Form No. 3325-547

TORO®

518xi

Wheel Horse® Garden Tractor

Model No. 73471—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	4
Slope Chart	6
Safety and Instruction Decals	7
Check Before Operating	8
Opening the Hood	8
Closing the Hood	9
Removing the Side Panels	9
Adding Fuel	9
Check the Engine Oil Level	10
Check for Debris	11
Check the Safety Interlock System	12
Check the Brake	12
Operation	12
Think Safety First	12
Controls	12
Using the Parking Brake	13
Starting and Stopping the Engine	13
Operating the Power Take Off (PTO)	14
The Safety Interlock System	14
Gauges and Indicator Lights	16
Driving Forward or Backward	16
Stopping the Machine	17
Raising and Lowering Attachments	17
Positioning the Seat	18
Lights	18
Positioning the Tilt Steering Wheel	19
The Smart Turnt Steering Feature	19
Pushing the Machine by Hand	19
Maintenance	20
Recommended Maintenance Schedule	20
Servicing the Air Cleaner	21
Servicing the Engine Oil	22
Changing Spark Plugs	23
Greasing the Tractor	24
Maintaining the Tire Pressure	25
Servicing the Brake	25
Draining the Fuel Tank	26
Replacing the Fuel Filter	27
Servicing the Front Wheel Toe-In	27
Changing Transaxle Fluid	28
Replacing Fuses	29
Replacing Headlights	30
Servicing the Battery	30
Cleaning and Storage	33
Wiring Diagram	34
Troubleshooting	35
The Toro Total Coverage Guarantee	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.

© 2000 by The Toro Company
8111 Lyndale Avenue South
Bloomington, MN 55420-1196

All Rights Reserved
Printed in the USA

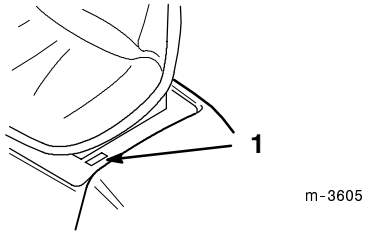


Figure 1

1. Model and serial number plate

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

Model No: _____

Serial No. _____

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 the B71.1-1998 specifications of the American National Standards Institute, 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 ANSI standard B71.1—1998.

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

General Operation

- Read, understand, and follow all instructions in the operator's manual and on the machine before starting.
- Allow only responsible adults who are familiar with the instructions to operate the machine.
- Clear the area of objects such as rocks, toys, wire, etc., which could be picked up and thrown by the blade.
- Be sure the area is clear of other people before mowing. Stop the machine if anyone enters the area.
- Never carry passengers.
- Do not mow in reverse unless absolutely necessary. Always look down and behind before and while backing.
- Be aware of the mower discharge direction and do not point it at anyone. Do not operate the mower without either the entire grass catcher or the guard in place.
- Slow down before turning.
- Never leave a running machine unattended. Always turn off blades, set parking brake, stop engine, and remove keys before dismounting.
- Turn off blades when not mowing.
- Stop the engine before removing the grass catcher or unclogging the chute.
- Mow only in daylight or good artificial light.
- Do not operate the machine while under the influence of alcohol or drugs.
- Watch for traffic when operating near or crossing roadways.
- Use extra care when loading or unloading the machine into a trailer or truck.
- Always wear safety goggles or safety glasses with side shields when operating mower.

- Data indicates that operators, age 60 years and above, are involved in a large percentage of riding mower-related injuries. These operators should evaluate their ability to operate the riding mower safely enough to protect themselves and others from serious injury.

Slope Operation

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution. If you cannot back up the slope or if you feel uneasy on it, do not mow it.

- Mow up and down slopes, not across.
- Remove obstacles such as rocks, tree limbs, etc.
- Watch for holes, ruts or bumps. Uneven terrain could overturn the machine. Tall grass can hide obstacles.
- Use slow speed. Choose a low gear so that you will not have to stop or shift while on the slope.
- Follow Toro's recommendations for wheel weight or counterweights to improve stability.
- Use extra care with grass catchers or other attachments. These can change the stability of the machine.
- Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction.
- Avoid starting or stopping on a slope. If tires lose traction, disengage the blades and proceed slowly straight down the slope.
- Do not turn on slopes unless necessary, and then, turn slowly and gradually downhill, if possible.
- Do not mow near drop-offs, ditches, or embankments. The machine could suddenly turn over if a wheel goes over the edge of a cliff or ditch, or if an edge caves in.
- Do not mow on wet grass. Reduced traction could cause sliding.
- Do not try to stabilize the machine by putting your foot on the ground.
- Do not use a grass catcher on steep slopes.

Children

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the machine and the mowing activity. Never assume that children will remain where you last saw them.

- Keep children out of the mowing area and under the watchful care of another responsible adult.
- Be alert and turn the machine off if children enter the area.
- Before and while backing, look behind and down for small children.
- Never carry children, even with the blades off. They may fall off and be seriously injured or interfere with safe machine operation.
- Never allow children to operate the machine.
- Use extra care when approaching blind corners, shrubs, trees, the end of a fence or other objects that may obscure vision.

Service

- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
  - Use only an approved container.
  - Never remove the gas cap or add fuel when the engine is running. Allow the engine to cool before refueling. Do not smoke.
  - Never refuel the machine indoors.
  - Never store the machine or fuel container inside where there is an open flame, such as near a water heater or furnace.
- Never run a machine inside a closed area.
- Keep nuts and bolts tight, especially the blade attachment bolts. Keep equipment in good condition.
- Never tamper with safety devices. Check their proper operation regularly.
- Keep the machine free of grass, leaves, or other debris build-up. Clean up oil or fuel spillage. Allow the machine to cool before storing.
- Stop and inspect the equipment if you strike an object. Repair, if necessary, before restarting.
- Grass catcher components are subject to wear, damage and deterioration, which could expose moving parts or allow objects to be thrown. Frequently check components and replace with manufacturer's recommended parts, when necessary.
- Mower blades are sharp and can cut. Wrap the blade(s) or wear gloves, and use extra caution when servicing them.
- Use only genuine Toro replacement parts to ensure that original standards are maintained.

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 ANSI standard.

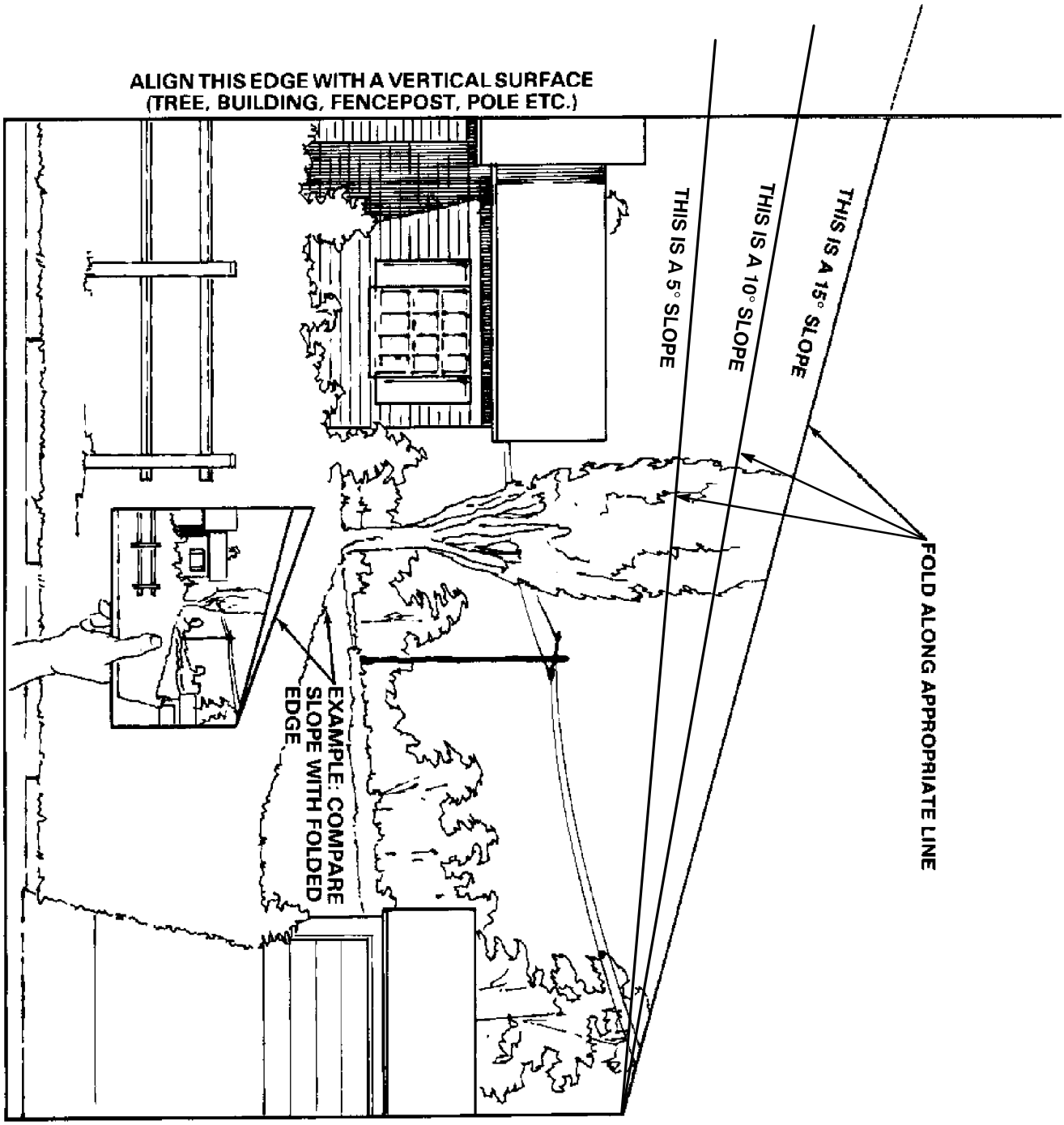
Warning

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

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

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

Slope Chart

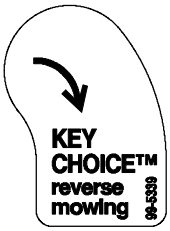

ALIGN THIS EDGE WITH A VERTICAL SURFACE
(TREE, BUILDING, FENCEPOST, POLE ETC.)
THIS IS A 5° SLOPE
THIS IS A 10° SLOPE
THIS IS A 15° SLOPE
FOLD ALONG APPROPRIATE LINE
EXAMPLE: COMPARE SLOPE WITH FOLDED EDGE

Safety and Instruction Decals

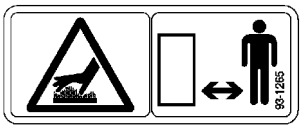
Safety decals and instructions are easily visible to the operator and are located near any area of potential danger. Replace any decal that is damaged or lost.

On the drive shaft cover (Part No. 99-6090)

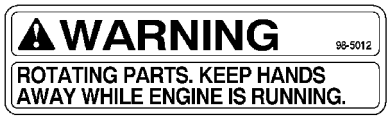
On the front of the seat bracket (Part No. 99-5339)



On the battery strap (Part No. 93-1265)

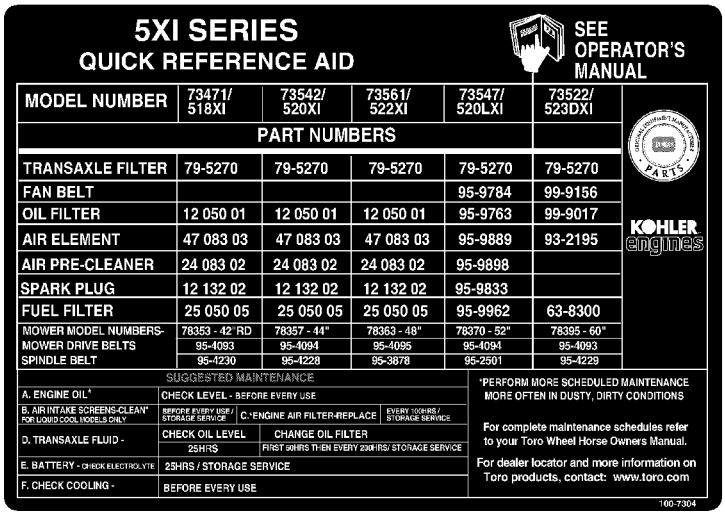


On the engine bulkhead (Part No. 98-5012)



On the drive shaft tunnel (Part No. 80-8760)

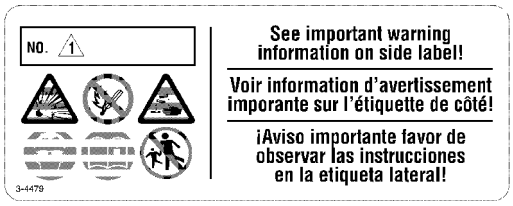
On the front of the seat bracket (Part No. 99-2985)



Under the hood (Part No. 100-7304)

(2) Under the side shield (Part No. 98-5014)

On the Battery
(Part No. 104-4163)



On the Battery
(Part No. 104-4164)

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).

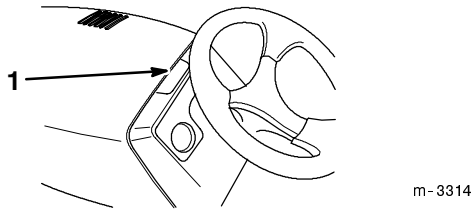


Figure 2

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.

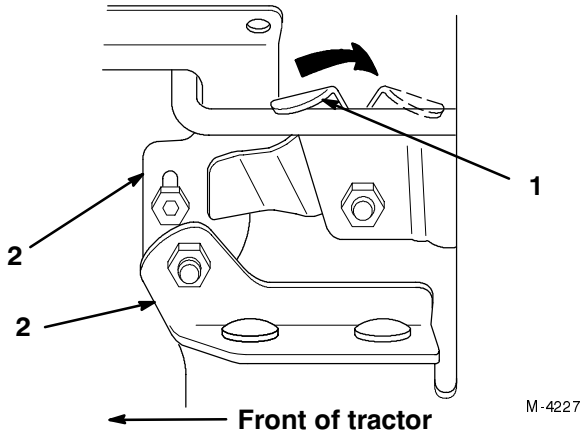


Figure 3

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).

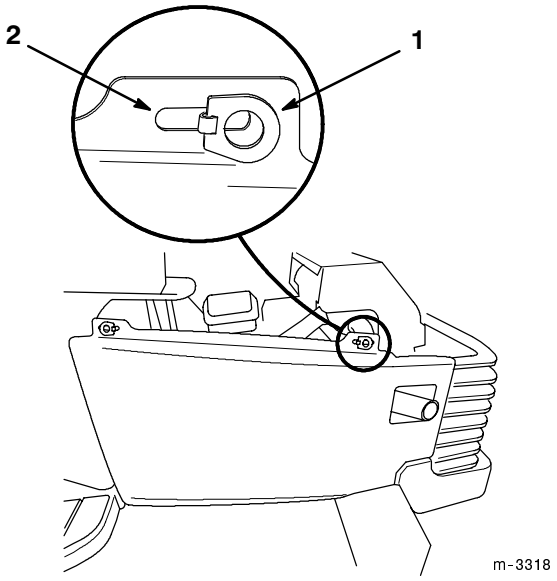


Figure 4

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.

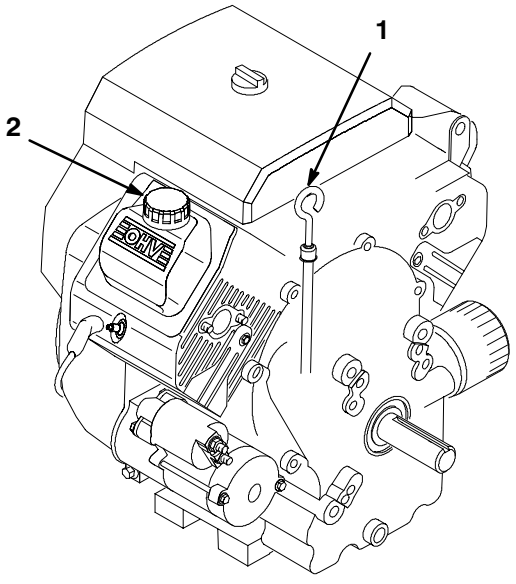


Figure 5

1. Dipstick
2. Oil filler

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

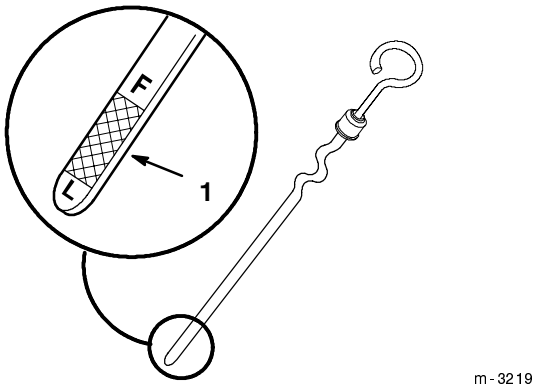


Figure 6

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 22.

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

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. 7).

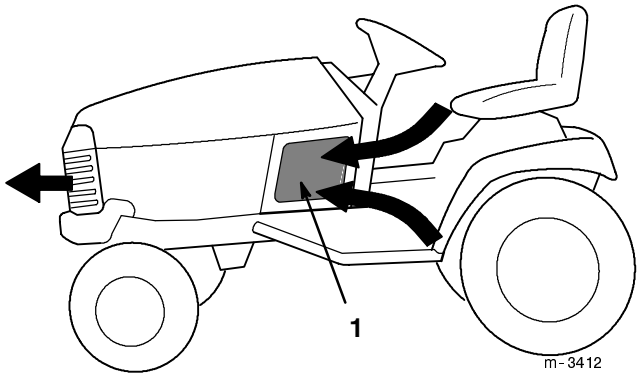


Figure 7

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. Wipe away any accumulated debris from the rotating air-intake screen (Fig. 8).

Danger

The rotating air-intake screen and drive shaft can catch fingers, hands, and loose clothing, causing amputation or other severe injury when moving.

- **Do not operate the tractor without the side panels and hood in place.**
- **Keep fingers, hands and clothing clear of the rotating air-intake screen and drive shaft.**
- **Stop the engine and remove the ignition key before performing maintenance.**

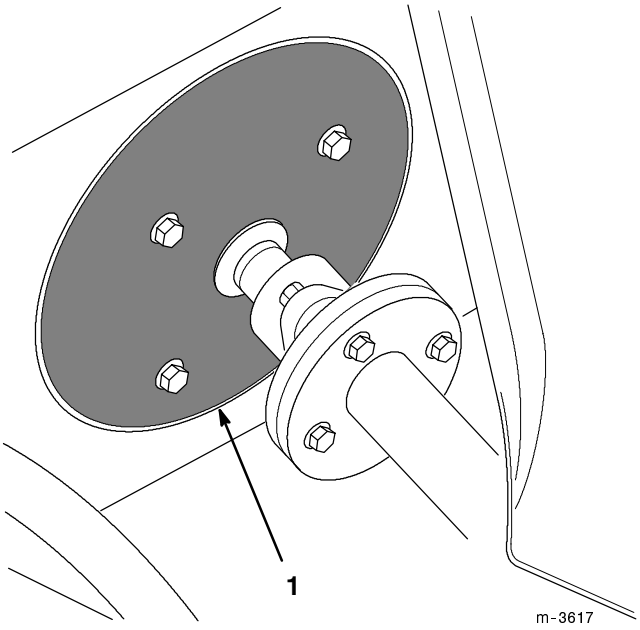


Figure 8

1. Rotating air intake screen

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

Important If possible, blow dirt out (Fig. 9), rather than washing it out. If water is used, keep it away from electrical items.

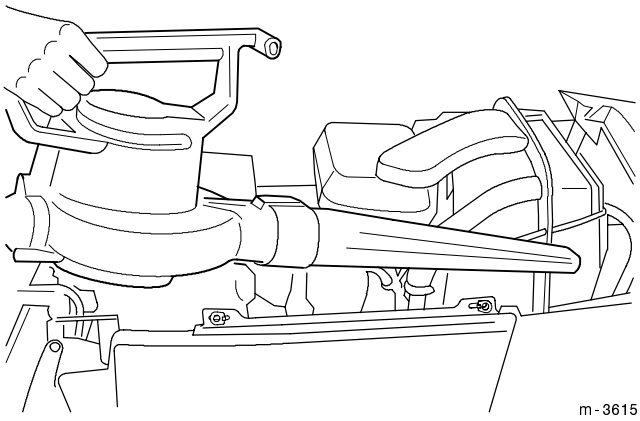


Figure 9

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

6. Clean debris from the rear transaxle cover (Fig. 10).

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

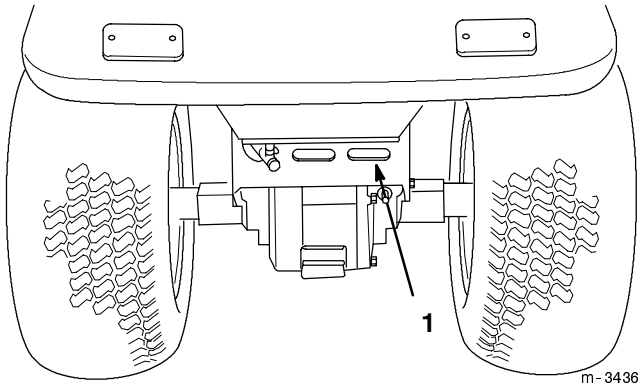


Figure 10

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 14.

Check the Brake

Refer to Checking and Adjusting the Brake, page 25.

Operation

Think Safety First

Please carefully read all the safety instructions on pages 3 through 7. Knowing this information could help you, your family, pets, or bystanders avoid injury.

Controls

Become familiar with all the controls (Fig. 11) before you start the engine and operate the machine.

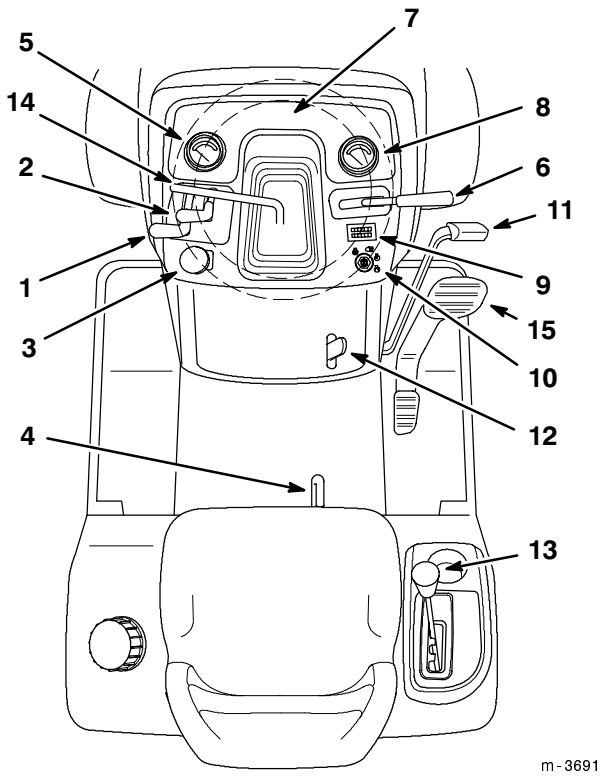


Figure 11

1. Throttle
2. Choke
3. PTO switch
4. Seat adjustment lever
5. Engine oil temperature gauge
6. Attachment lift lever
7. Indicator lights
8. Fuel gauge
9. Hour meter
10. Ignition switch
11. Brake pedal
12. Parking brake lever
13. High-Low range lever
14. Steering wheel tilt lever
15. 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. 11) down and hold it.
2. Lift the parking brake lever (Fig. 11) 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. 11).

   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. 12).

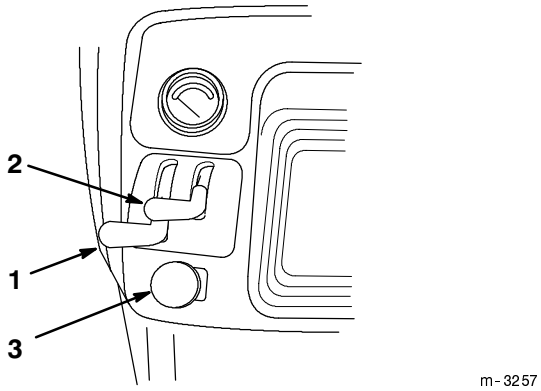


Figure 12

1. Throttle
2. Choke
3. PTO switch

4. Move the choke lever to the on position (if the engine is cold) (Fig. 12).
5. Move the throttle lever halfway to the fast position (Fig. 12).
6. Turn the ignition key clockwise and hold it in the start position (Fig. 13).

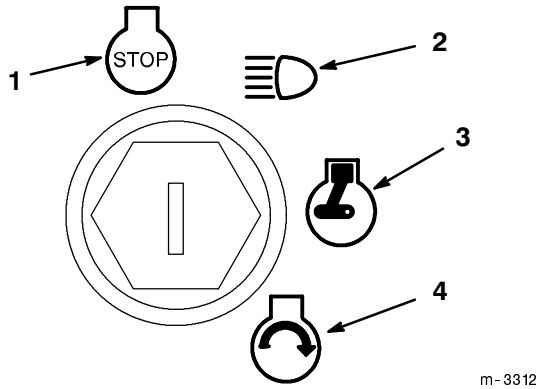


Figure 13

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

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. 12).

   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. 12).
2. Allow the engine to run for a short time to cool down.
3. Turn the ignition key to the stop position (Fig. 13).
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. 14).

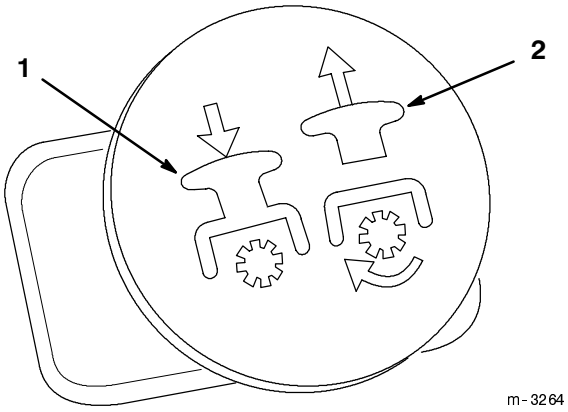


Figure 14

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 cause 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. 15).

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.

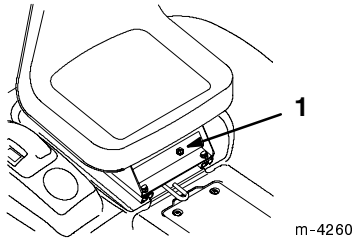


Figure 15

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. 16) to serve as a reminder that the interlock has been deactivated.

4. Remove the KeyChoice key.

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. 16) illuminate when certain controls are activated and when major malfunctions occur that need immediate attention.

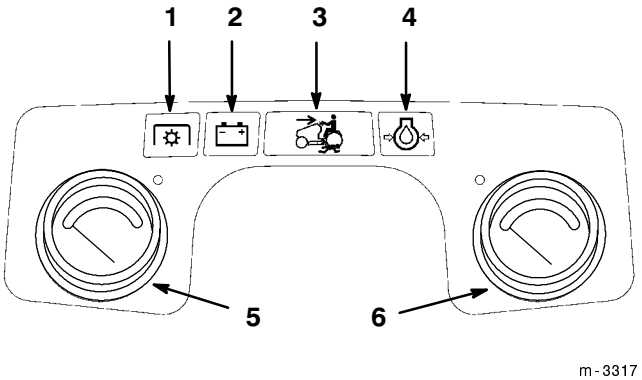


Figure 16

1. PTO (power take off) light
2. Battery light
3. Operating–in–Reverse warning light
4. Oil pressure light
5. Engine oil temperature gauge
6. Fuel gauge

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.**

Engine Oil Temperature Gauge

This gauge shows the oil 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. 11) 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. 11).

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.)

4. 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. 17).

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

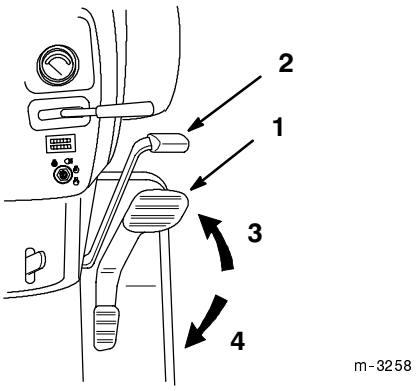


Figure 17

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

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

Stopping the Machine

1. Release the traction control pedal.
2. Step on the brake pedal.
3. Disengage the PTO.
4. Lower the attachment lift.
5. Turn the ignition key to the stop position to stop the engine.
6. Set the parking brake before getting off; refer to Setting the Parking Brake, page 13.
7. 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. 18).

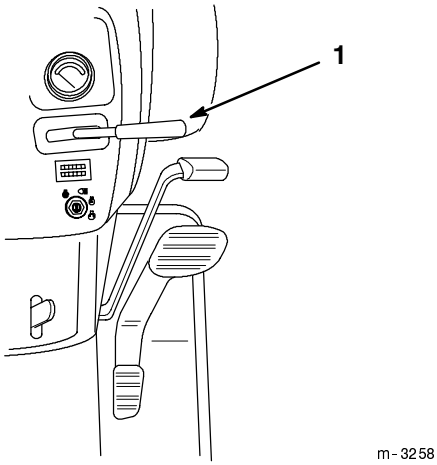


Figure 18

1. Attachment power lift lever

Raising Attachments

1. Start the tractor.
2. Pull the lift lever up to raise the attachment (Fig. 19).

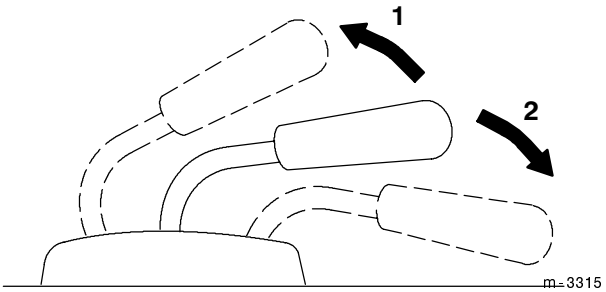


Figure 19

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. 19).

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. 20).
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.

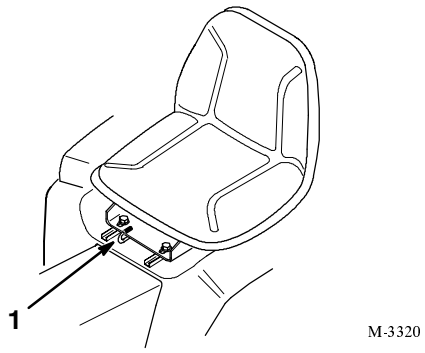


Figure 20

1. Adjustment lever

Lights

The lights turn on whenever you turn the ignition key to or past the lights position (Fig. 21). You can turn then 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.

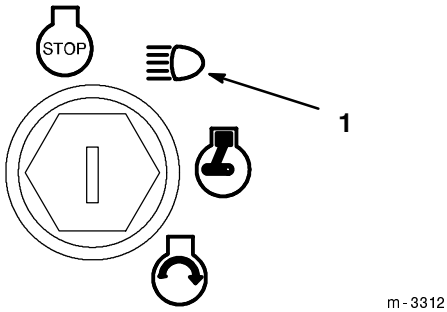


Figure 21

1. Lights

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. 22).
2. Move the steering wheel to a comfortable position; then release the lever to lock it in place.

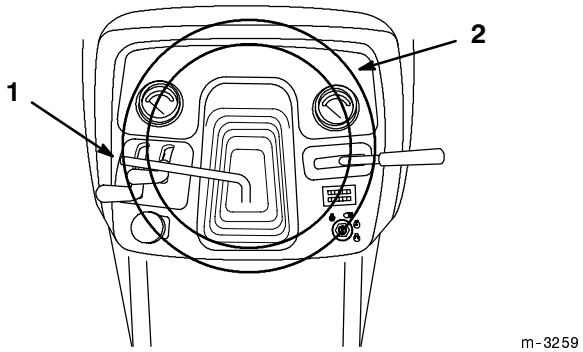


Figure 22

1. Tilt lever
2. Steering wheel

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.

Danger

Driving with excessive speed while turning can cause you to rollover, resulting in serious injury or death to you or bystanders.

- **Do not rely on the Smart Turn steering feature to avoid accidents while turning.**
- **Read, understand, and follow all instructions in the *Operator's Manual* and on the machine before starting.**

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	• Engine oil—check level • Brakes—check • Safety System—check • Air-intake screens—clean[1] • Engine area—clean[1] • Rear transaxle cover—clean[1]
25 Hours	• Engine air precleaner—clean[1] • Tires—check pressure • Battery—check electrolyte level • Transaxle—check oil level
50 Hours	• Grease fittings—grease • Power take off (PTO) belt—check tension
100 Hours	• Engine oil—change[2] • Engine air filter—replace[1] • Fuel filter—replace
200 Hours	• Engine oil filter—change • Transaxle oil and oil filter—change[3] • Spark plugs—change
Yearly/Storage Service	• Chipped surfaces—paint • Brakes—check • Safety System—check • Air-intake screens—clean • Rear transaxle cover—clean • Engine air precleaner—clean • Tires—check pressure • Battery—check electrolyte level • Grease fittings—grease • Power take off (PTO) belt—check tension • Engine oil—change • Engine air filter—replace • Fuel filter—replace • Engine oil filter—change • Transaxle oil and oil filter—change • Spark plugs—change

[1]More often in dusty, dirty conditions

[2]Initially, perform this operation after 5 hours

[3]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 accidently 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 after every 25 operating hours, or yearly, whichever occurs first.

Paper Element: Replace after every 100 operating hours or yearly, whichever occurs first.

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. 23).

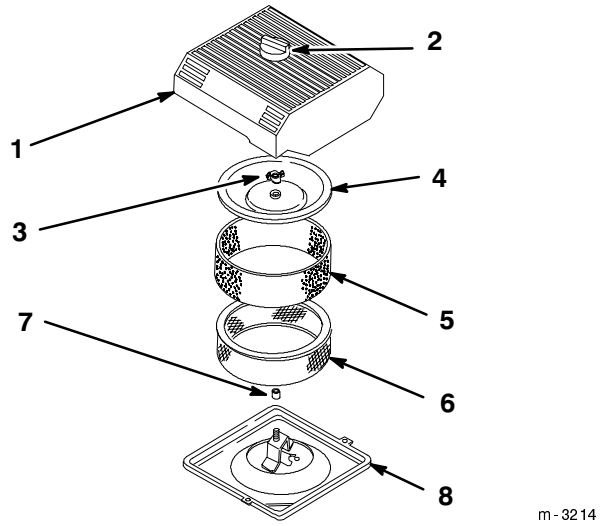


Figure 23

1. Air cleaner cover
2. Knob
3. Cover nut
4. Cover
5. Foam element
6. Paper element
7. Rubber seal
8. Air cleaner base

4. Loosen the knob on the air cleaner cover and remove the cover (Fig. 23).
5. Carefully slide the foam element off the paper element (Fig. 23).
6. Unscrew the cover nut and remove the cover and paper element (Fig. 23).

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. Put one or two ounces of oil on the element (Fig. 24).

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

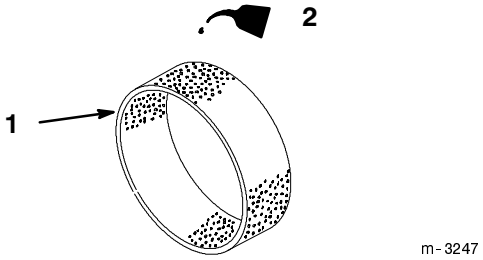


Figure 24

1. Foam element
2. Oil

5. Squeeze the element to distribute the oil.

Checking the Paper Element

Inspect the element for tears, an oily film, damage to the rubber seal, excessive dirt, or other damage (Fig. 25). If any of these conditions exit, replace the filter.

Important Do not clean the paper element with pressurized air or liquids, such as solvent, gas, or kerosene.

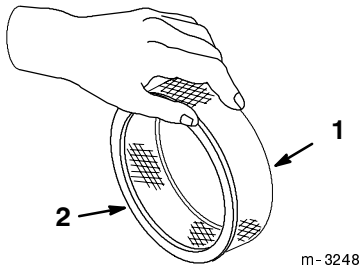


Figure 25

1. Paper element
2. Rubber seal

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

Installing the Foam and Paper Elements

1. Carefully slide the foam element onto the paper air cleaner element (Fig. 23).
2. Slide the air cleaner assembly and cover onto the long rod.
3. Install the cover nut finger-tight against the cover (Fig. 23).

Note: Ensure that the rubber seal is flat against the air cleaner base and cover.

4. Install the air cleaner cover and knob (Fig. 23).
5. Close the hood.

Servicing the Engine Oil

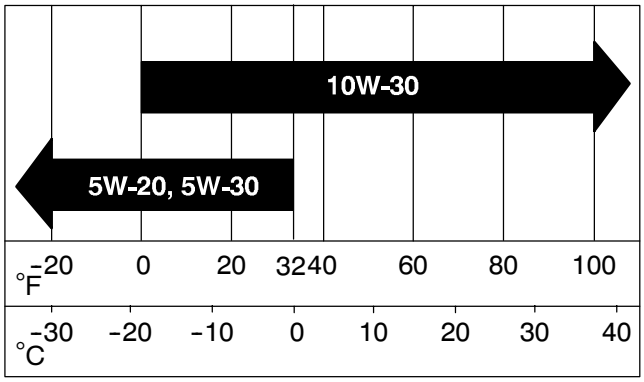
Change oil after the first 5 operating hours and then after every 100 operating hours. Change the oil filter every 200 hours of operation or every other oil change.

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

Crankcase Capacity: w/filter, 2.1 qts. (2.0 l)

Viscosity: Refer to the following table.

USE THESE SAE VISCOSITY OILS



Changing the Engine Oil

1. Start the engine and let it run for five minutes. This warms the oil so it drains better.
2. Park the machine so that the drain side is slightly lower than the opposite side to ensure that the oil drains completely.
3. Disengage the PTO, set the parking brake, lower the attachment lift, stop the engine, and remove the ignition key.
4. 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.

5. Place a pan below the oil drain.
6. Open the drain by turning it counterclockwise 1/8 turn and pulling out on it (Fig. 26).

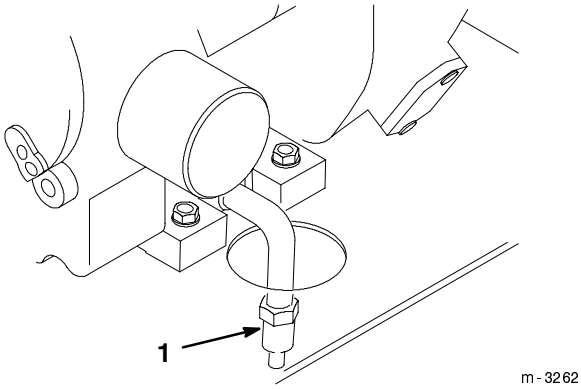


Figure 26

1. Oil drain

7. When the oil has drained completely, close the drain by pushing it in and turning it clockwise, 1/8 turn.
8. Dispose of the used oil at a certified recycling center.
9. Slowly pour approximately 80% of the specified amount of oil into the oil filler tube (Fig. 27).

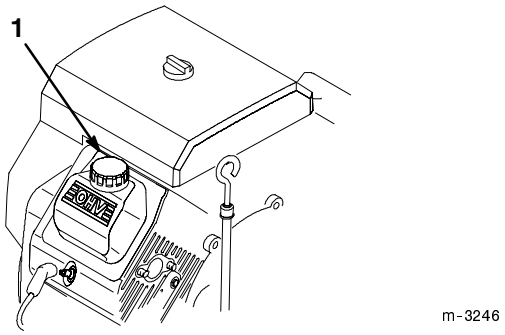


Figure 27

1. Oil filler tube

10. Check the oil level; refer to Checking the Engine Oil Level, page 10.
11. Slowly add additional oil to bring the oil level to the full mark on the dipstick.

Important Overfilling the crankcase with oil may cause engine damage.

Changing the Engine Oil Filter

1. Drain the oil from the engine; refer to Changing Oil, page 22, steps 1 through 8.
2. Remove the old filter (Fig. 28).

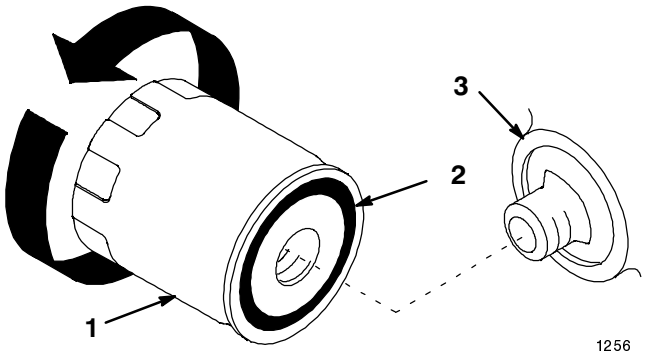


Figure 28

1. Oil filter
2. Gasket
3. Adapter

3. Wipe the filter adapter gasket surface (Fig. 28).
4. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Fig. 28).
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 an additional 1/2 turn (Fig. 28).
6. Fill the crankcase with the correct type of new oil; refer to Changing Oil, page 22, steps 9 through 11.
7. Dispose of the used oil filter at a certified recycling center.

Changing Spark Plugs

Change the spark plugs after every 200 operating hours. Make sure 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: Champion RC-12YC (or equivalent)
Air Gap: 0.030” (0.76 mm)

Removing the Spark Plug

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. 29).

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 washers.

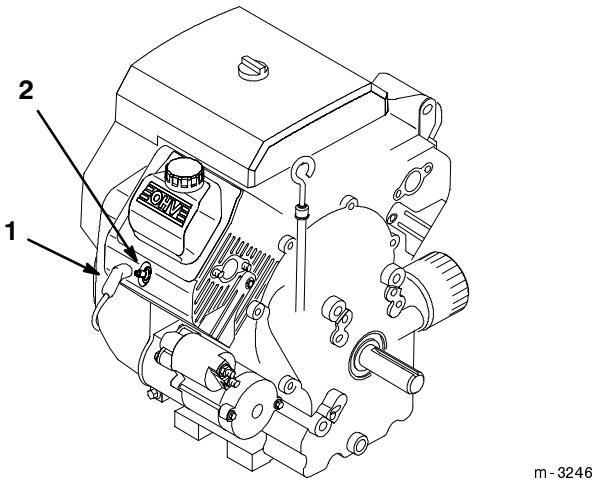


Figure 29

1. Spark plug wire
2. Spark plug

Checking the Spark Plugs

1. Look at the center of the spark plugs (Fig. 30).

   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. 30) and bend the side electrode, if the gap is not correct.

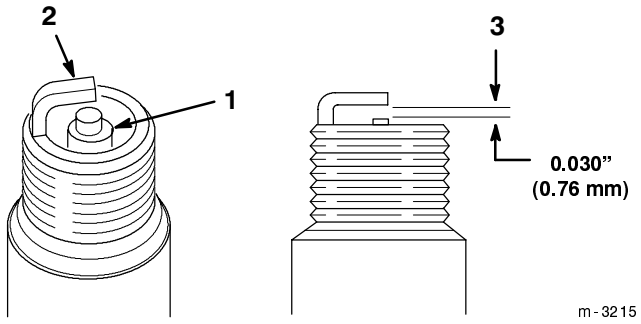


Figure 30

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

Installing the Spark Plugs

1. Install the spark plugs and metal washers.
2. Ensure that the air gap is set correctly.
3. Tighten the spark plugs to 18 to 22 ft-lb (24.4 to 29.8 Nm).
4. Push the wires onto the spark plugs (Fig. 29).
5. 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. 31).
2. Lubricate the front axle pivot (Fig. 31).

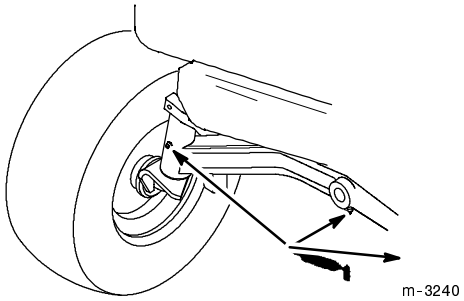


Figure 31

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. 32).

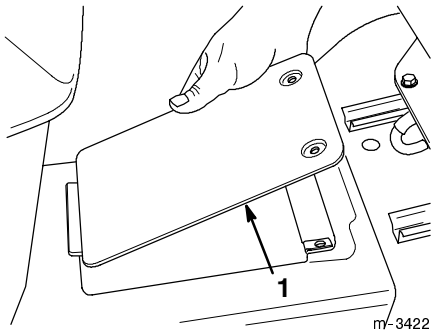


Figure 32

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. 33).

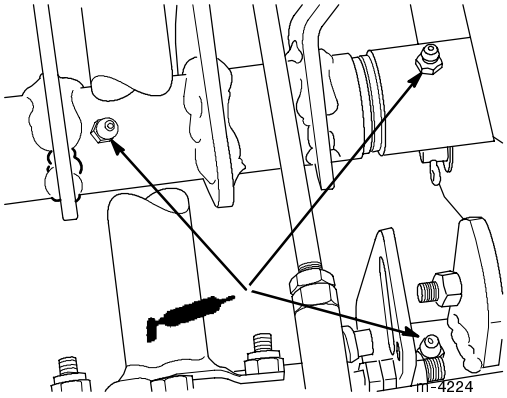


Figure 33

5. Replace and secure the cover.

6. Grease the fitting on the brake pedal (Fig. 34).

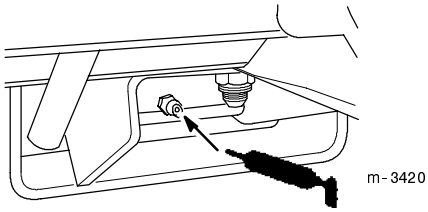


Figure 34

7. If your tractor has manual steering, put one pump of grease into the steering housing (from underneath the frame) (Fig. 35).

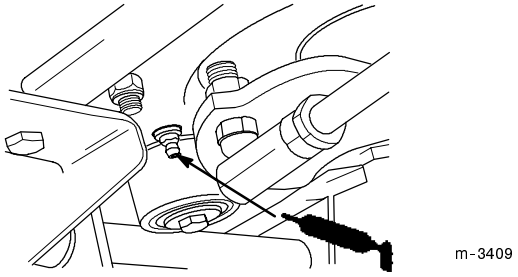


Figure 35

Maintaining the Tire Pressure

Check the pressure at the valve stem after every 25 operating hours or monthly, whichever occurs first (Fig. 36). 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

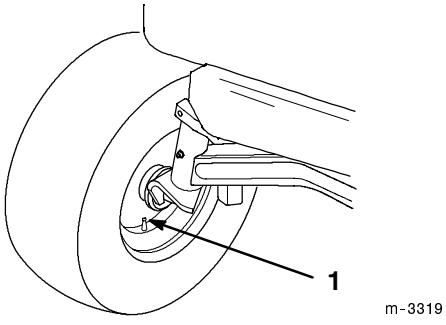


Figure 36

1. Valve stem

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. 37) before the brake begins to engage.

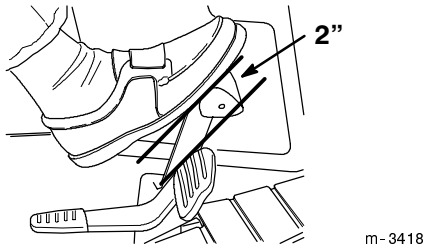


Figure 37

3. Turn the brake adjustment nut at the rear of the tractor (Fig. 38) until there is 2 in. (51 mm) of free travel.

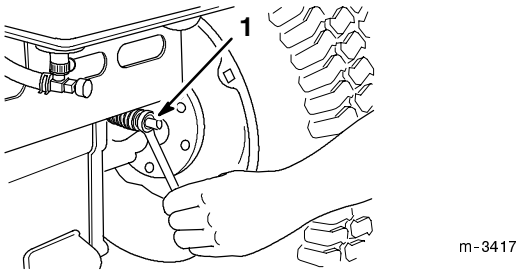


Figure 38

1. Brake adjustment nut

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. 39 & 40).

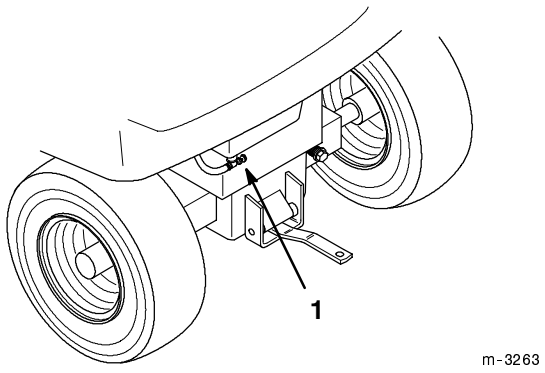


Figure 39

1. Fuel shut-off valve

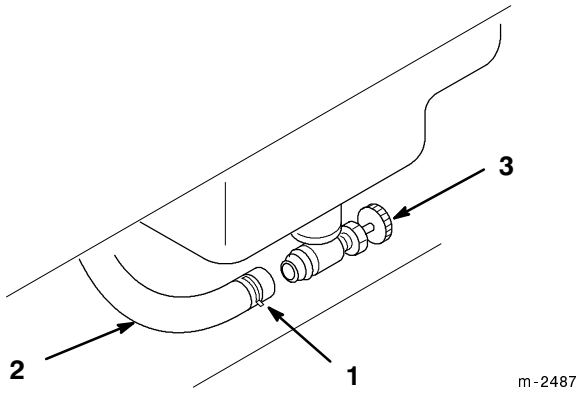


Figure 40

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. 40).
5. Pull the fuel line off the fuel shut-off valve (Fig. 40).

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. 40).

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. 39 & 40).
3. Open the hood and remove the side panels.
4. Squeeze the ends of the hose clamps together and slide them away from the filter (Fig. 41).
5. Remove the filter from the fuel lines.

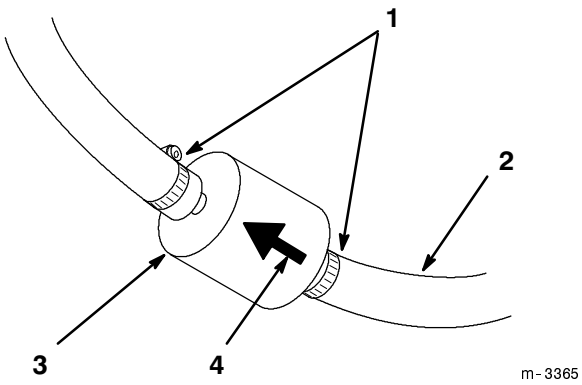


Figure 41

1. Hose clamp
2. Fuel line
3. Filter
4. Flow direction arrow

6. Install a new filter and move the hose clamps close to the filter.

   Ensure that the flow direction arrow points toward the engine.
7. Open the fuel shut-off valve at the fuel tank (Fig. 39 & 40).
8. 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. 42).

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.

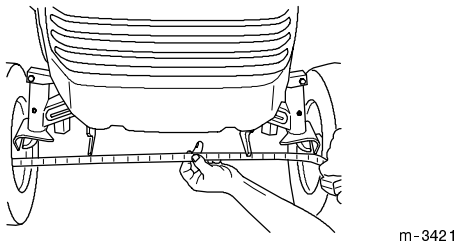


Figure 42

Adjusting Toe-In

1. Loosen the jam nuts at the ends of the steering rods (Fig. 43).

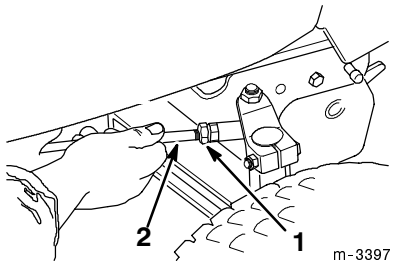


Figure 43

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. 44).

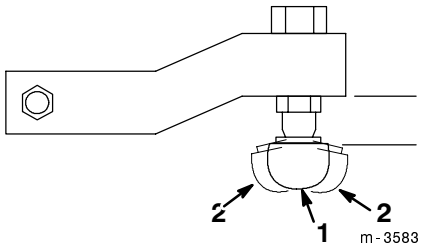


Figure 44

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. 45) so dirt cannot fall into the filler hole and damage the transaxle.

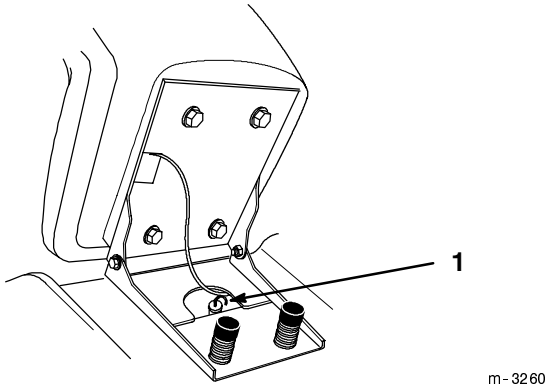


Figure 45

1. Transmission dipstick and filler tube

5. Pull out the transmission dipstick and wipe the metal end clean (Fig. 45).
6. Slide the dipstick fully into the filler tube (Fig. 45).
7. Pull the dipstick out and look at the metal end (Fig. 46).

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

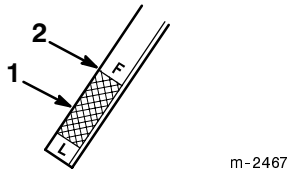


Figure 46

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. 47).

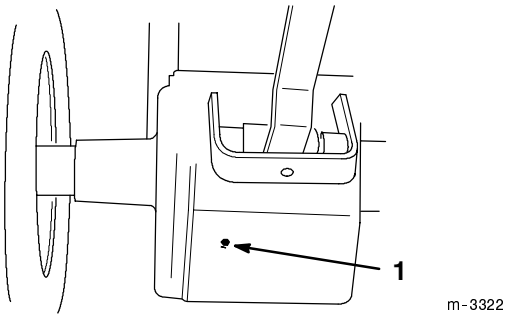


Figure 47

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. 48).

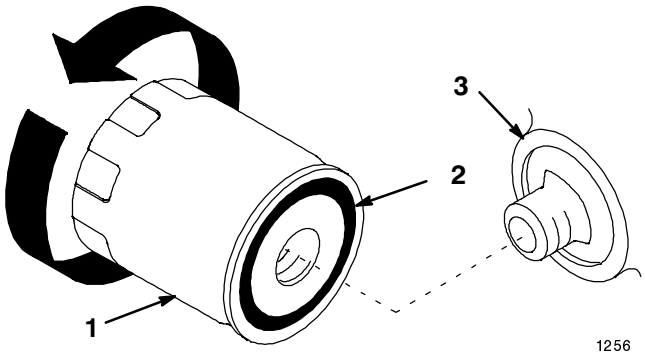


Figure 48

1. Transaxle filter
2. Gasket
3. Adapter

2. Wipe the filter adapter gasket surface (Fig. 48).

3. Apply a thin coat of new oil to the rubber gasket on the replacement filter (Fig. 48).

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. 48).

Filling the Transaxle Oil

1. Slowly pour the specified refill capacity of oil into the filler tube (Fig. 45).

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 28.

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. 49).

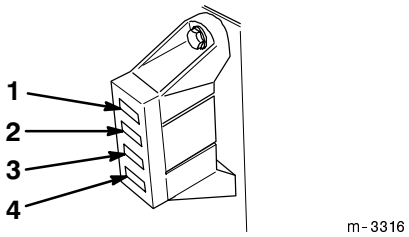


Figure 49

1. F1; main-30 amp
2. F2; regulator-25 amp
3. F3; dash, interlock-10 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. 50).

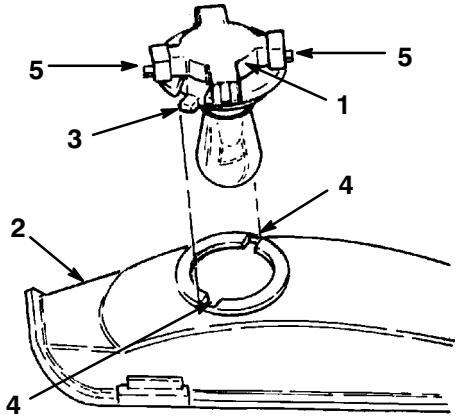


Figure 50

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

5. Push and rotate the bulb counterclockwise until it stops (approx. 1/4 turn) and remove the bulb from the bulb holder (Fig. 51).

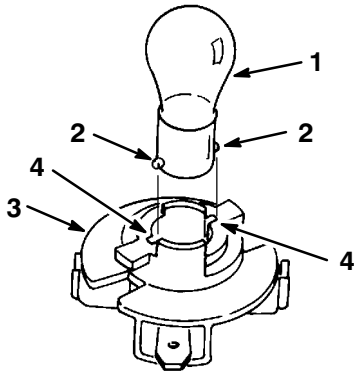


Figure 51

1. Bulb
2. Metal pins
3. Bulb holder
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. 51). 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. 50).
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.

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. Remove the front grill by pulling it outward toward you.
3. Remove the battery shield (Fig. 52).

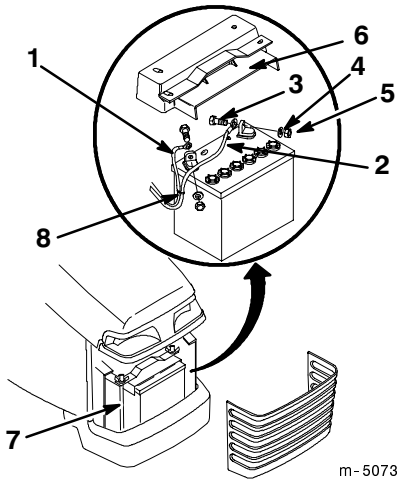


Figure 52

1. Negative cable (black)
2. Positive cable (red)
3. Bolt (2)
4. Washer (2)
5. Locknut (2)
6. Battery shield
7. Hold–down rod
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 .**

4. Disconnect the negative (black) ground cable from the battery post (Fig. 52).

Important Always disconnect the negative (black) cable first.

5. Disconnect the positive (red) cable from the battery post (Fig. 52).
6. 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. 53). Do not allow the electrolyte to fall below the Lower line (Fig. 53).
3. If the electrolyte is low, add the required amount of distilled water; refer to Adding Water to the Battery

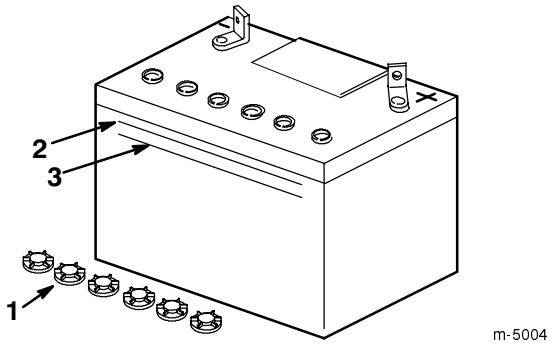


Figure 53

1. Vent caps
2. Upper line
3. Lower 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 robber 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. 53).
4. Slowly pour distilled water into each battery cell until the electrolyte level is up to the Upper line (Fig. 53) 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. 53) 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 31.
2. Check the electrolyte level; refer to Checking the Electrolyte Level, page 31.
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. 54).

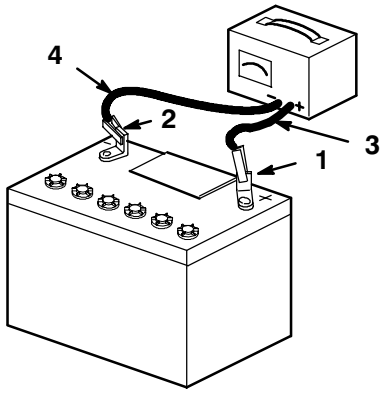


Figure 54

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. 52).

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. 52).
3. Using the bolt, washer and locknut, connect the negative (black) cable to the negative (-) battery post (Fig. 52).
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.

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 11.

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 25.
5. Service the air cleaner; refer to Servicing the Air Cleaner, page 21.
6. Grease the chassis; refer to Greasing the Tractor, page 24.
7. Change the crankcase oil; refer to Servicing Engine Oil, page 22.
8. Check the tire pressure; refer to Maintaining the Tire Pressure, page 25.
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 26.

   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 23.
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 23.

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 30.

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

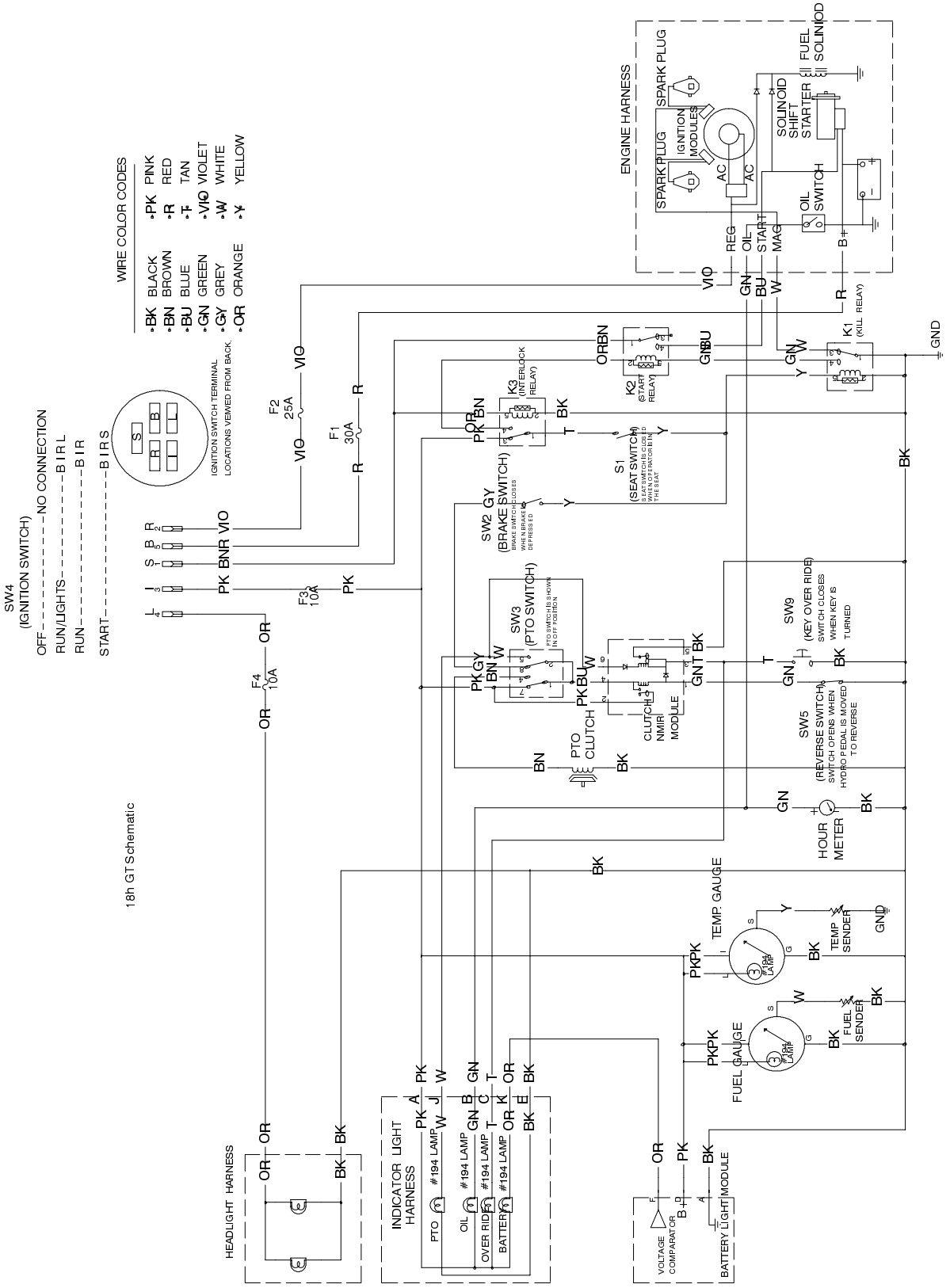
Important The battery must be fully charged to prevent it from freezing and being damaged at temperatures below 32°F (0°C). A fully charged battery maintains its charge for about 50 days at temperatures lower than 40°F (4°C). If the temperatures will be above 40°F (4°C), check the water level in the 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 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.	1. The PTO is on.	1. Move the PTO to the off position.
	2. The brake is not depressed or the parking brake is not on.	2. Set the parking brake.
	3. The operator is not seated.	3. Sit on the seat.
	4. The electrical connections are corroded or loose.	4. Check the electrical connections for good contact.
	5. A fuse is blown or loose.	5. Correct or replace fuse.
	6. The relay or switch is broken.	6. Contact Authorized Service Dealer.
	7. The battery is discharged.	7. Charge or replace the battery.
	8. The safety interlock system is malfunctioning.	8. Contact your Authorized Service Dealer.
	9. A broken starter or starter solenoid.	9. Contact your Authorized Service Dealer.
	10. Seized internal engine components.	10. Contact your Authorized Service Dealer.
The engine cranks, but will not start.	1. Incorrect starting procedure.	1. Refer to Starting and Stopping the Engine, page 13.
	2. The fuel tank is empty.	2. Fill with fresh fuel.
	3. The fuel shut-off valve is closed.	3. Open the fuel shut-off valve.
	4. Dirt, water, or stale fuel is in the fuel system.	4. Drain and flush the fuel system; add fresh fuel.
	5. Clogged fuel line.	5. Clean or replace.
	6. The spark plug lead is disconnected.	6. Reconnect the spark plug.
	7. The kill relay is not energized.	7. Contact your Authorized Service Dealer.
	8. A spark plug is damaged or dirty.	8. Replace the spark plug.
	9. The ignition is broken.	9. Contact your Authorized Service Dealer.

Problem	Possible Causes	Corrective Action
The engine starts, but does not keep running	1. Misadjusted or broken choke or throttle control cable.	1. Contact your Authorized Service Dealer.
	2. The fuel tank vent is restricted.	2. Contact your Authorized Service Dealer.
	3. Dirt or water in the fuel system.	3. Drain and flush the fuel system; add fresh fuel.
	4. The fuel filter is clogged.	4. Replace the fuel filter.
	5. The fuel pump is broken.	5. Contact your Authorized Service Dealer.
	6. The carburetor is broken.	6. Contact your Authorized Service Dealer.
	7. Loose wires or poor connections.	7. Check and tighten wire connections.
	8. The cylinder head gasket is broken.	8. Contact your Authorized Service Dealer.
	9. A fuse is blown or loose.	9. Correct or replace fuse.
The engine runs, but knocks or misses.	1. Dirt, water, or stale fuel is in the fuel system.	1. Drain and flush the fuel system; add fresh fuel.
	2. A spark plug lead is loose.	2. Reconnect the spark plug lead.
	3. A spark plug is broken.	3. Replace the spark plug.
	4. Loose wires or poor connections.	4. Check and tighten wire connections.
	5. Engine overheating.	5. See Engine Overheats.
The engine will not idle.	1. The fuel tank vent is restricted.	1. Contact your Authorized Service Dealer.
	2. Dirt, water, or stale fuel is in the fuel system.	2. Drain and flush the fuel system; add fresh fuel.
	3. A spark plug is damaged or broken.	3. Replace the spark plug.
	4. Carburetor idle passages are plugged.	4. Contact your Authorized Service Dealer.
	5. The idle speed adjusting screw is incorrectly set.	5. Contact your Authorized Service Dealer.
	6. The fuel pump is broken.	6. Contact your Authorized Service Dealer.
	7. Low compression.	7. Contact your Authorized Service Dealer.
	8. The air cleaner element is dirty.	8. Clean or replace.

Problem	Possible Causes	Corrective Action
The engine overheats.	1. The crankcase oil level is incorrect.	1. Fill or drain to the full mark.
	2. The fuel mixture is lean.	2. Contact your Authorized Service Dealer.
	3. Excessive loading.	3. Reduce load; use lower ground speed.
	4. The air intake screens are dirty.	4. Clean with every use.
	5. The cooling fins and air passages under the engine blower housing and/or the rotating air intake screen are plugged.	5. Clean with every use.
The engine loses power.	1. The crankcase oil level is incorrect.	1. Fill or drain to the full mark.
	2. The air cleaner element is dirty.	2. Clean or replace.
	3. Dirt, water, or stale fuel is in the fuel system.	3. Drain and flush the fuel system; add fresh fuel.
	4. The engine is overheated.	4. See Engine Overheats.
	5. A spark plug is damaged or dirty.	5. Replace the spark plug.
	6. Low compression.	6. Contact your Authorized Service Dealer.
	7. The vent hole in the fuel tank vent fitting is plugged.	7. Contact your Authorized Service Dealer.
	8. The engine load is excessive.	8. Reduce ground speed.
The tractor will not operate in either direction because the engine bogs down or stalls.	1. The brake is sticking.	1. Contact your Authorized Service Dealer.
The tractor goes forward only at partial speed and is slow or does not operate in reverse.	1. The engine is running at partial speed.	1. Move the throttle to the fast position.
	2. The linkage is out of adjustment.	2. Contact your Authorized Service Dealer.
	3. There is internal hydro wear.	3. Contact your Authorized Service Dealer.

Problem	Possible Causes	Corrective Action
The tractor will not operate in either direction.	1. The High-Low range lever is in neutral (N). 2. The transmission oil is low. 3. The transmission is broken. 4. The control linkage needs adjustment or replacement. 5. The parking brake was not released or the parking brake is not releasing. 6. The drive shaft or wheel hub key has been damaged.	1. Move the High-Low range lever to L or H. 2. Fill to the full mark on the transmission oil dipstick when the transmission is cold. 3. Contact your Authorized Service Dealer. 4. Contact your Authorized Service Dealer. 5. Release the parking brake or check the linkage. 6. Contact your Authorized Service Dealer.
The tractor operates erratically.	1. The transmission oil level is low. 2. The transmission control linkage needs adjustment or replacement. 3. The transmission is broken.	1. Fill to the full mark on the transmission oil dipstick when the transmission is cold. 2. Contact your Authorized Service Dealer. 3. Contact your Authorized Service Dealer.
The tractor operates in both directions, but with a loss of power. This condition becomes worse as the transmission becomes hot.	1. The transmission oil level is low. 2. The transmission shows signs of overheating or water contamination. 3. The cooling fan and/or transmission cooling fins are faulty or dirty. 4. The engine is not operating at full throttle	1. Fill to the full mark on the transmission oil dipstick when the transmission is cold. 2. Replace the transmission oil and filter. 3. Clean the transmission and/or replace the fan (contact your Authorized Service Dealer). 4. Increase the engine speed to full throttle.
Abnormal vibration or noise.	1. The engine mounting bolts are loose. 2. The idler pulley or cutter deck blade is loose. 3. The transaxle cooling fan is loose. 4. There is a problem with the electric clutch	1. Tighten the engine mounting bolts. 2. Tighten the appropriate pulley. 3. Contact your Authorized Service Dealer. 4. Contact your Authorized Service Dealer.

Problem	Possible Causes	Corrective Action
PTO belt comes off of pulleys, slips, or fails.	1. Belt tension is incorrect.	1. Refer to the attachment operator's manual.
	2. Mower level is incorrect	2. Refer to the attachment operator's manual.
	3. Blade slope in transport is incorrect.	3. Refer to the attachment operator's manual.
	4. Cutter deck belt guide is loose or incorrectly adjusted.	4. Adjust and tighten belt guide.
	5. Belt is worn or damaged.	5. Refer to the attachment operator's manual.
	6. A pulley is damaged.	6. Contact your Authorized Service Dealer.
	7. The engine is not at full throttle.	7. Always operate engine powered attachments at full throttle.
	8. The PTO is being engaged when cutter deck is in tall uncut grass or weeds.	8. Engage PTO only in shorter or previously cut grass.
	9. The mower is overloaded because mulching or bagging requires more power.	9. Reduce ground speed when mulching or bagging.
	10. The mower is overloaded because too much grass is being cut at a time.	10. Cut tall grass and weeds with mower in its highest position, making a second pass cutting at height desired.
	11. The mower is overloaded because deck is clogged with grass clippings.	11. Clean the mower.
	12. The attachment is overloaded because tractor is mowing too fast for conditions.	12. Reduce ground speed.

Consumer
Riding
Products

The Toro Total Coverage Guarantee

A Two-Year Full Warranty
(Limited Warranty for Commercial Use)

Conditions and Products Covered

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly promise to repair any Toro Product used for normal residential purposes* if defective in materials or workmanship. The following time periods apply from the date of purchase:

Products	Warranty Period
• All Products	2 year full warranty
• 300 and 5xi Series Tractors:	
Chassis	5 year full warranty
Front Axle	5 year full warranty
Drive Shaft (5xi Series Only)	5 year full warranty
• All Batteries	1 year full warranty

This warranty covers both the cost of parts and labor, and transportation within a fifteen mile radius of the servicing dealer.

This warranty applies to all consumer riding products and their attachments.

* Normal residential purposes means use of the product on the same lot as your home. Use at more than one location is considered commercial use, and the commercial use warranty would apply.

Limited Warranty for Commercial Use

Toro Consumer Products and attachments used for commercial, institutional, or rental use are warranted against defects in materials or workmanship for the following time periods from the date of purchase:

Products	Warranty Period
• All Products	90 day limited warranty
• 300 and 5xi Series Tractors	
Chassis	1 year limited warranty
Liquid Cooled Gas Engines	1 year limited warranty
Air Cooled Gas and Diesel Engines	2 year limited warranty

Instructions for Obtaining Warranty Service

Should you feel your Toro Product contains a defect in materials or workmanship, contact the retailer who sold you the product or any Authorized Service Dealer or Master Service Dealer. The Yellow Pages of your telephone directory is a good reference source. The dealer will either arrange service at his/her dealership or recommend another Authorized Service Dealer who may be more convenient. You may need proof of purchase (copy of registration card, sales receipt, etc.) for warranty validation.

If for any reason you are dissatisfied with the Service Dealer's analysis of the defect in materials or workmanship or if you need a referral to a Toro Service Dealer, please feel free to contact us at:

Customer Service Department
Toro Warranty Company
8111 Lyndale Avenue South
Bloomington, MN 55420-1196
952-888-8801 or 800-421-9684

Owner Responsibilities

You must maintain your Toro Product by following the maintenance procedures described in the operator's manual. Such routine maintenance, whether performed by a dealer or by you, is at your expense.

Items and Conditions Not Covered

There is no other express warranty except for special emission system coverage on some products. This express warranty does not cover:

- Cost of regular maintenance service or parts, such as filters, fuel, lubricants, tune-up parts, blade sharpening, brake and clutch adjustments.
- Any product or part which has been altered or misused or required replacement or repair due to normal wear, accidents, or lack of proper maintenance.
- Repairs necessary due to improper fuel, contaminants in the fuel system, or failure to properly prepare the fuel system prior to any period of non-use over three months.
- Pickup and delivery charges for distances beyond a fifteen mile radius from an Authorized Toro Service Dealer.

All repairs covered by this warranty must be performed by an Authorized Toro Service Dealer using Toro approved replacement parts.

General Conditions

Repair by an Authorized Toro Service Dealer is your sole remedy under this warranty.

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

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

Countries Other than the United States or Canada

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

Part No. 374-0009 Rev. -