



**520Lxi**

**Wheel Horse<sup>®</sup> Garden Tractor**

**Model No. 73580—210000001 and Up**

**Operator's Manual**





## Warning



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

**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 this engine on any forest-covered, brush-covered or grass-covered land. Other states or federal areas may have similar laws.

This spark ignition system complies with Canadian ICES-002.

Ce système d'allumage par étincelle de véhicule est conforme à la norme NMB-002 du Canada.

**The enclosed Engine Owner's Manual is supplied for information regarding The U.S. Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance and warranty.**

**Keep this engine Owner's Manual with your unit. Should this engine Owner's Manual become damaged or illegible, replace immediately. Replacements may be ordered through the engine manufacturer.**

# Contents

	Page
Introduction .....	2
Safety .....	3
Safe Operating Practices .....	3
Toro Riding Mower Safety .....	5
Sound Pressure Level .....	6
Sound Power Level .....	6
Vibration Level .....	6
Slope Chart .....	7
Safety and Instruction Decals .....	8
Check Before Operating .....	10
Opening the Hood .....	10
Closing the Hood .....	10
Removing the Side Panels .....	11
Adding Fuel .....	11
Check the Engine Oil Level .....	12
Check Coolant Levels .....	12
Check for Debris .....	13
Check the Safety Interlock System .....	14
Check the Brake .....	14

	Page
Operation .....	14
Think Safety First .....	14
Controls .....	14
Using the Parking Brake .....	14
Starting and Stopping the Engine .....	15
Operating the Power Take Off (PTO) .....	15
The Safety Interlock System .....	16
Gauges and Indicator Lights .....	18
Driving Forward or Backward .....	18
Stopping the Machine .....	19
Raising and Lowering Attachments .....	19
Using the Cruise Control .....	20
Centering the Steering Wheel .....	21
Positioning the Seat .....	21
Lights .....	21
Positioning the Tilt Steering Wheel .....	21
The Smart Turnt Steering Feature .....	21
Pushing the Machine by Hand .....	22
Maintenance .....	22
Recommended Maintenance Schedule .....	22
Servicing the Air Cleaner .....	23
Servicing Engine Oil .....	25
Changing the Engine Coolant .....	26
Changing Spark Plugs .....	26
Greasing the Tractor .....	27
Maintaining the Tire Pressure .....	29
Servicing the Brake .....	29
Draining the Fuel Tank .....	29
Replacing the Fuel Filter .....	30
Servicing the Front Wheel Toe-In .....	31
Changing Transaxle Fluid .....	31
Replacing Fuses .....	33
Replacing Headlights .....	33
Replacing Taillights .....	34
Servicing the Battery .....	34
Cleaning and Storage .....	36
Wiring Diagram .....	38
Troubleshooting .....	40

# Introduction

Thank you for purchasing a Toro product.

All of us at Toro want you to be completely satisfied with your new product, so feel free to contact your local Authorized Service Dealer for help with service, genuine replacement parts, or other information you may require.

Whenever you contact your Authorized Service Dealer or the factory, always know the model and serial numbers of your product. These numbers will help the Service Dealer

or Service Representative provide exact information about your specific product. You will find the model and serial number plate at the location shown in Figure 1.

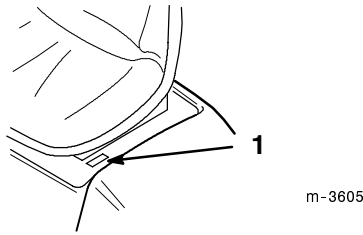


Figure 1

1. Model and serial number plate

For your convenience, write the product model and serial numbers in the space below.

<b>Model No:</b> _____
<b>Serial No.</b> _____

Read this manual carefully to learn how to operate and maintain your product correctly. Reading this manual will help you and others avoid personal injury and damage to the product. Although we design, produce and market safe, state-of-the-art products, you are responsible for using the product properly and safely. You are also responsible for training persons, who you allow to use the product, about safe operation.

The warning system in this manual identifies potential hazards and has special safety messages that help you and others avoid personal injury, even death. **Danger**, **Warning**, and **Caution** are signal words used to identify the level of hazard. However, regardless of the hazard, be extremely careful.

**Danger** signals an extreme hazard that will cause serious injury or death if the recommended precautions are not followed.

**Warning** signals a hazard that may cause serious injury or death if the recommended precautions are not followed.

**Caution** signals a hazard that may cause minor or moderate injury if the recommended precautions are not followed.

Two other words are also used to highlight information. **Important** calls attention to special mechanical information, and **Note** emphasizes general information worthy of special attention.

Determine the left and right side of the machine from the normal operating position.

# Safety

This machine meets or exceeds European Standards in effect at the time of production. However, improper use or maintenance by the operator or owner can result in injury. To reduce the potential for injury, comply with these safety instructions and always pay attention to the safety alert **▲** symbol, which means CAUTION, WARNING, or DANGER—"personal safety instruction." Failure to comply with the instruction may result in personal injury or death.

## Safe Operating Practices

The following instructions are from the CEN standard EN 836:1997.

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

## Training

- Read the instructions carefully. Be familiar with the controls and the proper use of the equipment.
- Never allow children to use the lawnmower. Never allow people unfamiliar with these instructions to use the lawnmower. Local regulations can restrict the age of the operator.
- Never mow while people, especially children, or pets are nearby.
- Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people or their property.
- Do not carry passengers.
- All operators should seek and obtain professional and practical instruction. Such instruction should emphasize:
  - the need for care and concentration when working with ride-on machines;
  - control of a ride-on machine sliding on a slope will not be regained by the application of the brake. The main reasons for loss of control are:
    - insufficient wheel grip;
    - being driven too fast;
    - inadequate braking;
    - the type of machine is unsuitable for its task;
    - lack of awareness of the effect of ground conditions, especially slopes;
    - incorrect hitching and load distribution.

## Preparation

- While mowing, always wear substantial footwear and long trousers. Do not operate the equipment when barefoot or wearing open sandals.
- Thoroughly inspect the area where the equipment is to be used and remove all objects which may be thrown by the machine.
- **WARNING** - Fuel is highly flammable.
  - Store fuel in containers specifically designed for this purpose.
  - Refuel outdoors only and do not smoke while refuelling.
  - Add fuel before starting the engine. Never remove the cap of the fuel tank or add fuel while the engine is running or when the engine is hot.
  - If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have dissipated.
  - Replace all fuel tanks and container caps securely.
- Replace faulty silencers.
- Before using, always visually inspect to see that the blades, blade bolts and cutter assembly are not worn or damaged. Replace worn or damaged blades and bolts in sets to preserve balance.
- On multi-bladed machines, take care as rotating one blade can cause other blades to rotate.

## Operation

- Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.
- Mow only in daylight or in good artificial light.
- Before attempting to start the engine, disengage all blade attachment clutches and shift into neutral.
- Do not use on slopes of more than
  - 5° when mowing on side hills;
  - 10° when mowing uphill;
  - 15° when mowing downhill.
- Remember there is no such thing as a “safe” slope. Travel on grass slopes requires particular care. To guard against overturning:
  - do not stop or start suddenly when going up or downhill;
  - engage clutch slowly, always keep machine in gear, especially when travelling downhill;

- machine speeds should be kept low on slopes and during tight turns;
- stay alert for humps and hollows and other hidden hazards;
- never mow across the face of the slope, unless the lawnmower is designed for this purpose.
- Use care when pulling loads or using heavy equipment.
  - Use only approved drawbar hitch points.
  - Limit loads to those you can safely control.
  - Do not turn sharply. Use care when reversing.
  - Use counterweight(s) or wheel weights when suggested in the instruction handbook.
- Watch out for traffic when crossing or near roadways.
- Stop the blades rotating before crossing surfaces other than grass.
- When using any attachments, never direct discharge of material toward bystanders nor allow anyone near the machine while in operation.
- Never operate the machine with damaged guards or without safety protective devices in place.
- Do not change the engine governor settings or overspeed the engine. Operating the engine at excessive speed can increase the hazard of personal injury.
- Before leaving the operator’s position:
  - disengage the power take-off and lower the attachments;
  - change into neutral and set the parking brake;
  - stop the engine and remove the key.
- Disengage drive to attachments, stop the engine, and disconnect the spark plug wire(s) or remove the ignition key
  - before clearing blockages or unclogging chute;
  - before checking, cleaning or working on the lawnmower;
  - after striking a foreign object. Inspect the lawnmower for damage and make repairs before restarting and operating the equipment;
  - if the machine starts to vibrate abnormally (check immediately).
- Disengage drive to attachments when transporting or not in use.
- Stop the engine and disengage drive to attachment
  - before refuelling;

- before removing the grass catcher;
- before making height adjustment unless adjustment can be made from the operator's position.
- Reduce the throttle setting during engine run-out and, if the engine is provided with a shut-off valve, turn the fuel off at the conclusion of mowing.



## Maintenance and Storage

- Keep all nuts, bolts and screws tight to be sure the equipment is in safe working condition.
- Never store the equipment with fuel in the tank inside a building where fumes can reach an open flame or spark.
- Allow the engine to cool before storing in any enclosure.
- To reduce the fire hazard, keep the engine, silencer, battery compartment and fuel storage area free of grass, leaves, or excessive grease.
- Check the grass catcher frequently for wear or deterioration.
- Replace worn or damaged parts for safety.
- If the fuel tank has to be drained, this should be done outdoors.
- On multi-bladed machines, take care as rotating one blade can cause other blades to rotate.
- When machine is to be parked, stored or left unattended, lower the cutting means unless a positive mechanical lock is used.

## Toro Riding Mower Safety

The following list contains safety information specific to Toro products or other safety information that you must know that is not included in the CEN standard.

- Use only Toro-approved attachments. Warranty may be voided if used with unapproved attachments.

 <b>Warning</b> 
<p><b>Engine exhaust contains carbon monoxide, an odorless, deadly poison that can kill you.</b></p> <p><b>Do not run the engine indoors or in an enclosed area.</b></p>

- Stop the engine, disconnect spark plug wire(s) and remove key before performing any service, repairs, maintenance or adjustments.

- Slow down before turning. Sharp turns on any terrain may cause loss of control.
- Never leave a running machine unattended. Always turn off blades, set parking brake, stop engine, and remove the ignition and KeyChoice™ keys before dismounting.
- Keep hands, feet, hair and loose clothing away from attachment discharge area, underside of mower and any moving parts while engine is running.
- Do not touch equipment or attachment parts which may be hot from operation. Allow to cool before attempting to maintain, adjust or service.
- Remove obstacles such as rocks, tree limbs, etc. from the mowing area. Watch for holes, ruts or bumps, as uneven terrain could overturn the machine. Tall grass can hide obstacles.
- Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes and clothing. Protect your face, eyes and clothing when working with a battery.
- Battery gases can explode. Keep cigarettes, sparks and flames away from battery.
- Use only genuine replacement parts to ensure that original standards are maintained.
- Mow up and down slopes greater than 5°, not across.
- Mow downhill only on slopes above 10°, never mow uphill. If a steep slope must be ascended, back up the hill, and drive forward down the hill, keeping the machine in gear.
- Do not operate machine on hillsides or slopes exceeding 15°.
- Avoid turning on slopes. If you must turn, turn slowly and gradually downhill, if possible.
- Do not use a grass catcher on steep slopes. Heavy grass bags could cause loss of control or overturn the machine.

## **Sound Pressure Level**

This unit has an equivalent continuous A-weighted sound pressure at the operator ear of: 90 dB(A), based on measurements of identical machines per procedures outlined in Directive 84/538/EEC and amendments.

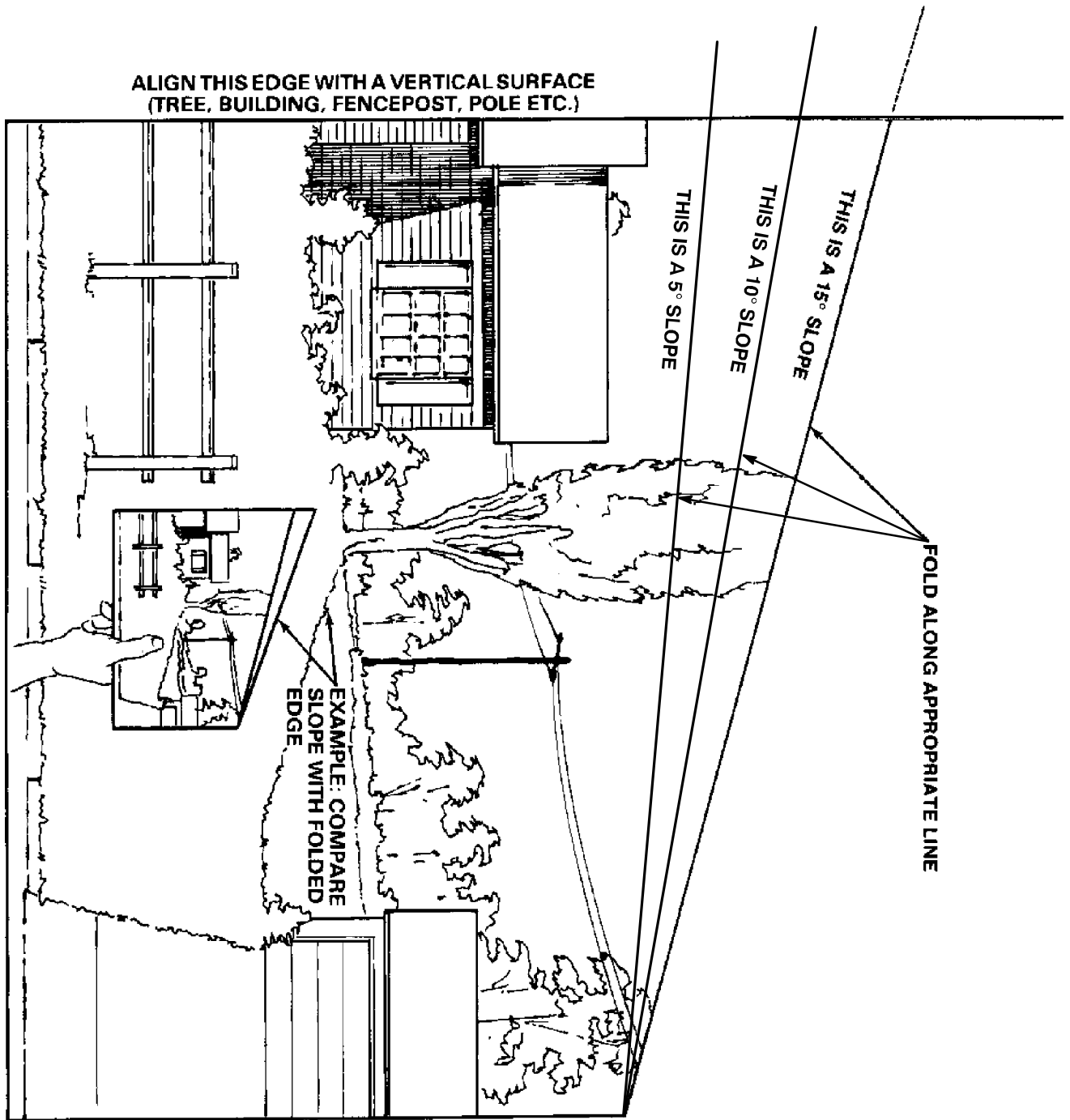
## **Sound Power Level**

This unit has a sound power level of: 105 L<sub>wa</sub>, based on measurements of identical machines per procedures outlined in Directive 84/538/EEC and amendments.

## **Vibration Level**

This unit has a maximum hand-arm vibration level of 7.0 m/s<sup>2</sup> and whole body vibration level of 0.3 m/s<sup>2</sup>, based on measurements of identical machines per EN 1033 and EN 1032.

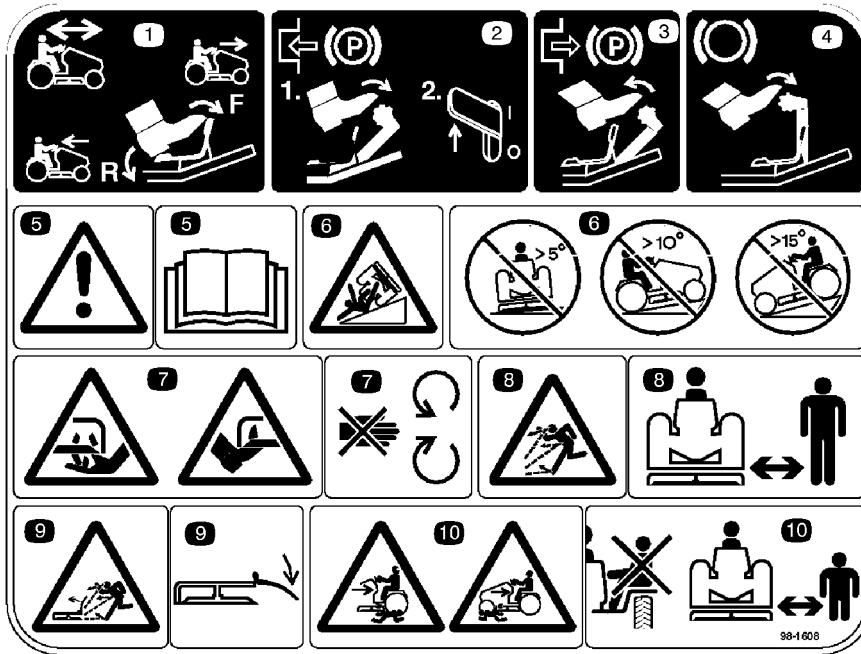
# Slope Chart



# Safety and Instruction Decals

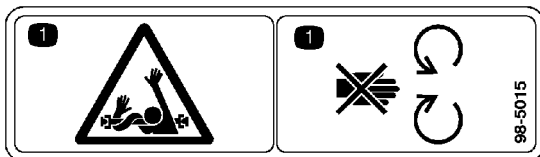


Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost.



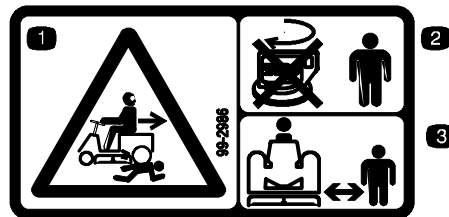
**Part No. 98-1508**

- |  |  |   |   |
|--|--|---|---|
| <ol style="list-style-type: none"> <li>1. Press the traction control pedal forward to move forward and rearward to back up.</li> <li>2. To set the parking brake, press the brake pedal and lift the parking brake lever.</li> </ol> | <ol style="list-style-type: none"> <li>3. To release the parking brake, press the brake pedal</li> <li>4. To stop the tractor, press the brake pedal.</li> <li>5. Danger—read and understand the operator's manual.</li> </ol> | <ol style="list-style-type: none"> <li>6. Tipping hazard—do not go across slopes greater than 5 degrees, up slopes greater than 10 degrees, or down slopes greater than 15 degrees.</li> <li>7. Cutting/dismemberment hazard of hands or feet—stay away from rotating blades and moving parts.</li> </ol> | <ol style="list-style-type: none"> <li>8. Thrown object hazard—keep bystanders away.</li> <li>9. Thrown object hazard from mower—keep the deflector in place.</li> <li>10. Crushing/dismemberment hazard—look back and down when backing, do not carry riders, and keep children away.</li> </ol> |
|--|--|---|---|



**Part No. 98-5015**

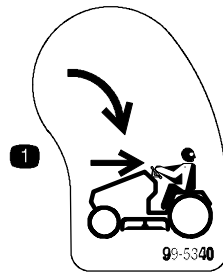
1. Drive shaft entanglement hazard—stay away from moving parts



**Part No. 99-2986**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Crushing and dismemberment hazard—look back and down while backing up.</li> </ol> | <ol style="list-style-type: none"> <li>2. Do not deactivate the no-operate-in-reverse feature when children or bystanders are present.</li> <li>3. Keep children away.</li> </ol> |
|---|---|





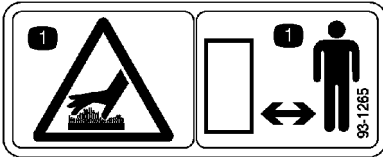
Part No. 99-5340

1. KeyChoice, turn to mow in reverse



Part No. 95-4143

1. Cutting/dismemberment hazard—stay away from moving parts.



Part No. 93-1265

1. Hot surface hazard—stay away.

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NIVEAU MAXIMUM      MAXIMUM FILL      CAPACIDAD MAXIMA  
 NIVEAU MINIMUM      MINIMUM FILL      CAPACIDAD MINIMA

**1**

**2**

**! DANGER/POISON ! PELIGRO/VENENO !**

<p><b>3</b></p> <p><b>SHIELD EYES.</b> EXPLOSIVE GASES CAN CAUSE BLINDNESS OR INJURY.</p> <p><b>PROTEGER LES YEUX.</b> GAZ EXPLOSIFS PEUVENT RENDRE AVEUGLE OU PROVOQUER DES LESIONS.</p> <p><b>PROTEJA LOS OJOS.</b> GASES EXPLOSIVOS PUEDEN CAUSAR CEGUERA O DAÑO.</p>	<p><b>4</b></p> <p><b>NO</b> • SPARKS • FLAMES • SMOKING</p> <p><b>ÉLOIGNER</b> • ÉTINCELLES • FLAMMES • CIGARETTES</p> <p><b>NO</b> • CHISPAS • FLAMAS • FUMAR</p>	<p><b>5</b></p> <p><b>SULFURIC ACID</b> CAN CAUSE BLINDNESS OR SEVERE BURNS.</p> <p><b>ACIDE</b> SULFURIQUE PEUT RENDRE AVEUGLE OU PROVOQUER DES BRULURES GRAVES.</p> <p><b>ACIDO</b> SULFURICO PUEDE CAUSAR CEGUERA O QUEMAGURAS SEVERAS.</p>
<p><b>KEEP OUT OF THE REACH OF CHILDREN. DO NOT TIP. DO NOT OPEN BATTERY!</b>  <b>MAINTENIR HORS DE LA PORTÉE DES ENFANTS. NE RENVERSEZ PAS. N'OUVREZ PAS LA BATTERIE!</b>  <b>MANTENGASE FUERA DEL ALCANCE DE LOS NIÑOS. NO INCLINE. NO ABRA LA BATERIA!</b></p>		

**6**

**FLUSH EYES IMMEDIATELY WITH WATER. GET MEDICAL HELP FAST.**

**RINCER IMMEDIATEMENT LES YEUX A GRANDE EAU. CONTACTER RAPIDEMENT UN MEMBRE DE LA PROFESSION MEDICALE.**

**LAVE LOS OJOS DE INMEDIATO. CONSIGA AYUDA MEDICA RAPIDO.**

**9**

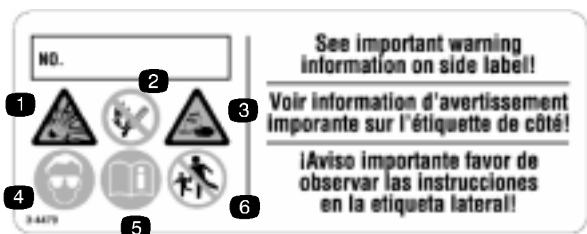
**HOW TO ACTIVATE DRY CHARGED BATTERIES**

1. Use only battery electrolyte (1.250 Sp. Gr.) to fill battery initially.
2. Do not overfill. Let stand for 15 minutes.
3. Charge battery at 4-5 amps until specific gravity is 1.250 or higher and temperature is at least 60°F. – all cells gassing freely.
4. After battery has been activated, add only water to replace normal loss.

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Part No. 104-4164

- |   |  |   |  |
|---|--|---|--|
| <ol style="list-style-type: none"> <li>1. Contains lead, do not throw the battery in the garbage</li> <li>2. Recycle</li> </ol> | <ol style="list-style-type: none"> <li>3. Wear eye protection—explosive gases can cause blindness and other injuries</li> <li>4. No sparks, flame, or smoking</li> </ol> | <ol style="list-style-type: none"> <li>5. Sulfuric acid can cause blindness or severe burns</li> <li>6. Flush eyes immediately with water and get medical help fast.</li> </ol> | <ol style="list-style-type: none"> <li>7. Maximum fill line</li> <li>8. Minimum fill line</li> <li>9. Instructions for activating the battery</li> </ol> |
|---|--|---|--|



**Part No. 104-4163**

- |  |                               |
|--|-------------------------------|
| 1. Explosion hazard  | 4. Wear eye protection        |
| 2. No sparks, flame, or smoking                            | 5. Read the operator's manual |
| 3. Caustic liquid hazard—burns to hand and damage to items | 6. Keep bystanders away       |

# Check Before Operating

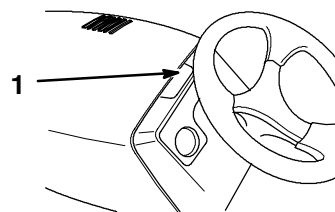
Each time before operating your tractor, check the following:

- Fuel level
- Engine oil level
- Debris on the air-intake screens
- Debris in the engine area
- Debris on the rear transaxle cover
- The safety interlock system
- The brake

Some of these steps will require that you open the hood or remove the side panels on the tractor.

## Opening the Hood

1. Park the machine on a level surface, disengage the power take off (PTO), set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Push the hood latch to the left (Fig. 2).



**Figure 2**

m-3314

1. Hood latch

3. Raise the hood to full height.

**Caution**

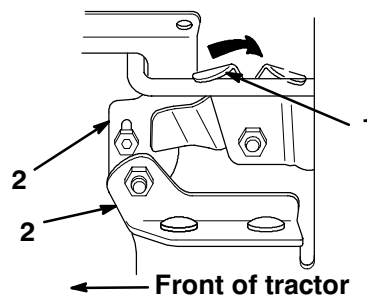
**Components under the hood will be hot if the tractor has been running. If you touch hot components you may be burned.**

**Allow the tractor to cool before performing maintenance or touching components under the hood.**

## Closing the Hood

The hood catch is located at the left hand corner of the grill.

1. Press rearward on the hood catch as you begin to lower the hood.
2. Push the hood down until the latch closes.



**Figure 3**

M-4227

1. Hood catch
2. Hood hinges

## Removing the Side Panels

1. Park the machine on a level surface, disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Raise the hood.
3. Lift up and twist each of the two side panel latches until they line up with the open slot (Fig. 4).

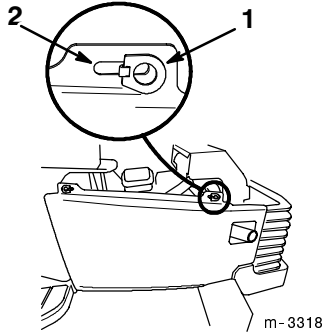


Figure 4

1. Side panel latch

2. Open slot

4. Pull the top of the side panel toward you until the side panel latches pass through the open slot.
5. Lift the side panel from the tractor.

## Adding Fuel

Use unleaded, regular gasoline suitable for automotive use (85 pump octane minimum). Leaded regular gasoline may be used if unleaded regular is not available.

**Important** Do not use methanol, gasoline containing methanol, or gasohol containing more than 10% ethanol because the fuel system could be damaged. Do not mix oil with 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, 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 1/4 to 1/2 in. (6 to 13 mm) below the bottom of the filler neck. This empty space in the tank allows gasoline to expand.
- Never smoke when handling gasoline, and stay away from an open flame or where gasoline fumes may be ignited by a spark.
- Store gasoline in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of gasoline.
- 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.

## Using Stabilizer/Conditioner

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

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

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

Add the correct amount of fuel stabilizer/conditioner to the gasoline, as directed by the manufacturer.

**Note:** A fuel stabilizer/conditioner is most effective when mixed with fresh gasoline.

## Filling the Fuel Tank

1. Park the machine on a level surface, disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.

**Note:** When filling the tank, make sure that the machine is on a level surface so that adequate air space is allowed.

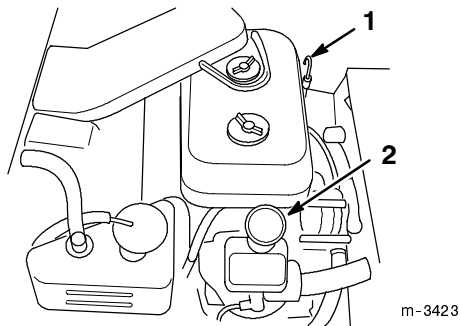
2. Clean around the fuel tank cap and remove the cap.
3. Add fuel until the fuel level is 1/4 to 1/2 in. (6 mm to 13 mm) below the bottom of the filler neck.

This space in the tank allows for expansion of the fuel. Do not fill the fuel tank completely.

4. Install the fuel tank cap securely.
5. Wipe up any gasoline that may have spilled.

## Check the Engine Oil Level

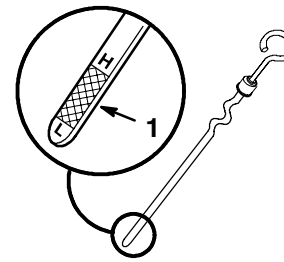
1. Park the machine on a level surface, disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Open the hood.
3. Clean around the oil dipstick (Fig. 5) so dirt cannot fall into the dipstick tube and damage the engine.



**Figure 5**

1. Dipstick
2. Oil filler

4. Pull out the oil dipstick and wipe the metal end clean (Fig. 6).



**Figure 6**

1. Metal end
5. Slide the oil dipstick fully into the dipstick tube (Fig. 5).
6. Pull the dipstick out and look at the metal end (Fig. 6). If the oil level is low (near the L mark), add oil; refer to Engine Oil, page 25.

**Important** Do not overfill the crankcase with oil because this may result in engine damage.

## Check Coolant Levels

The cooling system contains a 50/50 solution of water and permanent ethylene glycol anti-freeze. Check the level of coolant at the beginning of each day before starting the engine.

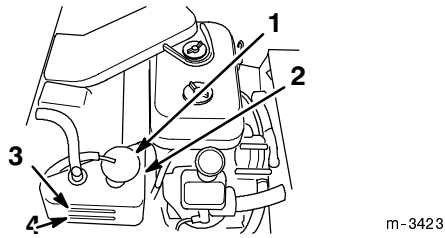
**Warning**

**If the engine has been running, the coolant in the radiator will be hot and pressurized. If you remove the cap, it may spray out, causing severe burns.**

- Do not remove the radiator cap to check coolant levels.
- Do not remove the radiator cap when the engine is hot. Allow the engine to cool for at least 15 minutes or until the radiator cap is cool enough to touch without burning your hand.

1. Park the machine on a level surface, disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Open the hood.
3. Check the coolant level.

Coolant should be between the two lines on the reserve tank when the engine is cold (Fig. 7).



**Figure 7**

- |                     |                              |
|---------------------|------------------------------|
| 1. Reserve tank cap | 3. Maximum level line (cold) |
| 2. Reserve tank     | 4. Minimum level line (cold) |

4. If coolant is low, remove the reserve tank cap and add a 50/50 mixture of water and permanent ethylene glycol anti-freeze.

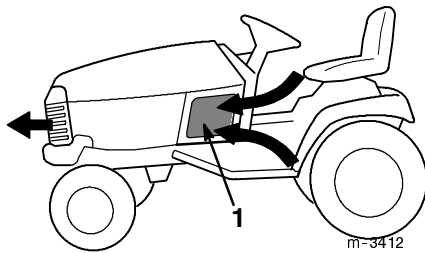
**Important** Do not overfill the tank. Coolant needs room to expand when it gets hot.

5. Install the reserve tank cap.

## Check for Debris

**Important** Operating the engine with a blocked grass screen, dirty or plugged cooling fins, and/or cooling shrouds removed, will result in engine damage from overheating.

1. Park the machine on a level surface, disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Check for debris on the air-intake screens (Fig. 8).



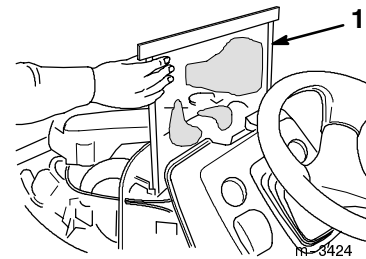
**Figure 8**

Arrows show air intake and exhaust path

1. Air intake screens (1 of 3 shown)

3. Wipe away debris before each use and/or during use, if required.

4. Pull the radiator screen (Fig. 9) up from the retention slot between the radiator and the tractor dash.



**Figure 9**

1. Radiator screen

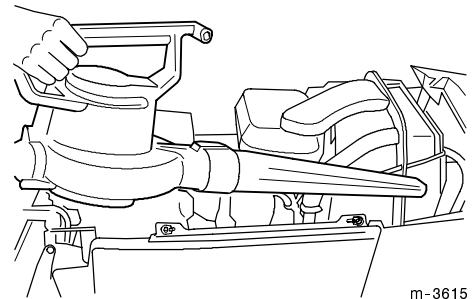
5. Wipe or wash off all accumulated debris from the screen.

6. Blow (or low pressure wash) debris from the radiator cooling fins.

7. Install the radiator screen.

8. Clean any debris build-up from the engine area with a brush or blower.

**Important** If possible, blow dirt out (Fig. 10), rather than washing it out. If water is used, keep it away from electrical items.

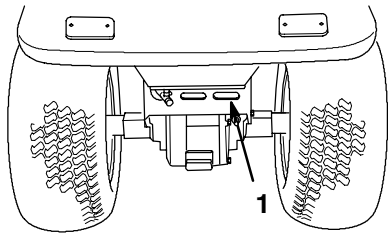


**Figure 10**

**Important** Do not clean the machine using pressurized water. High-pressure washing can damage the electrical system or deplete grease.

9. Clean debris from the rear transaxle cover (Fig. 11).

**Note:** The rear transaxle cover is an air-intake area for cooling the transaxle.



m-3436

**Figure 11**

1. Rear transaxle cover

## Check the Safety Interlock System

Always check the interlock system before operating the tractor. Instructions for checking the interlock system are found in the Operation section, page 16.

## Check the Brake

Refer to Checking and Adjusting the Brake, page 29.

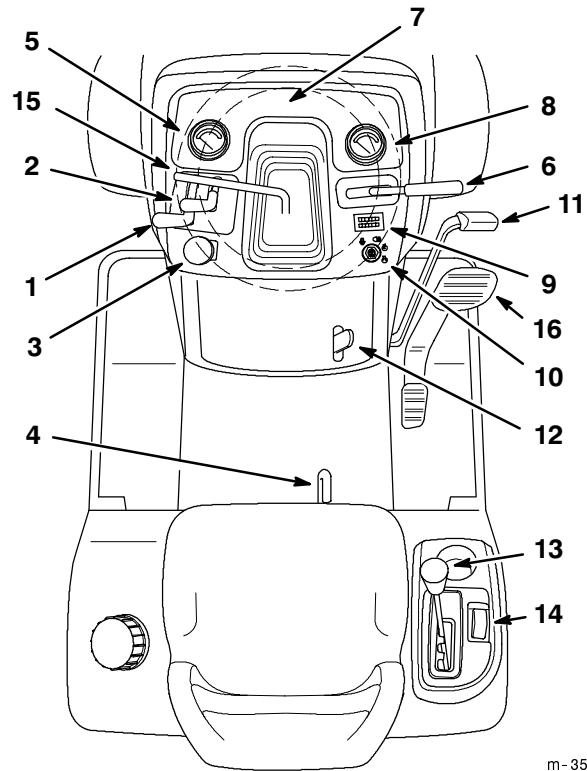
# Operation

## Think Safety First

Please carefully read all the safety instructions on pages 3 through 8. Knowing this information could help you, your family, pets, or bystanders avoid injury.

## Controls

Become familiar with all the controls (Fig. 12) before you start the engine and operate the machine.



m-3597

**Figure 12**

- |                                   |                               |
|-----------------------------------|-------------------------------|
| 1. Throttle                       | 9. Hour meter                 |
| 2. Choke                          | 10. Ignition switch           |
| 3. PTO switch                     | 11. Brake pedal               |
| 4. Seat adjustment lever          | 12. Parking brake lever       |
| 5. Engine water temperature gauge | 13. High-Low range lever      |
| 6. Attachment lift lever          | 14. Cruise control switch     |
| 7. Indicator lights               | 15. Steering wheel tilt lever |
| 8. Fuel gauge                     | 16. Traction control pedal    |

## Using the Parking Brake

Set the parking brake when you stop the machine or leave it unattended.

### Setting the Parking Brake

1. Push the brake pedal (Fig. 12) down and hold it.
2. Lift the parking brake lever (Fig. 12) up and gradually take your foot off the brake pedal. The brake pedal should stay down.

### Releasing the Parking Brake

1. Push down on the brake pedal (Fig. 12).  
The parking brake lever should release.

2. Release the brake pedal.

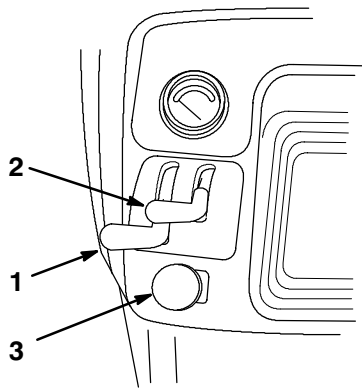
## Starting and Stopping the Engine

### Starting

1. Sit down on the seat.
2. Push the brake pedal down.

**Note:** The engine will not start unless you push the brake pedal down fully.

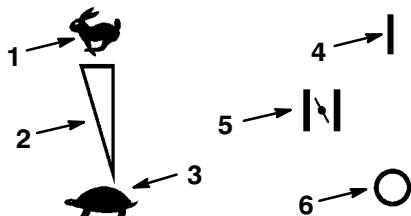
3. Push the PTO switch to the off position (Fig. 13).



**Figure 13**

1. Throttle
2. Choke
3. PTO switch

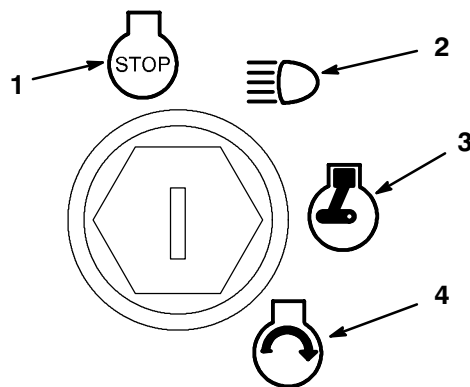
m-3257



**Figure 14**

1. Fast
2. Variable from slow to fast
3. Slow
4. On
5. Choke
6. Off

4. Move the choke lever to the on position (if the engine is cold) (Fig. 13 and 14).
5. Move the throttle lever halfway to the fast position (Fig. 13 and 14).
6. Turn the ignition key clockwise and hold it in the start position (Fig. 15).



**Figure 15**

1. Stop
2. Run with lights
3. Run
4. Start

m-3312

7. When the engine starts, release the key.

**Important** Do not crank the engine continuously for more than 10 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.

8. After the engine starts, move the choke lever to the off position (Fig. 13 and 14).

If the engine stalls or hesitates, move the choke lever back to the on position for a few seconds. Then, move the throttle lever to the desired setting. Repeat this as required.

9. Allow the engine to warm up before using it.

### Stopping

1. Move the throttle lever to the slow position (Fig. 13 and 14).
2. Allow the engine to run for a short time to cool down.
3. Turn the ignition key to the stop position (Fig. 15).
4. Remove both the ignition and KeyChoice™ keys when the equipment is not in use or unattended.

## Operating the Power Take Off (PTO)

The power take off (PTO) runs the various powered attachments such as mowers, snowthrowers, and tillers.

If the ignition key is in the run or lights position and the PTO is engaged, the PTO indicator light will be on. When this light is on, it is a reminder: the implement is being

powered and the starter will not crank while the PTO is engaged. Always turn off the PTO before getting off the seat.

## Engaging the PTO

1. Press the brake pedal to stop the machine.
2. Move the throttle lever to the fast position.

**Important** For best performance, always use full throttle when the PTO is on.

3. Pull the PTO switch to the on position (Fig. 16).

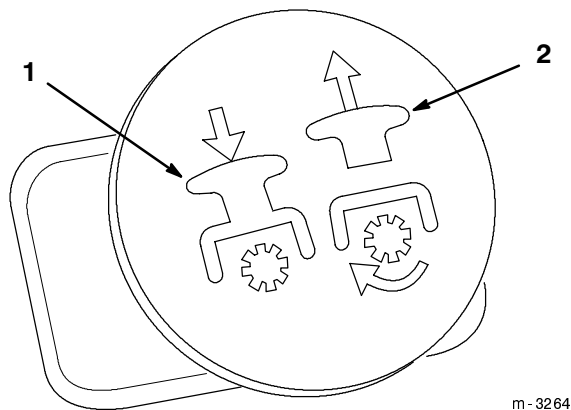


Figure 16

1. Push (off-disengaged)
2. Pull (on-engaged)

## Disengaging the PTO

Push the PTO switch to the off position.

## The Safety Interlock System

### Understanding the Safety Interlock System

The safety interlock system is designed to prevent the engine from starting unless the following conditions are met:

- You are sitting on the seat
- The brake pedal is depressed
- The PTO is in the off position

The safety interlock system is designed to stop the engine when you do the following:

- You rise from the seat when the brake pedal is released
- You rise from the seat when the PTO is in the on position.

The safety interlock system is designed to stop the PTO when you shift into reverse with the power take off (PTO) engaged.

## Operating in Reverse

The tractor has an interlock feature that prevents mowers, snowthrowers, and other PTO powered attachments from operating while the tractor is traveling in reverse. If you shift into reverse with the PTO engaged, the PTO will stop.

If you need to mow or use other PTO powered attachments while in reverse gear, you can temporarily deactivate this interlock. **Do not mow while backing up unless it is absolutely necessary.**

! **Danger** !

**A child or bystander could be backed over by a riding mower with blades engaged and suffer serious personal injury or death.**

- **Do not mow in reverse unless absolutely necessary.**
- **Always look backward and down before backing up.**
- **Use the KeyChoice switch only if you are certain no children or other bystanders will appear in the mowing area.**
- **Always remove both the ignition and KeyChoice keys and put them in a safe place out of the reach of children or unauthorized users when leaving the unit unattended.**

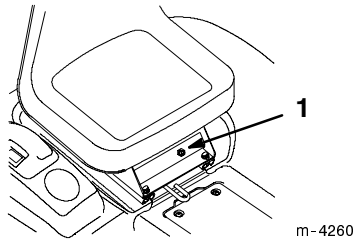
Before deactivating this interlock, ensure that there are no children present on or near the property where you are using the tractor, and that none are likely to appear while you are mowing or operating an attachment. Be extra observant after you have chosen to deactivate the interlock because the sound of the tractor's engine might prevent you from being aware that a child or bystander has entered the area.

If you are certain that you can safely mow or operate an attachment in reverse, complete the following procedure:

1. Engage the PTO.
2. Insert the KeyChoice key into the KeyChoice switch (Fig. 17).

**Note:** Do not insert the KeyChoice key unless it is absolutely necessary to mow or operate an attachment in reverse. Always remove both the ignition and the KeyChoice keys and put them in a safe place out of the reach of children when leaving the unit unattended.





**Figure 17**

1. Reverse interlock key

3. Turn the KeyChoice key clockwise until it stops and release it.

A red light illuminates on the front console (Fig. 18) to serve as a reminder that the interlock has been deactivated.

4. Remove the KeyChoice key, when finished.

Once you deactivate the interlock, it stays in this mode—with your mower blade or PTO powered attachment operating whenever you back up—and the console light stays on until you either disengage the PTO or turn off the engine.

## Testing the Safety Interlock System

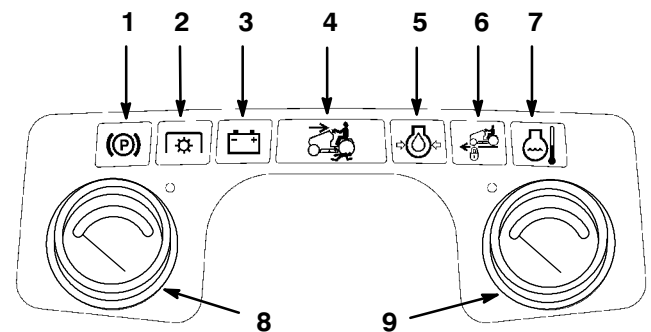
Test the safety interlock system each time before you use the machine. Do not operate the machine if the safety system is not functioning properly. If the safety system does not operate as described below, have an Authorized Service Dealer repair the safety system immediately.

1. Fully press the brake pedal. Pull the PTO switch to the On position.
2. Turn the ignition key to the Start position. The starter should not crank.
3. Push the PTO switch to the Off position and release the brake pedal.
4. Turn the ignition key to the Start position. The starter should not crank.
5. Fully press the brake pedal and set the parking brake. Push the PTO switch to the Off position and rise from the seat.
6. Turn the ignition key to the Start position. The starter should not crank.
7. Fully press the brake pedal and set the parking brake. Push the PTO switch to the Off position and start the engine.
8. With the engine running, release the parking brake and rise slightly from the seat; the engine should stop.

9. Fully press the brake pedal, set the parking brake, push the PTO switch to the Off position, and start the engine.
10. Pull the PTO switch to the On position and rise slightly from the seat; the engine should stop.
11. With the parking brake released, turn the ignition key to the Run position without starting the engine.
12. Pull the PTO switch to the On position; you should hear an audible click indicating that the PTO is activated and the PTO light should illuminate.
13. Move the foot pedal to reverse; you should hear an audible click, indicating that the PTO is deactivated, and the PTO light should turn off.
14. With the parking brake released, turn the ignition key to the Run position without starting the engine.
15. Pull the PTO switch to the On position.
16. Turn the KeyChoice key and release it. The Operating-in-Reverse warning light should illuminate.
17. Move the foot pedal to reverse; the PTO and PTO light on the dash should remain on.
18. Push the PTO switch to the Off position; the PTO light and the Operating-in-Reverse warning light should turn off.

## Gauges and Indicator Lights

The indicator lights (Fig. 18) illuminate when certain controls are activated and when major malfunctions occur that need immediate attention.



m-3330

**Figure 18**

- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| 1. Parking brake light                | 6. Cruise control light             |
| 2. PTO (power take off) light         | 7. Coolant temperature light        |
| 3. Battery light                      | 8. Engine coolant temperature gauge |
| 4. Operating-in-Reverse warning light | 9. Fuel gauge                       |
| 5. Oil pressure light                 |                                     |

## Parking Brake Light

When the parking brake light is on, it indicates the parking brake is set. The machine will not drive while the parking brake is set.

## PTO Light

When the PTO light is on, it indicates the implement is being powered. The PTO clutch must be disengaged before the engine will start.

## Battery Light

The battery light will be on when the key is in the run or lights positions if the battery voltage is below 12.1 volts or above 15.0 volts. If the light comes on at a higher RPM, it is important to have your battery and electrical system checked and the problem corrected.

## Operating–in–Reverse Warning Light

The Operating–in–Reverse warning light will illuminate whenever the KeyChoice key is used to deactivate the operating–in–reverse interlock. It is a reminder that the interlock system is deactivated. The light goes out whenever the PTO is disengaged or the engine is shut off. **When the light is on, look behind and use extra caution when backing. Be especially watchful for children and pets.**

## Oil Pressure Light

When the oil light is on, it indicates the engine oil pressure is low. After the engine starts the light should go out. When the engine is running, the light comes on if the oil pressure drops below a safe operating level. If the light comes on while the engine is running, **stop the engine immediately and correct the cause of low oil pressure.**

## Cruise Control Light

The cruise control light indicates that the cruise control system is activated.

## Coolant Temperature Light

The coolant temperature light shows when the engine cooling system is overheated. If this light illuminates, check the engine coolant temperature gage.

## Engine Coolant Temperature Gauge

This gauge shows the coolant temperature in the engine. If the gauge enters the red zone, disengage the PTO and allow the engine to cool while continuing to run the engine.

If the gauge does not show temperatures dropping, **stop the engine immediately, clean the air intake screens, and/or correct the cause of high temperature.**

## Fuel Level Gauge

This gauge shows the level of fuel remaining.

## Hour Meter

The hour meter (Fig. 12) records the amount of time the engine has run. Use it to schedule regular maintenance.

## Driving Forward or Backward



1. Stop the tractor.

**Important** Do not shift gears with the tractor in motion. Internal transmission damage may result.

**Important** Do not force the shift lever. Applying slight pressure to the traction control pedal while shifting will help the gears engage.

2. Shift into high (H) or low (L) forward speed with the High-Low lever (Fig. 12).

**Note:** Use low for best mowing performance and smoothest operation with all attachments. Use high for transporting or where conditions permit higher speed.

Danger

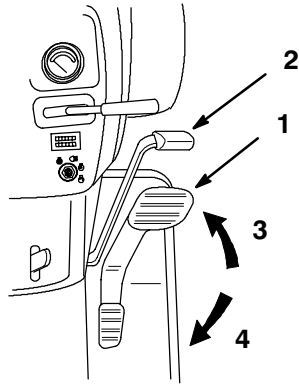
**Driving with excessive speed on slopes can cause you to rollover or lose control, resulting in serious injury or death to you or bystanders.**

- **Do not shift into neutral while moving.**
- **Do not allow the tractor to roll freely in neutral on slopes.**
- **Read, understand, and follow all instructions in the *Operator's Manual* and on the machine before starting.**

3. Place the throttle control in the fast position for best performance. (The throttle control regulates engine revolutions per minute.)

- Place your foot on the traction control pedal and slowly press on the top of the pedal to move forward, or on the bottom of the pedal to move backward (Fig. 19).

**Note:** The farther you move the pedal in either direction, the faster the machine will move in that direction.



m-3258

**Figure 19**

- |                           |             |
|---------------------------|-------------|
| 1. Traction control pedal | 3. Forward  |
| 2. Brake pedal            | 4. Backward |

- To slow down, release the pressure on the traction control pedal and step on the brake pedal.

## Stopping the Machine

- Release the traction control pedal.
- Step on the brake pedal.
- Disengage the PTO.
- Lower the attachment lift.
- Turn the ignition key to the stop position to stop the engine.
- Set the parking brake before getting off; refer to Setting the Parking Brake, page 14.
- Remove the ignition and KeyChoice keys from the switches.

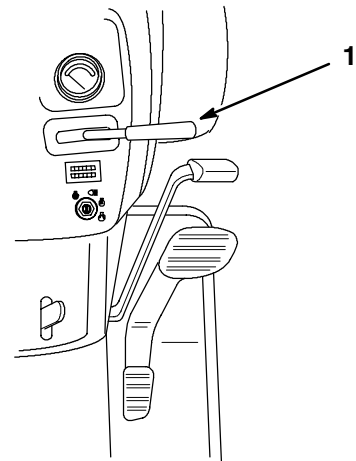
⚠
Caution
⚠

**Children or bystanders may be injured if they move or attempt to operate the tractor while it is unattended.**

**Always remove the ignition and KeyChoice keys and set the parking brake when leaving the machine unattended, even if just for a few minutes.**

## Raising and Lowering Attachments

Raise and lower attachments using the attachment power lift lever. This lever is located to the right of the steering wheel (Fig. 20).



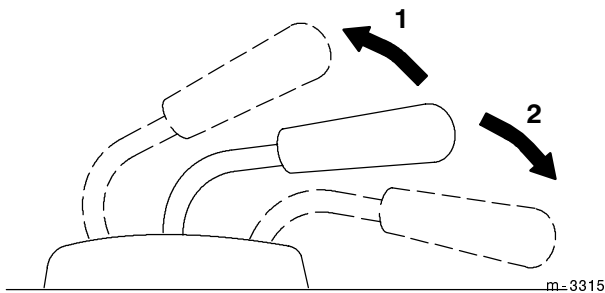
m-3258

**Figure 20**

- Attachment power lift lever

## Raising Attachments

- Start the tractor.
- Pull the lift lever up to raise the attachment (Fig. 21).



**Figure 21**

1. Lift lever, Up
2. Lift lever, Down

3. Release the lever when the attachment has reached the desired height.

The attachment will remain in the raised position until you lower it again.

⚠
Warning
⚠

**When the engine is off, attachments in the raised position may gradually lower, possibly pinning or injuring you or a bystander.**

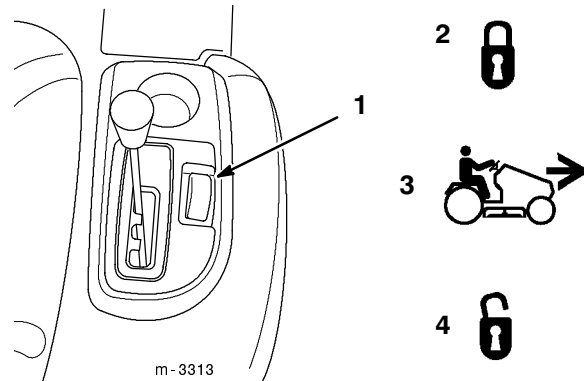
**Lower the attachment lift before stopping the engine.**

## Lowering Attachments

1. Start the tractor.
2. Push the lift lever down to lower the attachment (Fig. 21).

## Using the Cruise Control

The cruise control is a switch (Fig. 22) on the right fender that maintains a set traction control position without foot pressure. The cruise control only operates when moving forward.



**Figure 22**

1. Cruise control switch
2. Set
3. Cruise control
4. Off

## Engaging the Cruise Control

1. Drive the tractor forward and obtain the desired speed.
2. While holding your foot steady on the traction control pedal, push the cruise control switch (Fig. 22) to the set position.  
  
This locks the traction control in position.
3. Remove your foot from the traction control.

**Note:** If you initially set the cruise control to any speed other than full speed, you can speed up with your foot on the traction pedal as needed. When you release the traction pedal, the cruise speed you set previously resumes automatically.

**Important** If you accidentally press the cruise control while the engine is running and you are not moving, the machine will subsequently operate at partial speed in forward and will not operate in reverse. To correct this situation, move the cruise control switch to the off position or press the brake pedal to disengage the cruise control.

## Disengaging the Cruise Control

To disengage the cruise control, complete one of the following steps:

- While holding your foot steady on the traction control, move the cruise control switch to the off position (Fig. 22).
- Press the brake pedal.

This automatically disengages the cruise control and applies the brake at the same time.

## Centering the Steering Wheel

The power steering will not always return the steering wheel to the centered position. When this happens, the steering wheel will appear to be un-centered when the front wheels return to the straight-ahead position.

This is not a mechanical problem, but if it happens to your vehicle and you wish to center the steering wheel, you may do so:

1. Note the degree to which the steering wheel is out of center, then turn the steering wheel all the way in the opposite direction until the front wheels no longer turn.
2. Continue turning the steering wheel by the degree to which it is off center.
3. Turn the steering wheel in the other direction until the front wheels aim straight ahead.

## Positioning the Seat

You can move the seat forward and backward. Position the seat where you have the best control of the machine and are most comfortable.

1. Move the adjustment lever sideways to unlock seat (Fig. 23).
2. Slide the seat to the desired position and release the lever to lock the seat into position.

**Important** Ensure that the seat is locked in position before operating.

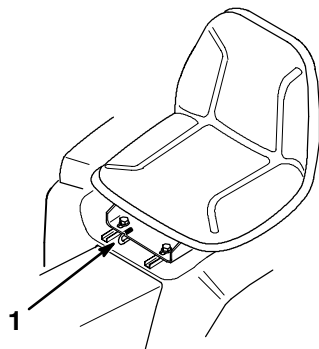


Figure 23

1. Adjustment lever

M-3320

## Lights

The lights turn on whenever you turn the ignition key to or past the lights position (Fig. 24). You can turn them on even if the engine is not running; therefore remove the

ignition key when leaving the machine unattended so that no one can accidentally turn on the lights and discharge the battery.

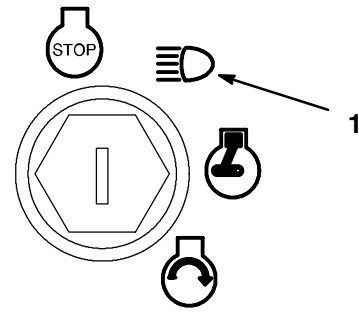


Figure 24

1. Lights

m-3312

## Positioning the Tilt Steering Wheel

The steering wheel has four tilt locations. Position the steering wheel where you have the best control of the machine and are most comfortable.

1. Lift the tilt lever to release the lock (Fig. 25).
2. Move the steering wheel to a comfortable position; then release the lever to lock it in place.

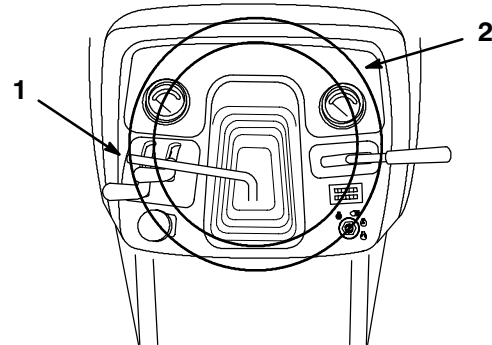


Figure 25

1. Tilt lever
2. Steering wheel



m-3259

## The Smart Turn™ Steering Feature

The Smart Turn™ Steering feature automatically lowers the speed of the tractor in tight turns. The decrease in speed is directly proportional to the sharpness of the turn, up to a maximum speed reduction of 40 percent. This allows you to make turns at higher speeds without having to change the speed control position. After the turn, the original speed is automatically restored.

The Smart Turn™ Steering feature does not affect engine speed.

This system was set at the factory and should not need adjustment.

 <span style="font-size: 1.2em; font-weight: bold; margin: 0 10px;">Danger</span> 
<p><b>Driving with excessive speed while turning can cause you to rollover, resulting in serious injury or death to you or bystanders.</b></p> <ul style="list-style-type: none"> <li>• <b>Do not rely on the Smart Turn steering feature to avoid accidents while turning.</b></li> <li>• <b>Read, understand, and follow all instructions in the <i>Operator's Manual</i> and on the machine before starting.</b></li> </ul>

## Pushing the Machine by Hand

**Important** Do not tow the machine because transmission damage may occur. Always push the machine by hand.

1. Disengage the PTO and stop the engine.
2. Move the High-Low range lever to the neutral position (N).  
This allows the rear wheels to turn freely.
3. Push the machine to the desired location.
4. Place the lever high or low after moving the machine, and set the parking brake.

# Maintenance

## Recommended Maintenance Schedule

Maintenance Service Interval	Maintenance Procedure
Each Use	<ul style="list-style-type: none"> <li>• Engine oil—check level</li> <li>• Brakes—check</li> <li>• Safety System—check</li> <li>• Air-intake screens—clean<sup>1</sup></li> <li>• Radiator screen—clean<sup>1</sup></li> <li>• Engine area—clean<sup>1</sup></li> <li>• Rear transaxle cover—clean<sup>1</sup></li> </ul>
25 Hours	<ul style="list-style-type: none"> <li>• Engine air precleaner—clean<sup>1</sup></li> <li>• Tires—check pressure</li> <li>• Battery—check electrolyte level</li> <li>• Transaxle—check oil level</li> </ul>
50 Hours	<ul style="list-style-type: none"> <li>• Engine oil—change<sup>2</sup></li> <li>• Grease fittings—grease</li> <li>• Power take off (PTO) belt—check tension</li> <li>• Spark plugs—change</li> </ul>
100 Hours	<ul style="list-style-type: none"> <li>• Engine air filter—clean<sup>1</sup></li> <li>• Fuel filter—replace</li> <li>• Engine oil filter—change</li> </ul>
200 Hours	<ul style="list-style-type: none"> <li>• Transaxle oil and oil filter—change<sup>3</sup></li> <li>• Power steering filter—have it cleaned by your Authorized Service Dealer<sup>3</sup></li> </ul>
300 Hours	<ul style="list-style-type: none"> <li>• Engine air filter—replace<sup>1</sup></li> </ul>



Maintenance Service Interval	Maintenance Procedure
Yearly/Storage Service	<ul style="list-style-type: none"> <li>• Chipped surfaces—paint</li> <li>• Brakes—check</li> <li>• Safety System—check</li> <li>• Air-intake screens—clean</li> <li>• Radiator screen—clean<sup>1</sup></li> <li>• Rear transaxle cover—clean</li> <li>• Engine air precleaner—clean</li> <li>• Engine air filter—clean</li> <li>• Tires—check pressure</li> <li>• Battery—check electrolyte level</li> <li>• Grease fittings—grease</li> <li>• Power take off (PTO) belt—check tension</li> <li>• Engine oil—change</li> <li>• Fuel filter—replace</li> <li>• Engine oil filter—change</li> <li>• Transaxle oil and oil filter—change</li> <li>• Spark plugs—change</li> </ul>
400 Hours or 2 Years	<ul style="list-style-type: none"> <li>• Radiator coolant—flush and change</li> </ul>

<sup>1</sup>More often in dusty, dirty conditions

<sup>2</sup>Initially, perform this operation after 5 hours

<sup>3</sup>Initially, perform this operation after 50 hours

**Important** Refer to your engine operator's manual for additional maintenance procedures.


Caution


**If you leave the key in the ignition switch, someone could accidentally start the engine and seriously injure you or other bystanders.**

**Remove the key from the ignition and disconnect the wire from the spark plug before you do any maintenance. Set the wire aside so that it does not accidentally contact the spark plug.**

## Servicing the Air Cleaner

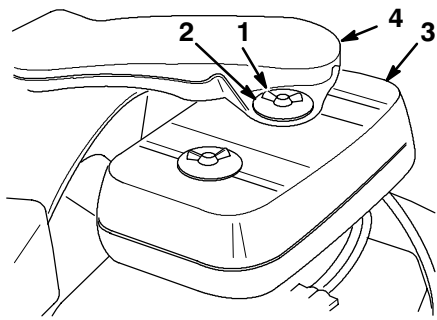
**Foam Element:** Clean and oil every 25 operating hours, or yearly, whichever occurs first.

**Paper Element:** Clean every 100 operating hours or yearly, whichever occurs first. Replace every 300 operating hours.

**Note:** Service the air cleaner more frequently (every few hours) if operating conditions are extremely dusty or sandy.

## Removing the Foam and Paper Elements

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Open the hood.
3. Clean around the air cleaner to prevent dirt from getting into the engine and causing damage (Fig. 26).

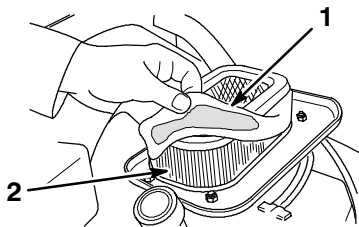


m-3425

**Figure 26**

- |              |                      |
|--------------|----------------------|
| 1. Wing bolt | 3. Air cleaner cover |
| 2. Washer    | 4. Air intake duct   |

4. Remove the wing bolts, washers, air intake duct, and air cleaner cover (Fig. 26).



m-3426

**Figure 27**

- |                 |                  |
|-----------------|------------------|
| 1. Foam element | 2. Paper element |
|-----------------|------------------|

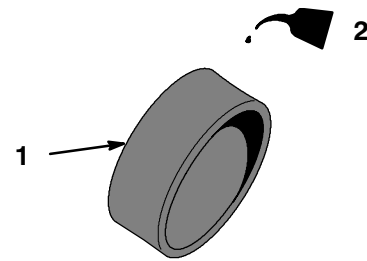
5. Remove the elements and separate the foam element from the paper element (Fig. 27).

**Important** Do not clean the elements with solvents or compressed air.

## Cleaning the Foam Element

1. Wash the foam element in liquid soap and warm water.
2. When the element is clean, rinse it thoroughly.
3. Dry the element by squeezing it in a clean cloth.
4. Saturate the element with clean engine oil (Fig. 28), squeeze out the excess oil, the wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the element.

**Important** Replace the foam element if it is torn or worn.



m-3364

**Figure 28**

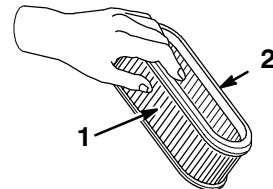
- |                 |        |
|-----------------|--------|
| 1. Foam element | 2. Oil |
|-----------------|--------|

## Cleaning the Paper Element

1. Clean the paper element by tapping it gently on a flat surface to remove dust.
2. Inspect the element for tears, an oily film, and damage.

If the element is very dirty or damaged, replace it with a new one.

**Important** Never clean the paper element with pressurized air or liquids, such as solvent, gas, or kerosene. Replace the element if it is damaged or cannot be cleaned thoroughly.



m-3363

**Figure 29**

- |                  |                |
|------------------|----------------|
| 1. Paper element | 2. Rubber seal |
|------------------|----------------|

## Checking the Air Filter Housing

Check the air cleaner housing for deformation or other damage. The housing must seal well and permit only filtered air to reach the carburetor. If the housing is damaged, it must be replaced. Ensure that no foreign material is obstructing the air passage.

## Installing the Foam and Paper 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 element onto the paper air cleaner element (Fig. 27).
2. Install the wing bolts, washers, air intake duct, and air cleaner cover removed previously (Fig. 26).



- Close the hood.

## Servicing Engine Oil

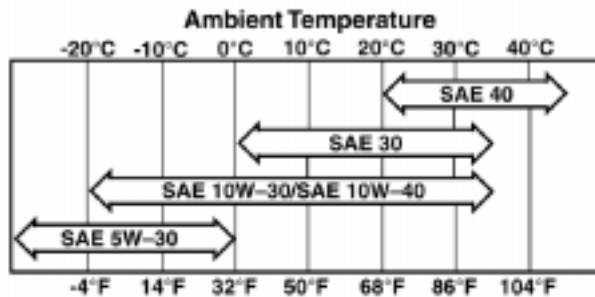
Change oil after the first 5 operating hours and then every 50 operating hours thereafter. Change the oil filter every 100 operating hours.

**Oil Type:** Detergent oil (API service SG or SH)

**Crankcase Capacity:** w/filter, 1.9 qts. (1.8 l)

**Viscosity:**

### USE THESE SAE VISCOSITY OILS



## Changing the Engine Oil

- Start the engine and let it run for five minutes. This warms the oil so it drains better.
- Park the machine so that the drain side is slightly lower than the opposite side to ensure that the oil drains completely.
- Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
- Open the hood.



### Caution



Components under the hood will be hot if the tractor has been running. If you touch hot components you may be burned.

Allow the tractor to cool before performing maintenance or touching components under the hood.

- Place a pan below the oil drain.
- Open the drain by turning it counterclockwise 1/8 turn and pulling out on it (Fig. 30).

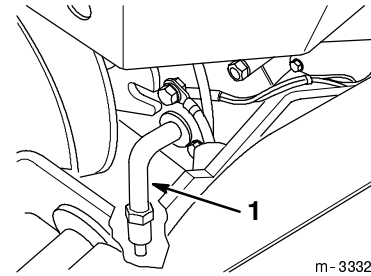


Figure 30

- Oil drain

- When the oil has drained completely, close the drain by pushing it in and turning it clockwise, 1/8 turn.
- Dispose of the used oil at a certified recycling center.
- Remove the oil filler cap (Fig. 31).

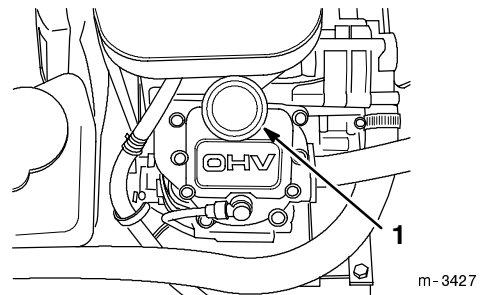


Figure 31

- Filler cap

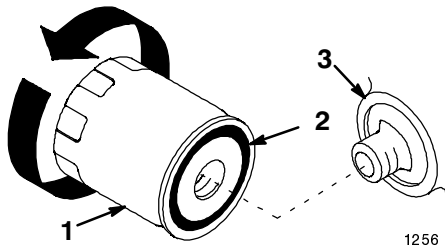
- Slowly pour approximately 80% of the specified amount of oil into the filler tube (Fig. 31).
- Check the oil level; refer to Checking the Engine Oil Level, page 12.
- Slowly add additional oil to bring the oil level to the full (H) mark on the dipstick.

**Important** Do not overfill the crankcase with oil because this may cause engine damage.

## Changing the Engine Oil Filter

- Drain the oil from the engine; refer to Changing Oil, page 25, steps 1 through 8.

2. Remove the old filter (Fig. 32).



**Figure 32**

1. Oil filter
2. Gasket
3. Adapter

3. Wipe the filter adapter gasket surface (Fig. 32).
4. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Fig. 32).
5. Install the replacement oil filter to the filter adapter. Turn the oil filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter by hand an additional 3/4 turn (Fig. 32).
6. Fill the crankcase with the correct type of new oil; refer to Changing Oil, page 25, steps 9 through 12.
7. Run the engine at slow idle speed for two minutes.
8. Stop the engine.
9. Check the oil level; refer to Checking the Engine Oil Level, page 12.
10. Add oil to the full (H) mark on the dipstick.
11. Install the filler cap and dipstick.
12. Dispose of oil filter properly. Recycle it in accordance with local codes.

## Changing the Engine Coolant



### Warning

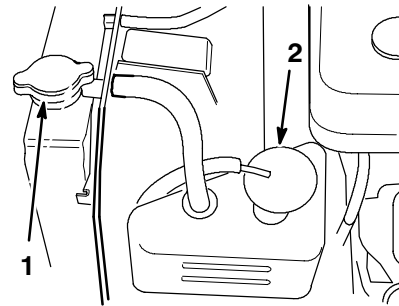


If the engine has been running, the coolant in the radiator will be hot and pressurized. If you remove the cap, it may spray out, causing severe burns.

- Do not remove the radiator cap to check coolant levels.
- Do not remove the radiator cap when the engine is hot. Allow the engine to cool for at least 15 minutes or until the radiator cap is cool enough to touch without burning your hand.

1. Park the machine on a level surface.

2. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
3. Remove the radiator cap and reserve tank cap (Fig. 33).



**Figure 33**

1. Radiator cap
2. Reserve tank cap

4. Open the coolant drain at the bottom of the radiator and allow coolant to flow into a drain pan.

**Note:** If you wish, you can attach a 3/8 ID hose to the drain valve.

5. When coolant stops flowing, close the drain.
6. Remove the coolant plug from the engine and allow coolant to flow into the drain pan.
7. When coolant stops flowing, install the drain plug.
8. Slowly fill the radiator with a 50/50 mixture of water and permanent ethylene glycol anti-freeze.
9. Install the radiator cap.
10. Slowly fill the reserve tank until the level reaches the upper line.

**Important** Do not overfill the tank. Coolant needs room to expand when it gets hot.

11. Install the reserve tank cap.
12. Start the engine and operate it until it is warm.
13. Check the coolant level after the engine has cooled down and replenish, if required.

## Changing Spark Plugs

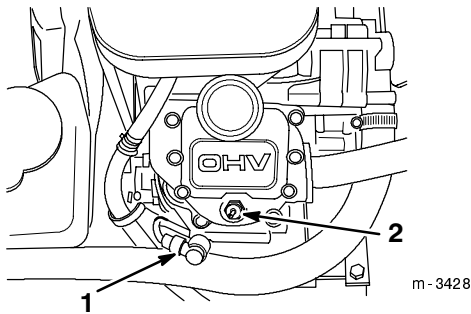
Check the spark plugs and reset the air gap as necessary. Replace the spark plugs after every 100 operating hours. Ensure that the air gap between the center and side electrodes is correct before installing the spark plugs. Use a spark plug wrench for removing and installing the spark plugs and a gapping tool/feeler gauge to check and adjust the air gap.

**Type:** NGK BMR4A

**Air Gap:** 0.024–0.028” (0.6–0.7 mm)

## Removing the Spark Plugs

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Open the hood.
3. Pull the wires off the spark plugs (Fig. 34).
4. Clean around the spark plugs to prevent dirt from falling into the engine and potentially causing damage.
5. Remove the spark plugs and metal washer.



**Figure 34**

1. Spark plug wire
2. Spark plug

## Checking the Spark Plugs

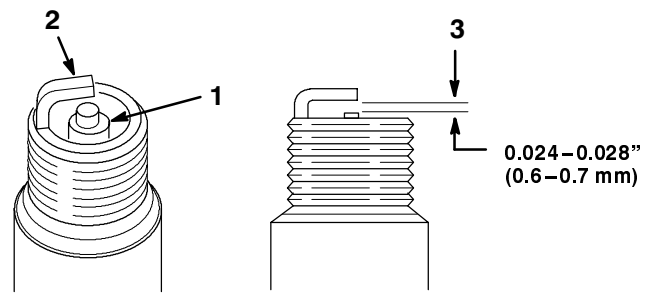
1. Look at the center of the spark plugs (Fig. 35).

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.

- Important** Do not clean the spark plugs. Always replace a spark plug when it has a black coating, worn electrodes, an oily film, or cracks.
2. Check the gap between the center and side electrodes (Fig. 35).
  3. Bend the side electrode (Fig. 35) if the gap is not correct.

## Installing the Spark Plugs

1. Install the spark plugs and metal washers.



m-3215

**Figure 35**

1. Center electrode insulator
2. Side electrode
3. Air gap (not to scale)

2. Tighten the spark plugs to 15–20 ft-lb (20–27 Nm).
3. Push the wires onto the spark plugs (Fig. 34).
4. Close the hood.

## Greasing the Tractor

Grease the machine after every 50 operating hours or yearly, whichever occurs first. Grease more frequently when operating conditions are extremely dusty or sandy.

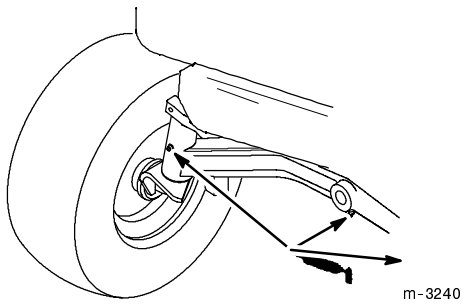
**Grease Type:** General-purpose grease.

### How to Add Grease

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Clean the grease fittings with a cloth.
3. Scrape off any paint from the fittings.
4. Connect a grease gun to each fitting in turn.
5. Pump grease into the fittings until grease begins to ooze out of the bearings.
6. Wipe up any excess grease.

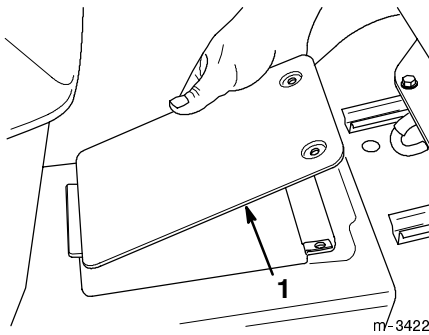
### Where to Add Grease

1. Lubricate the left-hand and right-hand spindles until grease begins to ooze out of the bearings (Fig. 36).
2. Lubricate the front axle pivot (Fig. 36).



**Figure 36**

3. Open the drive shaft maintenance cover on the tractor tunnel near the seat by unscrewing the two screws securing it, then raising it (Fig. 37).



**Figure 37**

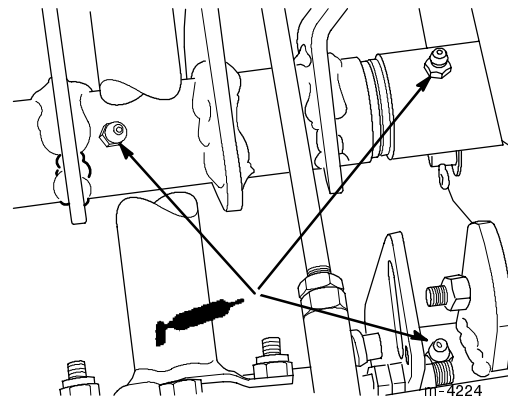
1. Drive shaft maintenance cover

**! Danger !**

**The rotating, cooling fan and drive shaft can catch fingers, hands, feet, hair, and loose clothing, causing amputation or other severe injury.**

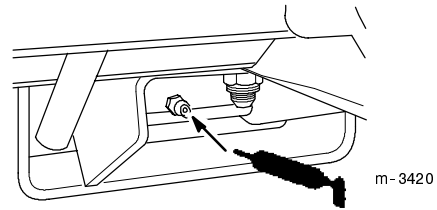
- Do not operate the tractor without the drive shaft cover in place.
- Keep fingers, hands and clothing clear of the rotating, fan and drive shaft.
- Stop the engine and remove the ignition key before performing maintenance.

4. Lubricate the three grease fittings (Fig. 38).



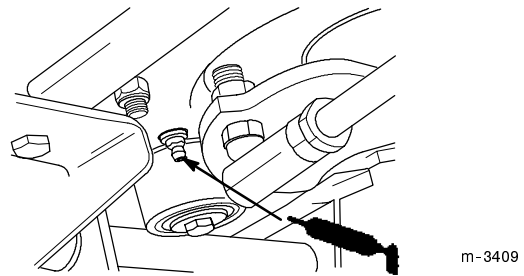
**Figure 38**

5. Replace and secure the cover.
6. Grease the fitting on the brake pedal (Fig. 39).



**Figure 39**

7. If your tractor has manual steering, put one pump of grease into the steering housing (from underneath the frame) (Fig. 40).

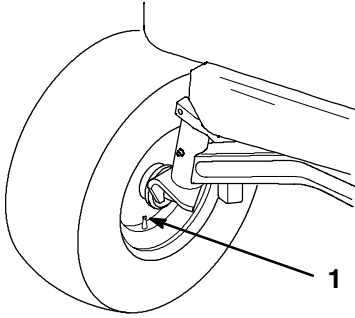


**Figure 40**

# Maintaining the Tire Pressure

Check the pressure at the valve stem after every 25 operating hours or monthly, whichever occurs first (Fig. 41). Check the tires when they are cold to get the most accurate pressure reading. If the tire pressure is low, fill the tire to the following pressure:

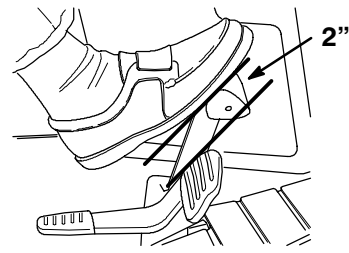
**Pressure:** 20 psi (138 kPa) front and rear



m-3319

**Figure 41**

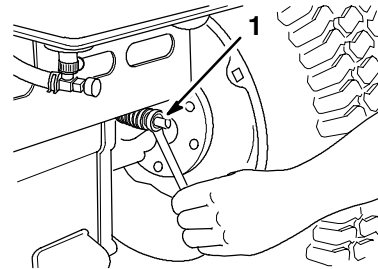
1. Valve stem



m-3418

**Figure 42**

3. Turn the brake adjustment nut at the rear of the tractor (Fig. 43) until there is 2 in. (51 mm) of free travel.



m-3417

**Figure 43**

1. Brake adjustment nut

# Servicing the Brake

Check the parking brake before each use. If the parking brake does not hold securely, adjust it.

## Checking the Brake

1. Park the machine on a level surface, disengage the PTO, put the High-Low range lever in the neutral position.
2. Set the parking brake, stop the engine, and remove the ignition key.
3. Push the tractor forward.

The rear wheels must lock and skid. If the wheels turn and do not lock, adjust the brake; refer to Adjusting the Brake.

## Adjusting the Brake

1. Place the transmission in neutral.
2. Depress the brake pedal.

There should be 2 in. (51 mm) of free travel (Fig. 42) before the brake begins to engage.

**Important** Do not overtighten the adjustment nut.

**Important** With the parking brake released, the rear wheels must rotate freely when you push the tractor. If brake action and free wheel rotation cannot be achieved, contact your Authorized Service Dealer immediately.

# Draining the Fuel Tank

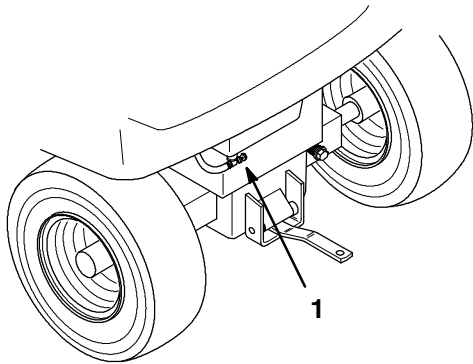
**Danger**

**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.**

- Drain gasoline from the fuel tank when the engine is cold. Do this outdoors in an open area. Wipe up any gasoline that spills.
- Never smoke when draining gasoline, and stay away from an open flame or where a spark may ignite the gasoline fumes.

1. Park the machine on a level surface to ensure that the fuel tank drains completely.

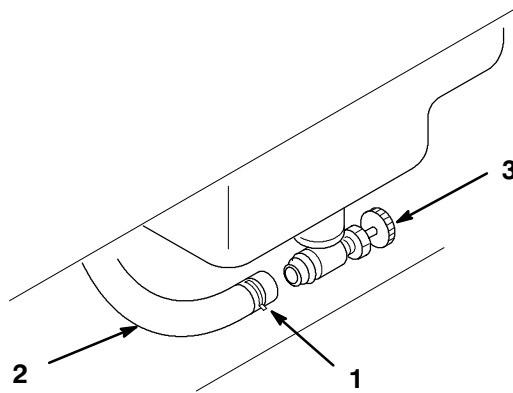
2. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
3. Close the fuel shut-off valve at the fuel tank (Fig. 44 & 45).



m-3263

**Figure 44**

1. Fuel shut-off valve



m-2487

**Figure 45**

1. Hose clamp
2. Fuel line
3. Fuel shut-off valve

4. Loosen the hose clamp and slide it up the fuel line away from the fuel shut-off valve (Fig. 45).
5. Pull the fuel line off the fuel shut-off valve (Fig. 45).

**Note:** Some fuel will flow out from the hose as it is disconnected from the valve.

6. Attach a 5/16 in. internal diameter hose to the valve to help drain the fuel into the container.
7. Open the valve and allow gasoline to drain into a gas can or drain pan.

**Important** Do not turn or unscrew the fuel shut-off valve.

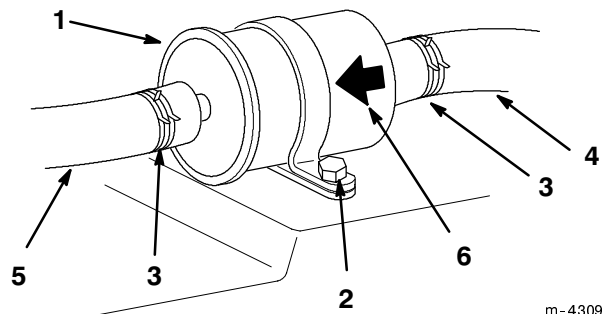
8. Remove the drain hose.
9. Install the fuel line onto the fuel shut-off valve.
10. Slide the hose clamp close to the valve to secure the fuel line (Fig. 45).

**Note:** The fuel shut-off valve should normally be left open, except for service on the fuel system or when the tractor is transported on a trailer.

## Replacing the Fuel Filter

Replace the fuel filter after every 100 operating hours.

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Close the fuel shut-off valve at the fuel tank (Fig. 44 & 45).
3. Open the hood and remove the side panels.
4. Remove the filter mounting bolt and remove the filter (Fig. 46).



m-4309

**Figure 46**

1. Filter
2. Mounting bolt
3. Hose clamp
4. Fuel line from tank
5. Fuel line to engine\fuel pump
6. Flow direction arrow

5. Squeeze the ends of the hose clamps together and slide them away from the filter (Fig. 46).
6. Remove the filter from the fuel lines.
7. Install a new filter, ensuring that the flow direction arrow points toward the engine\fuel pump.
8. Install the filter mounting bolt (Fig. 46).
9. Move the hose clamps close to the filter.
10. Open the fuel shut-off valve at the fuel tank (Fig. 44 & 45).

11. Replace the side panels and close the hood.

## Servicing the Front Wheel Toe-In

Maintaining correct front wheel toe-in is important for safety, Smart Turn steering operation, and ease of use. If uneven tire wear, lawn scuffing, or hard steering develop, you may need to adjust the toe-in of the front wheels. Check the toe-in after every 100 operating hours or once a year, whichever occurs first.

Maintain the following specification: 1/8-1/4 inch (3.5-6.5 mm) toe-in on the front wheels.

### Measuring Toe-In

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Turn the wheels straight ahead.
3. Push the front of the tires out to remove normal looseness in the linkage.
4. Measure the distance between both of the front tires at spindle level (at the front and rear of the wheels) (Fig. 47).

The front measurement should be 1/8 to 1/4 in. (3 to 6 mm) less than the rear measurement. If adjustment is needed, refer to Adjusting Toe-In.

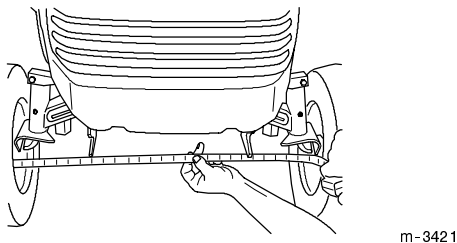


Figure 47

### Adjusting Toe-In

1. Loosen the jam nuts at the ends of the steering rods (Fig. 48).

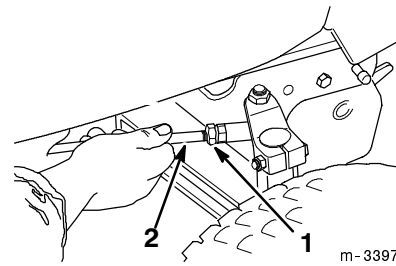


Figure 48

1. Jam nut
2. Steering rod

2. Rotate both steering rods equal amounts to adjust the toe-in to 1/8 to 1/4 in. (3 to 6 mm).
3. Hold each tie rod end with one wrench and tighten the jam nut with a second wrench.

**Important** Ensure that the flat surface on the top of the front tie rod ends is parallel to the bottom of the steering arm (Fig. 49).

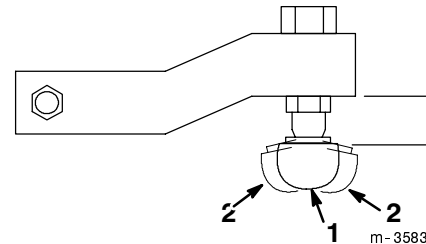


Figure 49

View from front of tractor looking at end of tie rod

1. This
2. Not this

4. Check the toe-in; refer to Measuring Toe-In.

## Changing Transaxle Fluid

Check the fluid level every 25 hours. Always keep the fluid level in the correct operating range on the dipstick when the transaxle is cold.

Replace the transaxle fluid and filter at 50 hours initially, then every 200 hours thereafter.

**Fluid Type:** SAE 10W-30 Detergent oil (API service SG, SH or above)

### Transaxle Capacity:

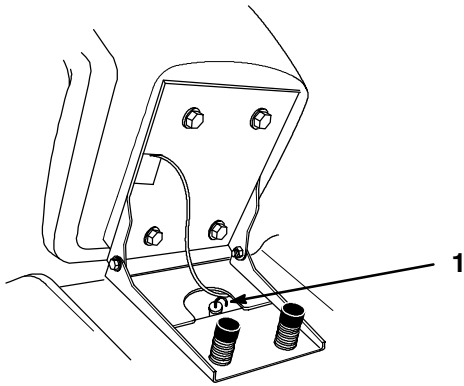
Total system capacity: 6.0 qts.

Approximate refill capacity: 4.5 qts.

**Fluid Type:** SAE 10W-30 Detergent oil (API service SG, SH or above)

## Checking the Transaxle Oil

1. Park the machine on a level surface.
2. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
3. Tilt the seat up.
4. Clean around the transmission dipstick (Fig. 50) so dirt cannot fall into the filler hole and damage the transaxle.

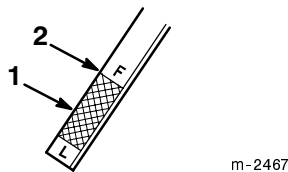


**Figure 50**

1. Transmission dipstick and filler tube

5. Pull out the transmission dipstick and wipe the metal end clean (Fig. 50).
6. Slide the dipstick fully into the filler tube (Fig. 50).
7. Pull the dipstick out and look at the metal end (Fig. 51).

When the transaxle is cold, oil should be in the operating range, below the full line on the dipstick.



**Figure 51**

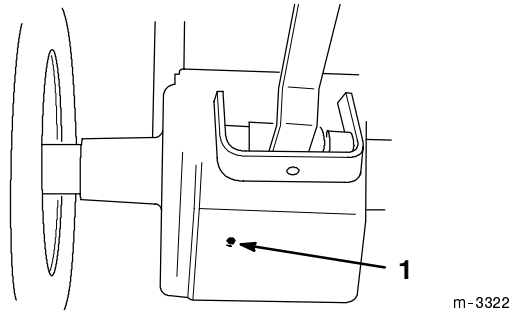
1. Operating range
2. FULL line

8. If the oil level is low, slowly pour only enough SAE 10W-30 detergent oil into the filler tube to raise the level to the full line.

**Important** Do not fill above the full line because the fluid may overflow.

## Draining the Transaxle Oil

1. Warm up the transaxle oil by driving the tractor.
2. Park the machine on a level surface to ensure that the oil drains completely.
3. Turn off the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
4. Place a pan below the transaxle drain.
5. Open the drain by removing the plug (Fig. 52).



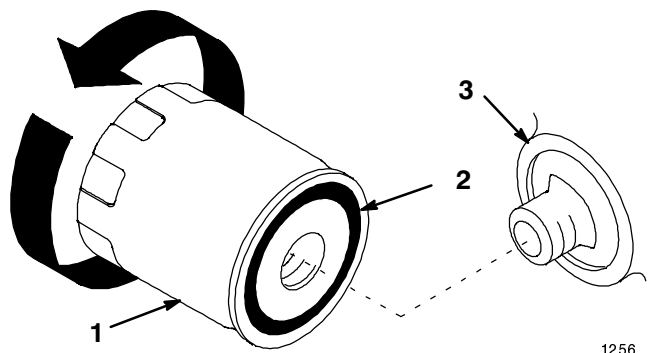
**Figure 52**

1. Transaxle drain plug

6. When the oil has drained completely, wipe the plug clean, apply pipe sealant to the plug, and install it.
7. Dispose of the used oil at a certified recycling center.

## Changing the Transaxle Filter

1. Remove the transaxle filter (Fig. 53).



**Figure 53**

1. Transaxle filter
2. Gasket
3. Adapter

2. Wipe the filter adapter gasket surface (Fig. 53).



3. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Fig. 53).
4. Install the replacement transaxle filter to the filter adapter. Turn the filter clockwise until the rubber gasket contacts the filter adapter, then tighten the filter an additional 3/4 turn (Fig. 53).

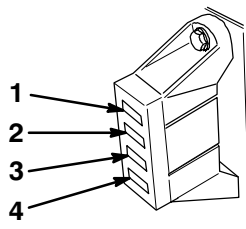
## Filling the Transaxle Oil

1. Slowly pour the specified refill capacity of oil into the filler tube (Fig. 50).
2. Start the engine, let it run for 30 seconds at high idle, and cycle the steering wheel several times (power steering models only) to fill the filter and hydraulic lines.
3. Stop the engine.
4. Check the fluid level; refer to Checking Transaxle Fluid Level, page 32.
5. Slowly add additional oil to bring the oil level to the full mark on the dipstick.

## Replacing Fuses

The electrical system is protected by fuses. They require no maintenance. However, if a fuse blows, check the component and circuit for a malfunction or short.

To replace a fuse, pull it out of the fuse box and insert a new fuse of the same type and size that you removed (Fig. 54).



**Figure 54**

- |                         |                               |
|-------------------------|-------------------------------|
| 1. F1; main-30 amp      | 3. F3; dash, interlock-10 amp |
| 2. F2; regulator-25 amp | 4. F4; headlights-10 amp      |

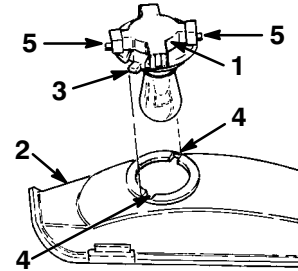
## Replacing Headlights

**Specification:** Bulb # 1156 Automotive Type

### Removing the Bulb

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.

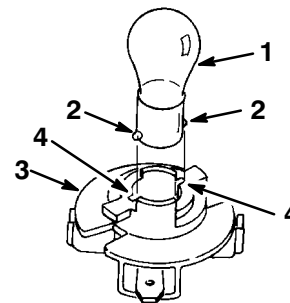
2. Open the hood.
3. Pull the wire connectors off both bulb holder terminals.
4. Rotate the bulb holder 1/4 turn counterclockwise and remove it from the reflector (Fig. 55).



**Figure 55**

- |                |              |
|----------------|--------------|
| 1. Bulb holder | 4. Slots     |
| 2. Reflector   | 5. Terminals |
| 3. Tabs        |              |

5. Push and rotate the bulb counterclockwise until it stops (approx. 1/4 turn) and remove the bulb from the bulb holder (Fig. 56).



**Figure 56**

- |               |                |
|---------------|----------------|
| 1. Bulb       | 3. Bulb holder |
| 2. Metal pins | 4. Slots       |

### Installing the Bulb

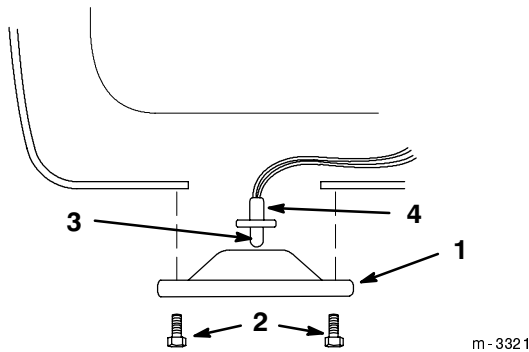
1. The bulb has metal pins on the side of its base. Align the pins with the slots in the bulb holder and insert the base into the holder (Fig. 56). Push and rotate the bulb clockwise until it stops.
2. Align the two tabs on the bulb holder with the slots in the reflector and insert the bulb holder into the reflector (Fig. 55).
3. Rotate it 1/4 turn clockwise until it stops.
4. Push the wire connectors onto the terminals on the bulb holder.
5. Close the hood.

# Replacing Taillights

**Specification:** Bulb GE 194

## Removing the Bulb

1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Remove the two screws securing the lens (Fig. 57).



**Figure 57**

- |           |           |
|-----------|-----------|
| 1. Lens   | 3. Bulb   |
| 2. Screws | 4. Socket |

3. Pull the lens out far enough so you can remove the bulb socket (Fig. 57).
4. Pull the bulb from the socket (Fig. 57).

## Installing the Bulb

1. Push a new bulb into the socket (Fig. 57).
2. Install the bulb socket in the lens and push the lens into the tractor (Fig. 57).
3. Secure the lens with the two screws removed previously (Fig. 57).

# Servicing the Battery

**Warning**

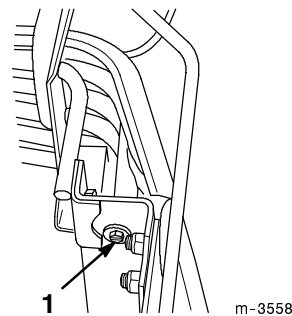
**Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.**

Check the electrolyte level in the battery every 25 hours. 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.

Battery size: 12 v, 380 Cold Cranking Amps

## Removing the Battery

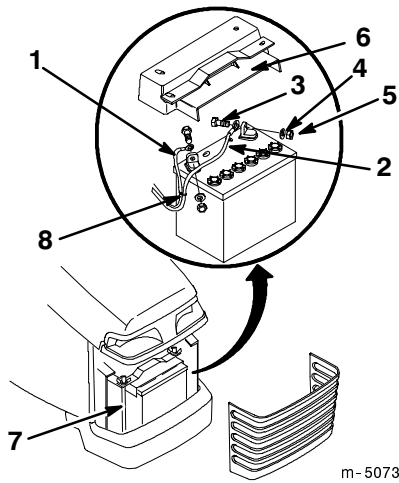
1. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
2. Raise the hood and unscrew the two screws and washers securing the grill (Fig. 58).



**Figure 58**

1. Grill screw (1 of 2)

3. Close the hood and remove the grill by pulling it out toward you.
4. Remove the battery shield (Fig. 59).



**Figure 59**

- |                           |                   |
|---------------------------|-------------------|
| 1. Negative cable (black) | 5. Locknut (2)    |
| 2. Positive cable (red)   | 6. Battery shield |
| 3. Bolt (2)               | 7. Hold-down rod  |
| 4. Washer (2)             | 8. Wire tie       |

! **Warning** !

**Battery terminals or metal tools could short against metal tractor 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 tractor.
- Do not allow metal tools to short between the battery terminals and metal parts of the tractor.

! **Warning** !

**Incorrect battery cable routing could damage the tractor 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 .

5. Disconnect the negative (black) ground cable from the battery post (Fig. 59).

**Important** Always disconnect the negative (black) cable first.

6. Disconnect the positive (red) cable from the battery post (Fig. 59).
7. Remove the battery by lifting it up, then pulling it out (directly toward you) from the tractor.

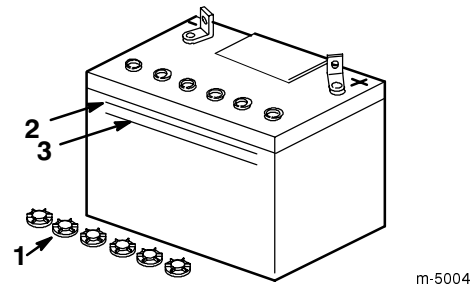
**Important** Always hold the battery vertical to avoid spilling battery acid.

### Checking the Electrolyte Level

1. With the engine off, open the hood to locate the battery.
2. Look at the side of the battery.

The electrolyte must be up to the Upper line (Fig. 60). Do not allow the electrolyte to fall below the Lower line (Fig. 60).

3. If the electrolyte is low, add the required amount of distilled water; refer to Adding Water to the Battery



**Figure 60**

- |               |               |
|---------------|---------------|
| 1. Vent caps  | 3. Lower line |
| 2. Upper line |               |

! **Danger** !

**Battery electrolyte contains sulfuric acid which is a deadly poison and causes severe burns.**

- Do not drink electrolyte and avoid contact with skin, eyes or clothing. Wear safety glasses to shield your eyes and rubber gloves to protect your hands.
- Fill the battery where clean water is always available for flushing the skin.

### Adding Water to the Battery

The best time to add distilled water to the battery is just before you operate the machine. This lets the water mix thoroughly with the electrolyte solution.

1. Remove the battery from the tractor.
2. Clean the top of the battery with a paper towel.

**Note:** Never fill the battery with distilled water while the battery is installed in the tractor. Electrolyte could be spilled on other parts and cause corrosion.

3. Remove the vent caps from the battery (Fig. 60).
4. Slowly pour distilled water into each battery cell until the electrolyte level is up to the Upper line (Fig. 60) on the battery case.

**Important** Do not overfill the battery because electrolyte (sulfuric acid) can cause severe corrosion and damage to the chassis.

5. Wait five to ten minutes after filling the battery cells. Add distilled water, if necessary, until the electrolyte level is up to the Upper line (Fig. 60) on the battery case.
6. Reinstall the battery vent caps.

## Charging the Battery



### Warning

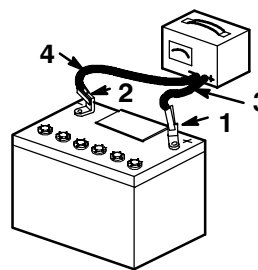


Charging the battery produces gasses that can explode.

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

**Important** Always keep the battery fully charged (1.265 specific gravity). This is especially important 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 34.
2. Check the electrolyte level; refer to Checking the Electrolyte Level, page 35.
3. Make sure the vent caps are installed in the battery. Charge the battery for 10 to 15 minutes at 25 to 30 amps or 30 minutes at 4-6 amps. Do not overcharge the battery.
4. When the battery is fully charged, unplug the charger from the electrical outlet, then disconnect the charger leads from the battery posts (Fig. 61).



m-4970

Figure 61

1. Positive Battery Post
2. Negative Battery Post
3. Red (+) Charger Lead
4. Black (-) Charger Lead

5. Install the battery in the tractor and connect the battery cables; refer to Installing the Battery

**Note:** Do not run the tractor with the battery disconnected, electrical damage may occur.

## Installing the Battery

1. Place the battery onto the chassis (Fig. 59).

**Important** Always connect the positive (red) cable first.

2. Using the bolt, washer and locknut, connect the positive (red) cable to the positive (+) battery post (Fig. 59).
3. Using the bolt, washer and locknut, connect the negative (black) cable to the negative (-) battery post (Fig. 59).
4. Replace the battery shield and secure to the chassis with the hold-down rods and wing nuts.

**Important** Keep the battery shield in place to protect the battery from heat.

5. Replace the grill and secure it with the two screws removed previously.

## Cleaning and Storage

1. Disengage the PTO, set the parking brake, stop the engine, and remove the ignition and KeyChoice keys.
2. Remove grass clippings, dirt, and grime from the external parts of the entire machine, especially the engine.
3. Clean dirt and chaff from the outside of the engine's cylinder head fins and blower housing; refer to Check for Debris, page 13.

**Important** You can wash the machine with mild detergent and water. **Do not use high pressure water** to wash the machine. Pressure washing may damage the

electrical system or wash away necessary grease at friction points. Avoid excessive use of water, especially near the control panel, lights, engine, and the battery.

4. Check the brake; refer to Servicing the Brake, page 29.
5. Service the air cleaner; refer to Servicing the Air Cleaner, page 23.
6. Grease the chassis; refer to Greasing the Tractor, page 27.
7. Change the crankcase oil; refer to Servicing Engine Oil, page 25.
8. Check the tire pressure; refer to Maintaining the Tire Pressure, page 29.
9. For storage over 30 days, prepare the tractor as follows:
  - A. Add a petroleum based stabilizer/conditioner to fuel in the tank.

Follow mixing instructions from stabilizer manufacturer. (1 oz. per gallon). **Do not use an alcohol based stabilizer (ethanol or methanol).**

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

- B. Run the engine to distribute conditioned fuel through the fuel system (5 minutes).
- C. Stop the engine, allow it to cool and drain the fuel tank; refer to Draining the Fuel Tank, page 29.
- D. Restart the engine and run it until it stops.
- E. Choke the engine.
- F. Start and run the engine until it will not start again.
- G. Dispose of fuel properly. Recycle as per local codes.

**Important** Do not store stabilizer/conditioned gasoline over 90 days.

10. Remove the spark plugs and check their condition; refer to Changing Spark Plugs, page 26.
11. With the spark plugs removed from the engine, pour two tablespoons of engine oil into the spark plug hole.
12. Use the electric starter to crank the engine and distribute the oil inside the cylinder.
13. Install the spark plugs and tighten to recommended torque; refer to Changing Spark Plugs, page 26.

**Note:** Do not install the wire on the spark plug(s).

14. Remove the battery from the chassis, check the electrolyte level, and charge it fully; refer to Servicing the Battery, page 34.

**Note:** Do not connect the battery cables to the battery posts during storage.

**Important** The battery must be fully charged to prevent it from freezing and being damaged at temperatures below 32°F (0°C). A fully charged battery maintains its charge for about 50 days at temperatures lower than 40°F (4°C). If the temperatures will be above 40°F (4°C), check the water level in the battery and charge it every 30 days.

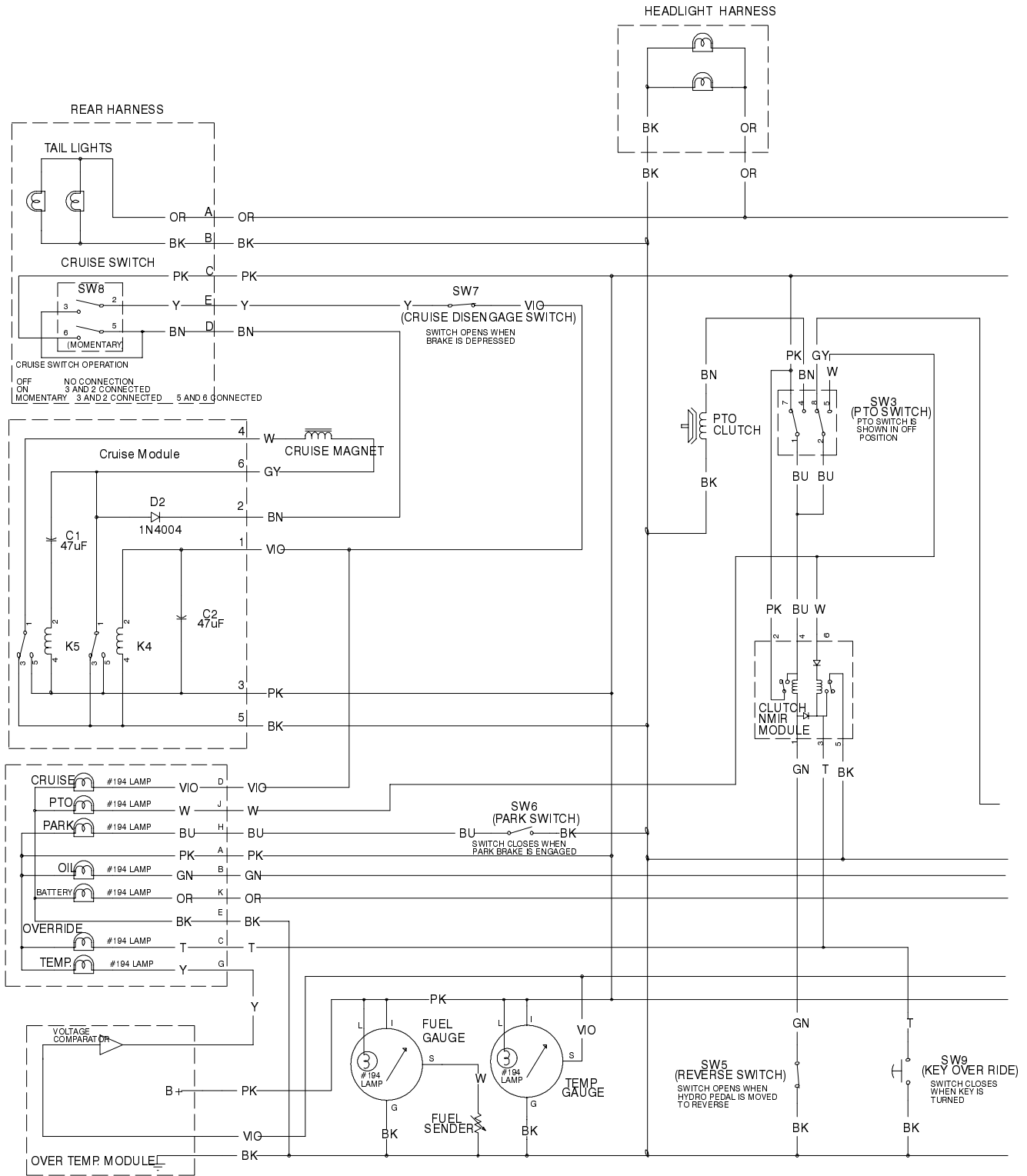
15. Check and tighten all bolts, nuts, and screws. Repair or replace any part that is damaged.

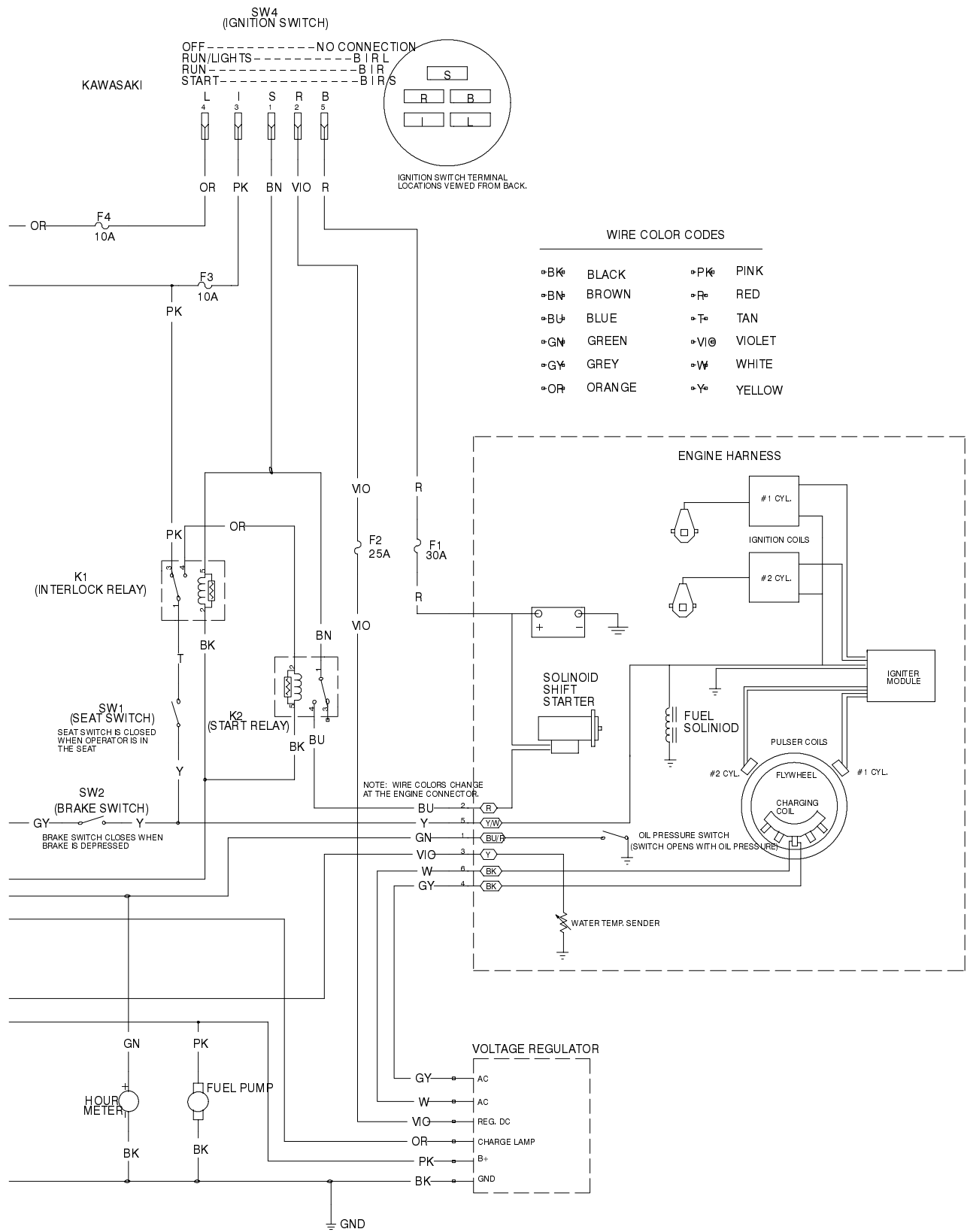
16. Paint all scratched or bare metal surfaces.

Paint is available from your Authorized Service Dealer.

17. Store the machine in a clean, dry garage or storage area.
18. Remove both the ignition and KeyChoice keys and put them in a safe place out of the reach of children.
19. Cover the machine to protect it and keep it clean.

# Wiring Diagram





# Troubleshooting

PROBLEM	POSSIBLE CAUSES	CORRECTIVE ACTION
The starter does not crank.	<ol style="list-style-type: none"> <li>1. The PTO is on.</li> <li>2. The brake is not depressed or the parking brake is not on.</li> <li>3. The operator is not seated.</li> <li>4. The electrical connections are corroded or loose.</li> <li>5. A fuse is blown or loose.</li> <li>6. The relay or switch is defective.</li> <li>7. The battery is discharged.</li> <li>8. The safety interlock system is malfunctioning.</li> <li>9. A faulty starter or starter solenoid.</li> <li>10. Seized internal engine components.</li> </ol>	<ol style="list-style-type: none"> <li>1. Move the PTO to the off position.</li> <li>2. Set the parking brake.</li> <li>3. Sit on the seat.</li> <li>4. Check the electrical connections for good contact.</li> <li>5. Correct or replace the fuse.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Charge the battery or replace it.</li> <li>8. Contact your Authorized Service Dealer.</li> <li>9. Contact your Authorized Service Dealer.</li> <li>10. Contact your Authorized Service Dealer.</li> </ol>
The engine cranks, but will not start.	<ol style="list-style-type: none"> <li>1. Incorrect starting procedure.</li> <li>2. The fuel tank is empty.</li> <li>3. The fuel shut-off valve is closed.</li> <li>4. Dirt, water or stale fuel is in the fuel system.</li> <li>5. Clogged fuel line.</li> <li>6. The spark plug lead is disconnected.</li> <li>7. The kill relay is not energized.</li> <li>8. A spark plug is faulty.</li> <li>9. The ignition module is faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to Starting and Stopping the Engine, page 15.</li> <li>2. Fill with fresh fuel.</li> <li>3. Open the fuel shut-off valve.</li> <li>4. Drain and flush the fuel system; add fresh fuel.</li> <li>5. Clean or replace.</li> <li>6. Reconnect the spark plug.</li> <li>7. Contact your Authorized Service Dealer.</li> <li>8. Replace the spark plug.</li> <li>9. Contact your Authorized Service Dealer.</li> </ol>



<b>PROBLEM</b>	<b>POSSIBLE CAUSES</b>	<b>CORRECTIVE ACTION</b>
The engine starts, but does not keep running	<ol style="list-style-type: none"> <li>1. Misadjusted or faulty choke or throttle control cable.</li> <li>2. The fuel tank vent is restricted.</li> <li>3. Dirt or water in the fuel system.</li> <li>4. The fuel filter is clogged.</li> <li>5. The fuel pump is faulty.</li> <li>6. The carburetor is faulty.</li> <li>7. Loose wires or poor connections.</li> <li>8. The cylinder head gasket is faulty.</li> <li>9. A fuse is blown or loose.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact your Authorized Service Dealer.</li> <li>2. Contact your Authorized Service Dealer.</li> <li>3. Drain and flush the fuel system; add fresh fuel.</li> <li>4. Replace the fuel filter.</li> <li>5. Contact your Authorized Service Dealer.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Check and tighten wire connections.</li> <li>8. Contact your Authorized Service Dealer.</li> <li>9. Correct or replace the fuse.</li> </ol>
The engine runs, but knocks or misses.	<ol style="list-style-type: none"> <li>1. Dirt, water or stale fuel is in the fuel system.</li> <li>2. A spark plug lead is loose.</li> <li>3. A spark plug is faulty.</li> <li>4. Loose wires or poor connections.</li> <li>5. Engine overheating.</li> </ol>	<ol style="list-style-type: none"> <li>1. Drain and flush the fuel system; add fresh fuel.</li> <li>2. Reconnect the spark plug lead.</li> <li>3. Replace the spark plug.</li> <li>4. Check and tighten wire connections.</li> <li>5. See The engine overheats below.</li> </ol>
The engine will not idle.	<ol style="list-style-type: none"> <li>1. The fuel tank vent is restricted.</li> <li>2. Dirt, water or stale fuel is in the fuel system.</li> <li>3. A spark plug is faulty.</li> <li>4. Carburetor idle passages are plugged.</li> <li>5. The idle speed adjusting screw is incorrectly set.</li> <li>6. The fuel pump is faulty.</li> <li>7. Low compression.</li> <li>8. The air cleaner element is dirty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact your Authorized Service Dealer.</li> <li>2. Drain and flush the fuel system; add fresh fuel.</li> <li>3. Replace the spark plug.</li> <li>4. Contact your Authorized Service Dealer.</li> <li>5. Contact your Authorized Service Dealer.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Contact your Authorized Service Dealer.</li> <li>8. Clean or replace.</li> </ol>
The engine overheats.	<ol style="list-style-type: none"> <li>1. More coolant is needed.</li> <li>2. The air intake screens are dirty.</li> <li>3. Restricted air flow into the engine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and add coolant.</li> <li>2. Clean with every use.</li> <li>3. Inspect and clean the radiator screen with every use.</li> </ol>

PROBLEM	POSSIBLE CAUSES	CORRECTIVE ACTION
	<ol style="list-style-type: none"> <li>4. Radiator fins are dirty.</li> <li>5. The crankcase oil level is incorrect.</li> <li>6. The fuel mixture is lean.</li> <li>7. Excessive loading.</li> </ol>	<ol style="list-style-type: none"> <li>4. Clean the radiator fins.</li> <li>5. Fill or drain to the full mark.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Reduce load; use lower ground speed.</li> </ol>
The engine loses power.	<ol style="list-style-type: none"> <li>1. The crankcase oil level is incorrect.</li> <li>2. The air cleaner element is dirty.</li> <li>3. Dirt, water or stale fuel is in the fuel system.</li> <li>4. The engine is overheated.</li> <li>5. A spark plug is faulty.</li> <li>6. Low compression.</li> <li>7. The vent hole in the fuel tank vent fitting is plugged.</li> <li>8. The engine load is excessive.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill or drain to the full mark.</li> <li>2. Clean or replace.</li> <li>3. Drain and flush the fuel system; add fresh fuel.</li> <li>4. See the engine over heats above.</li> <li>5. Replace the spark plug.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Contact your Authorized Service Dealer.</li> <li>8. Reduce ground speed.</li> </ol>
The tractor will not operate in either direction because the engine bogs down or stalls.	<ol style="list-style-type: none"> <li>1. The brake is sticking.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact your Authorized Service Dealer.</li> </ol>
The tractor goes forward only at partial speed and is slow or does not operate in reverse.	<ol style="list-style-type: none"> <li>1. The cruise control was engaged when the traction pedal was in neutral.</li> <li>2. The engine is running at partial speed.</li> <li>3. The linkage is out of adjustment.</li> <li>4. There is internal hydro wear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn the cruise control off.</li> <li>2. Move the throttle to the fast position.</li> <li>3. Contact your Authorized Service Dealer.</li> <li>4. Contact your Authorized Service Dealer.</li> </ol>

<b>PROBLEM</b>	<b>POSSIBLE CAUSES</b>	<b>CORRECTIVE ACTION</b>
The tractor will not operate in either direction.	<ol style="list-style-type: none"> <li>1. The High-Low range lever is in neutral.</li> <li>2. The transmission oil is low.</li> <li>3. The transmission is faulty.</li> <li>4. The control linkage needs adjustment or replacement.</li> <li>5. The parking brake was not released or the parking brake is not releasing.</li> <li>6. The drive shaft or wheel hub key has been damaged.</li> <li>7. The power steering filter is dirty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Move the High-Low range lever to low or high.</li> <li>2. Fill to the full F mark on the transmission oil dipstick when the transmission is cold.</li> <li>3. Contact your Authorized Service Dealer.</li> <li>4. Contact your Authorized Service Dealer.</li> <li>5. Release the parking brake or check the linkage.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Contact your Authorized Service Dealer.</li> </ol>
The tractor operates erratically.	<ol style="list-style-type: none"> <li>1. The transmission oil level is low.</li> <li>2. The transmission control linkage needs adjustment or replacement.</li> <li>3. The transmission is faulty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill to the full F mark on the transmission oil dipstick when the transmission is cold.</li> <li>2. Contact your Authorized Service Dealer.</li> <li>3. Contact your Authorized Service Dealer.</li> </ol>
The tractor operates in both directions, but with a loss of power. This condition becomes worse as the transmission becomes hot.	<ol style="list-style-type: none"> <li>1. The transmission oil level is low.</li> <li>2. The transmission shows signs of overheating or water contamination.</li> <li>3. The cooling fan and/or transmission cooling fins are faulty or dirty.</li> <li>4. The engine is not operating at full throttle.</li> <li>5. The power steering filter is dirty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill to the full F mark on the transmission oil dipstick when the transmission is cold.</li> <li>2. Replace the transmission oil and filter.</li> <li>3. Clean the transmission and/or replace the fan (contact your Authorized Service Dealer).</li> <li>4. Increase the engine speed to full throttle.</li> <li>5. Contact your Authorized Service Dealer.</li> </ol>
The front wheels do not turn with the steering wheel.	<ol style="list-style-type: none"> <li>1. Air in the hydraulic system.</li> </ol>	<ol style="list-style-type: none"> <li>1. With the engine running, operate the lift and turn the steering wheel back and forth several times.</li> </ol>
The steering is noisy.	<ol style="list-style-type: none"> <li>1. The power steering filter is dirty.</li> </ol>	<ol style="list-style-type: none"> <li>1. Contact your Authorized Service Dealer.</li> </ol>

PROBLEM	POSSIBLE CAUSES	CORRECTIVE ACTION
PTO belt comes off of pulleys, slips, or fails.	<ol style="list-style-type: none"> <li>1. Belt tension is incorrect.</li> <li>2. Mower level is incorrect</li> <li>3. Blade slope in transport is incorrect.</li> <li>4. Cutter deck belt guide is loose or incorrectly adjusted.</li> <li>5. Belt is worn or damaged.</li> <li>6. A pulley is damaged.</li> <li>7. The engine is not at full throttle.</li> <li>8. The PTO is being engaged when cutter deck is in tall uncut grass or weeds.</li> <li>9. The mower is overloaded because mulching or bagging requires more power.</li> <li>10. The mower is overloaded because too much grass is being cut at a time.</li> <li>11. The mower is overloaded because deck is clogged with grass clippings.</li> <li>12. The attachment is overloaded because tractor is mowing too fast for conditions.</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to the attachment operator's manual.</li> <li>2. Refer to the attachment operator's manual.</li> <li>3. Refer to the attachment operator's manual.</li> <li>4. Adjust and tighten belt guide.</li> <li>5. Refer to the attachment operator's manual.</li> <li>6. Contact your Authorized Service Dealer.</li> <li>7. Always operate engine powered attachments at full throttle.</li> <li>8. Engage PTO only in shorter or previously cut grass.</li> <li>9. Reduce ground speed when mulching or bagging.</li> <li>10. Cut tall grass and weeds with mower in its highest position, making a second pass cutting at height desired.</li> <li>11. Clean the mower.</li> <li>12. Reduce ground speed.</li> </ol>
Abnormal vibration or noise.	<ol style="list-style-type: none"> <li>1. The engine mounting bolts are loose.</li> <li>2. The idler pulley or cutter deck blade is loose.</li> <li>3. The transaxle cooling fan is loose.</li> <li>4. There is a problem with the electric clutch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the engine mounting bolts.</li> <li>2. Tighten the appropriate pulley.</li> <li>3. Contact your Authorized Service Dealer.</li> <li>4. Contact your Authorized Service Dealer.</li> </ol>