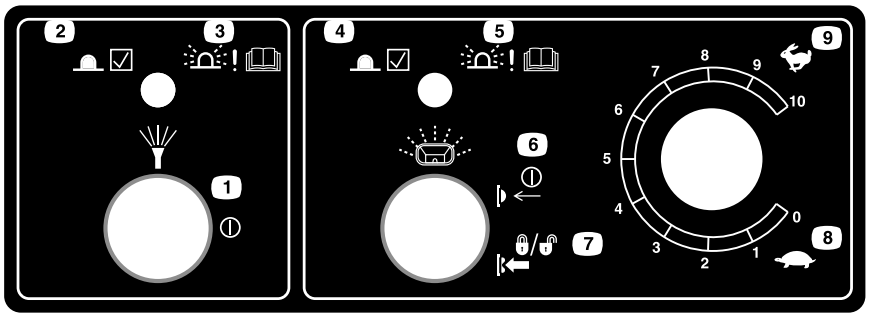
126-4994

1. Cutting/dismemberment hazard—keep away from moving parts.
2. Warning—do not use the upper front locations as tie down points, only use the specified tie down points; see the Operator's Manual for location.



126-5186

1. Read the *Operator's Manual* before servicing the machine or performing maintenance.
2. Grease the steering pivots every 100 hours.
3. Check the hydraulic oil level every 50 hours.
4. For more information on servicing the rear axle shafts, read the *Operator's Manual*.
5. Check the tire pressure—90kPa (13 psi) every 50 hours.
6. Read the *Operator's Manual*.



Spreader Sprayer Control

1. Spray pump switch-On/Off
2. Solid light-normal pump operation
3. Fast flashing light-pump malfunction; see *Operator's manual*.
4. Solid light-normal operation of spreader motor and speed control.
5. Fast flashing light-spreader motor and/or speed control malfunction; see *Operator's manual*. Constant slow flashing light-spreader motor speed setting locked.
6. Granular impeller motor and speed control-On/Off; press push button fast.
7. Granular speed control lock/unlock-On/Off; press and hold button.
8. Speed control-slow
9. Speed control-fast

Setup

Loose Parts

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

Procedure	Description	Qty.	Use
4	No parts required	–	Connect the battery.

Media and Additional Parts

Description	Qty.	Use
Operator's Manual	1	Read before operating the machine.
Key	2	Start the machine.

1

Checking the Tire Pressure

No Parts Required

Procedure

Front and Rear Tire Air Pressure: 83 to 97 kPa (12 to 14 psi)

1. Check the air pressure in the front and rear tires.
2. If the air pressure in the tires need adjustment, inflate the tires to 83 to 97 kPa (12 to 14 psi).

2

Checking the Engine-Oil Level

No Parts Required

Procedure

The engine is shipped with oil; check the engine-oil level and, if necessary, add to the appropriate level. Refer to Checking the Engine-Oil Level (page 21) for instructions and the oil specification.

3

Checking the Transaxle-Oil Level

No Parts Required

Procedure

Transaxle Oil Type: Toro® HYPR-OIL™ 500 hydraulic oil or Mobil® 1 15W-50

The Transaxle is shipped with oil; check transaxle oil level in the oil expansion tank, and if necessary, add to the appropriate level; refer to Servicing the Transaxle (page 63)

4

Connecting the Battery

No Parts Required

Procedure

1. Remove the battery cover from the battery box (Figure 4).

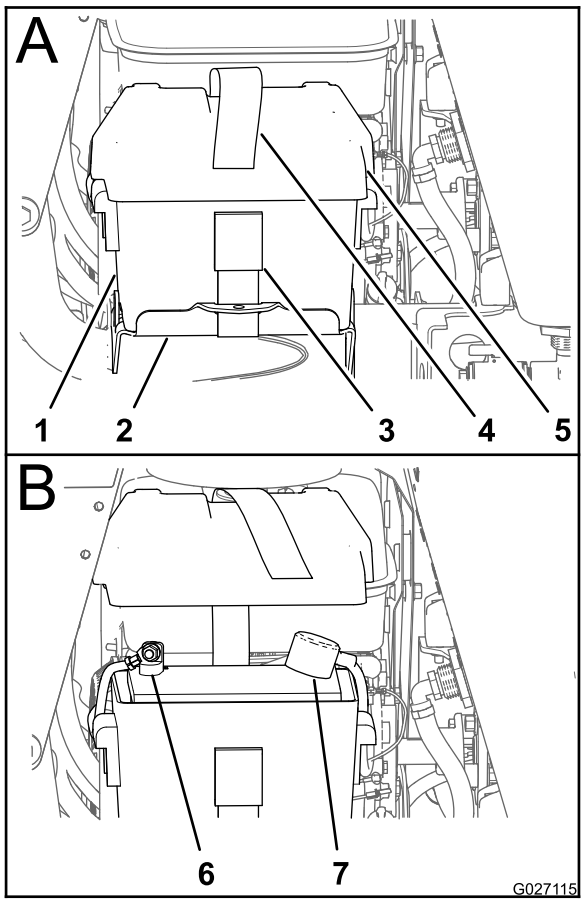


Figure 4

1. Battery box
2. Battery support
3. Buckle
4. Battery strap
5. Battery cover
6. Negative terminal
7. Positive terminal

2. Install the negative battery cable to the negative (-) battery terminal with a flanged bolt and flanged nut (Figure 4).
3. Install the cover on the battery box and secure the cover and box to the battery tray with the battery strap (Figure 4).

Product Overview

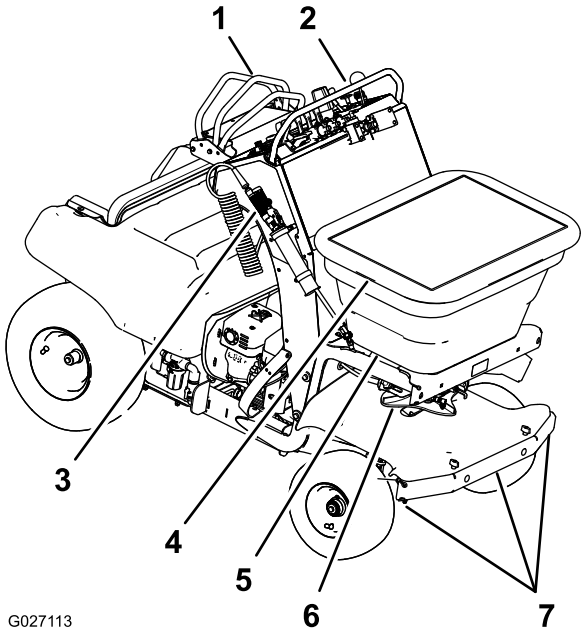


Figure 5

1. Motion/steering control
2. Engine/spreader–sprayer controls
3. Spray wand
4. Hopper cover
5. Hopper
6. Impeller
7. Sprayer nozzles

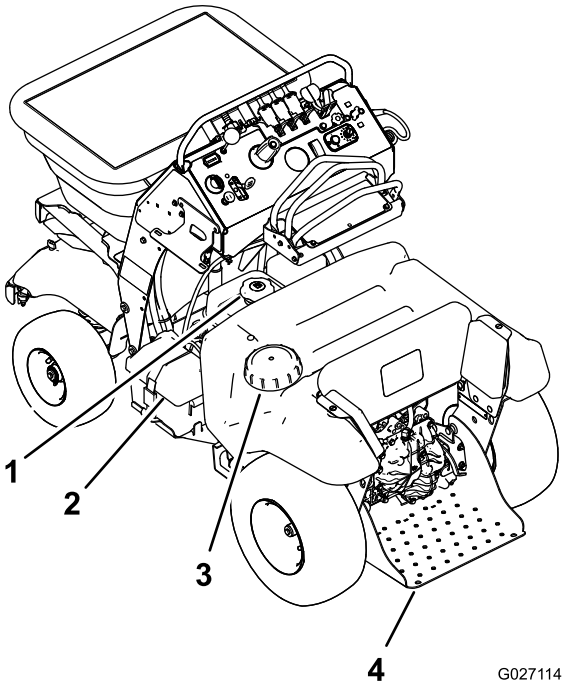


Figure 6

1. Cap (fuel tank)
2. Battery
3. Cap (sprayer tank)
4. Platform

Controls

Machine Controls

Steering Control

The steering control is located behind the control console (see Figure 7).

- Move the steering control to the right or left to steer the machine to the right or left respectively.
- Moving the steering control to the center allows the machine to steer straight.

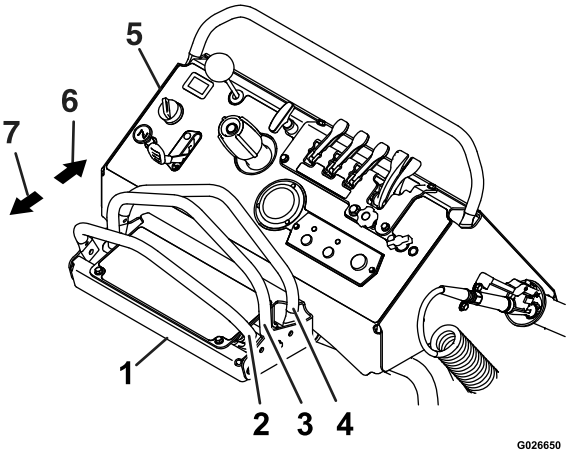


Figure 7

1. Steering control
2. Rear reference bar
3. Motion control lever (Neutral position)
4. Front reference bar
5. Control console
6. Forward
7. Reverse

Motion Control Lever

The motion control lever, located in the center of the steering control, controls the forward and reverse motion of the machine (see Figure 7).

- Move the motion control lever forward or backward to drive the machine respectively.

  Note: The machine speed is proportional to the amount that you move the motion control lever.

- When you move the motion control lever to the center position, the machine should stop.

  Note: When you release the motion control lever, it should return to the Neutral position.

  Important: If the motion control lever does not return to the Neutral position when you release it, contact an Authorized Service Dealer.

Throttle Control

The throttle control (the red lever) is located at the left side of the control console (Figure 8).

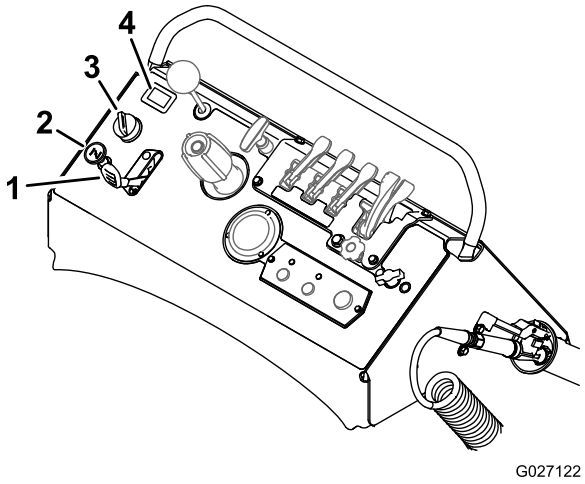


Figure 8

1. Throttle
2. Choke
3. Ignition switch
4. Hour meter

Choke Control

The choke control is located at the left side of the control console, and is used to aid in starting a cold engine.(Figure 8).

Note: Do not start or run a warm engine with the choke in the On position.

- Pull up on the choke control to set the choke to the On position.
- Push down on the choke control to set the choke to the Off position.

Ignition Switch

The ignition switch is located at the left side of the control console (Figure 8).

Use the ignition switch to start and stop the engine. The ignition switch has three positions, Off, On and Start.

Note: You must have the parking brake set in order to start the engine.

Hour Meter

The hour meter is located above the ignition switch at the left side of the control console (Figure 8).

The hour meter records the number of hours that the machine has operated.

Fuel Shut-Off Valve

The fuel shutoff valve is located at the front right side of the engine below the fuel tank (Figure 9).

Note: Close the fuel shut-off valve when the machine is not used for a few days, during transport to and from the job site, or when parking the machine inside a building.

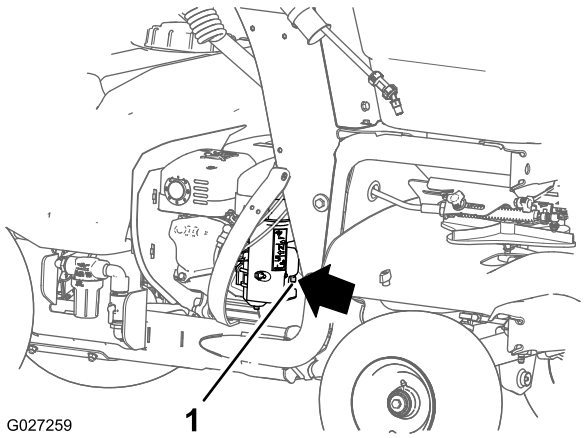


Figure 9

1. Fuel shutoff valve (right side of the engine)

Parking Brake Lever

The parking brake lever is located above the platform at the right side (Figure 10).

- To set the parking brake, push the parking brake lever down.

  Note: The brake lever engages a parking brake in the transaxle.

- To release the parking brake, pull the lever up.

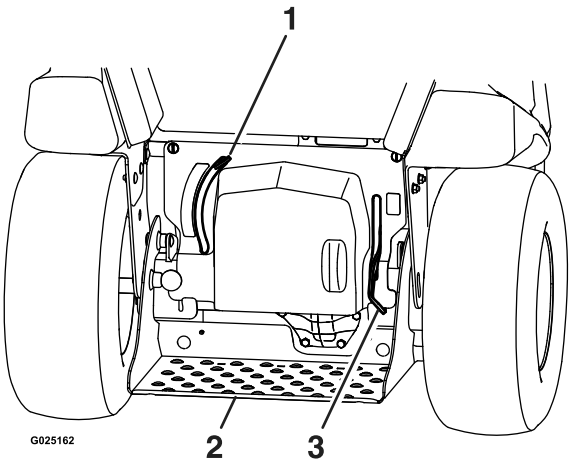


Figure 10

1. Drive wheel release lever
2. Platform
3. Park brake lever

Note: When parking on a steep slope, chock or block the wheels in addition to setting the parking brake. When transporting the machine, set the parking brake and bind the machine to the transport vehicle.

Drive Wheel Release Lever

The drive wheel release lever is located above the platform at the left side (Figure 10).

Use the drive wheel release lever to disengage the hydrostatic drive system to allow the machine to be moved by hand without the engine running.

- To push or pull the machine, move the drive wheel release lever up.
- To operate the machine, move the drive wheel release lever down.

Spreader Controls

Deflector Gate Control

The deflector gate control is located to the right of the hour meter at the control console (Figure 11).

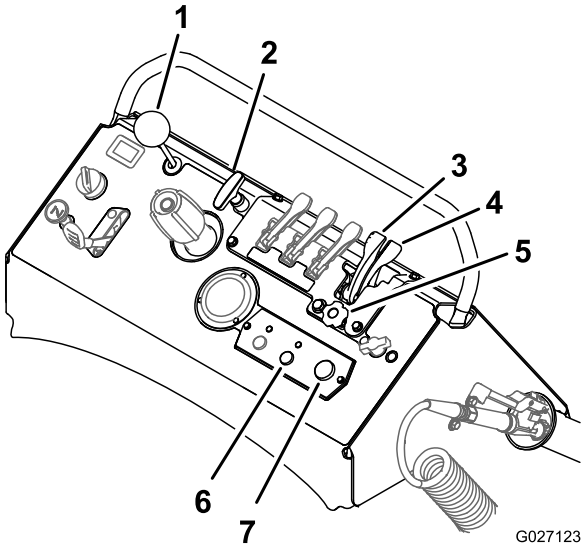


Figure 11

1. Deflector gate control
2. Spreader pattern control
3. Wide-distribution impeller-gate lever
4. Narrow-distribution impeller-gate lever
5. Narrow-spreader distribution flow-rate knob
6. Impeller On/Off switch
7. Impeller-speed control

Use the deflector gate control to temporarily stop the discharge of granular materials from the left side of the spreader. Close the deflector gate with the control when it is not desirable to broadcast granular materials onto sidewalks, parking lots, or patios.

- Push the knob for the deflector gate control down to close the gate and temporarily deflect the granular materials.
- Pull the knob up to open the deflector gate for full broadcasting operation.

Spreader Pattern Control

The spreader pattern control is located to the right of the deflector gate control at the control console (Figure 11).

Use the spreader pattern control to broadcast a heavier pattern of granular material to the left or right side of the machine.

- To broadcast a heavier pattern to the left, unlock the spreader pattern control, pull the control up slightly, and lock the control.
- To broadcast a heavier pattern to the right, unlock the spreader pattern control, push the control down slightly, and lock the control.

Wide-distribution Impeller Gate Lever

The wide-distribution impeller gate lever is the 4th lever located at the top center of the control console (Figure 11).

- To broadcast a wide pattern of granular material, pull the wide-distribution impeller gate lever rearward fully to the full Open position.
- To close the impeller gate, push the wide-distribution impeller gate lever forward fully to the Closed position.

Narrow-distribution Impeller Gate Lever

The narrow-distribution impeller gate lever is the 5th lever located at the top center of the control console (Figure 11).

- To broadcast a narrow pattern of granular material, pull the narrow-distribution impeller gate lever rearward fully to the limited Open position.
- To close the impeller gate, push the **wide-distribution** impeller gate lever forward fully.

  Note: Only the wide-distribution impeller-gate lever will close the impeller gate. Pushing the wide-distribution impeller-gate lever forward will also reset the narrow-distribution impeller-gate lever to the forward position.

Narrow-Spreader Distribution Flow-Rate Knob

The narrow-spreader distribution flow-rate knob is located below the wide and narrow impeller gate levers (Figure 11).

Use the narrow-spreader distribution flow-rate knob to control the discharge rate of granular material from the hopper onto the impeller when the narrow narrow-distribution impeller gate lever is in the Open position (limited).

- Rotate the narrow-spreader distribution flow-rate knob clockwise to decrease the discharge rate of granular material from the hopper.
- Rotate the distribution flow rate knob counterclockwise to increase the discharge rate of granular material from the hopper.

Impeller On/Off Switch

The impeller On/Off switch is located below the impeller-distribution flow-rate knob at the bottom of the control console (Figure 11).

Use the impeller On/Off switch to run the electric motor that drives the impeller.

- Press the impeller On/Off switch up to run the impeller.
- Press the impeller On/Off switch down to stop the impeller.

Impeller-speed Control

The impeller-speed control is located to the right of the impeller On/Off switch at the bottom of the control console (Figure 11).

Use the impeller-speed control to adjust the rotational speed of the impeller.

- Rotate the impeller-speed control counterclockwise to decrease the rotational speed of the impeller.
- Rotate the impeller-speed control clockwise to increase the impeller speed.

Drop-rate Cam and Linkage

The drop-rate cam and linkage is located at the front of the machine and below the hopper for the spreader (Figure 12).

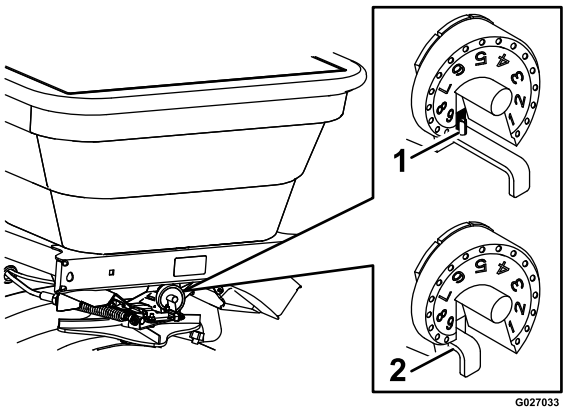


Figure 12

1. Slot–maximum position (drop-rate cam)
2. Linkage

Use the drop-rate cam to set the maximum amount of material to be dispensed through the impeller gate and onto the impeller.

The slot in the cam, after setting 9 on the cam, allows the impeller gate to be opened to the maximum position. This setting can be used for dry sand, ice melt, or other materials that are difficult to spread.

Note: Use cam setting 9 may when cleaning out the hopper.

Sprayer Controls

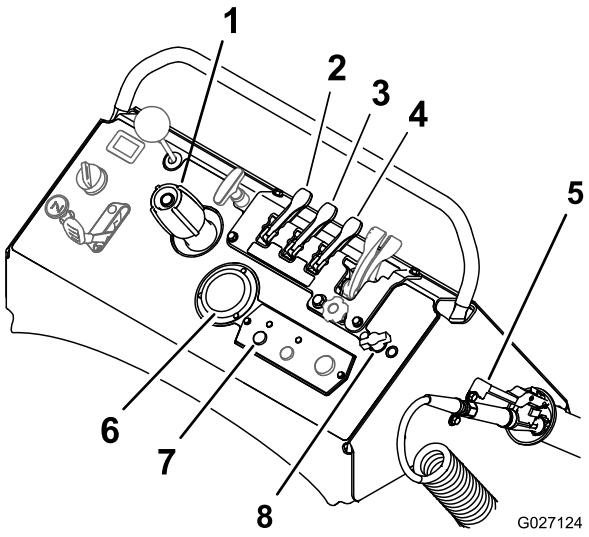


Figure 13

1. Sprayer pressure control
2. Tank agitation lever
3. Narrow spray pattern lever
4. Wide spray pattern lever
5. Sprayer wand
6. Sprayer pressure gauge
7. Sprayer pump switch
8. Sprayer wand pressure control

Sprayer Pressure Control

The sprayer pressure control is located to the left of the spray pressure gauge (Figure 13).

- Rotate the sprayer pressure control clockwise to increase pressure to the sprayer nozzles
- Rotate the pressure control counterclockwise to decrease nozzle pressure.

Tank Agitation Lever

The tank agitation lever is the left most lever located at the top center of the control console (Figure 13).

Setting the tank agitation lever to the On position allows the sprayer pump to circulate the content in the spray tank in order to keep the chemical solution mixed.

- Pull the tank agitation lever rearward to circulate the content in the spray tank.
- Push the lever forward to stop to circulating the content in the spray tank.

  Note: Agitation is not meant to be used while spraying. Shut off the tank agitation lever to ensure proper spray distribution.

Note: Run the engine speed above idle and run the sprayer pump for the tank agitation to work effectively.

Narrow Spray Pattern Lever

The narrow spray pattern lever is the second lever, located at the top center of the control console, to the right of the tank agitation lever (Figure 13).

- Pull the narrow spray pattern lever toward you to turn on the sprayer in a narrow spray pattern (the center nozzle only).
- Push the narrow spray pattern lever away from you to turn off the sprayer.

Wide Spray Pattern Lever

The wide spray pattern lever is the third lever, located at the top center of the control console, to the right of the narrow spray control lever (Figure 13).

- Pull the wide spray pattern lever toward you to turn on the sprayer in a wide spray pattern (the right and left nozzles).
- Push the wide spray pattern lever away from you to turn off the sprayer.

Sprayer Pressure Gauge

The sprayer pressure gauge is located to the left of the sprayer pump switch at the control console (Figure 13).

Use the pressure gauge to see the fluid pressure in the sprayer system.

Sprayer Pump Switch

The sprayer pump switch is located to the left of the impeller On/Off switch (Figure 13).

Use the sprayer pump switch to start and stop the pump when spraying or circulating the fluid in the sprayer tank.

- Push down on the top of the sprayer pump switch to start the pump.
- Push down on the bottom of the switch to stop the pump.

Spray Wand Trigger and Trigger Lock

The spray wand trigger and trigger lock are located on the top side of the spray wand handle (Figure 13 and Figure 14).

- To use the spray wand, hold the handle of the wand squeeze the trigger.
- To lock the trigger to the On position, Fully squeeze the trigger against the handle of the spray gun and then rotate the trigger lock forward with your thumb; to unlock the trigger lock, rotate the lock toward you.
- Release the trigger to stop spraying with the wand.

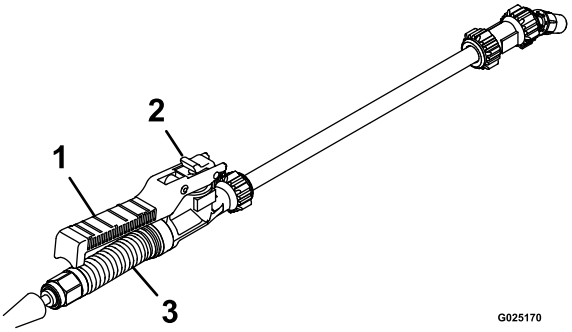


Figure 14

1. Trigger
2. Trigger lock
3. Spray wand handle

Tank Drain Valve

The tank drain valve is located at the left side and under the sprayer tank (Figure 16).

Use the tank drain valve to empty the sprayer tank of liquid chemicals.

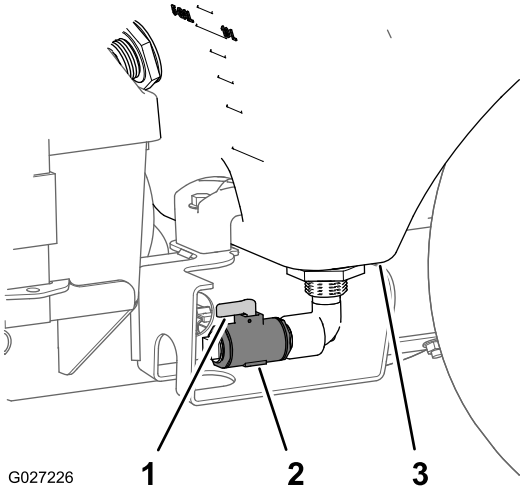


Figure 15

1. Handle (open position)
2. Tank drain valve
3. Sprayer tank

- Rotate the handle of the tank drain valve 90° clockwise (lever in-line with valve) to open the valve.
- Rotate the handle 90° counterclockwise to close the valve.

Sprayer Pump Supply Valve

The sprayer pump supply valve is located at the right side of the machine and under the sprayer tank (Figure 16).

Use the sprayer pump supply valve to shut off the flow of liquid chemicals to the pump.

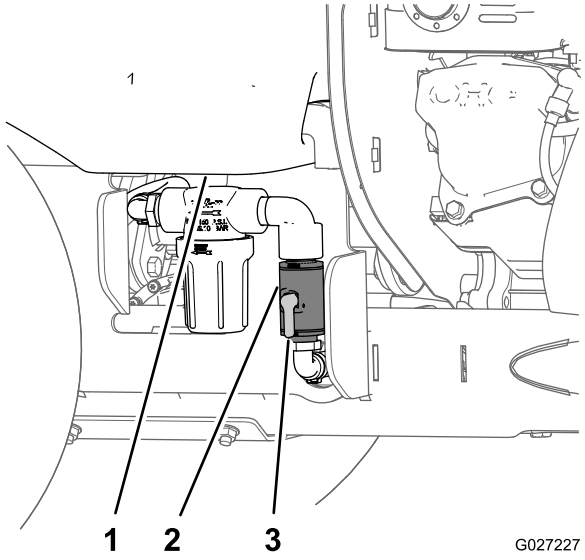


Figure 16

1. Sprayer tank
2. Sprayer pump supply valve
3. Handle (open position)

- Rotate the handle of the tank drain valve 90° clockwise (lever in-line with valve) to open the valve.
- Rotate the handle 90° counterclockwise to close the valve.

Specifications

Overall width		90 cm (35.5 inches)
Overall length		171 cm (67.5 inches)
Overall height		131 cm (51.5 inches)
Weight	sprayer tank and hopper empty	227 kg (500 lb)
	only hopper full	307 kg (676 lb)
	only sprayer tank full	309 kg (682 lb)
	sprayer tank and hopper empty and 1 extra bag of granular material in the tank	412 kg (909 lb)
Maximum machine weight	loaded machine + operator	≤ 513 kg (1130 lb)
Hopper capacity		79 kg (175 lb)
Sprayer tank capacity		76 L (20 US gallon)
Maximum ground speed	forward	9 kph (5.5 mph)

Operation

Note: Determine the left and right sides of the machine from the normal operating position.

Checking the Engine-Oil Level

Service Interval: Before each use or daily

Oil Type: Detergent oil (API service SJ or higher)

Oil viscosity: Refer to the table below.

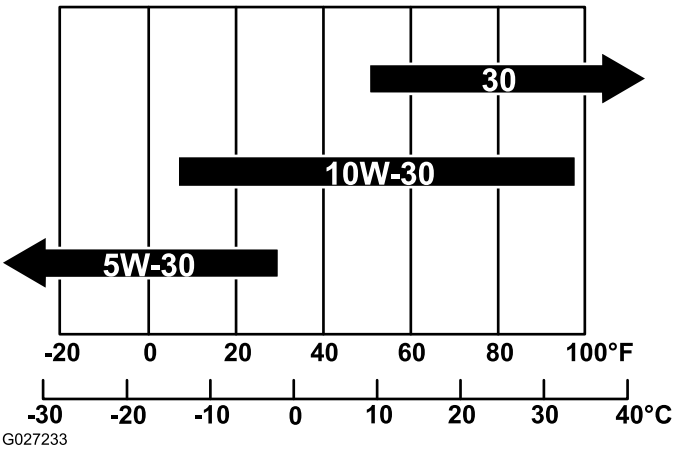
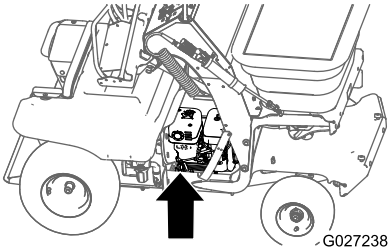


Figure 17

Important: Do not operate the engine with the oil level below the Low (or Add) mark on the dipstick, or over the Full mark.

1. Move the machine to a level surface.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position
3. Allow the engine to cool.
4. Remove the dipstick from the engine and wipe the dipstick with a clean rag (Figure 18).



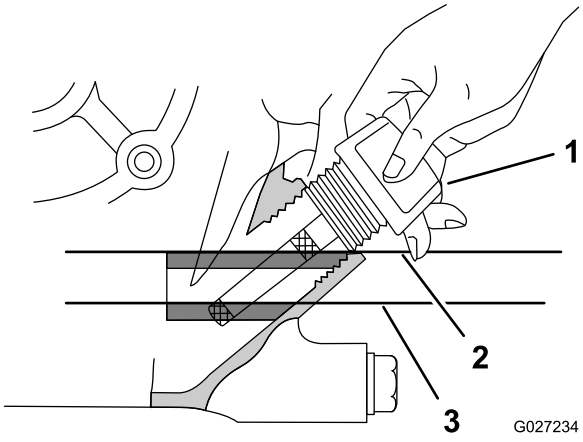


Figure 18

1. Dipstick
2. Maximum oil level
3. Minimum oil level

5. Insert the dipstick from the engine as shown in Figure 18.

   Note: Do not thread the dipstick into the filler neck when checking the engine oil level.

6. Remove the dipstick from the filler neck and look at the oil level in the dipstick (Figure 18).

   Note: The engine oil level must cover between the hatch marked areas on the dipstick (Figure 18).

7. If the oil level is low, wipe off the area around the filler neck and add the specified oil until the oil level is between the hatch marked areas on the dipstick.

   Note: **Do not** overfill the engine with oil.

8. Insert the dipstick into the filler neck and tighten the dipstick hand tight (Figure 18).

Adding Fuel

Fuel tank capacity: 6.1 L (1.6 US gallons)

- 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, gasoline is extremely flammable and highly explosive. A fire or explosion from gasoline can burn you and others and can damage property.

- **Fill the fuel tank outdoors, in an open area, and when the engine is cold. Wipe up any gasoline that spills.**
- **Do not fill the fuel tank completely full. Add gasoline 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 the gasoline to expand.**
- **Never smoke when handling gasoline, and stay away from an open flame or where a spark may ignite the gasoline fumes.**
- **Store gasoline in an approved fuel container and keep it out of the reach of children.**
- **Never buy more than a 30-day supply of gasoline.**

⚠ DANGER

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

- **Always place gasoline containers on the ground away from your vehicle before filling.**
- **Do not fill gasoline 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 gas-powered 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 gasoline dispenser nozzle.**
- **If a gasoline dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.**

⚠ WARNING

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

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

Using Stabilizer/Conditioner

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

- Keeps gasoline fresh during storage of 90 days or less. For longer storage it is recommended that the fuel tank be drained.
- 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 gas stabilizer/conditioner to the gas.

Note: A fuel stabilizer/conditioner is most effective when mixed with fresh gasoline. To minimize the chance

of varnish deposits in the fuel system, use fuel stabilizer at all times.

Fueling the Machine

Note: Refueling the engine is difficult when using a larger refueling container such as a container with a 19 L (5 US gal) capacity.

To make fueling the machine easier use the following equipment:

- a fuel container with approximately a 4 to 8 L (1 to 2 US gal) capacity
- a funnel

1. Clean around the fuel tank cap.
2. Remove the cap from the tank.
3. Fill the fuel tank with unleaded gasoline to within 6 to 13 mm (1/4 to 1/2 inch) from the top of the tank. **Do not fill into the filler neck.**

   Important: Do not fill the tank more than 6 mm (1/4 inch) from the top of the tank because the gasoline must have room to expand.
4. Install the fuel tank cap and wipe up any spilled gasoline.

Checking the Safety Interlock System

Service Interval: Before each use or daily

⚠ CAUTION

If interlock switch is disconnected or damaged the machine could operate unexpectedly causing personal injury.

- **Do not tamper with the interlock switch.**
- **Check the operation of the interlock switch daily and replace damaged switch before operating the machine.**

Important: It is essential that the safety mechanisms on your machine are connected and in proper operating condition prior to operating your machine.

The safety interlock system is designed to prevent the engine from starting unless the parking brake is set.

Testing the Starter Interlock

Service Interval: Before each use or daily

1. Move the machine to a level surface.
2. Chock the wheels of the machine.
3. Disconnect the spark plug wires.
4. Release the parking brake.
5. With the motion control lever in the neutral position turn the key to the start position.

   Note: The starter must not rotate the engine.

   - If the starter rotates the engine of your machine—the machine does not pass this test, do not operate it. Contact your authorized Toro service distributor.
   - If the starter does not rotate the engine—the machine does pass the test: Set the parking brake, connect the sparkplug wire to the spark plug, and remove the chock(s) from the wheels.

Checking the Machine for Loose Hardware

Service Interval: Before each use or daily

1. Stop engine, wait for all moving parts to stop, remove key, and set parking brake.
2. Visually inspect machine for damaged or worn parts, and check for loose hardware.

   Note: Replace any damaged parts and tighten all loose hardware before operating the machine.

Operating the Machine

Extending and Retracting the Operator's Platform

Extending the Operator's Platform

Extend the platform as follows:

1. Pull inward the knob for the platform lock until the pin of the lock clears the upper hole in the chassis (Figure 19).

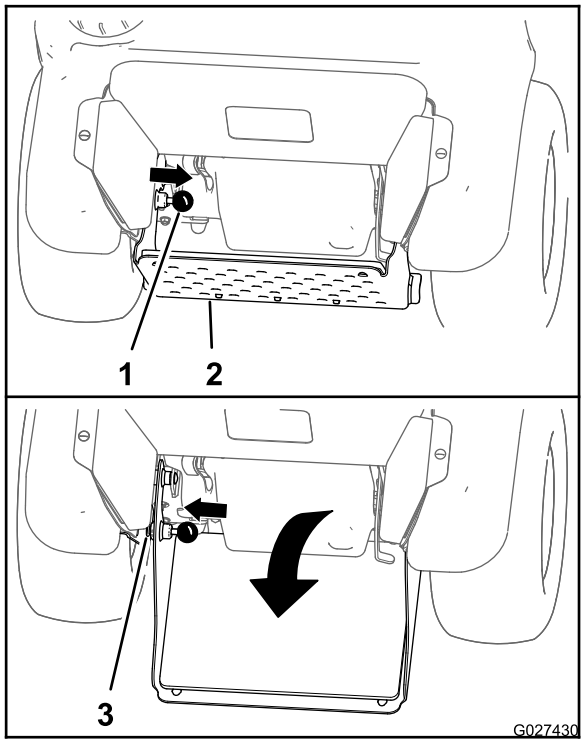


Figure 19

1. Knob (platform lock)
2. Operator's platform
3. Lower chassis hole

2. Rotate the operator's platform down until the pin of the platform lock is aligned with the lower hole in the chassis (Figure 19).
3. Move the knob for the platform lock outward until the pin for the lock is protruding through the lower hole (Figure 19).

Retracting the Operator's Platform

1. Pull inward the knob for the platform lock until the pin of the lock clears the upper hole in the chassis (Figure 19).
2. Rotate the operator's platform up until the pin of the platform lock is aligned with the upper hole in the chassis (Figure 19).
3. Move the knob for the platform lock outward until the pin for the lock is protruding through the upper hole (Figure 19).

Opening and Closing the Fuel Shut-off Valve

Control fuel flow to the engine with the fuel shutoff valve as follows:

- Rotate the handle for the fuel-shutoff valve 90 degrees clockwise to the open the valve.
- Rotate fuel-shutoff valve handle 90 degrees counterclockwise to close the valve.

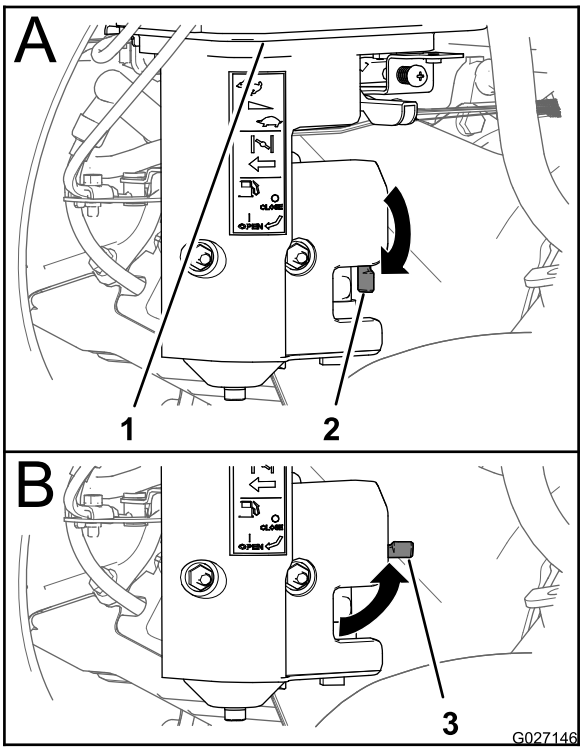


Figure 20

1. Fuel tank
2. Fuel-shutoff valve (open position)
3. Fuel-shutoff valve (closed position)

Starting the Engine

1. Ensure that the fuel-shutoff valve is open; refer to Opening and Closing the Fuel Shut-off Valve (page 24).
2. Move the steering control/motion-control lever in Neutral position and set the parking brake; refer to Steering Control (page 16), Motion Control Lever (page 16), and Parking Brake Lever (page 17).

   Note: To start the engine, the parking brake must be set. (The operator can start the engine while he or she is off the platform.)
3. Move the throttle lever midway between the Slow and Fast positions; refer to Throttle Control (page 16).
4. If the engine is cold, pull up the choke control to the On position; refer to Choke Control (page 16).

   Note: If the engine is warm , push down the choke lever to the Off position.

5. Rotate the ignition switch to the Start position; refer to Ignition Switch (page 16).

   Note: Release the switch as soon as the engine starts.

   Important: Do not crank the engine continuously for more than ten seconds at a time. If the engine does not start, allow a 60 second cool-down period between starting attempts. Failure to follow these guidelines can burn out the starter motor

6. If the choke control is in the On position, gradually move the lever down, toward the Off position as the engine warms up.

Stopping the Engine

1. Move the steering control/motion-control lever to the Neutral position and bring the machine to a full stop; refer to Steering Control (page 16) and Motion Control Lever (page 16).
2. Place the throttle in the midway between the Slow and Fast positions; refer to Throttle Control (page 16).
3. Allow the engine to run for a minimum of 15 seconds, then turn the ignition switch to the Off position to stop the engine; refer to Ignition Switch (page 16).

   Note: You must have the parking brake in the released position to shut off the engine.
4. Set the parking brake; refer to Parking Brake Lever (page 17).
5. Remove the key to prevent children or other unauthorized persons from starting the engine.
6. Close the fuel shut-off valve when the machine will not be in use for a few days, when transporting, or when the machine is parked inside a building; refer to Opening and Closing the Fuel Shut-off Valve (page 24).

Driving the Machine

⚠ CAUTION

Machine can turn rapidly by moving the steering control to the far right or left. Operator may lose control of the machine, which may cause damage to the machine or injury.

- **Use caution when making turns.**
- **Slow down the machine before making sharp turns.**

Important: If the motion control lever does not return to the Neutral position when you release it, contact an Authorized Service Dealer.

Important: To begin moving the machine (forward or backward), the brake lever must be released (pulled up) before you move the motion control lever.

Driving the Machine Forward

1. Move the motion control lever to the Neutral position.
2. Release the parking brake.
3. To drive the machine, perform the following:
   - To move the machine forward in a straight line, center the steering control and move the motion control lever forward.

     Note: The machine will move faster the farther the motion control lever is moved from the Neutral position.

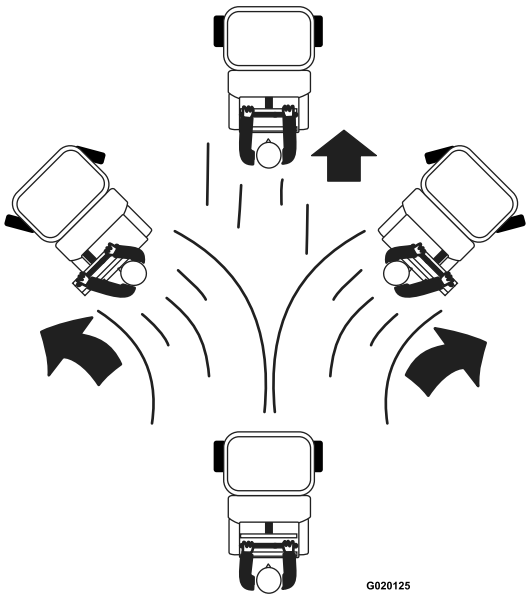


Figure 21

   - To turn left or right, move the steering control toward the desired turn direction.
   - To stop the machine, move the motion control lever in the Neutral position.

Note: Stopping distance may vary depending on the spreader-sprayer load.

Note: When you release the motion control lever, it automatically returns to the Neutral position.

Driving the Machine in Reverse

1. Move the motion control lever to the neutral position.
2. To move the machine rearward in a straight line, slowly move the motion control lever rearward.

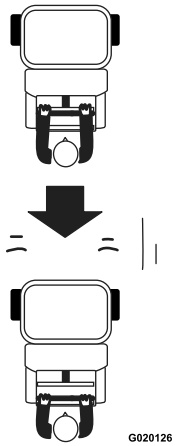


Figure 22

To turn left or right, move the steering control toward the desired turn direction.

3. To stop the machine, move the motion control lever to the Neutral position.

   Note: Stopping distance may vary depending on the spreader-sprayer load.

Operating the Spreader

⚠ CAUTION

Chemicals are hazardous and can cause personal injury.

- **Read the chemical manufacture's directions on the label before handling the chemicals; follow all manufacturer recommendations and precautions.**
- **Keep chemicals away from your skin. Should contact occur, wash the affected area thoroughly with soap and clean water.**
- **Wear goggles, gloves, and any other protective equipment recommended by the chemical manufacturer.**

Use the spreader to disperses free-flowing granular substances such as grass seed, fertilizer, ice melt, etc. When you use the spreader, first fill the granular hopper, then apply the granular materials to the work site, and finally clean the hopper. It is important to complete all three of these steps to avoid damaging the spreader.

Note: When you use your spreader, thoroughly clean it at the end of the day.

Before Operating the Spreader

Before you start using the spreader, make sure the spreader has been calibrated for the material that you will disperse; refer to Calibrating the Spreader (page 27).

Important: Verify that the proper application rate has been set on the spreader prior to filling the hopper.

Calibrating the Spreader

Calibrate the spreader each time a new material is used. The spreader can broadcast material in a pattern 1.5 to 6.7 m (5 to 22 ft) wide depending on the material particle size, volume/density, and rate of travel, and wind.

Refer to the spreading charts along with **Determining the Distribution Pattern, Determining the Effective Spreading Width,** and **Calculating the Application Rate** sections to calibrate the machine.

Determining the Distribution Pattern

Operator supplied equipment: 15 shallow collection pans and 15 graduated measuring cylinders

The most accurate method to measure the distribution is to use shallow collection pans and graduated measuring cylinders. In the example below, 15 shallow collection pans approximately 30 cm (12 inches) wide, 91 cm (36 inches) long, and 5 cm (2 inches) tall are used.

1. Allow ample driving distance before the area where the collection pans are located to ensure that the machine is traveling at the desired speed (for spreading) before the machine reaches the collection pans.
2. Place one pan in the center of the drive path. Arrange the next two pans, one on each side, far enough apart to allow adequate room for the drive tires of the machine to pass around the center pan.
3. Place the remaining pans in a straight line as shown in Figure 23 or Figure 24.
   - For larger granule materials:

     Space six additional pans, on each side, 12 inches (30 cm) apart (Figure 23).

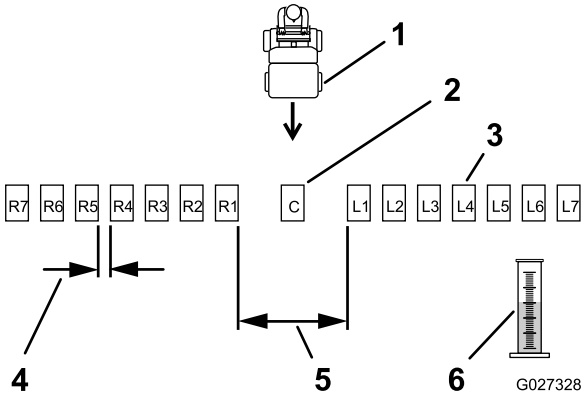


Figure 23

Pan spacing for larger granule materials

1. Spreader moving towards pans
2. Center pan
3. Collection pans (gap between each)
4. L1 and R1 collection pan gap (spread apart to allow machine to pass through)
5. 30 cm (12 inch) gap
6. Graduated measuring cylinder

   - For small granule materials:

     Place six additional pans, on each side, with no gap in between each pan (Figure 24).

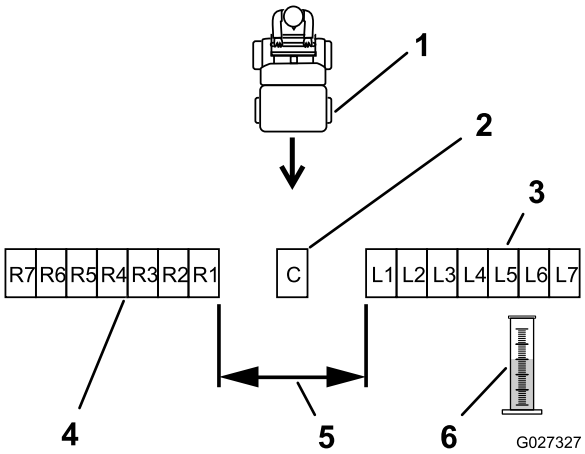


Figure 24

Pan spacing for small granule materials

1. Spreader moving towards pans
2. Center collection pan
3. Lest collection pans (no gap between each)
4. Right collection pans (no gap between each)
5. L1 and R1 collection pan gap (spread apart to allow machine to pass through)
6. Graduated measuring cylinder

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4. Set the drop rate cam to the recommended application rate; refer to Spreading Charts (page 31) to determine the appropriate drop-rate cam setting.
5. Fill the hopper approximately half-full with the desired material; refer to Filling the Spreader Hopper (page 28).
6. Set the spreader pattern control to the middle of its travel; refer to Adjusting the Spreader Pattern (page 32).
7. Set the impeller speed to the appropriate broadcasting rate.
8. Pull the wide distribution granular gate control to the open position and drive the spreader, at the appropriate speed, over the center pan.

   Note: Repeat broadcasting over the test site several times, moving in the same direction each time, until enough material is dispensed to the collection pan to fill a graduated cylinder 1/2–full
9. Label each graduated measuring cylinder to correspond with the distribution pans (i.e. ...L2, L1, Center, R1, R2....); refer to Figure 23 and Figure 24.
10. One at a time, take a collection pan and dump the contents into the corresponding graduated cylinder. Record the amount of material collected and return the pan to its location. Repeat this until all pan contents have been emptied.
11. With the graduated measuring cylinder in the same straight line as the pans, evaluate the volume of material in each cylinder to determine the quality of the distribution from the spreader.

12. To adjust the spreader pattern, refer to the Adjusting the Spreader Pattern (page 32).
13. Repeat steps 5 through 12 until an uniform pattern is achieved.

Determining the Effective Spreading Width

The effective width is used to determine the uniform distribution of the material.

Note: The spreading width range is 6 to 8 m (20 to 25 ft).

1. After the spreader pattern is correctly adjusted, evaluate the amount of material in the center graduated measuring cylinder.
2. Locate the two tubes, one each side of center, that contain 1/2 the measured amount of the material that you observed in the center graduated cylinder.
3. Go to the two corresponding pans. Starting from the outer edge, measure and record the distance between left pan, through the center pan, to the outer edge of the right pan.

   Note: This measurement is the effective spreading width.

Calculating the Application Rate

1. Determine the area and amount of material that you are applying to the job site.
2. Determine the calibration course length as follows:
   A. Initially, use the recommended rate indicated in the Spreading Charts (page 31) section or the rate recommended on the product manufacturer's label as a guide to help determine the amount of material that you would spread over a 93 m^2 (1,000 ft^2) area.
   B. Determine a course length by dividing 93 m^2 (1,000 ft^2) by the effective spread width.

      Note: For example, if the effective width is 1.8 meters (6 feet), then the calibration course length equals 51 m (167 ft).

Course Length

$$\frac{93\ m^2(1{,}000\ ft^2)}{1.8\ m\ (6\ ft)} = \textbf{51 m (167 ft)}$$

   C. The calibration course is 1.8 m (6 ft) by 51m (167 ft).
   D. Measure and visibly mark the course length. Make sure that you allow enough distance before the starting marker so that the spreader moving forward at full speed when crossing the first mark of the course.
3. Set the appropriate drop-rate cam setting; refer to the Spreading Charts (page 31) as a starting point.
4. Add material to the hopper (for example, add 11.3 kg (25 lb) add of material).
5. Drive the spreader over the calibration course while applying the material.
6. Empty the remaining material of the hopper into a clean bucket; refer to Emptying the Hopper (page 29).
7. Weigh the bucket containing the material and record the weight. Pour the contents back into the hopper and then weigh the empty bucket. Subtract these two amounts to determine the amount of material remaining in the hopper—for example, 9 kg (20 lb) of material is remained in the hopper after applying the material to the test course.
8. Subtract the amount remaining in the hopper (step 7) from the amount originally added (step 4); the result is the amount applied to the course.

Amount Applied

11.3 kg (25 lb) – 9 kg (20 lb) = **2.3 kg (5 lb)**

For this example, 2.3 kg (5 lb) of material was applied to the 93 m^2 (1,000 ft^2) test course.

9. If necessary, adjust the drop-rate cam to achieve the recommended application rate. Once the correct application rate is achieved, repeat this procedure an additional time to verify your results.

   Important: Designate a new calibration course each time, so the turf is not damaged by excessive application of material.

Using the Spreader

Filling the Spreader Hopper

Maximum hopper weight capacity: 79 kg (175 lb)

1. Drive the machine to the work site.
2. Move the machine to a level surface, move motion control lever to the Neutral position, stop the engine, and set the parking brake.
3. Ensure that the wide-distribution impeller-gate lever is in the fully forward (closed) position; refer to Wide-distribution Impeller Gate Lever (page 18).
4. Use the Spreading Charts (page 31) to determine the setting for the drop-rate cam (Figure 25).

   Note: If the setting is not listed for the type of material that you are using, set the cam to the setting with a lower value then adjust as needed.

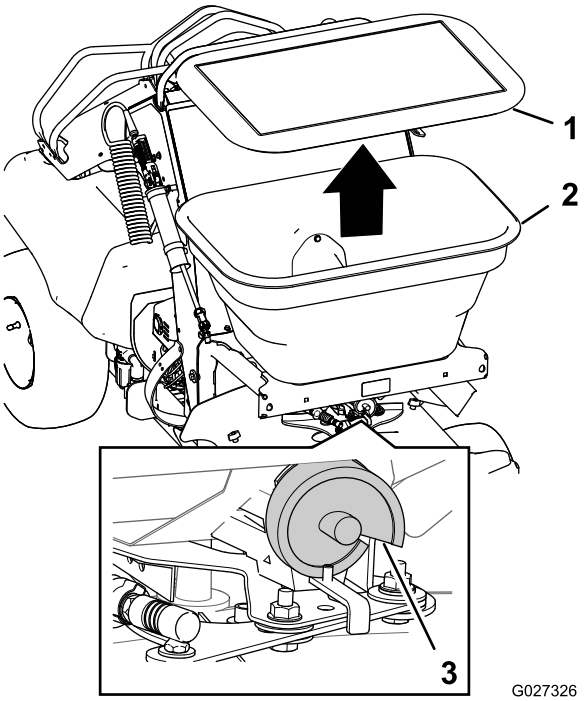


Figure 25

1. Cover
2. Hopper
3. Drop-rate cam

5. Remove the cover from the hopper, add the material to be spread, and install the cover onto the hopper (Figure 25).

   Note: Do not overload the hopper; the maximum weight capacity of the hopper is 175 lb (79 kg).

   Note: One extra bag of granular product may be placed on top of the sprayer tank; however, this is not recommended if the operator is heavy.

Emptying the Hopper

1. Move the machine to a level surface, move motion control lever to the Neutral position, stop the engine, and set the parking brake.
2. Empty the hopper by scooping out as much of the material as possible.
3. Remove the 4 thumb screws that secure the front cover (below the is below the impeller) to the chassis and remove the cover (Figure 26).

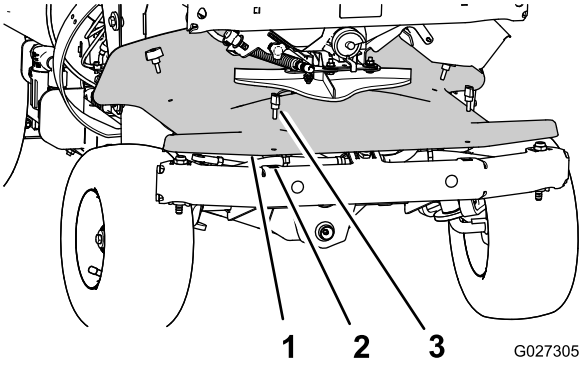


Figure 26

1. Forward cover
2. Clip nut
3. Thumb screw

4. Remove the drive pin that secure the impeller to the shaft of the impeller motor and remove the impeller from the shaft (Figure 27 and Figure 28).

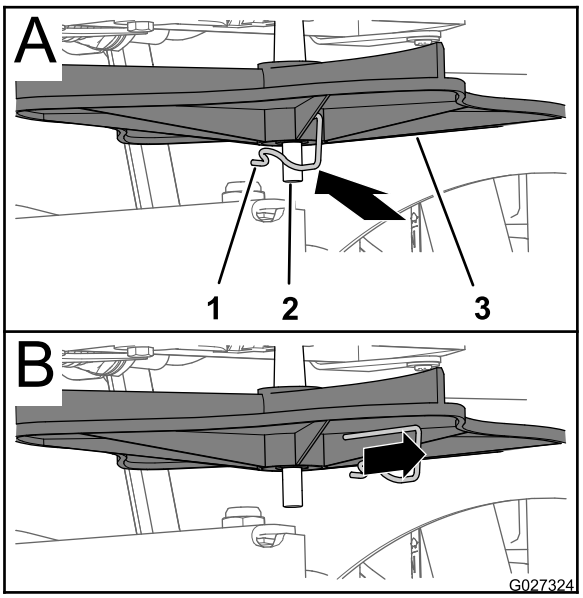


Figure 27

1. Drive pin (impeller)
2. Shaft (impeller motor)
3. Impeller

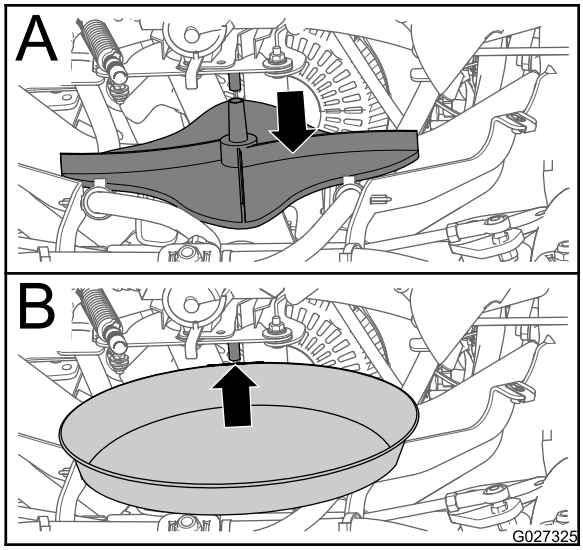


Figure 28

5. Place a shallow pan under the shaft of the impeller motor (Figure 28).
6. Open the hopper gate as follows:
   A. Push the locking sleeve for the gate cable rearward and lift the cable up from the ball stud of the rate gate linkage (Figure 29).

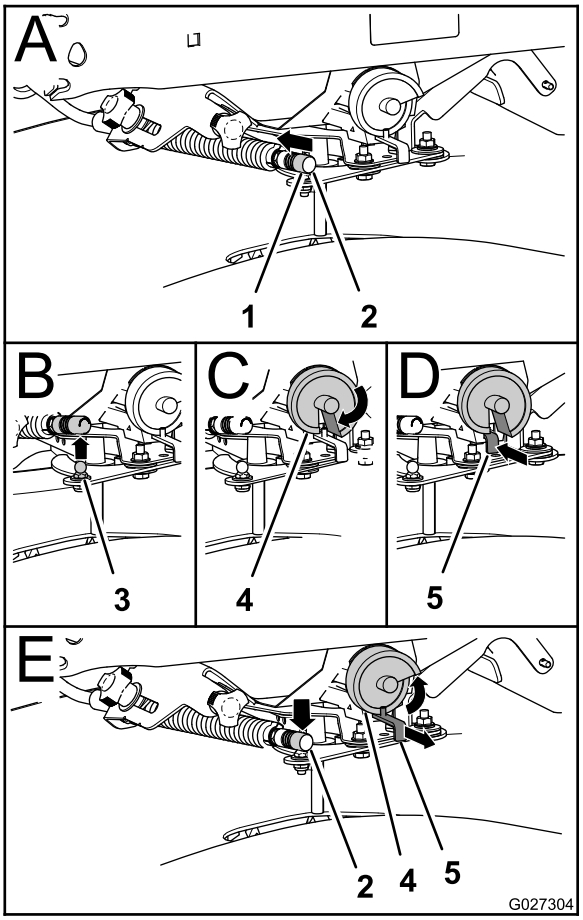


Figure 29

1. Locking sleeve
2. Gate cable
3. Ball stud
4. Drop-rate cam
5. Linkage

   B. Pull the cable off the ball stud (Figure 29).
   C. Rotate the drop-rate cam past the position 9 so that the slot in the cam is aligned with the linkage (Figure 29).
   D. Fully push the linkage rearward (Figure 29).
7. Allow the remaining material in the hopper to pour into the shallow pan and then remove the pan.
8. Connect the hopper gate cable as follows:
   A. Pull the linkage out until it clears the drop-rate cam (Figure 29).
   B. Move the wide-distribution impeller-gate lever forward.
   C. Attaching the cable to the ball stud at the gate lever(Figure 29).
9. Assemble impeller onto the impeller shaft and secure the impeller with the drive pin.
10. Align the holes in the front cover with the clip nuts in the chassis and secure the cover with the 4 thumb nuts that you removed in 3.

Spreading Charts

Note: The cam setting tables for pellet material and the grass seed are provided with permission from the Brinly-Hardy Company; reference the Brinly-Hardy Company website for more information.

These charts are to be used as an approximate guideline only. Other factors, such as weather conditions, spreader operation, and condition of materials, will affect your results.

Cam Settings for Pellet Material Application

Type	kg per 93 m² (lb per 1,000 ft²)	Cam Setting — One Pass	Cam Setting — Two Passes
Fine Pellets	0.5 (1)	3.6	3.1
	0.9 (2)	4.0	3.5
	1.4 (3)	4.2	3.7
Mixed Fine Pellets	0.9 (2)	3.7	3.2
	1.8 (4)	4.7	4.1
	2.7 (6)	5.2	4.5
Small Pellets	0.9 (2)	3	2.2
	1.8 (4)	4.2	3.7
	2.7 (6)	4.5	4
Nitrogen Pellets Medium Size	0.5 (1)	3.5	3
	0.9 (2)	4.2	3.7
	1.4 (3)	4.7	4
Medium Pellets and Granules	0.9 (2)	3.5	3
	1.8 (4)	4.2	3.8
	2.7 (6)	5.2	4.5
Large Heavy Pellets	0.9 (2)	3.8	3.3
	1.8 (4)	4.9	4.1
	2.7 (6)	5.9	4.9

The chart below is for reference only. When spraying and spreading at the same time, set the spread pattern to twice the width of the spray; this will help avoid striping and streaking. For example, standard spray width = 2.7 m (9 ft) and spread width = 5.4 m (18 ft).

Cam Settings for Grass Seed Application

Type	Bag Weight	Coverage - m² (ft²)	Cam Setting – Full Rate	Cam Setting – Half Rate	Spreader Width
Blue Grass or Red Top	0.23 kg (0.5 lb)	93 (1,000)	1.25		4
	0.45 kg (1 lb)	93 (1,000)	2.0		4
	0.9 kg (2 lb)	93 (1,000)	2.5		4
Park, Merion, Delta, or Kentucky Bluegrass	2.27 kg (.5 lb)	93 (1,000)	2.5		4
	0.45 kg (1 lb)	93 (1,000)	3.0		4
	0.9 kg (2 lb)	93 (1,000)	3.5		4
Hulled Bermuda	0.9 kg (2 lb)	93 (1,000)	2.75	2.25	6
	1.36 kg (3 lb)	93 (1,000)	3.0	2.5	6
	1.81 kg (4 lb)	93 (1,000)	3.25	2.75	6
Mixtures Including Coarse Seeds	0.9 kg (2 lb)	93 (1,000)	6.0		6
	1.81 kg (4 lb)	93 (1,000)	7.0		6
	2.72 kg (6 lb)	93 (1,000)	7.0		6

Cam Settings for Grass Seed Application (cont'd.)

Type	Bag Weight	Coverage - m² (ft²)	Cam Setting – Full Rate	Cam Setting – Half Rate	Spreader Width
Rye Grasses or Tall Fescue	0.9 kg (2 lb)	93 (1,000)	6.0		6
	1.81 kg (4 lb)	93 (1,000)	7.0		6
	2.72 kg (6 lb)	93 (1,000)	7.75		6
Dichondra	113 kg (4 oz)	93 (1,000)	1.9		8
	227 g (8 oz)	93 (1,000)	2.1		8
	340 g (12 oz)	93 (1,000)	2.5		8
Pensacola Bahia	1.81 kg (4 lb)	93 (1,000)	4.5	3.75	7
	2.27 kg (.5 lb)	93 (1,000)	4.75	4.0	7
	2.72 kg (6 lb)	93 (1,000)	5.0	4.25	7

Adjusting the Spreader Pattern

If the spreader is casting material in a unequal side-to side—too light/heavy to one side—(see Figure 30 and Figure 31), adjust the spreader pattern control as follows:

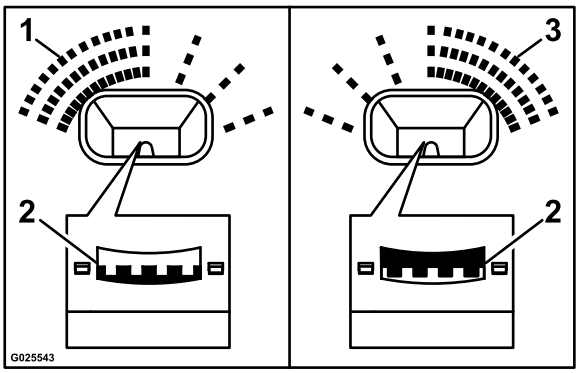


Figure 30

1. Heavy to left side
2. Move ramp pattern to shaded position
3. Heavy to right side

Note: Do not adjust the ramps that split product flow. Adjust only the front or rear ramp positions.

1. Unlock the spreader pattern control by turning the handle counterclockwise 90 degrees as shown in 2 of Figure 31.

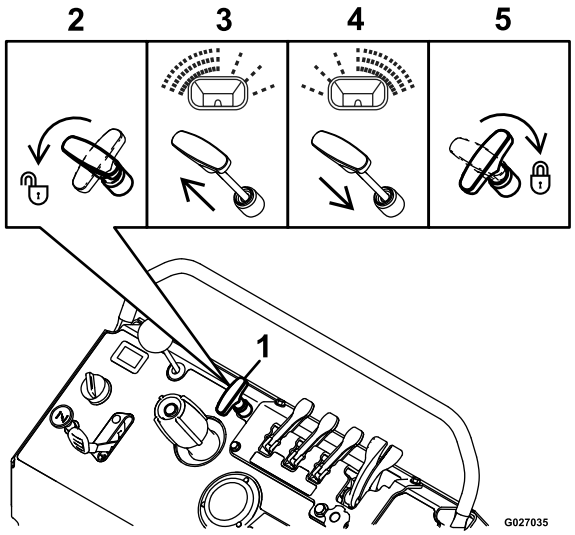


Figure 31

1. Spreader pattern control
2. Rotate counterclockwise to unlock
3. Start notch if pattern is heavy to left side
4. Start notch if pattern is heavy to right side
5. Rotate clockwise to lock

2. Adjust the spreader pattern as follows:
   - If the material is broadcast too heavy at the left side of the machine, pull up the spreader pattern control slightly up; refer to 3 of Figure 31.
   - If the material is broadcast too heavy at the right side of the machine, push down the spreader pattern control slightly down; refer to 4 of Figure 31.
3. Lock the spreader pattern control by turning the handle clockwise 90 degrees; refer to 5 of Figure 31.

Using the Deflector Gate

Use the deflector gate control to temporarily stop or deflect granular material away from sidewalks, parking lots, patios, or anywhere granular chemicals are not desired.

Note: The deflector gate changes the discharged of materials from the left side of the spreader only.

Push the knob for the deflector gate control down to lower the deflector and temporarily deflect the granular material.

Pull the knob up to raise the deflector for normal casting of materials at the left side of the machine..

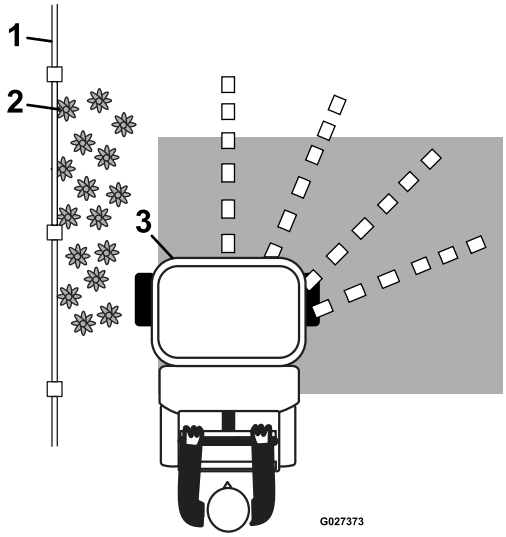


Figure 32

1. Fence
2. Flowers
3. Deflector gate lowered

Spreading Tips

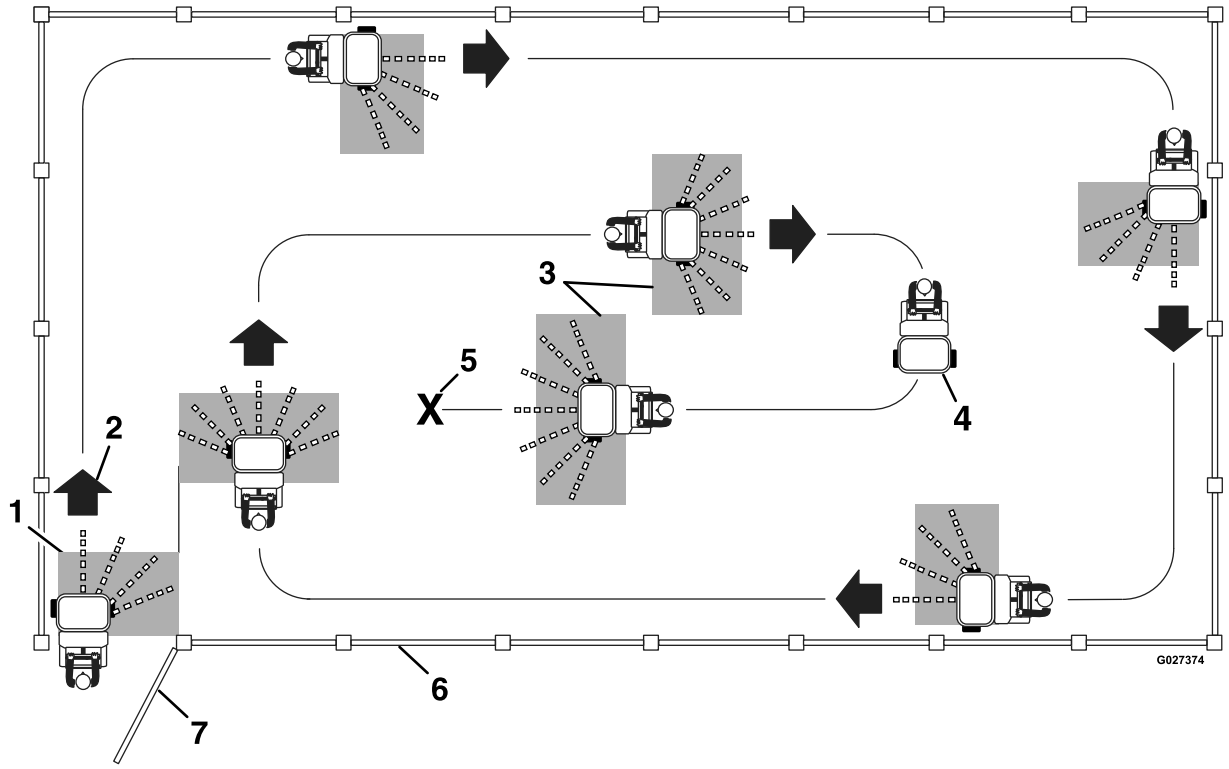


Figure 33
Spreader path example

1. Narrow distribution-side deflector lowered
2. Forward
3. Effective spreading width—variable 1.5 to 6.7 m (5 to 22 ft)
4. Do not spread when turning 180 degrees
5. End of spreading job
6. Property fence
7. Gate

- To ensure uniform application, broadcast the material in an overlapping pattern as shown in Figure 33. The highest amount of material will dispense from the front of the hopper and less material from each side. You can adjust the distribution pattern to achieve the desired results.
- Watch for changes in the distribution pattern; unequal distribution may lead to striping.

Note: Make sure that you calibrate the spreader before you start using the spreader.

1. Start the engine and place the throttle midway between the Slow and the Fast positions.
2. Set the impeller-speed control to appropriate broadcast rate and then press the impeller On/Off switch to the On position (Figure 34).

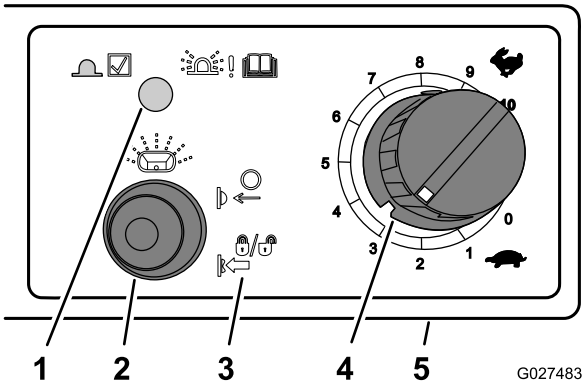


Figure 34

1. Indicator light
2. Impeller On/Off switch
3. Icon—press and hold the impeller On/Off button 5 seconds
4. Impeller-speed control
5. Spreader motor and sprayer motor controller

- To lock the impeller speed control, press and hold the impeller On/Off switch for 5 seconds (Figure 34).

Note: The indicator light above the impeller On/Off switch will flash at a constant rate.

Note: As long as the impeller speed control is locked (indicated by the flashing indicator light) the impeller motor will start and run at the last locked speed.

- To unlock the impeller speed control, start the impeller motor and then press and hold press and hold the On/Off switch for 5 seconds (the indicator light will illuminate steady).

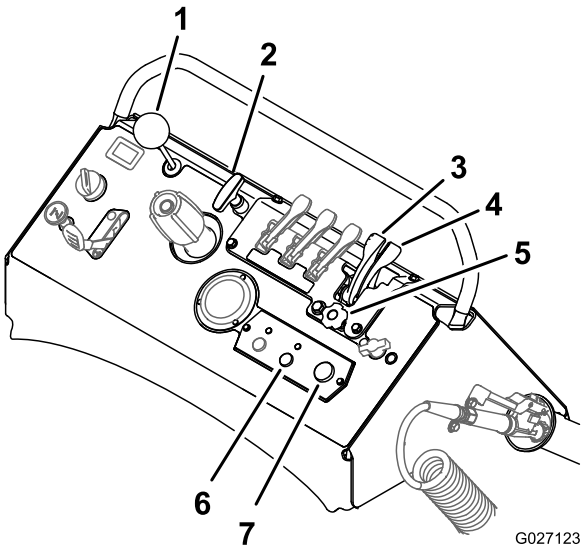


Figure 35

1. Deflector gate control
2. Spreader pattern control
3. Wide-distribution impeller-gate lever
4. Narrow-distribution impeller-gate lever
5. Narrow-spreader distribution flow-rate knob
6. Impeller On/Off switch
7. Impeller-speed control

3. Move the throttle to the Fast position and drive the machine forward.
4. Open the either the narrow or wide impeller-gate lever to begin spreading (Figure 36).

   Note: Use the narrow-spreader distribution flow-rate knob to control the discharge rate of granular material from the hopper onto the impeller when the narrow narrow-distribution impeller gate lever is in the Open position.

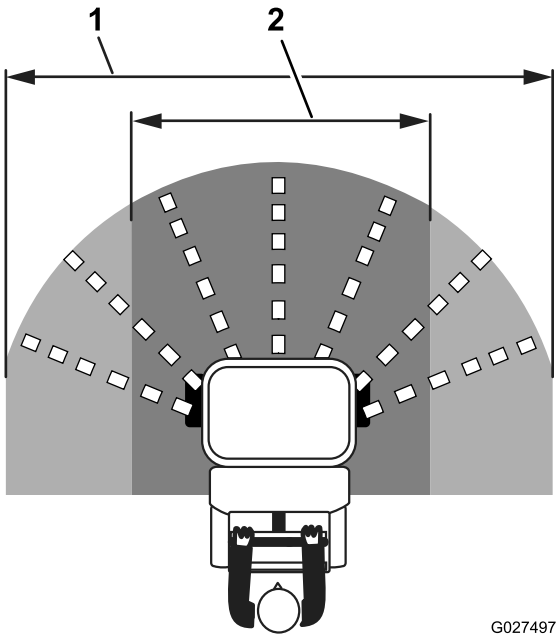


Figure 36

1. Wide spreader pattern—variable effective width to 6.7 m (22 ft) maximum
2. Narrow spreader pattern—variable effective width from 1.5 m (5 ft) minimum

5. Evaluate the spread pattern.

   Note: If adjustments to the spreading pattern are needed, refer to Calibrating the Spreader (page 27).
6. When you are finished spreading, close the wide-distribution impeller-gate lever.

   Note: Only the wide-distribution impeller-gate lever will close the impeller gate. Pushing the wide-distribution impeller-gate lever forward will also reset the narrow-distribution impeller-gate lever to the forward position.
7. Clean the hopper after **each** spreading session; refer to Cleaning and Lubricating the Spreader (page 35).

   Important: Always empty and clean the spreader immediately after each use. Failure to do so may cause the chemicals to corrode the spreader and other components.

Cleaning and Lubricating the Spreader

Service Interval: After each use

1. Drive the machine to a designated cleaning area with a level surface.
2. Stop the machine, move the motion control lever in the Neutral position, shut off the engine, and set the parking brake.
3. Empty the hopper; refer to steps 2 through 6 in Emptying the Hopper (page 29).
4. Using a garden hose, spray the inside and outside of the entire spreader with clean water (Figure 37).

Note: Do not use a power washer to clean the machine. The high pressure water may force residual corrosive materials into spreader-spreader components.

Note: Tilt the screen at the bottom of the hopper forward to clean the bottom components of hopper.

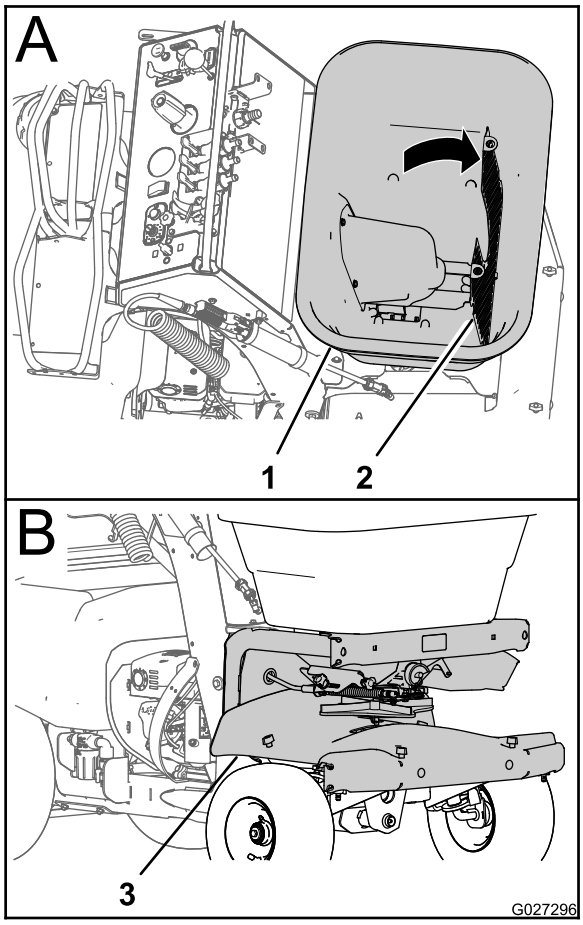


Figure 37

5. When the hopper has been thoroughly rinsed and drained, perform the following:
   A. Rotate the hopper screen down (Figure 37).
   B. Place the rate gate dial to a setting lower than the maximum open position and allow the spreader-sprayer to completely dry.(Figure 29).
   C. Connect the hopper gate cable; refer to step 8 in Emptying the Hopper (page 29).
6. Apply water-displacing lubricant to the components as shown in Figure 38.

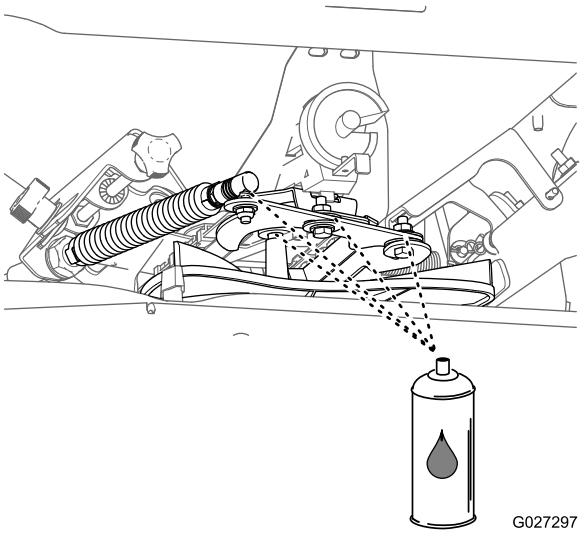


Figure 38

Operating the Sprayer

⚠ CAUTION

Chemicals are hazardous and can cause personal injury.

- **Read the chemical manufacture's directions on the label before handling the chemicals; follow all manufacturer recommendations and precautions.**
- **Keep chemicals away from your skin. Should contact occur, wash the affected area thoroughly with soap and clean water.**
- **Wear goggles, gloves, and any other protective equipment recommended by the chemical manufacturer.**

Use the sprayer to disperse liquid herbicides, pesticides, fertilizers, and other substances. Before using the sprayer make sure that you have cleaned the tank, plumbing, and nozzles before adding any chemicals. When you use the sprayer, you first fill the spray tank, then apply the chemical solution to the work site, and then when you are finished spraying, clean the tank. It is important to complete all three of these steps to avoid damaging the sprayer. For example, Do not mix and add chemicals in the spray tank the night before and then spray in the morning. This could lead to separation of the chemicals and possible cause damage to components of the sprayer.

Calibrating the Sprayer

Note: Before you use the sprayer for the first time or change the nozzles or when the sprayer is out of adjustment—calibrate the sprayer for ground speed and flow rate.

Note: The left and right sprayer boom nozzles are wide pattern (white)nozzles and the center nozzle is narrow pattern (red) nozzle.

Note: Refer to the chemical product label for output recommendations.

The method to calibrate the sprayer flow involves driving a preset distance, recording the time, and then measuring the amount of liquid applied during that time.

Calculating the Ground Speed

Operator supplied equipment: Stop watch capable of measuring ± 1/10 second.

1. Measure and visibly mark a course length to use to calculate your the average ground speed.

   Record your course length here _____.

   Note: Allow ample distance ahead of the starting marker to ensure the machine is at full ground speed when you cross the first marker of the course.

   Note: Example: the course length equals 45.7 m (150 ft).

2. Add clean water into the spray tank 1/2 full; refer to Filling the Spray Tank (page 41).
3. Drive the sprayer to an area far enough away from the course so that the machine will be traveling at the desired ground speed for spraying before the it reaches the first marker.
4. Use a stop watch to measure the time (in seconds) that it takes the machine to travel the marked course (45.7 m (150 ft) in this example) while maintaining the desired ground speed.

   Note: Record your course time in the course time worksheet.

Course Time Worksheet

	Time
Test 1	seconds
Test 2	seconds
Test 3	seconds

5. Repeat steps 2 through 4 2-additional times.
6. Stop the sprayer on a level surface, leave the motion control lever in the neutral position, and shut off the engine.
7. Average the three test run times (in seconds) using the average course time formula below:

   Record your the average course speed here _____.

Average Course Time Formula

Formula

$$\frac{\text{time 1 + time 2 + time 3}}{3} = \text{The average time to drive the course}$$

Example

$$\frac{21.6 + 19.1 + 18.4 \text{ seconds}}{3} = 19.7 \text{ seconds}$$

8. Use the ground speed formula below to determine the average ground speed.

   Record your the average ground speed here _____.

   Note: 1 kph = 16.6 m/minute (1 mph = 88 ft/minute)

Ground Speed Formula

Formula

$$\frac{\text{Distance traveled m (ft) x 60 seconds}}{\text{Time (seconds) x 16.7 m/minute (88 ft/minute)}} = \text{Speed (mph)}$$

Example

$$\frac{45.7 \text{ m (150 ft) x 60 seconds}}{\text{19.7 seconds x 16.6 m/minute (88 ft/minute)}} = \text{8.4 kph (5.2 mph)}$$

Understanding the Effective Spray Pattern Width

Note: Sprayer pressure regulator: 2.8 bar (40 psi).

- The narrow spray pattern (Figure 39) on the machine is **122 cm (48 inches)** wide.

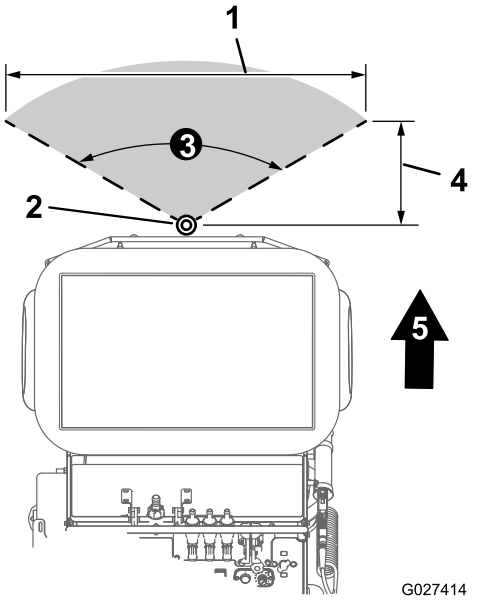


Figure 39

Top view of the narrow pattern spray nozzle

1. Spray width = 122 cm (48 inches)
2. Nozzle
3. Spray angle = 120 degrees
4. Spray distance = 36 cm (14 inches)
5. Front of the machine

- The wide spray pattern (Figure 40) on this machine is **274 cm (108 inches)** wide.

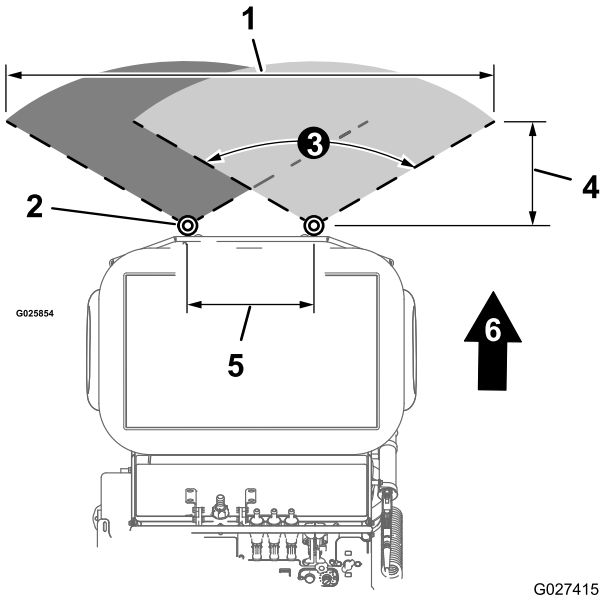


Figure 40

Top view of the wide pattern spray nozzles

1. Spray width = 274 cm (108 inches)
2. Nozzle
3. Spray angle = 120 degrees
4. Spray distance = 61 cm (24 inches)
5. Distance between spray nozzles = 66 cm (26 inches)
6. Front of the machine

Testing the Sprayer Nozzle Discharge

Operator supplied equipment: Stop watch capable of measuring ± 1/10 second and a container graduated in 50 ml (1 fl-oz) increments.

Note: Ensure that there is enough clean water in the tank to complete the calibration.

1. Set the parking brake and turn the engine on.
2. Set the pump/tank agitation switch to the On position.
3. Pull the agitation lever rearward to turn on the tank agitation.
4. Place the throttle to the Fast position.
5. Push the agitation control lever down to the Off position.

   Note: Shut off the agitation to ensure proper spray pressure and distribution.
6. Use the spray pressure control to adjust the pressure sprayer system to 40 psi (2.8 bar).

   Note: The red and white nozzles installed on this unit have a normal operating pressure of 40 psi (2.8 bar).
7. Align the graduated container under each nozzle for **19.7 seconds**.

   Note: Record the amount of water collected from each nozzle in the collection worksheet below.

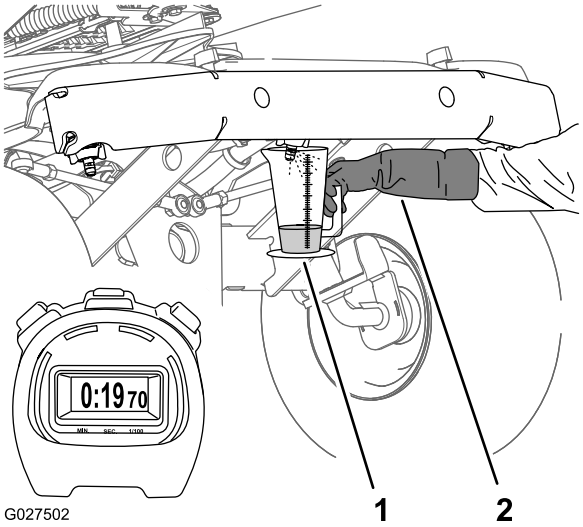


Figure 41

1. Graduated container
2. Personal protective equipment—chemical resistant gloves

Collection Worksheet

	Left sprayer nozzle	Center sprayer nozzle	Right sprayer nozzle
Test 1	ml (fl-oz)	ml (fl-oz)	ml (fl-oz)
Test 2	ml (fl-oz)	ml (fl-oz)	ml (fl-oz)
Test 3	ml (fl-oz)	ml (fl-oz)	ml (fl-oz)

8. Repeat test step 7 for each nozzle 2-additional times.
9. Turn off the pump/tank agitation switch.
10. Calculate the average quantity of water discharged using the average discharge formula for each nozzle.

Average Discharge Formula

Formula $\frac{\text{test 1 + test 2 + test 3}}{3}$ = The average spray nozzle discharge in 19.7 seconds

Example center nozzle—narrow pattern (red) $\frac{\text{475 ml (16.05 fl oz) + 507 ml (17.15 fl oz) + 504 ml (17.05 fl oz)}}{3}$ = 0.49 L (16.75 fl oz)

A. **Record the average quantity of water collected from the right nozzle here _____.**

B. **Record the average quantity of water collected from the center nozzle here _____.**

C. **Record the average quantity of water collected from the left nozzle here _____.**

Converting the Time and Collection Results to Flow Rate

1. Convert the milliliters (fluid ounce) quantities that you calculated in step 10 of Testing the Sprayer Nozzle Discharge (page 38) to liters (gallons) using the quantity conversion formula.

Note: 1 US gallon = 128 fl-oz

Quantity Conversion Formula

Formula $\frac{\text{Result (X) ml (fl-oz)}}{\text{.1 L (128 fl-oz)}}$ = (X) L (US gallon)

Example center nozzle—narrow pattern (red) $\frac{\text{490 ml (16.75 fl oz)}}{\text{.1 L (128 fl-oz)}}$ = 0.49 L (0.13 US gallon)

A. **Record the converted quantity of water collected for the right nozzle here _____.**

B. **Record the converted quantity of water collected for the center nozzle here _____.**

C. **Record the converted quantity of water collected for the left nozzle here _____.**

2. Calculate the flow rate of each nozzle using the flow rate formula.
3.

Flow Rate Formula

Formula $\frac{\text{Result (X) L (US gallon) x 60 seconds}}{\text{19.7 seconds}}$ = (X) L (US gallon)

Example center nozzle—narrow pattern (red) $\frac{\text{.49 L (0.13 US gallon) x 60 seconds}}{\text{19.7 seconds}}$ = 3.07 L (0.40 US gallon) per minute

A. **Record the flow rate of water collected for the right nozzle here _____.**

B. **Record the flow rate of water collected for the center nozzle here _____.**

C. **Record the flow rate of water collected for the left nozzle here _____.**

Note: If the collected nozzle spray does not meet the quantity in the Nozzle Flow Rate Chart (page 39), check the nozzles, hoses, and fittings for leaks or damage; clean or replace if needed.

Nozzle Flow Rate Chart

The following chart is based on the nozzle capacity information chart provided with permission from TeeJet® Technologies. Use the chart below or reference the TeeJet® Technologies website to determine if the flow rate of the sprayer nozzle is within the specified flow rate (+/– 10%).

Note: The chart information below is based on the machine spraying water spraying at 70˚F (21˚C).

Center Nozzle—Narrow Pattern (red)

Pressure	Flow Rate—New		Flow Rate—In Service Nozzle
0.7 bar (10 psi)	769 ml (26 fl-oz) /min	0.76 L (0.20 US gallon) /min	0.68 to 0.75 L (0.18 to 0.22 US gallon) /min
1.4 bar (20 psi)	1065 ml (36 fl-oz) /min	1.06 L (0.28 US gallon) /min	0.95 to 1.17 L (0.25 to 0.31 US gallon) /min

Center Nozzle—Narrow Pattern (red) (cont'd.)

2.1 bar (30 psi)	1331 ml (45 fl-oz) /min	1.32 L (0.35 US gallon) /min	1.19 to 1.45 L (0.32 to 0.39 US gallon) /min
2.8 bar (40 psi)	1508 ml (51 fl-oz) /min	1.51 L (0.40 US gallon) /min	1.36 to 1.66 L (0.36 to 0.44 US gallon) /min

Left and Right Nozzles—Wide Pattern (white)

Pressure	Flow Rate—New		Flow Rate—In Service Nozzle
0.7 bar (10 psi)	1508 ml (51 fl-oz) /min	1.51 L (0.40 US gallon) /min	1.36 to 1.66 L (0.36 to 0.44 US gallon) /min
1.4 bar (20 psi)	2159 ml (73 fl-oz) /min	2.16 L (0.57 US gallon) /min	1.94 to 2.38 L (0.51 to 0.63 US gallon) /min
2.1 bar (30 psi)	2602 ml (88 fl-oz) /min	2.61 L (0.69 US gallon) /min	2.35 to 2.87 L (0.62 to 0.76 US gallon) /min
2.8 bar (40 psi)	3017 ml (102 fl-oz) /min	3.03 L (0.80 US gallon) /min	2.73 to 3.33 L (0.72 to 0.88 US gallon) /min

Determining Application Rate

Use the example results of the calculated speed, spray width, and nozzle capacity to determine the application rate.

Note: The application rate may also be determined by using the Nozzle Flow Rate Chart (page 39), along with the chemical manufacturer's label of recommendation.

The examples below are based on the following information:

- Average ground speed = 8.4 kph (5.2 mph)
- Spray width = 2.7 m (108 inches)
- Number of nozzles = 2
- Nozzle capacity = 3.0 L/min (.79 gpm)

Note: The numbers 6 and 600 are constants used in the formulas shown below.

Liter per 100 m² Application Rate

$$\frac{\text{Single nozzle capacity (Lpm) x Number of nozzles x 6}}{\text{Speed (kph) x Spray width (m)}} = \frac{\text{L}}{100\ \text{m}^2}$$

$$\frac{2.99\ \text{Lpm} \times 2 \times 6}{8.369\ \text{kph} \times 2.743\ \text{m}} = \textbf{1.563 L/100 m}^2\textbf{(1.5 qt/1,000 ft}^2\textbf{)}$$

Liter per Hectar Application Rate

$$\frac{\text{Single nozzle capacity (Lpm) x Number of nozzles x 600}}{\text{Speed (kph) x Spray width (m)}} = \frac{\text{L}}{\text{hectar}}$$

$$\frac{2.99\ \text{Lpm} \times 2 \times 600}{8.369\ \text{kph} \times 2.743\ \text{m}} = \textbf{156 L/hectar(16.7 gal/acre)}$$

Note: The numbers 544; 136; and 5,940 are constants used in the formulas shown below.

Quart per 1,000 ft² Application Rate

$$\frac{\text{Single nozzle capacity (gpm) x Number of nozzles x 544}}{\text{Speed (mph) x Spray width (inches)}} = \frac{\text{qt}}{1{,}000\ \text{ft}^2}$$

$$\frac{0.79\ \text{gpm} \times 2 \times 544}{5.2\ \text{mph} \times 108\ \text{inches}} = \textbf{1.5 qt/1,000 ft}^2\ \textbf{(1.5 L/100 macre}^2\textbf{)}$$

Gallon per 1,000 ft ² Application Rate

$$\frac{\text{Single nozzle capacity (GPM) x Number of nozzles x 136}}{\text{Speed (mph) x Spray width (inches)}} = \frac{\text{gal}}{1{,}000\ \text{ft}^2}$$

$$\frac{0.79\ \text{gpm} \times 2 \times 136}{5.2\ \text{mph} \times 108\ \text{inches}} = \textbf{0.38 gal/1,000 ft}^2\ \textbf{(1.5 L/100 m}^2\textbf{)}$$

Gallon per Acre Application Rate

$$\frac{\text{Single nozzle capacity (gpm) x Number of nozzles x 5,940}}{\text{Speed (mph) x Spray width (inches)}} = \frac{\text{gal}}{\text{acre}}$$

$$\frac{0.79\ \text{gpm} \times 2 \times 5{,}940}{5.2\ \text{mph} \times 108\ \text{inches}} = \textbf{16.7 gal/acre (156.1 L/ha)}$$

Using the Sprayer

Before Operating the Sprayer

Some chemicals are more aggressive than others and each chemical interacts differently with various materials. Some consistencies of sprayer chemicals (e.g. wettable powders, charcoal) are more abrasive and lead to higher wear rates. If a chemical is available in a formulation that would provide increased life to the sprayer, use this alternative formulation.

Make sure the sprayer is calibrated before you start using the machine; refer to Calibrating the Sprayer (page 37).

Filling the Spray Tank

Important: Ensure that the chemicals that you are using in the sprayer are compatible for use with O-rings and seals made from fluoroelastomer material (refer to the chemical manufacturer's label; it should indicate if it is not compatible). If you use a chemical that is not compatible with fluoroelastomer material, the O-rings and seals in the sprayer will degrade and leak.

Important: Before applying chemicals to the job site, verify that you have set the proper application rate prior to filling the tank.

1. Drive the machine to a level surface, move motion control lever to the neutral position, shut off the engine, and set the parking brake.
2. Ensure that the handle for the drain valve for the tank rotated 90 degrees counterclockwise to the is closed position (Figure 42).

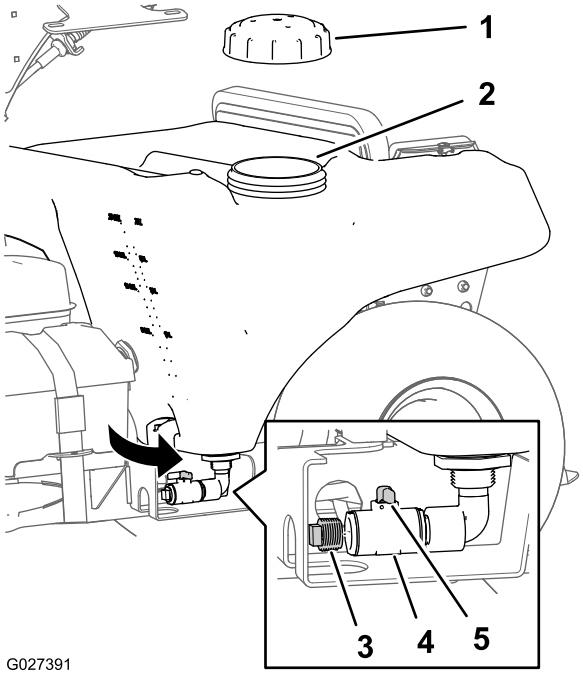


Figure 42

1. Cap (sprayer tank)
2. Filler neck (sprayer tank)
3. Plug
4. Drain valve
5. Handle (Off position shown)

3. Determine the amount of water needed to mix the amount of chemical needed as specified by the chemical manufacturer.
4. Open the tank cap on the spray tank (Figure 42).
5. Add 3/4 of the required water to the sprayer tank through the filler neck.

   Important: Always use fresh clean water in the spray tank. Do not pour chemical concentrate into an empty tank.
6. Rotate the pump-shutoff valve clockwise to the Open position (Figure 43).

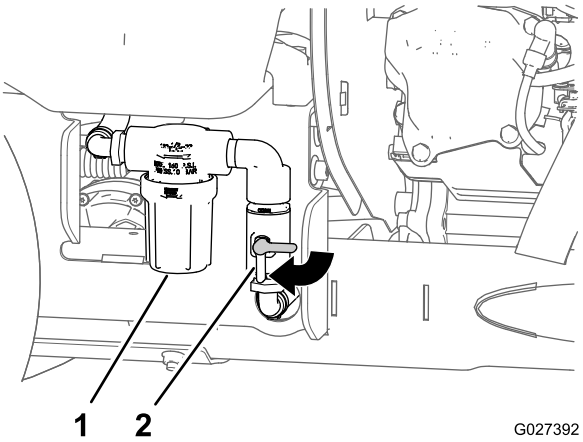


Figure 43

1. Strainer (sprayer tank)
2. Pump-shutoff valve

7. Start the engine and set the throttle midway between the Slow and Fast positions.
8. Set the sprayer pump switch to the On position (Figure 44).

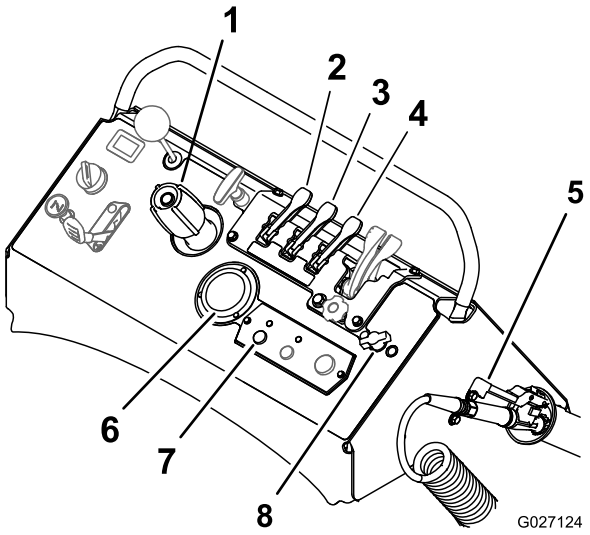


Figure 44

1. Sprayer pressure control
2. Agitation pump lever
3. Narrow spray pattern lever
4. Wide spray pattern lever
5. Sprayer pressure gauge
6. Sprayer pump/tank-agitation switch

9. Move the throttle to the Fast position.
10. Pull rearward on the tank agitation lever to the On position.

    Note: The water in the tank will circulate.
11. Add the specified amount of chemical concentrate to the tank as directed by the chemical manufacturer.

    Important: If you are using a wettable powder chemical, mix the powder with a small amount of water to form a liquid slurry before adding the chemical mixture to the tank.
12. Add remaining water to the tank and install cap onto the filler neck of the tank.

    Note: Allow the content of the sprayer tank to thoroughly mix

Emptying the Sprayer Tank

Operator supplied equipment: Drain hose with a 1/2–14 inch NPT male coupling and a drain container (capacity varies with remaining sprayer tank content).

1. Drive the machine to a level surface at the designated area for emptying and cleaning the sprayer tank, move motion control lever to the neutral position, shut off the engine, and set the parking brake.
2. Remove plug from the drain valve for the sprayer tank (Figure 45).

    Note: The drain valve is located at the left side of the machine.

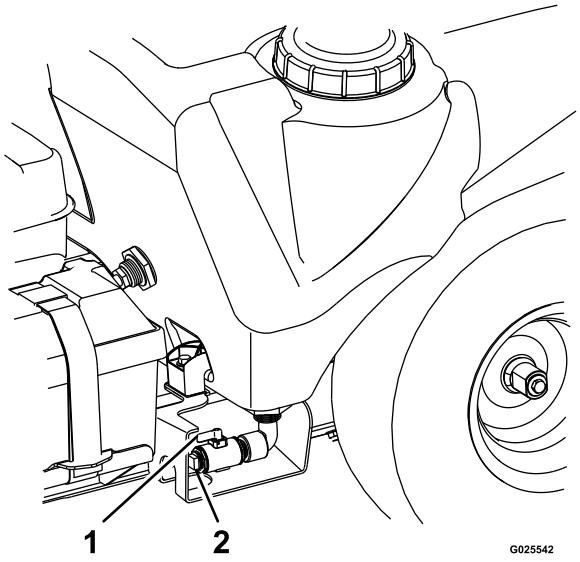


Figure 45

1. Handle (drain valve)
2. Plug

3. Thread a drain hose (operator provided) into the end of the drain valve.
4. Put the free end of the drain hose into a container with enough capacity to hold the remaining content of the sprayer tank.

    Note: Use the quantity marks at the front left side of the sprayer tank for determine the quantity of chemical solution in the tank.
5. Rotate the handle for the drain valve clockwise 90° to drain the tank (Figure 45).

    Note: Allow the sprayer tank to drain completely.
6. Close the tank drain valve, remove the drain hose and install the drain plug into the valve (Figure 45).

    Note: Dispose of the waste sprayer chemicals according to local codes and the chemical manufacturer's instructions.

Cleaning the Sprayer Tank

Service Interval: After each use

⚠ WARNING

Swallowing or inhaling chemicals could cause serious injury or death.

- **Do not clean sprayer nozzles using your mouth or blowing through the nozzles.**
- **Replace all worn and damaged sprayer nozzles.**
- **Make sure that the nozzles are installed correctly.**

Important: Always empty and clean the sprayer immediately after each use. Failure to do so may cause

the chemicals to dry or thicken in the lines, clogging the pump and other components.

Clean the spray system after **each** spraying session.

1. Empty the sprayer tank; refer to Emptying the Sprayer Tank (page 42).
2. Fill the sprayer tank with 19 L (5 US gallons) or more of clean water and install the cap; refer to Filling the Spray Tank (page 41).
3. Start the engine (Figure 46) and ensure that the motion control lever in neutral position; refer to Starting the Engine (page 24).

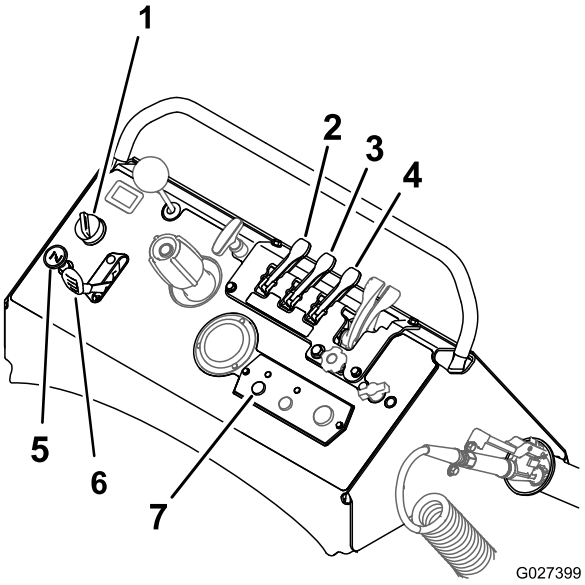


Figure 46

1. Ignition switch
2. Agitation pump lever
3. Narrow spray pattern lever
4. Wide spray pattern lever
5. Choke
6. Throttle
7. Sprayer pump/tank-agitation switch

4. Set the sprayer pump switch to the On position, and set the engine throttle to Fast position (Figure 46).
5. Move the tank agitation lever to the On position (Figure 46).
6. Pull back both narrow and wide spray pattern levers to the On position (Figure 46).

   Note: The sprayer nozzles will to begin spraying.
7. Allow the rinse water in the tank to spray out through the nozzles.
8. Check that all 3 nozzles are spraying correctly.
9. Remove the sprayer wand from the holder, point the wand in a safe direction, and squeeze the trigger; refer to Spray Wand Trigger and Trigger Lock (page 19).

   Note: Allow the rinse water to discharge from the wand for 1 to 2 minutes.
10. Release the trigger for the wand and return it to the holder on the machine (Figure 8).
11. Move the spray pattern levers forward to the Off position, set the sprayer pump switch to the Off position, and shut off the engine (Figure 46).
12. Clean the strainer; refer to Cleaning the Strainer (page 43)
13. Repeat steps 2 through 12 using cleaners and neutralizers recommended by the chemical manufacturers; refer to Filling the Spray Tank (page 41).
14. Repeat steps 2 through 12 using clean water only.
15. Using a garden hose, wash off the outside of the sprayer tank with clean water.

    Note: Do not use a power washer to clean the machine. The high pressure water may force residual corrosive materials into spreader-spreader components.
16. Remove and clean the sprayer nozzles; refer to Cleaning the Sprayer Nozzle (page 44).

    Note: Replace damaged or worn nozzles.
17. Allow the spreader-sprayer to completely dry before the next use.

Cleaning the Strainer

Service Interval: After each use

Important: If you used wettable powder chemicals, clean the strainer after each time that you rinse the sprayer tank.

1. Empty the tank; refer to Emptying the Sprayer Tank (page 42)
2. Rotate the handle for the sprayer pump supply valve 90° counterclockwise (Figure 47).

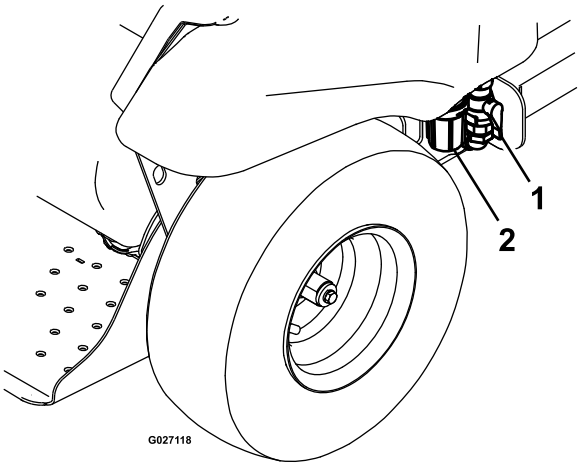


Figure 47

1. Pump-shutoff valve
2. Strainer

3. Align a drain pan under the strainer (Figure 47).

4. Rotate the strainer bowl counterclockwise and remove the bowl and screen from the body of the strainer (Figure 48).

   Note: Remove the strainer bowl by hand.

   Note: Replace the gasket or screen or both if these parts are worn or damaged

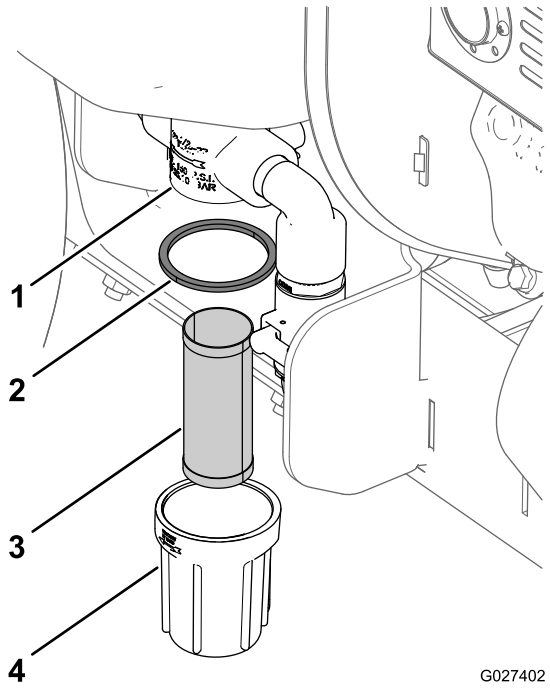


Figure 48

1. Strainer body
2. Gasket
3. Screen
4. strainer bowl

5. Allow any residual chemical solution to drain from the strainer body.

   Note: Dispose of the waste solution according to local codes and the chemical manufacturer's instructions.

6. Use a soft-bristle brush and clean water to clean the screen and bowl
7. Install the screen into the strainer body (.Figure 48).
8. Install the strainer bowl onto the strainer body and hand tighten the bowl (Figure 48).
9. Rotate the handle for the sprayer pump supply valve 90° clockwise (Figure 47).

Cleaning the Sprayer Nozzle

Service Interval: After each use

1. Rotate the nozzle cap 90° counterclockwise and remove the cap from the nozzle body (Figure 49).

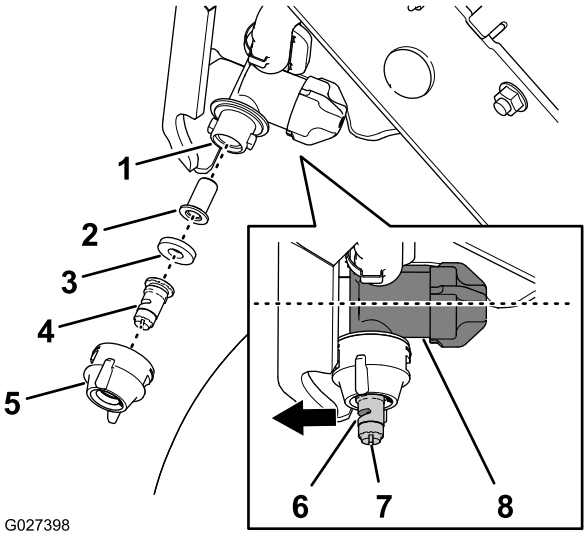


Figure 49

1. Nozzle body
2. Strainer
3. Gasket
4. Sprayer tip
5. Nozzle cap
6. Atomizer
7. Slot
8. Regulator case

2. Remove the sprayer tip, gasket, and strainer from the nozzle body (Figure 49).

   Note: Replace any worn or damaged nozzle parts.

3. Use a soft-bristle brush and clean water to clean the nozzle tip, gasket, and strainer.
4. Assemble the strainer into the nozzle body (Figure 49).
5. Assemble the sprayer tip and gasket into the nozzle cap (Figure 49).
6. Install the tip, gasket, and cap onto the nozzle body (.Figure 49).

   Note: Use the slot to rotate the atomizer (Figure 49) of the sprayer tip forward (in-line with the flow-regulator case of the nozzle body).

7. Rotate the nozzle cap 90° clockwise (Figure 49).
8. Repeat steps 1 through 7 for the 2 other sprayer nozzles.

Spraying with the Sprayer Boom

Important: In order to ensure that your chemical solution remains well mixed, use the agitation feature whenever you have solution in the tank. For the agitation feature to work, set the sprayer pump switch to the On position, pull back the tank agitation lever, and run the engine at high idle. If you stop the machine and agitation is needed, leave the motion control lever in the Neutral position, set the parking brake, increase the throttle to the Fast position, switch on the pump and set agitation lever.

Note: Move the tank agitation lever forward before spraying to ensure proper sprayer pump pressure. There is some agitation effect even while the tank agitation lever is in the Off position.

Note: Make sure the sprayer is calibrated before starting spray application

1. Set the sprayer pump switch is in the On position.
2. Drive to the work site where you will spray.
3. Push forward the tank agitation lever to the Off position.
4. Rotate the sprayer pressure control to the setting that you determined in Calibrating the Sprayer (page 37).
5. Move the narrow or wide spray pattern lever to the On position and begin spraying.

   Important: Do not use both the narrow and wide controls at the same time.

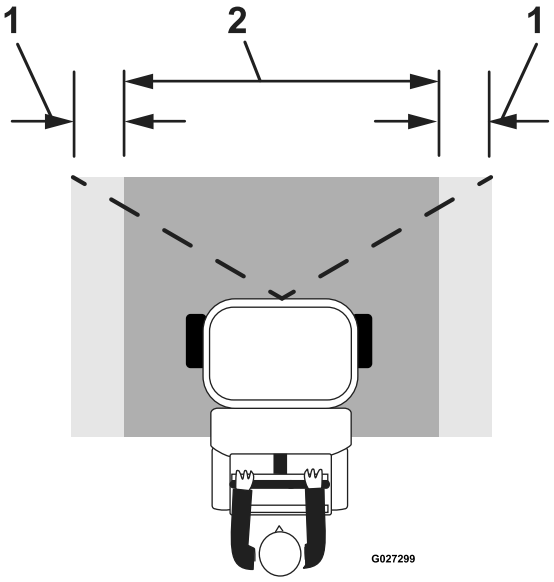


Figure 50
Narrow spray pattern

1. Overlap area (narrow spray pattern)
2. Effective spray area

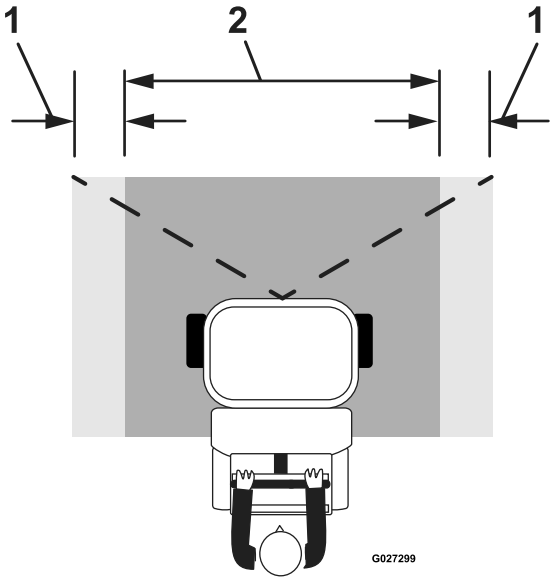


Figure 51
Wide spray pattern

1. Overlap area (wide spray pattern)
2. Effective spray area

6. When finished spraying, perform the following:
   A. Push forward the spray pattern lever.
   B. Set the sprayer pump switch is in the Off position.

   Note: If you need to continue to mix the sprayer tank contents, leave the sprayer pump switch and the tank agitation lever in the On position for sprayer tank agitation.

Spraying Tips

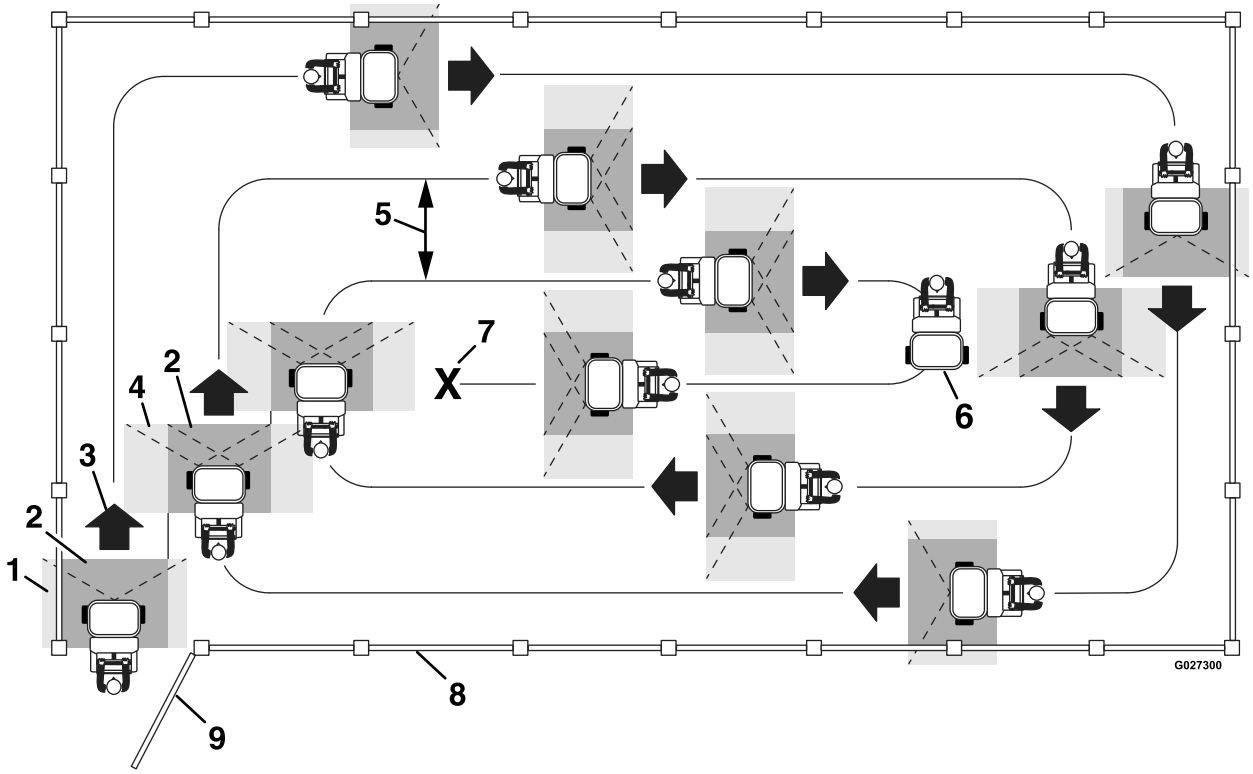


Figure 52

1. Overlap area (narrow spray pattern)
2. Effective spray area
3. Forward
4. Overlap area (wide spray pattern)
5. 2.4 m (8 ft)
6. Sprayer Off (do not spray when turning the machine 180°)
7. End of spraying job
8. Property fence
9. Gate

- Do not overlap the effective spray area that you have previously sprayed (see Figure 52).
- Watch for plugged sprayer nozzles.
- Move the narrow and wide spray pattern levers to the Off position to stop the spray flow before stopping the motion of the machine. Once stopped, leave the motion control lever in neutral and leave the sprayer pump switch in the On position..
- You will obtain better results if the machine is moving when spray controls are turned on.
- To ensure adequate pump pressure for proper spray distribution, push forward the tank agitation lever.
- Watch for changes in the application rate. Changes in the application rate indicate that your ground speed has changed beyond the operating range of the nozzles or there is a problem with the sprayer system.

Note: When the tank is nearly empty, the tank agitation may cause foaming of the chemical solution in the tank. In this case, push forward the tank agitation lever to the Off position. Alternatively, an anti-foaming agent can be used in the tank (if compatible with the existing chemical).

Spraying with the Spray Wand

⚠ WARNING

The spray wand traps liquids under high pressure, even when engine is off. High pressure spray discharge could cause serious injury or death.

- **Keep clear of nozzle and do not direct the spray or stream from the wand at people, pets, or non-work area property.**
- **Do not direct spray at or near electrical power components or source.**
- **Do not repair the spray wand, hoses, seals, nozzle, or other wand components; always replace them.**
- **Do not attach hoses or other components to the nozzle at the end of the spray wand.**
- **Do not attempt to disconnect the spray wand from the unit while the sprayer system is pressurized.**
- **Do not use spray wand if trigger lock is damaged or missing.**
- **Rotate the spray wand lock to the Off position when job is complete.**

1. Remove the wand from the holder at the right side of the machine (Figure 53).

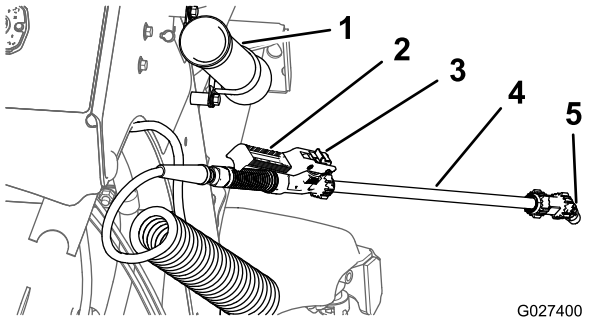


Figure 53

1. Holder
2. Trigger
3. Trigger lock
4. Wand
5. Nozzle

2. Firmly grip the spray wand and point it in the direction that you will spray.

   Note: Wand may recoil; make sure to hold the wand securely.

3. Adjust the pump pressure to the spray wand perform the following:
   - To increase pump pressure to the wand, rotate the wand pressure control counterclockwise (Figure 54).

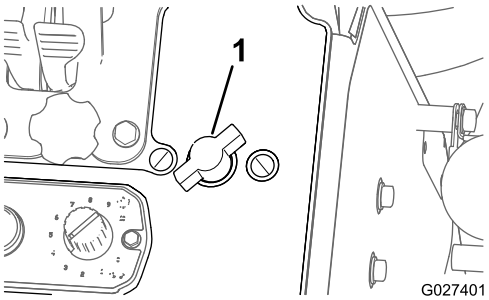


Figure 54

1. Sprayer wand pressure control

   - To decrease pressure to the wand, rotate the control clockwise direction (Figure 54).
   - To shut off pressure to the wand, rotate the wand pressure control clockwise until the valve for the control is closed (Figure 54).

4. Squeeze the trigger to the spray wand handle to begin spraying; lock the trigger in place if desired (Figure 53).
5. When finished spraying, perform the following:
   A. Rotate the spray wand lock to the Off position(if applicable) and release the trigger (Figure 53).
   B. Rotate the sprayer wand pressure control clockwise to the Off position (Figure 54).
   C. Put the wand back into the wand holder (Figure 53).

Transporting the Machine

Machine weight: 227 kg (500 lb)—both sprayer tank and hopper empty; 389 kg (857 lb)—both sprayer tank and hopper full

⚠ CAUTION

This machine does not have proper turn signals, lights, reflective markings, or a slow moving vehicle emblem. Driving on a street or roadway without such equipment is dangerous and can lead to accidents causing personal injury. Driving on a street or roadway without such equipment may also be a violation of State laws and the operator may be subject to traffic tickets and/or fines.

Do not drive a machine on a public street or roadway.

Loading the Machine onto a Transport Vehicle

⚠ WARNING

Loading the machine onto a trailer or truck increases the possibility of backward tip-over, and could cause serious injury or death.

- **Use extreme caution when operating a machine on a ramp.**
- **Use only a single, full-width ramp; do not use individual ramps for each side of the machine.**
- **If individual ramps must be used, use enough ramps to create an unbroken ramp surface wider than the machine.**
- **Do not exceed a 15-degree angle between ramp and ground, or between a ramp, a trailer, or a truck.**
- **Avoid sudden acceleration while driving machine up a ramp to avoid tipping backward.**
- **Avoid sudden deceleration while backing machine down a ramp to avoid tipping backward.**

Important: Do not attempt to turn the machine while on the ramp; you may lose control and drive off the side.

- Use extreme caution when loading units onto trailers or trucks.
- Use 1 full-width ramp that is wide enough to extend beyond the rear tires is recommended instead of individual ramps for each side of the machine (Figure 55). The platform, when down and locked into position, must extend back between the rear wheels and serves as a stop for tipping backward. Having a full-width ramp provides a surface for the platform to contact if the machine starts to tip backward. With the platform up, a full-width ramp provides a surface to walk on behind the machine.
- The ramp should be long enough so that the angles do not exceed 15 degrees (Figure 55). A steeper angle may cause the chassis to get caught as the machine moves from ramp to trailer or truck. A steeper angle may also cause the machine to tip backward. If loading on or near a slope, position the trailer or truck so it is on the down side of the slope and the ramp extends up the slope. This will minimize the ramp angle. The trailer or truck should be as level as possible.

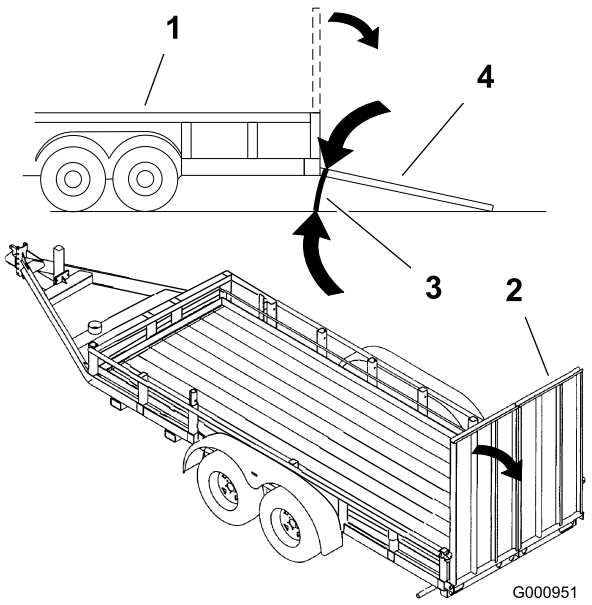


Figure 55

1. Trailer
2. Full-width ramp
3. Not greater than 15 degrees
4. Full-width ramp (side view)

- The operator should determine if it is best to have the platform up or down when loading, depending on conditions. If it is not possible to use one full-width ramp, use enough individual ramps to simulate a full-width, continuous ramp.
- Avoid sudden acceleration when driving up a ramp and sudden deceleration when backing down a ramp. Both maneuvers can cause the machine to tip backward.

Transporting the Machine

Note: Refer to the chemical warning product label(s) before transporting the unit and follow all local/state/federal requirements for transporting chemicals.

Note: Make sure the spreader hopper cover and the spray wand are secure before transporting.

Use a heavy-duty trailer or truck to transport the machine. Ensure that the trailer or truck has all the necessary brakes, lighting, and marking as required by law. Please carefully read all the safety instructions.

To transport the machine:

1. At the left side of the machine ensure that the shutoff valve for the sprayer tank is closed and the drain plug is secure. At the right side of the machine ensure that the pump-shutoff valve is closed.
2. If using a trailer, connect it to the towing vehicle and connect the safety chains.
3. If applicable, connect the trailer brakes.
4. Load the machine onto the trailer or truck.

5. Stop the engine, remove the key, set the brake, and close the fuel valve.
6. Set the parking brake and block the tires.
7. Use the tie-down points on the machine to securely bind the machine to the trailer or truck with straps, chains, cable, or ropes (Figure 55).

   Note: Refer to your local ordinances for specific trailer and tie-down regulations.

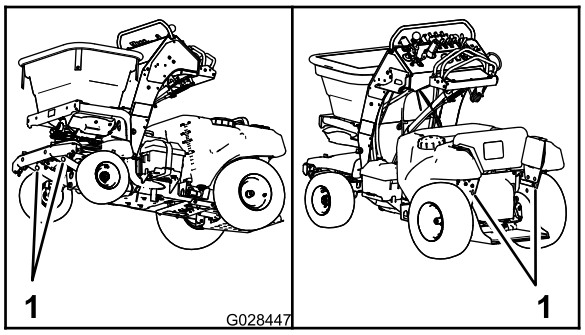


Figure 56

1. Tie-down points

Maintenance

⚠ WARNING

While you are maintaining or adjusting the machine, someone could start the engine. Accidentally starting the engine could seriously injure you or other bystanders.

Remove the key from the ignition switch, engage parking brake, and pull the wire(s) off the spark plug(s) before you do any maintenance. Also push the wire(s) aside so it does not accidentally contact the spark plug(s).

⚠ WARNING

The engine can become very hot. Touching a hot engine can cause severe burns.

Allow the engine to cool completely before service or making repairs around the engine area.

Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
Before each use or daily	• Check the engine-oil level. • Check the safety interlock system. • Test the starter interlock. • Check the machine for loose hardware. • Check air cleaner; replace if dirty. (May need more often under severe conditions.) • Clean the engine and the exhaust system area. • Clean the grass and debris buildup from the machine.
After each use	• Clean and lubricate the spreader. • Clean the sprayer tank. • Clean the strainer. • Clean the sprayer nozzles.
Every 50 hours	• Clean the foam air-cleaner element (more often under severe conditions). • Check the pressure in the tires. • Service the transaxle. • Check sprayer system.
Every 80 hours	• Remove the engine shrouds and clean the cooling fins.
Every 100 hours	• Lubricate the grease fittings. • Replace the dual element air filter. • Change the engine oil. • Change the engine oil (more often under severe condition). • Check, clean and gap the spark plug.
Every 200 hours	• Service the spark arrester.
Monthly	• Clean the fuel sediment cup. • Service the fuel strainer. • Check the battery.
Yearly	• Torque the axle bolts.
Yearly or before storage	• Prepare the machine for storage.

Premaintenance Procedures

⚠ CAUTION

Raising the machine for service or maintenance relying solely on mechanical or hydraulic jacks could be dangerous. The mechanical or hydraulic jacks may not be enough support or may malfunction allowing the machine to fall, which could cause injury.

Do not rely solely on mechanical or hydraulic jacks for support. Use adequate jack stands or equivalent support.

Preparing for the Machine for Maintenance

Perform the following before servicing, cleaning, or making any adjustments to the machine.

1. Move the machine to a level surface.
2. Shut off the engine, set the parking brake, wait for all moving parts to stop.
3. Remove the key from the key switch.

Lubrication

Lubricating the Grease Fittings

Service Interval: Every 100 hours

Grease type: National Lubricating Grease Institute (NGLI) grade #2 multi-purpose gun grease.

Note: Refer to the lubrication chart for the grease points and service intervals.

Lubrication Chart

Fitting Locations	Initial Pumps	Number of Places
1. Wheel bearings	1 to 2	2
2. Kingpin pivots	1 to 2	2
2. Front axle pivots	1 to 2	1
3. Steering control pivot	1 to 2	1

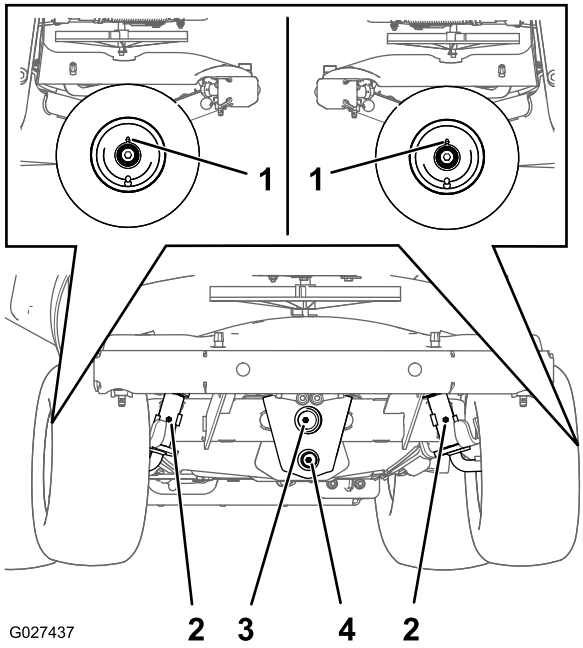


Figure 57

1. Stop engine, set the parking brake, wait for all moving parts to stop, and remove key.
2. Wipe clean the grease fittings with a rag (Figure 57).
3. Connect a grease gun to the fitting (Figure 57).
4. Pump grease into the fittings until grease begins to ooze out of the bearings.
5. Wipe up any excess grease.

Engine Maintenance

Servicing the Air Cleaner

Service Interval: Before each use or daily

Every 100 hours

Important: Do not apply oil to the foam or paper element.

Removing the Foam and Paper Elements

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Clean around the air cleaner to prevent dirt from getting into the engine and causing damage (Figure 58).

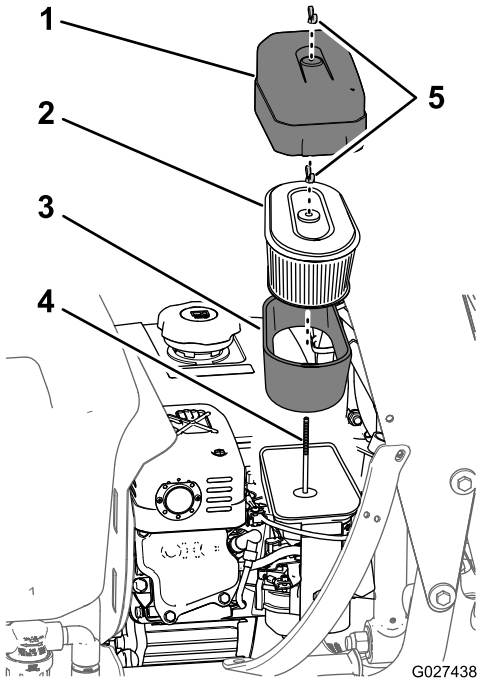


Figure 58

1. Air-cleaner cover
2. Paper filter element
3. Foam element
4. Hold-down rod (carburetor)
5. Wing nuts

3. Rotate the wing nut that secures the air-cleaner cover counterclockwise and remove the air-cleaner cover (Figure 58).
4. Rotate the wing nut that secures the paper and foam filter elements counterclockwise and remove the filter elements from the hold-down rod of the carburetor (Figure 58).
5. Carefully pull the foam element off the paper element (Figure 58).

Note: Inspect the paper and foam filter elements for damage or an excessive accumulation of dirt. Replace all damaged filters. Clean the foam filter element if it is dirty. Replace the paper filter element if it is dirty.

Servicing the Foam Filter Element

Service Interval: Every 50 hours (more often under severe conditions).

1. Inspect the element for tears, an oily film, or damaged (Figure 58).

   Important: Replace the foam element if it is worn or damaged.
2. Wash the foam element in liquid soap and warm water. When the element is clean, rinse it thoroughly.
3. Dry the element by squeezing it in a clean cloth.

   Note: Allow the foam filter element to air dry.

Installing the Foam and Paper Filter Elements

Important: To prevent engine damage, always operate the engine with the complete foam and paper air-cleaner assembly installed.

1. Carefully slide the foam filter element onto the paper filter element (Figure 58).
2. Align the hole in the top plate of the paper filter element with the hold-down rod of the carburetor (Figure 58).
3. Secure the filter elements to the carburetor with the wing nut (Figure 58) that you removed in step 4 of Removing the Foam and Paper Elements (page 52).
4. Align the hole in the air-cleaner cover with the hold-down rod (Figure 58) and secure the cover to the rod with the wing nut that you removed in step 3 of Removing the Foam and Paper Elements (page 52).

Servicing the Engine Oil

Oil Type: Detergent oil (API service SJ or higher)

Engine Oil Capacity: 1.1 L (1.2 US qt)

Oil viscosity: Refer to the table below.

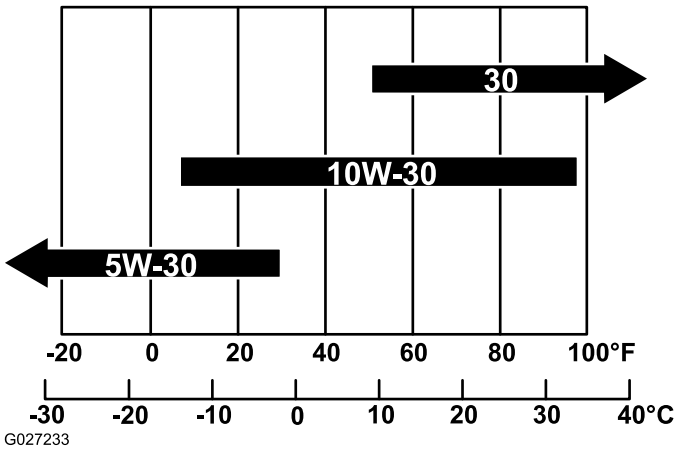


Figure 59

Changing the Engine Oil

Service Interval: Every 100 hours

Every 100 hours (more often under severe condition).

Important: Do not operate the engine with the oil level below the Low (or Add) mark on the dipstick, or over the Full mark.

1. Move the machine to a level surface.
2. Stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position
3. Allow the engine to cool.
4. Align a drain pan with a capacity of 1.5 L (1.6 US qt) or greater below the drain valve at the bottom of the skid plate and inboard from the battery tray (Figure 60).

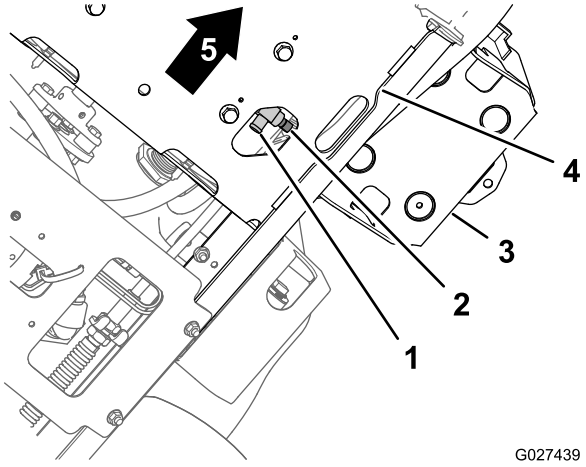


Figure 60

1. Drain valve
2. Hex-head stem
3. Battery tray
4. Skid plate
5. Front of the machine

5. Open the drain valve by rotating the hex-head stem of the valve counterclockwise with a wrench (Figure 60).

   Note: Allow the engine oil to drain completely.

6. Close the drain valve clockwise until the valve is fully seated (Figure 60).

   Note: Wipe clean any residual oil from the drain valve.

7. Remove the dipstick from the filler neck of the engine and wipe clean the dipstick with a rag (Figure 61).

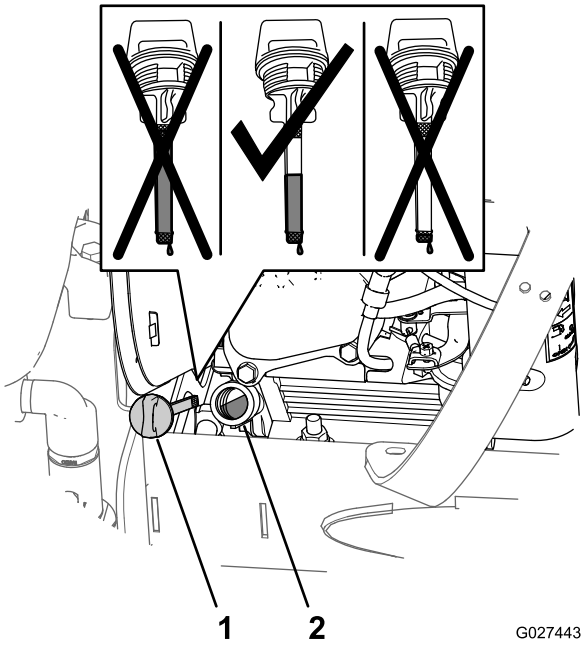


Figure 61

1. Dipstick
2. Filler neck

8. Slowly pour 1.1 L (1.2 US qt) of the specified oil into the crank case of the engine through the filler neck (Figure 61).

9. Insert the dipstick from the engine as shown in Figure 62.

   Note: Do not thread the dipstick into the filler neck when checking the engine oil level.

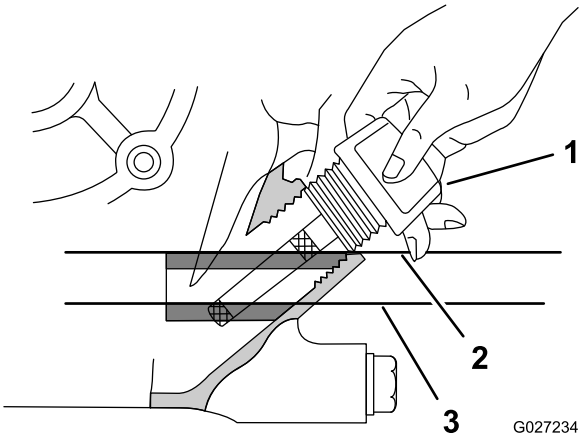


Figure 62

1. Dipstick
2. Maximum oil level
3. Minimum oil level

10. Remove the dipstick from the filler neck and look at the oil level in the dipstick (Figure 61).

    Note: The engine oil level must cover between the hatch marked areas on the dipstick (Figure 61).

11. If the oil level is low, add the specified oil into the engine until the oil level is between the hatch marked areas on the dipstick.

    Note: **Do not** overfill the engine with oil.

12. Insert the dipstick into the filler neck and tighten the dipstick hand tight (Figure 61).

Servicing the Spark Plug

Service Interval: Every 100 hours

Spark Plug Type: NGK BR6HS, Champion RTL86C, or equivalent

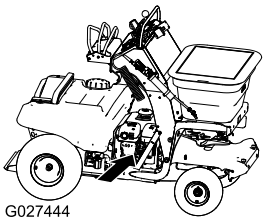
Air Gap: 0.6 to 0.7 mm (0.02 to 0.03 inch)

Make sure the air gap between the center and side electrodes is correct before installing the spark plug.

Use a spark plug wrench for removing and installing the spark plug(s) and a gapping tool/feeler gauge to check and adjust the air gap. Install a new spark plug(s) if necessary.

Removing the Spark Plug

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Remove the spark plug as shown in Figure 63.



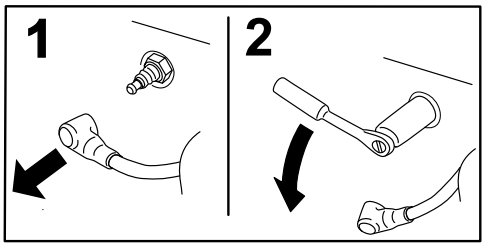


Figure 63

Checking the Spark Plug

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

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

Set the gap to 0.6 to 0.7 mm (0.02 to 0.03 inch).

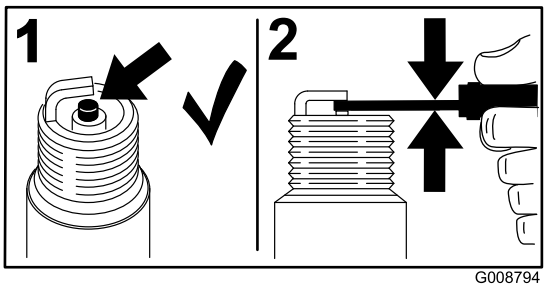


Figure 64

Installing the Spark Plug

Tighten the spark plug as follows:

- New spark plug—12 to 15 N-m (8.7 to 10.8 ft-lb)
- In-service spark plug—23 to 27 N-m (16.6 to 19.5 ft-lb)

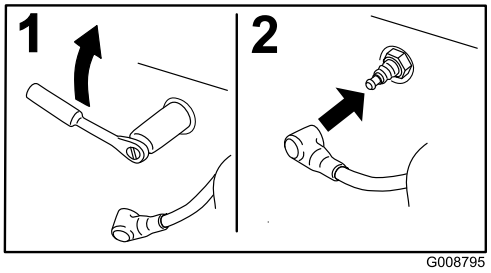


Figure 65

Servicing the Engine Fuel System

Cleaning the Fuel Sediment Cup

Service Interval: Monthly

1. Move the fuel shutoff valve to the Off position; refer to Fuel Shut-Off Valve (page 17).
2. Align a drain pan under the body of the fuel shutoff valve for the carburetor (Figure 66).

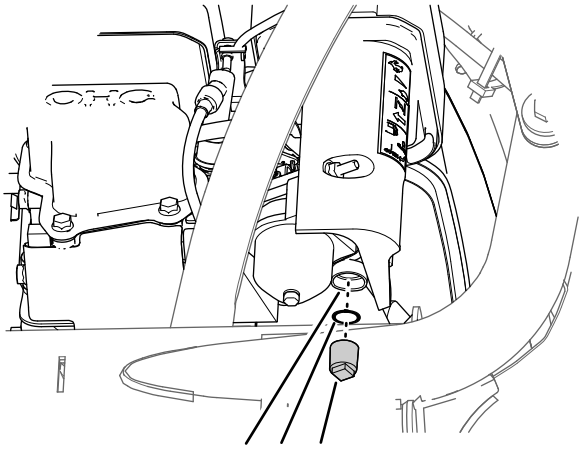


Figure 66

1. Fuel shutoff valve body (carburetor)
2. Seal
3. Sediment cup

3. Rotate the sediment cup counterclockwise and remove the cup from the carburetor (Figure 66).

   Note: Check the seal for the sediment cup for damage or wear; replace the seal if it is damaged or worn.
4. Clean the sediment cup in fresh gasoline or kerosene.
5. Thread the sediment cup into the body of the fuel shutoff valve hand tight (Figure 66).
6. Open the fuel shutoff valve and check for fuel leaks.

Servicing the Fuel Strainer

Service Interval: Monthly

Removing the Fuel Tank

1. Move the fuel shutoff valve to the Off position; refer to Fuel Shut-Off Valve (page 17).
2. Align a drain pan with a 6.1 L (1.6 US gallons) capacity with a under the carburetor.
3. Rotate the sediment cup counterclockwise and remove the cup from the carburetor.

   Note: Check the seal for the sediment cup for damage or wear; replace the seal if it is damaged or worn.
4. Move the fuel shutoff valve to the On position.

   Note: Allow the fuel system to drain completely.
5. Remove the 2 bolts 6 x 25 mm and 2 nuts 8 mm that secure the fuel tank to the tank supports (Figure 67).

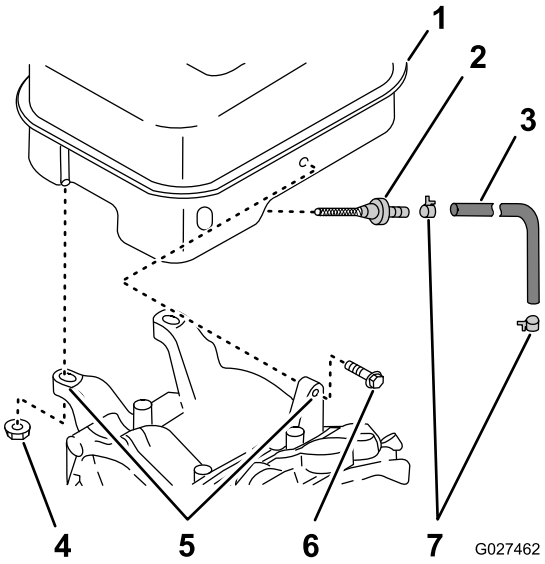


Figure 67

1. Fuel tank
2. Strainer
3. Fuel hose
4. Nuts 8 mm
5. Tank supports
6. Bolt 6 x 25 mm
7. Clamps

6. Loosen the hose clamp and disconnect fuel hose from the fitting on the carburetor (Figure 68).

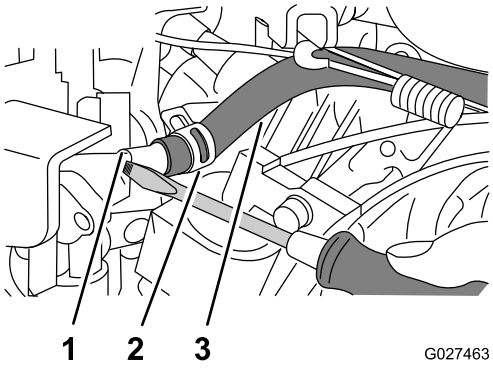


Figure 68

1. Fitting (carburetor)
2. Clamp
3. Fuel hose

7. Remove the fuel tank from the crankcase of the engine (Figure 67 and Figure 69).

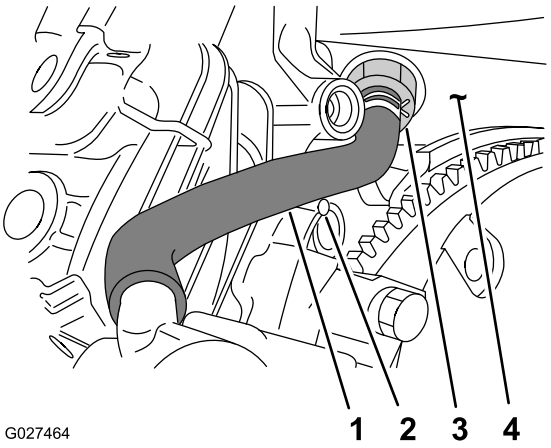


Figure 69

1. Fuel hose
2. Boss
3. Strainer
4. Fuel tank

Cleaning the Fuel Strainer

1. Loosen the hose clamp and disconnect fuel hose from the fitting at the fuel strainer (.Figure 67).
2. Rotate the fuel strainer counterclockwise and remove it from the fuel tank (Figure 67).

   Note: Check the seal and fuel strainer for damage or wear. Replace the seal or fuel strainer if the seal or strainer are damaged.
3. Clean the fuel strainer in fresh gasoline or kerosene.
4. Thread the fuel strainer into the fuel tank (Figure 67).
5. Torque the fuel strainer to 3.0 to 4.0 N-m (2.2 to 2.9 ft-lb).
6. Align the fuel hose that you removed in step 1 over the fitting on the fuel strainer (Figure 67 and Figure 69).
7. Secure the hose to the strainer fitting with the clamp (Figure 67 and Figure 69).

Installing the Fuel Tank

1. Apply medium-grade thread-locking compound to the 8 mm studs in the fuel tank and the 2 bolts 6 x 25 mm.
2. Align the fuel tank to the tank supports on the engine (Figure 67).
3. Align the fuel hose that you removed in step 6 of Removing the Fuel Tank (page 55) to the fitting on the carburetor (Figure 68 and Figure 69).
4. Secure the hose to the carburetor fitting with the clamp (Figure 68).
5. Assemble the tank to the tank supports on the engine with the 2 bolts 6 x 25 mm and 2 nuts 8 mm (Figure 67).
6. Torque the 6 mm bolts to 945 to 1171 N-m (86 to 106 in-lb).
7. Thread the sediment cup into the carburetor hand tight.

8. Add fuel to the fuel tank, open the fuel shutoff valve, and check for fuel leaks.

   Note: Do not add too much fuel to the tank before you have confirmed that there are no fuel leaks.

Servicing the Spark Arrester

Service Interval: Every 200 hours

Removing the Spark Arrester

⚠ WARNING

Hot exhaust system components may ignite gasoline vapors even after the engine is stopped. Hot particles exhausted during engine operation may ignite flammable materials. Fire may result in personal injury or property damage.

Do not refuel or run engine unless spark arrester is installed.

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Allow the muffler to cool.
3. Remove the 2 self-tapping screws that secure the tail screen to the muffler cover and remove the screen (Figure 70).

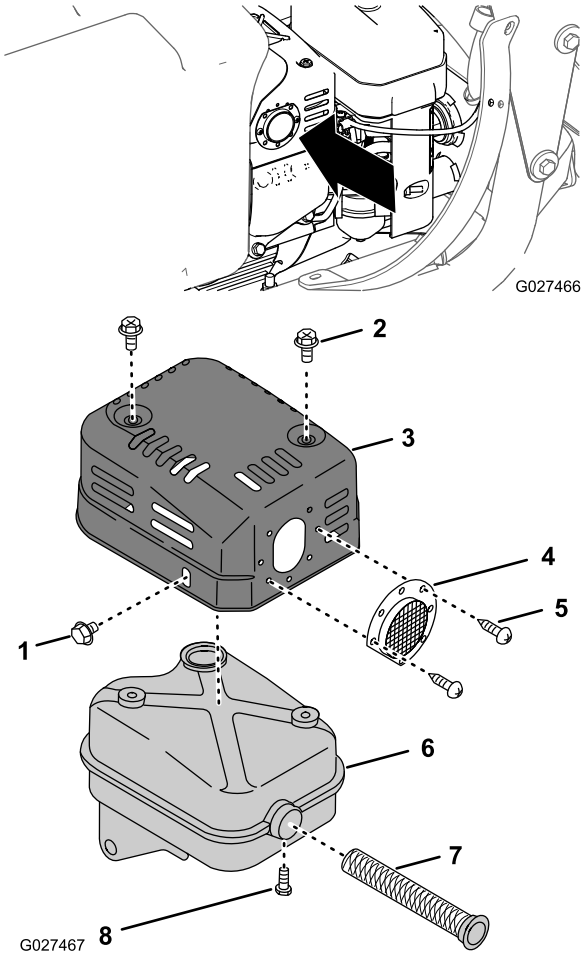


Figure 70

1. Fanged-head bolt
2. Bolts
3. Muffler cover
4. Tail screen
5. Self-tapping screw
6. Muffler
7. Spark arrester
8. Self-tapping screw

4. Remove the 2 bolts and 1 flanged-head bolt that secures the muffler cover to the muffler (Figure 70).
5. Remove the self-tapping screw that secure the spark arrester to the muffler and remove the spark arrester (Figure 70).

Electrical System Maintenance

Servicing the Battery

Service Interval: Monthly

Always keep the battery clean and fully charged. Use a paper towel to clean the battery case. If the battery terminals are corroded, clean them with a solution of four parts water and one part baking soda. Apply a light coating of grease to the battery terminals to prevent corrosion.

Voltage: 12 volts

⚠ WARNING

CALIFORNIA
Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

⚠ DANGER

Charging or jump starting the battery may produce explosive gases. Battery gases can explode causing serious injury.

- **Keep sparks, flames, or cigarettes away from battery.**
- **Ventilate when charging or using battery in an enclosed space.**
- **Make sure that the venting path of battery is always open once the battery is filled with acid.**
- **Do not lean over the batteries.**
- **Always shield eyes and face from battery.**

⚠ DANGER

Battery electrolyte contains sulfuric acid, which is poisonous and can cause severe burns. Swallowing electrolyte can be fatal or if it touches skin can cause severe burns.

- **Wear safety glasses to shield your eyes and rubber gloves to protect your skin and clothing when handling electrolyte.**
- **Do not swallow electrolyte.**
- **In the event of an accident, flush with water and call a doctor immediately.**

Checking the Battery Charge

⚠ CAUTION

If the ignition is in the On position there is potential for sparks and engagement of components. Sparks could cause an explosion or moving parts could accidentally engage causing personal injury.

Be sure ignition switch is in the Off position before charging the battery.

1. Move the ignition switch to the Off position and remove the key.
2. Remove the free end of the battery strap from the buckle and remove the battery cover from the battery box (Figure 71).

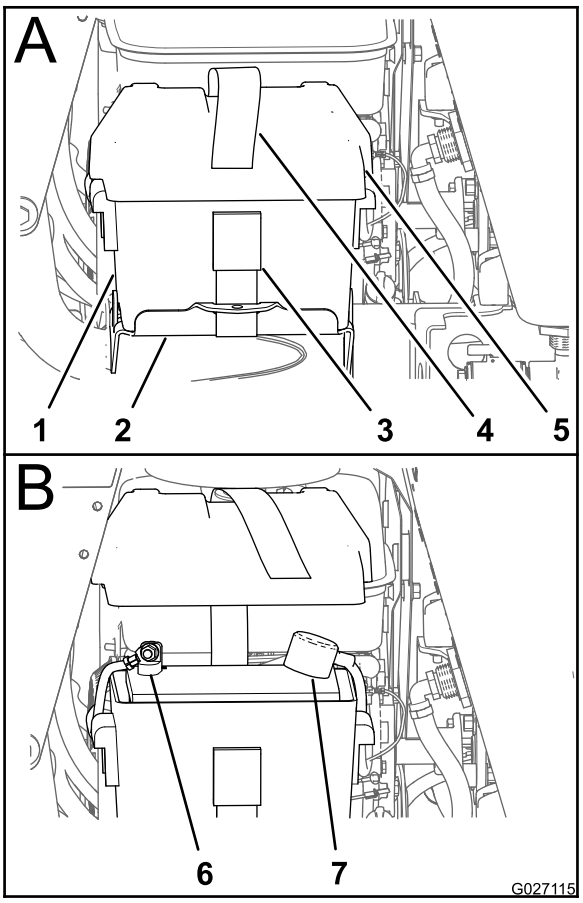


Figure 71

1. Battery box
2. Battery support
3. Buckle
4. Battery strap
5. Battery cover
6. Negative terminal
7. Positive terminal

3. Measure the voltage of the battery with a voltmeter.
4. Use the table below to locate the charge state or the battery, and if needed, the battery-charger setting and charging interval recommended to charge the battery to 12.6 volts or greater; refer to the battery charge table below.

Important: **Make sure that the negative battery cable is disconnected and the battery charger used for charging the battery has an output of 16 volts and 7 amps or less to avoid damaging the battery (see chart for recommended charger settings).**

Battery Charge Table

Voltage Reading	Percent Charge	Maximum Charger Settings	Charging Interval
12.6 or greater	100%	16 volts/ 7 amps	No Charging Required
12.4 – 12.6	75–100%	16 volts/ 7 amps	30 Minutes
12.2 – 12.4	50–75%	16 volts/ 7 amps	1 Hour
12.0–12.2	25–50%	14.4 volts/ 4 amps	2 Hours
11.7–12.0	0–25%	14.4 volts/ 4 amps	3 Hours
11.7 or less	0%	14.4 volts/ 2 amps	6 Hours or More

5. If the positive cable is also disconnected, connect the **positive (red) cable** to the positive battery terminal and slip terminal cover over the positive terminal (.Figure 71).
6. Remove the screw, washer, and ground cable from the engine. Secure the battery cable to the battery terminal with the bolt, washer, and nut and torque the nut and bolt to 1978 to 2542 N-cm (175 to 225 in-lb).

   Note: If time does not permit charging the battery or if charging equipment is not available, connect the negative battery cables and run the vehicle continuously for 20 to 30 minutes to charge the battery.
7. Align the battery cover to the battery box and secure the cover and box to the battery tray with the battery strap (Figure 71).

Charging the Battery

⚠ WARNING

Charging the battery produces gasses that can explode.

Never smoke near the battery and keep sparks and flames away from battery.

Important: **Always keep the battery fully charged (1.265 specific gravity) to prevent battery damage when the temperature is below 32°F (0°C).**

1. Remove the battery from the chassis; refer to Removing the Battery (page 59).
2. Check the electrolyte level.
3. Ensure that the filler caps are installed on the battery.
4. Charge the battery for 1 hour at 25 to 30 amps or 6 hours at 4 to 6 amps.
5. When the battery is fully charged, unplug the charger from the electrical outlet, and disconnect the charger leads from the battery posts (Figure 72).
6. Install the battery onto the machine and connect the battery cables; refer to Installing the Battery (page 60).

   Note: Do not run the machine with the battery disconnected; electrical damage may occur.

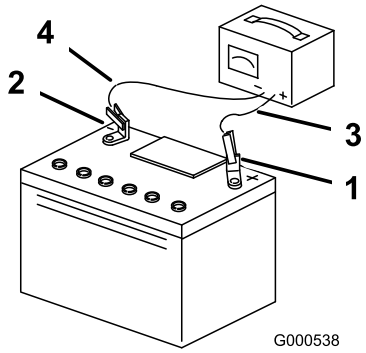


Figure 72

1. Positive battery post
2. Negative battery post
3. Red (+) charger lead
4. Black (-) charger lead

Removing and Installing the Battery

Removing the Battery

⚠ WARNING

Battery terminals or metal tools could short against metal machine components causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.

- **When removing or installing the battery, do not allow the battery terminals to touch any metal parts of the machine.**
- **Do not allow metal tools to short between the battery terminals and metal parts of the machine.**

⚠ WARNING

Incorrect battery-cable routing could damage the machine and cables causing sparks. Sparks can cause the battery gasses to explode, resulting in personal injury.

- **Always disconnect the negative (black) battery cable before disconnecting the positive (red) cable.**
- **Always connect the positive (red) battery cable before connecting the negative (black) cable.**

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Remove the battery cover (Figure 71); refer to step 2 of Checking the Battery Charge (page 58).
3. Remove the hex-flanged head bolt and flanged nut from the negative battery cable and negative (-) battery terminal, and remove the cable from the battery (Figure 73).

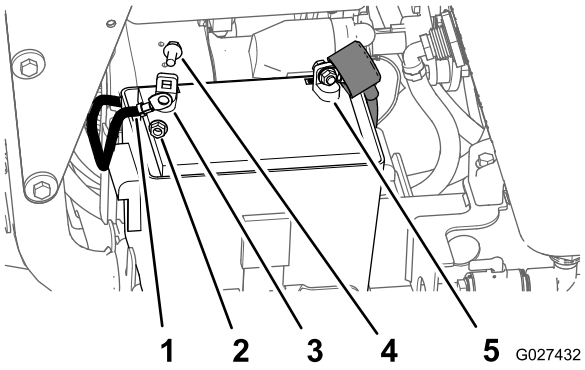


Figure 73

1. Negative-battery cable cover (black)
2. Flanged nut
3. Negative (-) battery terminal
4. Flanged bolt
5. Positive (+) battery terminal

4. Slide the red terminal cover off the positive battery terminal (Figure 73).
5. Remove the hex-flanged head bolt and flanged nut from the positive (red) battery cable and the positive (+) battery terminal, and remove the cable from the battery (Figure 73).
6. Remove the battery and battery box from the battery tray of the machine.

Installing the Battery

1. Place the battery into the battery box.
2. Position the battery and battery box onto the battery tray of the machine.
3. Install the positive (red) battery cable to positive (+) battery terminal with a flanged bolt and flanged nut (Figure 73).
4. Slide the red terminal cover over the positive-battery terminal.
5. Install the negative battery cable to the negative (-) battery terminal with a flanged bolt and flanged nut (Figure 73).
6. Align the battery cover to the battery box and secure the cover and box to the battery tray with the battery strap (Figure 71)

Jump Starting the Machine

⚠ DANGER

Jump starting a battery that is cracked, frozen, has low electrolyte level, or an open/shorted battery cell, can cause an explosion resulting in serious personal injury.

Do not jump start a battery if these conditions exist; replace the batttery.

⚠ CAUTION

Corrosion or loose connections can cause unwanted electrical voltage spikes at anytime during the jump starting procedure.

Do not attempt to jump start an machine with loose or corroded battery terminals, or damage to the engine may occur.

⚠ CAUTION

Connecting the jumper cables incorrectly (wrong polarity) can immediately damage the electrical system.

Be certain of battery terminal polarity and jumper cable polarity when hooking up batteries.

Important: Be sure that the vehicles do not touch and that both electrical systems are off and at the same rated system voltage. These instructions are for negative ground systems only.

Important: Use properly sized jumper cables (4 to 6 AWG) with short lengths to reduce voltage drop between systems. Make sure that the cables are color coded or labeled for the correct polarity.

Note: The following instructions are adapted from the SAE J1494 Rev. Dec. 2001 – Battery Booster Cables – Surface Vehicle Recommended Practice (SAE – Society of Automotive Engineers).

1. Check the battery terminals of the discharged battery and the booster battery for corrosion (white, green, or blue "snow").

   Note: Clean the corrosion from the battery terminals prior to jump starting. Tighten battery cable connections as necessary.

2. Make sure that the booster is a 12 volt battery with sufficient amp rating that is in good condition and fully charged.

   Note: Ensure that the vent caps are tight and level. Place a damp cloth, if available, over any vent caps on both batteries.

3. Connect the clamp positive (+) jumper cable to the positive (+) terminal of the discharged battery as shown in Figure 74.

   Note: The positive battery cable that is wired to the starter or solenoid

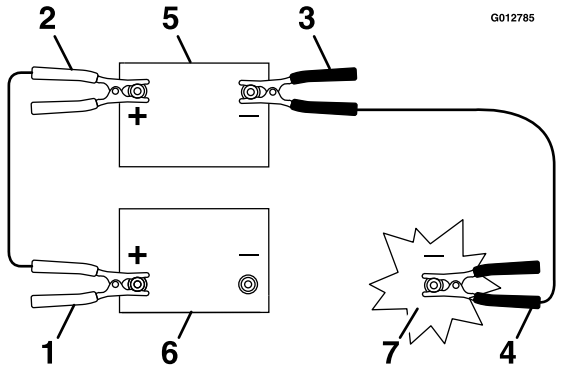


Figure 74

1. Positive (+) cable on discharged battery
2. Positive (+) cable on booster battery
3. Negative (–) cable on the booster battery
4. Negative (–) cable on the engine block
5. Booster battery
6. Discharged battery
7. Engine block

4. Connect the clamp other end of the positive jumper cable to the positive terminal of the booster battery.
5. Connect the clamp of the black negative (–) jumper cable to the other terminal (negative) of the booster battery.
6. Make the final jumper cable connection (the other clamp of the black negative (–) cable) to the engine block of the stalled machine (**not to the negative battery post**) and away from the discharged battery.
7. Stand away from the discharged battery of the machine.
8. Start the machine and remove the cables in the reverse order of connection (disconnecting the engine block (black) connection first).

Servicing the Fuses

The electrical system is protected by fuses, and requires no maintenance. If a fuse blows, check the component or circuit for a malfunction or short.

1. Remove the negative-battery cable from the battery terminal; refer to steps 2 and 3 of Removing the Battery (page 59).

   Note: Ensure that the negative battery cable does not touch the battery terminal.

2. Pushing the tab on the fuse/relay holder and separating the cover from the holder (Figure 75).
3. Pull the fuse from the socket of the fuse/relay holder (Figure 75).

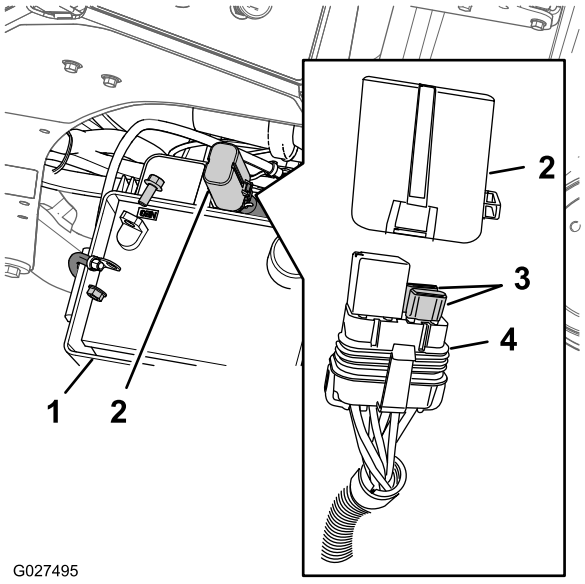


Figure 75

1. Battery box
2. Fuse holder
3. Cover
4. Fuses
5. Fuse/relay holder

4. Install a fuse of the same type and amperes into the socket of the fuse/relay holder (Figure 75).
5. Install the cover on to the fuse/relay holder until it locks into place (Figure 75).
6. Install the negative-battery cable from the battery terminal; refer to steps 5 and 6 of Installing the Battery (page 60).

Drive System Maintenance

Checking the Air Pressure in the Tires

Service Interval: Every 50 hours

Note: Both the front and rear tires need to be inflated.

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Check tire pressure in front and rear tires.
3. If necessary, adjust the air pressure in the tires to 83 to 97 kPa (12 to 14 psi).

Torquing the Axle Bolts

Service Interval: Yearly

Torque the 2 axle bolts for the front wheels and the 2 axle bolts for the rear wheels (Figure 76) to 48 N-m (35 ft-lb).

Important: If you remove the wheel(s) for maintenance, apply medium-grade thread-locking compound to the threads of the bolts before installing the wheel(s)

Important: If you remove the rear wheel(s) for maintenance, apply a copper-based, anti-seizing compound on the rear axle shafts.

Important: Do not use anti-seize compound on the wheel bolts.

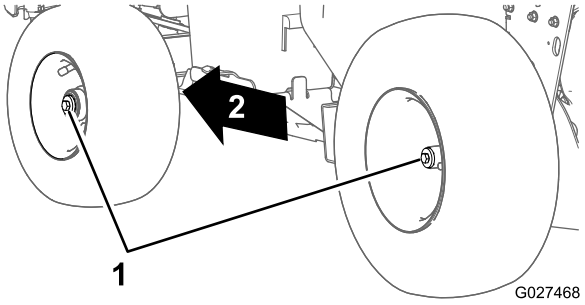


Figure 76

1. Axle bolts

Aligning the Front Wheels

Operator supplied equipment: 2 bolts 9 x 76 mm (5/16 x 3 inch) or longer

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Check the tire pressure; refer to Checking the Air Pressure in the Tires (page 62).
3. Center and secure the steering control by aligning 2 bolts 9 x 76 mm (5/16 x 3 inch) through the outside holes on the steering control and through the control column.

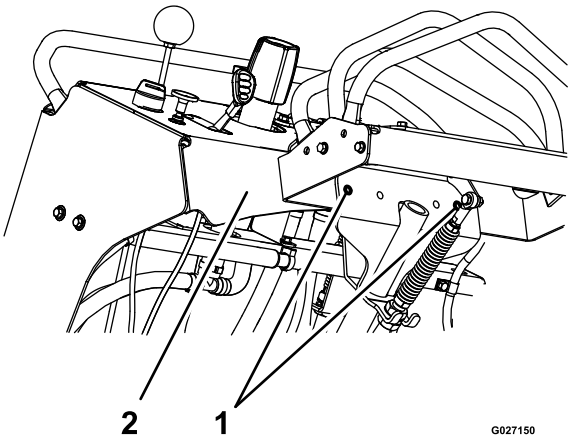


Figure 77

1. Outside holes (steering control)
2. Control column

4. Measure the distance between the 2 front faces of the front tires as shown in Figure 78.

   Record the front measurement here _____.

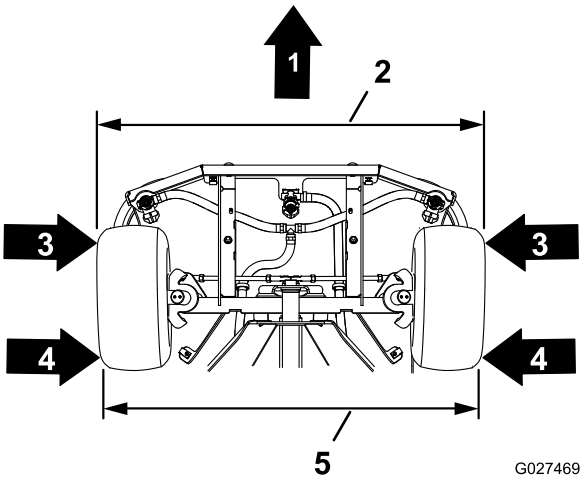


Figure 78

Viewed underneath machine

1. Front of the machine
2. Front measurement
3. Front face of the tire
4. Rear face of the tire
5. Rear measurement

5. Measure the distance between the 2 rear faces of the front tires as shown in Figure 78.

   Record the front measurement here _____.

   Note: The front measurement should be 6.4–12.7 mm (1/4 to 1/2 inch) larger than the rear measurement.

6. If the front measurement is smaller that 6.4 mm (1/4 inch) or larger that 12.7 mm (1/2 inch), adjustment the rod ends for the steering linkage as follows:

   A. Remove the 4 thumb screws that secure the front cover (below the is below the impeller) to the chassis and remove the cover (Figure 79).

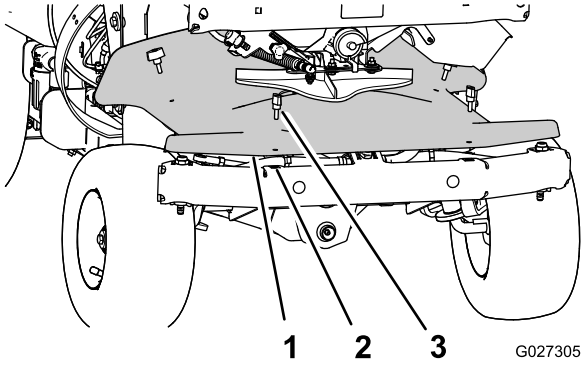


Figure 79

1. Forward cover
2. Clip nut
3. Thumb screw

   B. Loosen the jam nuts at the rod ends.

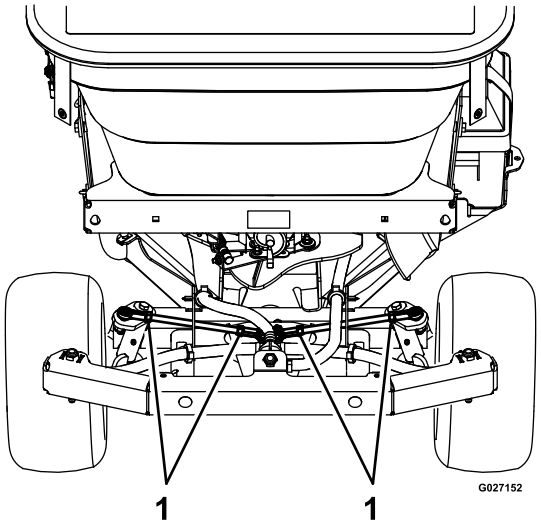


Figure 80

1. Jam nuts

   C. Rotate the steering rod to lengthen or shorten the linkage. Adjust both the left hand and right hand steering linkages equally.

   Note: The factory center-to-center distance between the ball joint rod ends at the steering linkage is 23.3 cm (9.21 inches).

   D. Tighten the jam nuts.

   E. Align the holes in the front cover with the clip nuts in the chassis and secure the cover with the 4 thumb nuts that you removed in A.

7. Remove the bolts that you installed in step 3 from the control column and steering control.

Servicing the Transaxle

Service Interval: Every 50 hours

Transaxle Oil Type: Toro® HYPR-OIL™ 500 hydraulic oil or Mobil® 1 15W-50

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Rotate counterclockwise the 2 quarter-turn fasteners that secure the knee pad to the chassis of the machine (Figure 81).

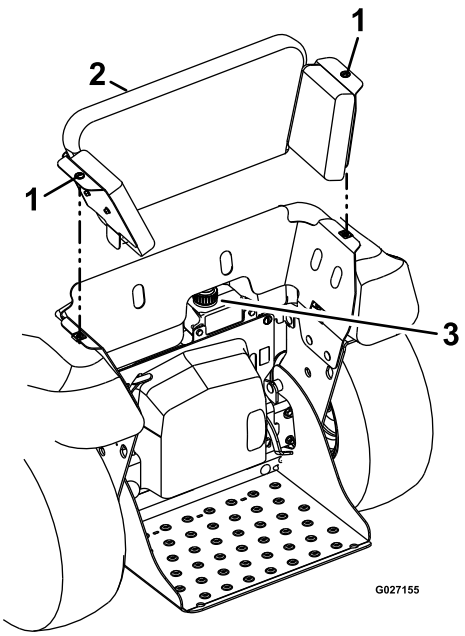


Figure 81

1. Quick release screws
2. Knee pad
3. Oil expansion tank

3. Lift the knee pad up and rearward slightly and remove the pad from the machine (Figure 81).
4. Clean area around oil expansion tank and remove cap (Figure 81).
5. Check the oil level in the expansion tank..

   Note: The oil level cover the bottom port in tank

6. If the oil level is too low, add the specified oil into the expansion tank.
7. Install tank cap onto the expansion tank and tighten the cap until it is snug (Figure 81).

   Note: Do not overtighten the cap.

Adjusting the Pattern Control Cable for the Spreader

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Empty the hopper; refer to Emptying the Hopper (page 29)
3. Close the impeller gate by pushing the wide-distribution impeller gate lever forward fully (Figure 82).

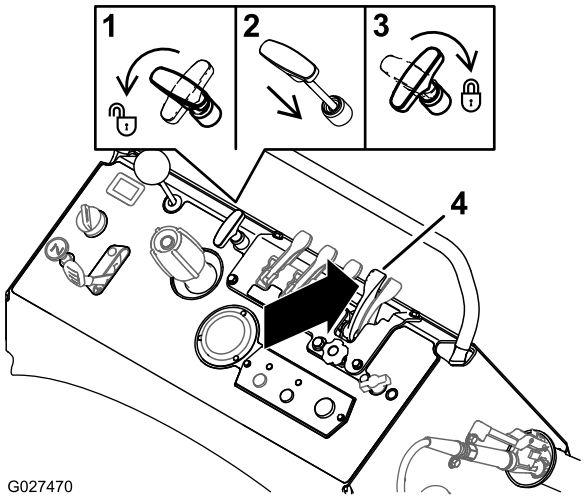


Figure 82

1. Unlock—spread pattern control handle (rotate counterclockwise)
2. Push down—spread pattern control handle
3. Lock—spread pattern control handle (rotate clockwise)
4. Push forward—wide-distribution impeller-gate lever

4. Rotate the spread pattern control handle counterclockwise (1), push the handle down (2), and rotate the spread pattern control handle clockwise(3) refer to Figure 82.
5. Loosen the jam nut at the end of the pattern control cable (Figure 83).

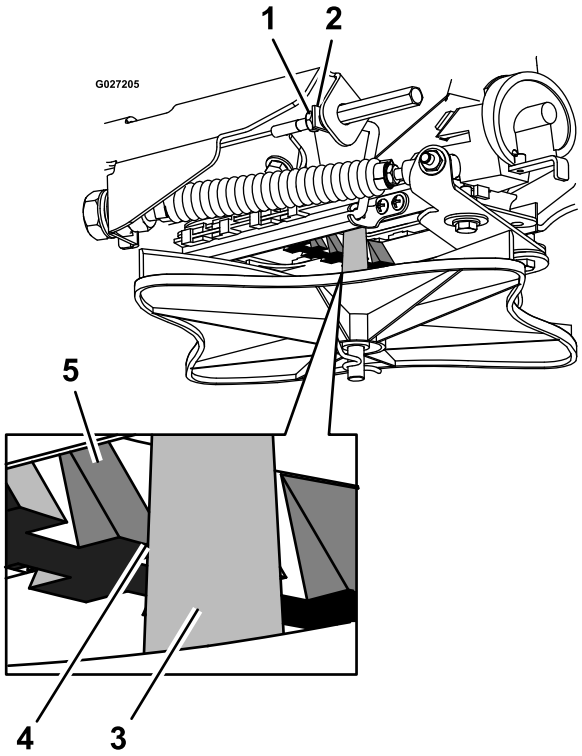


Figure 83

1. Jam nut (pattern control cable)
2. Linkage rod
3. Impeller shaft
4. 1/8 inch (3.2 mm) gap between ramp tooth and impeller shaft
5. Ramp tooth

6. Pull the linkage rod until there is 1/8 inch (3.2 mm) gap between the ramp tooth and the impeller shaft (Figure 83).
7. Tighten the jam nut (Figure 83).
8. Adjust the spread pattern control handle; refer to Adjusting the Spreader Pattern (page 32).

Maintaining the Sprayer System

Check Sprayer System

Service Interval: Every 50 hours

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Check all of the hoses, nozzles, and fittings for damage and leaks.

   Note: Replace all damaged or leaking sprayer components.
3. Check the nozzle strainers and in-line strainers for accumulation of dirt and chemical sludge.

   Note: Clean or replace strainers with an accumulation of dirt and chemical sludge.

Cleaning

Cleaning the Engine and the Exhaust System Area

Service Interval: Before each use or daily (may be required more often in dry or dirty conditions.)

⚠ CAUTION

Excessive debris around engine cooling air intake and exhaust system area can cause engine, exhaust area, and hydraulic system to overheat which can create a fire hazard.

Clean all debris from engine and exhaust system area.

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Clean all debris from screen next to the starter grip of the engine, around engine shrouding, fuel tank, and exhaust system area.
3. Wipe up any excessive grease or oil around the engine and exhaust system area.
4. Clean muffler heat shields of all debris, dirt, and oil.

Removing the Engine Shroud and Cleaning the Cooling Fins

Service Interval: Every 80 hours

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Remove cooling shroud from engine.
3. Clean cooling fins of the engine.

   Note: Also clean dust, dirt, and oil from external surfaces of engine which can cause improper cooling.
4. Install the cooling shrouds onto the engine.

   Note: Operating the engine without cooling shrouds will cause engine damage due to overheating.

Cleaning the Debris from the Machine

Service Interval: Before each use or daily

1. Stop the engine, set the parking brake, remove the key, and wait for all moving parts to stop before leaving the operating position.
2. Clean off any debris or chemical build-up on the machine, especially the nozzles, sprayer tank opening, impeller, and the spray wand and its holder

Waste Disposal

Chemical Disposal

Improper chemical disposal can pollute the environment and cause health issues.

Follow the disposal directions on the chemical manufacturer's label. Dispose of chemicals and containers in accordance to local/state/federal laws.

Disposing of the Engine Oil

Engine oil and hydraulic oil are both pollutants to the environment. Dispose of used oil at a certified recycling center or according to your state and local regulations.

Disposing of the Battery

⚠ DANGER

Battery electrolyte contains sulfuric acid, which is poisonous and can cause severe burns. Swallowing electrolyte can be fatal or if it touches skin can cause severe burns.

- **Wear safety glasses to shield eyes, and rubber gloves to protect skin and clothing when handling electrolyte.**
- **Do not swallow electrolyte.**
- **In the event of an accident, flush with water and call a doctor immediately.**

Federal law states that batteries should not be placed in the garbage. Management and disposal practices for batteries must follow relevant federal, state, or local laws.

If a battery is being replaced or if the machine containing the battery is no longer operating and is being scrapped, remove the battery and take it to a local certified recycling center. If no local recycling is available return the battery to any certified battery reseller.

Storage

1. Set sprayer pump switch to the Off position, stop the machine, shut off the engine, set the parking brake, and remove the key.
2. Remove dirt and grime from the entire machine.

   Important: You can wash the machine with mild detergent and water. Do not pressure wash the machine. Avoid excessive use of water, especially near the engine and hydrostatic drive.
3. Service the air cleaner; refer to Servicing the Air Cleaner (page 52).
4. Lubricate the machine; refer to Lubricating the Grease Fittings (page 51).
5. Change the engine oil; refer to Changing the Engine Oil (page 53).
6. Remove the rear wheels, apply a copper-based, anti-seizing compound to the rear axle shafts, and install the wheels; refer to Torquing the Axle Bolts (page 62).
7. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.
8. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
9. Store the machine in a clean, dry garage or storage area.
10. Cover the machine to protect it and keep it clean.

Preparing the Machine for Extended or Winter Storage

To help protect the pumps from freezing temperatures make sure the unit is free of all caustic chemicals and residue.

Cleaning the Spreader

Perform all the steps in Cleaning and Lubricating the Spreader (page 35).

Winterizing the Sprayer

Emptying the Tank

1. Perform all the steps in Cleaning the Sprayer Tank (page 42), Cleaning the Strainer (page 43), and Cleaning the Sprayer Nozzle (page 44).
2. Empty the sprayer system by performing the following:
   A. Empty the sprayer tank; refer to Emptying the Sprayer Tank (page 42).
   B. Start the machine and set sprayer pump switch to the On position
   C. Push forward the tank agitation lever.
   D. Pull back the narrow-spray pattern lever.

Note: Run the sprayer nozzle until the narrow nozzle is spraying air.

E. Push forward the narrow-spray pattern lever and pull back the wide-spray pattern lever.

Note: Run the sprayer nozzles until the both wide nozzles are spraying air.

F. Push forward the wide-spray pattern lever.

3. Shut off the sprayer pump and the engine.

Preparing the Sprayer System

Antifreeze type: 2.5 L (0.7 US gallon) rust inhibiting, non-alcohol based, RV antifreeze concentrate

Important: Do not allow all of the antifreeze mixture to empty from the sprayer tank while running the sprayer nozzles and wand. Keeping some of the antifreeze in the pump, valves, and hoses will help prevent corrosion and damage caused by moist air trapped in the sprayer system.

1. Mix 2.5 L (0.7 US gallon) RV anti-freeze concentrate with 5.1 L (1.3 US gallon) water and pour the antifreeze mixture into the into the sprayer tank.

   Note: Use a rust inhibiting, non-alcohol based, RV antifreeze concentrate.

2. Start the machine and set the sprayer pump switch to the On position.
3. Pull back the narrow-spray pattern lever to the On position.

   Note: Allow the antifreeze to circulate through sprayer and nozzle.

4. Push forward the narrow-spray pattern lever and pull back the wide-spray pattern lever.

   Note: Allow the antifreeze to circulate through sprayer and nozzle.

5. Push forward the wide-spray pattern lever.
6. Remove the wand from its holder, point it in a safe direction, and squeeze the spray wand trigger.

   Note: Allow the antifreeze to circulate through sprayer and nozzle and then return the wand to its holder.

7. Set the sprayer pump switch to the Off position and shut off the engine.

Troubleshooting

Important: **It is essential that the operator safety mechanisms for the machine are connected and in proper operating condition before you use the machine.**

When a problem occurs, do not overlook the simple causes. For example: starting problems could be caused by an empty fuel tank.

The following table lists some of the common causes of trouble. Do not attempt to service or replace major engine items or any items that call for special timing of adjustments procedures (such as valves, governor, etc.). Have this work done by your Engine Service Dealer.

Note: When disconnecting electrical connectors Do not pull on the wires to separate the connectors.

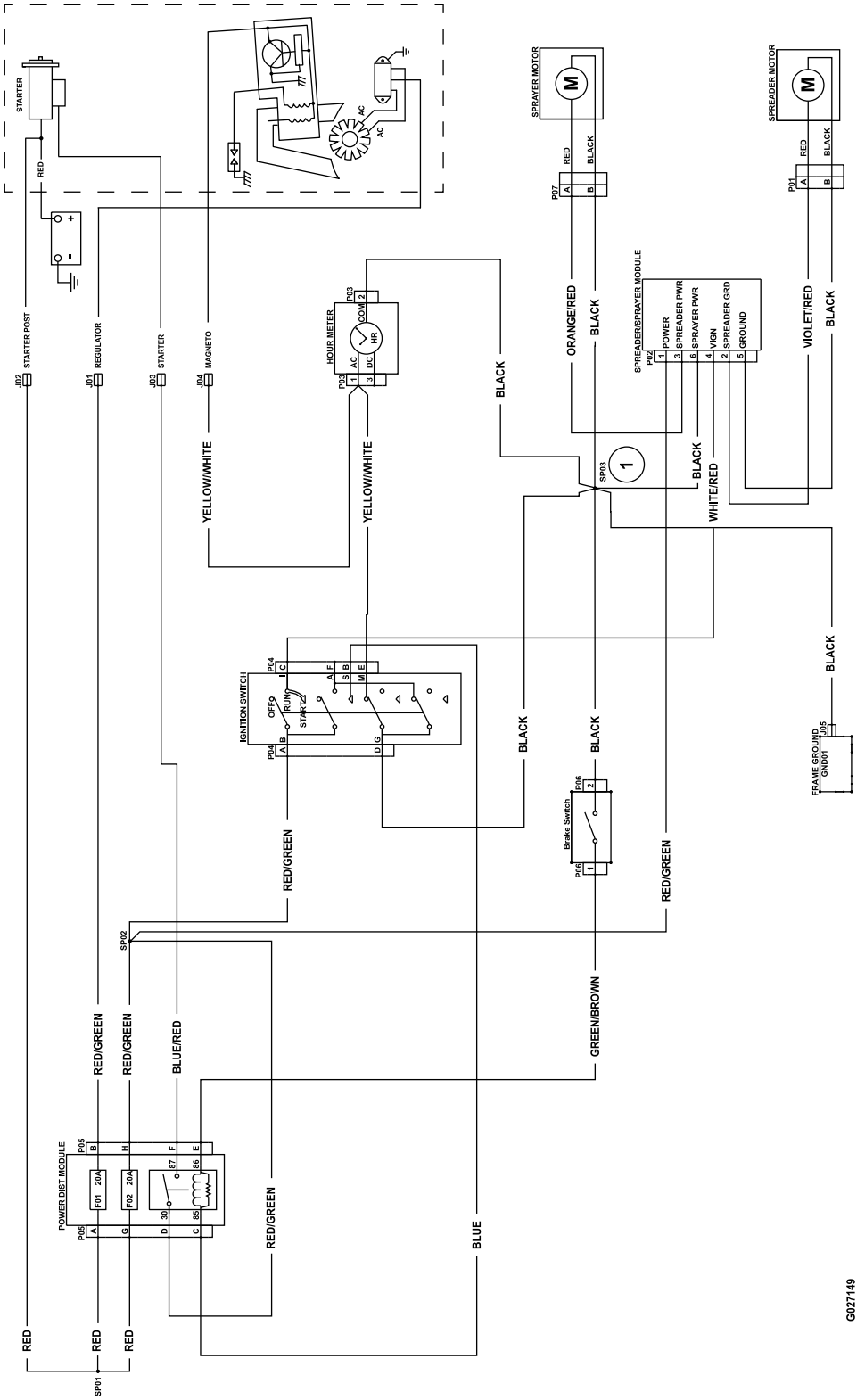
Problem	Possible Cause	Corrective Action
The starter does not rotate the engine.	1. The park brake is not set.	1. Set park brake.
	2. The battery does not have a full charge.	2. Charge the battery; refer to the Checking Battery Charge, Charging the Battery, and Jump Starting the Machine procedures in the Maintenance section.
	3. An electrical connection(s) is corroded, loose or faulty.	3. Check the electrical connection(s) for good contact. Clean connector terminals thoroughly with electrical-contact cleaner, apply dielectric grease to the terminals and connect the connectors.
	4. A fuse is blown.	4. Replace the blown fuse.
	5. A relay or switch is defective.	5. Contact an Authorized Service Dealer.
The engine will not start, it starts hard, or it fails to keep running.	1. The fuel tank is empty.	1. Fill the fuel tank with fuel.
	2. The fuel shutoff valve is closed.	2. Open the fuel shutoff valve.
	3. The throttle lever or choke lever or both are not in the correct position.	3. Move the throttle control is midway between the Slow and Fast positions. Set the choke to the On position when starting a cold engine or set the choke to the Off position when starting a warm engine.
	4. There is dirt in fuel strainer.	4. Clean or replace the fuel strainer (bottom of fuel tank).
	5. There is dirt, water, or stale fuel is in the fuel system.	5. Contact an Authorized Service Dealer.
	6. The air filter elements are dirty.	6. Clean the foam filter element or replace the paper filter element.
	7. An electrical connection(s) is corroded, loose or faulty.	7. Check the electrical connection(s) for good contact. Clean connector terminals thoroughly with electrical-contact cleaner, apply dielectric grease to the terminals and connect the connectors.
	8. A relay or switch is defective.	8. Contact an Authorized Service Dealer.
	9. The spark plug is faulty.	9. Clean, adjust or replace spark plug.
	10. The spark plug wire is not connected to the spark plug.	10. Check the spark plug wire connection at the spark plug.

Problem	Possible Cause	Corrective Action
The engine loses power.	1. The engine load is excessive.	1. Reduce the ground speed of the machine.
	2. The air filter elements are dirty.	2. Clean the foam filter element or replace the paper filter element.
	3. The oil level in the engine is low.	3. Add oil into the engine to the proper oil level.
	4. The cooling fins and air passages for the engine are plugged with dirt or debris.	4. Clean cooling fins and air passages.
	5. The vent hole in the fuel cap is plugged.	5. Clean the vent hole or replace the fuel cap.
	6. There is dirt in fuel strainer.	6. Clean or replace the fuel strainer (bottom of fuel tank).
	7. There is dirt, water, or stale fuel is in the fuel system.	7. Contact an Authorized Service Dealer.
The engine overheats.	1. The engine load is excessive.	1. Reduce the ground speed of the machine.
	2. The oil level in the engine is low.	2. Add oil into the engine to the proper oil level.
	3. The cooling fins and air passages for the engine are plugged with dirt or debris.	3. Clean cooling fins and air passages.
The machine pulls left or right (with steering control fully forward).	1. The air pressure in the tires are not correct.	1. Adjust air pressure in the drive tires.
	2. The steering linkage is damaged.	2. Replace steering linkage.
	3. The front wheel toe-out is not correct.	3. Align the front wheels refer to the Aligning the Front Wheels procedure in the Drive System Maintenance section.
	4. The front wheel axles are bent or damaged.	4. Repair or replace front wheel axles.
	5. The steering control is bent or damaged.	5. Repair or replace steering control.
The machine does not drive.	1. The bypass valve is not closed tight.	1. Close tight the bypass valve.
The machine vibrates abnormally.	1. The engine mounting bolts are loose.	1. Tighten the engine mounting bolts.
	2. The coupling bolts and nuts for the drive shaft are loose.	2. Tighten the appropriate fasteners.
The impeller does not rotate.	1. There is debris buildup at the impeller.	1. Clean the impeller.
	2. The hopper screen is plugged.	2. Clean the hopper screen.
	3. The impeller motor is loose or damaged.	3. Repair or replace impeller motor.
	4. An electrical components for the impeller motor system is open.	4. Check the electrical connections.
	5. The impeller On/Off switch is in the Off position or impeller speed control is set too slow.	5. Set the impeller On/Off switch to the On position and check the position of the knob for the impeller speed control.
	6. The impeller drive pin is missing.	6. Replace drive pin.
	7. The bearings failed in the impeller motor.	7. Replace bearings in the motor or the motor assembly.

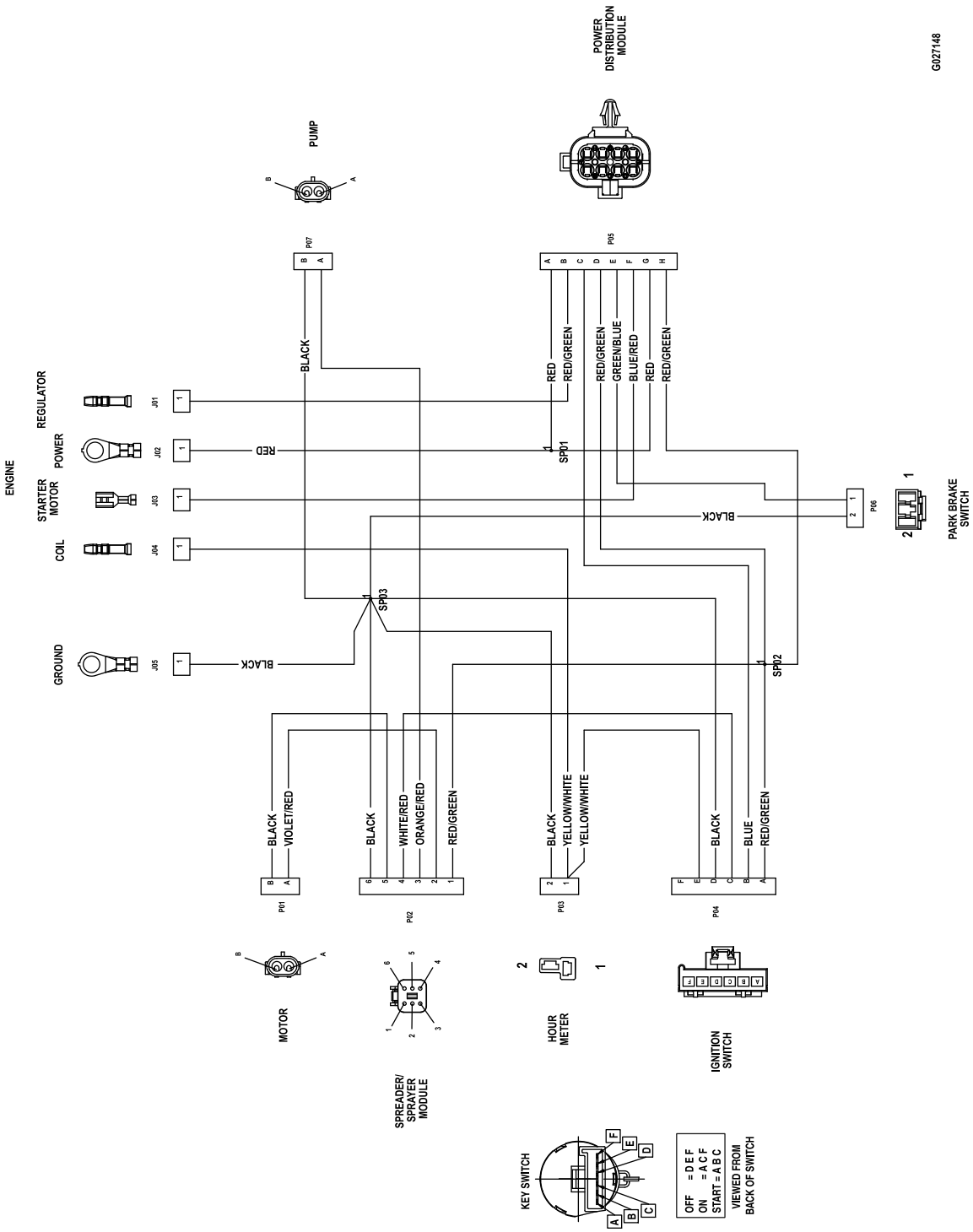
Problem	Possible Cause	Corrective Action
The spreader or sprayer pattern is uneven.	1. The impeller is dirty or damaged. 2. The spreader pattern control is not adjusted properly. 3. The sprayer nozzles are clogged. 4. The hopper screen is plugged. 5. Material in the hopper is clumped over the gate. 6. The diffuser ramp setting is incorrect.	1. Clean, repair, or replace impeller. 2. Adjust the spreader pattern control; refer to the Adjust the Spreader Pattern procedure in the Using the Spreader section. 3. Clean or replace nozzles. 4. Clean hopper screen. 5. Check to see if the agitator pin for the shaft of the impeller motor presence. 6. Adjust the position of the control cable.
There is no spray from the sprayer nozzles in the boom or the nozzles have poor output.	1. The sprayer tank is empty. 2. The sprayer pump supply valve is closed or partially closed. 3. The strainer is clogged or damaged. 4. The pump is clogged or damaged. 5. The nozzles are clogged. 6. The hoses are clogged, kinked, or damaged. 7. The tank agitation lever is in the On position. 8. The sprayer pattern lever is not in the On position. 9. The sprayer pressure and ground speed are incorrect. 10. The chemical mixture in the sprayer tank is incorrect. 11. The spray system is leaking.	1. Fill the sprayer tank. 2. Fully open the sprayer pump supply valve. 3. Clean, repair, or replace the strainer. 4. Clean, repair, or replace the pump. 5. Clean or replace the nozzles. 6. Clean, repair, or replace the hoses. 7. Move the tank agitation lever to the Off position. 8. Move the narrow- or wide-sprayer pattern lever to the On position. 9. Adjust sprayer pressure and the ground speed of the machine. 10. Follow chemical manufacturer's recommendation. 11. Inspect the components of the sprayer system; clean, repair, or replace the sprayer system components as needed.
No material dispensed from hopper.	1. Hopper screen is plugged. 2. Gate not adjusted properly.	1. Clean hopper screen. 2. Adjust the gate. See **Spreader Pattern Adjustment** section in Operation.
The spray wand does not work.	1. The sprayer tank is empty. 2. Sprayer wand pressure control is in wrong position. 3. The wand is clogged or damaged. 4. The spray nozzle for the wand is clogged. 5. The trigger is not pressed. 6. The hose is clogged or damaged. 7. The hose is not connected to wand. 8. The hose for the wand is kinked.	1. Fill the sprayer tank. 2. Rotate the pressure control to the Open position. 3. Clean, repair, or replace the wand. 4. Clean or replace the nozzle. 5. Press the trigger. 6. Clean, repair, or replace the hoses. 7. Connect the hose to the wand. 8. Straighten the kink in the hose.

Problem	Possible Cause	Corrective Action
The indicator light above the impeller On/Off switch is illuminated or flashing.	1. The indicator light is flashing at a slow, constant rate and the —impeller motor speed is not adjustable (locked).	1. While the impeller motor is running, press and hold the impeller On/Off switch for 5-seconds to reset impeller motor speed control; or shut off the engine, and then start the engine; and/or Contact an Authorized Service Dealer.
	2. The indicator light flashes for 2 seconds and then pulses 2 times—The electrical system for the impeller motor is over current.	2. Check the electrical connections for damage and corrosion; inspect impeller for blockage; and/or contact an Authorized Service Dealer.
	3. The indicator light flashes fast and constant and then pulses 4 times—the electrical system for the machine is under voltage.	3. Run engine at high idle with all spreader function turned off to charge the battery until flashing indicator light resets; check the condition of the battery; check the electrical harness for loose or damaged connections; check charging system of the engine for electrical output; and/or contact an Authorized Service Dealer.
	4. The indicator light flashes fast and then pulses 5 times—the electrical system for the machine is over voltage.	4. check charging system of the engine for electrical output and/or contact an Authorized Service Dealer.
The indicator light above the sprayer switch is illuminated or flashing.	1. The indicator light flashes for 2 seconds and then pulses 2 times—The electrical system for the sprayer pump is over current.	1. Check the electrical connections for damage and corrosion; inspect sprayer pump for blockage and drainage; and/or contact an Authorized Service Dealer.
	2. The indicator light flashes fast and constant and then pulses 4 times—the electrical system for the machine is under voltage.	2. Run engine at high idle with the sprayer function turned off to charge the battery until flashing indicator light resets; check the condition of the battery; check the electrical harness for loose or damaged connections; check charging system of the engine for electrical output; and/or contact an Authorized Service Dealer.
	3. The indicator light flashes fast and then pulses 5 times—the electrical system for the machine is over voltage.	3. check charging system of the engine for electrical output and/or contact an Authorized Service Dealer.

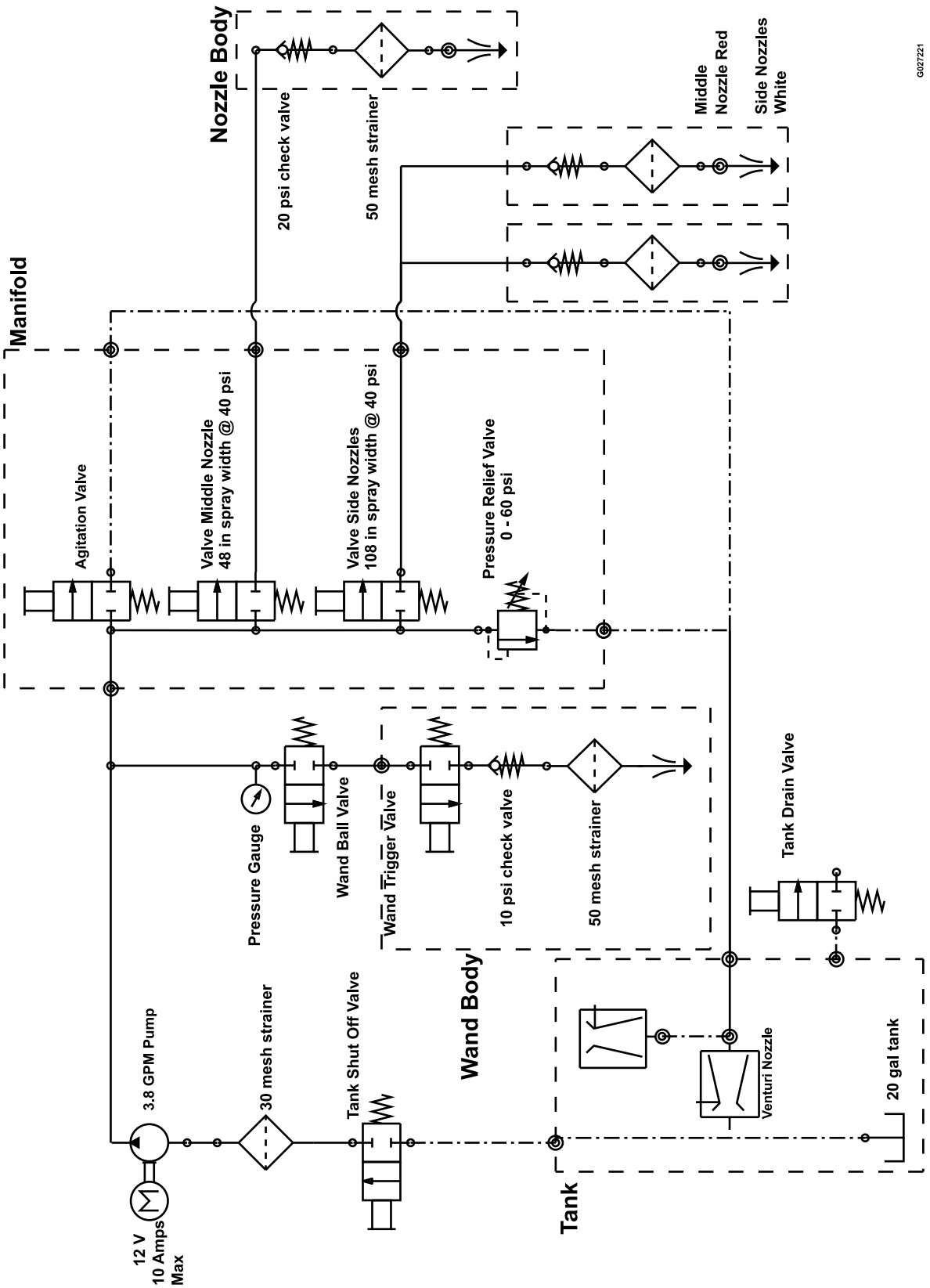
Schematics



Electrical Schematic (Rev. A)



Electrical Diagram (Rev. A)



Sprayer System Schematic (Rev. A)

Notes:

The Toro Warranty

A limited warranty (see warranty periods below)

SWS
Turf Renovation

Conditions and Products Covered

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrant your Toro Products listed below to be free from defects in materials or workmanship.

This warranty covers the cost of parts and labor, but you must pay transportation costs.

The following time periods apply from the date of purchase:

Products	**Warranty Period**
Turf Renovation	
Walk-Behind Aerator	1 year
▪ Engine	2 years
Stand-On Aerator	1 year
▪ Battery	90 days Parts and Labor 1 year Parts Only
▪ Engine	2 years
Dethatcher	1 year
▪ Engine	2 years
Turf Seeder	1 year
▪ Engine	2 years
Stand-On Spreader Sprayer	1 year
▪ Battery	90 days Parts and Labor 1 year Parts Only
▪ Engine	2 years
Walk-Behind Rotary Broom	1 year
▪ Engine	2 years

Where a warrantable condition exists, we will repair the Product at no cost to you including diagnosis, labor, and parts.

Instructions for Obtaining Warranty Service

If you think that your Toro Product contains a defect in materials or workmanship, follow this procedure**:

1. Contact any Authorized Servicing Outlet to arrange service at their dealership. To locate one convenient to you, access our website at www.Toro.com. Select “Where to Buy” and select “Contractor” under product type. You may also call our toll free number below.
2. Bring the product and your proof of purchase (sales receipt) to them.
3. If for any reason you are dissatisfied with the Service Outlet’s analysis or with the assistance provided, contact us at:

   SWS Customer Care Department
   Toro Warranty Company
   8111 Lyndale Avenue South
   Bloomington, MN 55420-1196
   Toll Free: 888-384-9939

**Toro Authorized Rental Customers who have purchased products directly from Toro and have signed the Toro Rental Customer Agreement have the ability to perform their own warranty work. Please visit Toro’s Rental Portal for electronic warranty clam filing procedures or call the toll free number above.

Owner Responsibilities

You must maintain your Toro Product by following the maintenance procedures described in the *Operator’s Manual*. Such routine maintenance, whether performed by a dealer or by you, is at your expense. Parts scheduled for replacement as required maintenance (“Maintenance Parts”), are warranted for the period of time up to the scheduled replacement time for that part. Failure to perform required maintenance and adjustments can be grounds for disallowing a warranty claim.

Items and Conditions Not Covered

Not all product failures or malfunctions that occur during the warranty period are defects in materials or workmanship. This express warranty does not cover the following:

- Product failures which result from installation and use of add-on, modified, or unapproved accessories
- Failure to perform required maintenance and/or adjustments
- Repairs necessary due to failure to follow recommended fuel procedure (consult *Operator's Manual* for more details)
  - Removing contaminants from the fuel system is not covered
  - Use of old fuel (more than one month old) or fuel which contains more than 10% ethanol or more that 15% MTBE
  - Failure to drain the fuel system prior to any period of non-use over one month
- Product failures which result from operating the product in an abusive, negligent or reckless manner
- Parts subject to consumption through use unless found to be defective. Examples of parts which are consumed, include, belts, cutters, blades, teeth, spark plugs, tires, filters, etc.
- Failures caused by outside influence include, weather, storage, contamination, lubricants, additives, or chemicals, etc.
- Normal “wear and tear” items incudes painted surfaces and scratched decals, etc.
- Any component covered by a separate manufacturer’s warranty
- Pickup and delivery charges

General Conditions

Repair by an Authorized Servicing Outlet or Self-Service as an Authorized Rental Customer is your sole remedy under the warranty.

Neither The Toro Company nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of the Toro Products covered by this warranty, including any cost or expense of providing substitute equipment or service during reasonable periods of malfunction or non-use pending completion of repairs under this warranty. All implied warranties of merchantability and fitness for use are limited to the duration of this express warranty. Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Except for the engine warranty coverage and the Emissions warranty referenced below, if applicable, there is no other express warranty. The Emissions Control System on your Product may be covered by a separate warranty meeting requirements established by the U.S. Environmental Protection Agency (EPA) or the California Air Resources Board (CARB). Refer to the California Emission Control Warranty Statement supplied with your Product or contained in the engine manufacturer’s documentation for details.

Countries Other than the United States or Canada

Customers who have purchased Toro products outside the United States or Canada should contact their Toro Distributor (Dealer) to obtain guarantee policies for your country, province, or state. If for any reason you are dissatisfied with your Distributor's service or have difficulty obtaining guarantee information, contact the Toro importer. If all other remedies fail, you may contact us at Toro Warranty Company.

Australian Consumer Law: Australian customers will find details relating to the Australian Consumer Law either inside the box or at your local Toro Dealer.