

WARNING

If you do not understand how a specific control functions, or have not yet thoroughly read the **FEATURES & CONTROLS** section, do so now.

Do NOT attempt to operate the tractor without first becoming familiar with the location and function of ALL controls.

Starting the Engine

1. While sitting in the operators seat, engage the parking brake, make sure the PTO switch is disengaged, and the ground speed control levers are locked in the neutral position.
2. Set the throttle to middle position (set throttle to FULL when starting in cold weather)
3. **(S/N: 2015276814 & Below):** Turn the key to the HEAT position.
(S/N: 2014276815 & Above): Turn the key to the HEAT/RUN position.
Hold the key to turn the glow plug indicator light on and activate the glow plugs.
4. Wait until the glow plug indicator light turns off, then turn the key to START. If the engine does not start immediately, move the throttle control to FULL.

NOTE: Do not crank the engine continuously for more than 30 seconds. Allow the starter motor to cool for two minutes before cranking the engine again.

5. After the engine starts, move the engine throttle control to SLOW. Warm up the engine by running it for at least a minute.
6. Move the throttle to FULL before engaging the PTO switch or driving the machine.

In the event of an emergency the engine can be stopped by simply turning the ignition switch to STOP. Use this method only in emergency situations. For normal engine shut down follow the procedure given in **STOPPING THE TRACTOR & ENGINE.**

Stopping the Tractor & Engine

1. Returning the ground speed control levers to the middle position will stop tractor movement. Pivot the levers outward and lock them in neutral.
2. Disengage the PTO.
3. Engage the parking brake.
4. Move the throttle control to SLOW and allow the engine to cool down for a short time.
5. Turn the ignition key to OFF. Remove the key.

Pushing the Rider by Hand



DO NOT TOW RIDER

Towing the unit will cause hydraulic pump and wheel motor damage. Do not use another vehicle to push or pull this unit.

1. Disengage the PTO, engage the parking brake, turn the ignition OFF, and remove the key.
2. Lift the seat plate to gain access to the hydraulic pumps.
3. Locate the hydraulic release valves (A, Figure 3) on the bottom side of the hydraulic pumps.
4. To disengage the pumps (free-wheel position), turn the hydraulic release valves located on the pumps COUNTER-CLOCKWISE a maximum of 2 full turns.
5. Disengage the parking brake. The tractor can now be pushed by hand.
6. After moving the tractor, re-engage the pumps (drive position) by turning the release valves CLOCKWISE and tighten to 80-120 in. lbs. of torque.

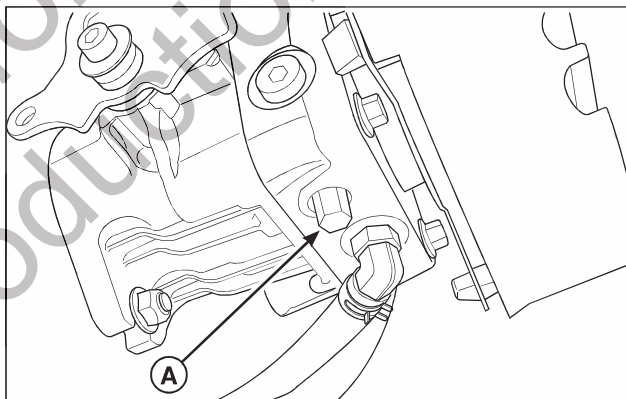


Figure 3. Hydraulic System By-Pass
A. Hydraulic Release Valve
(left-hand pump shown)

Operation

Zero-Turn Driving Practice

The lever controls of the Zero Turn rider are responsive. Learning how to gain smooth, efficient control of the rider's forward, reverse, and turning movements will take some practice.

Spending some time practicing the maneuvers shown and becoming familiar with how the unit accelerates, travels, and steers — before you begin mowing — is absolutely essential to getting the most out of the Zero Turn rider.

Locate a smooth, flat area of your lawn — one with plenty of room to maneuver. (Clear the area of objects, people and animals before you begin.) Operate the unit at mid-throttle during this practice session (ALWAYS operate at full throttle when mowing), and turn slowly to prevent tire slippage and damage to your lawn.

We suggest you begin with the Smooth Travel procedure to the right, and then advance through the forward, reverse, and turning maneuvers.

You must release the parking brake prior to moving the control levers inward.

Smooth Travel

The lever controls of the Zero Turn rider are responsive.

The BEST method of handling the ground speed control levers is in three steps — as shown in Figure 4.

FIRST place your hands onto the levers as shown.

SECOND, to go forward gradually push the levers forward with your palms.

THIRD, to speed up move the levers farther forward. To slow down smoothly, slowly move the levers toward neutral.

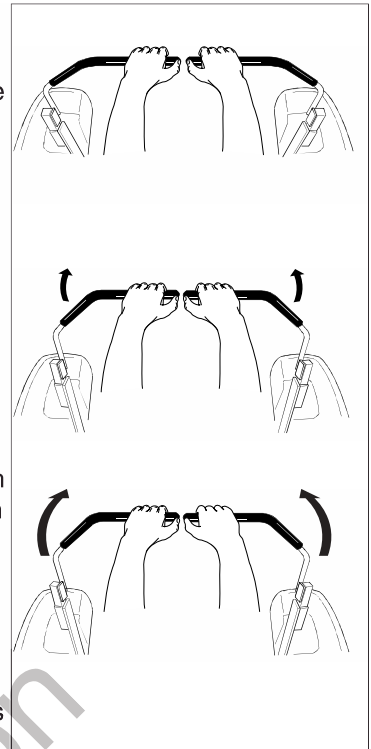


Figure 4. Move Control Levers Gradually

BASIC DRIVING

Forward Travel Practice

Gradually move both ground speed control levers evenly FORWARD from neutral. Slow down and repeat.

NOTE: Straight forward travel takes practice. If necessary, top speed can be balance-adjusted — see the Speed Balancing Adjustment in the Adjustments section near the back of this manual.

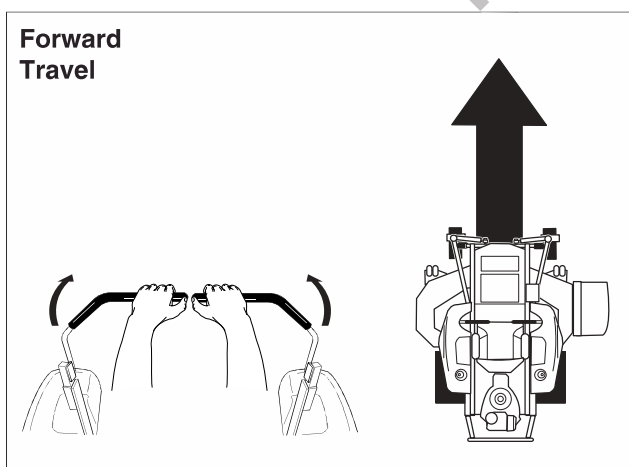


Figure 5. Forward Travel

Reverse Travel Practice

LOOK DOWN and BEHIND, then gradually move both ground speed control levers evenly BACK from neutral. Slow down and repeat.

NOTE: Practice backing up for several minutes before attempting to do so near objects. The rider turns sharply in reverse as well as forward, and backing up straight takes practice.

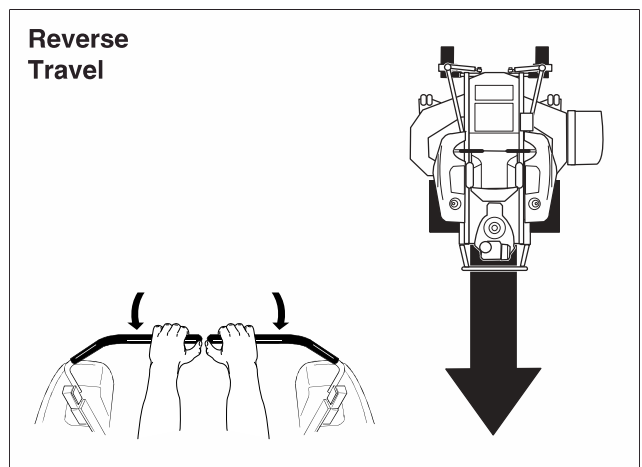


Figure 6. Reverse Travel

Practice Turning Around a Corner

While traveling forward allow one handle to gradually return back toward neutral. Repeat several times.

NOTE: To prevent pivoting directly on the tire tread, it is best to keep both wheels going at least slightly forward.

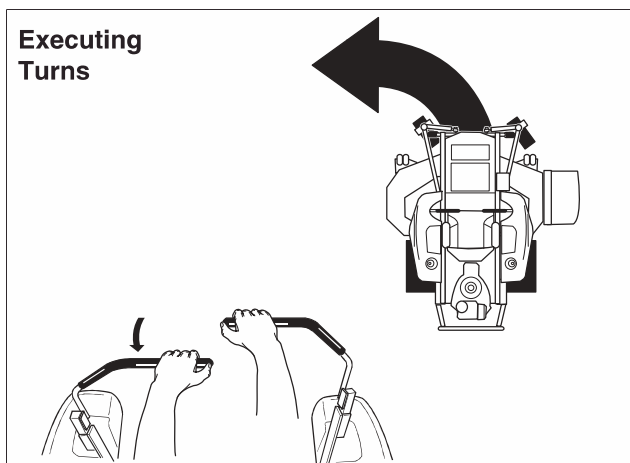


Figure 7. Turning Around a Corner

Practice Turning In Place

To turn in place, “Zero Turn,” gradually move one ground speed control lever forward from neutral and the other lever back from neutral simultaneously. Repeat several times.

NOTE: Changing the amount each lever is pulled forward or back, changes the “pivot point” you turn on.

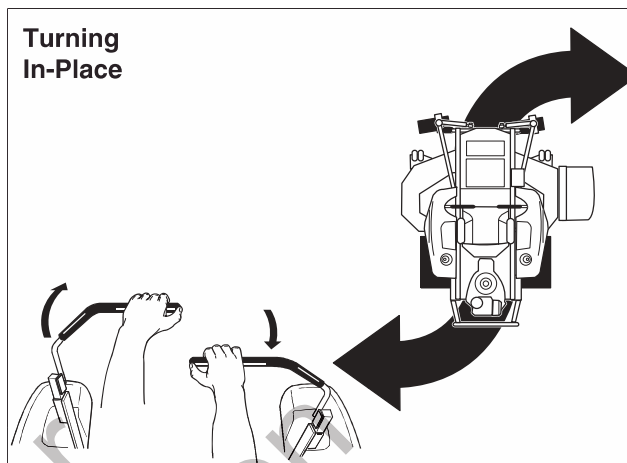


Figure 8. Turning in Place

ADVANCED DRIVING

Executing an End-Of-Row Zero Turn

Your Zero Turn Rider’s unique ability to turn in place allows you to turn around at the end of a cutting row, rather than having to stop and Y-turn before starting a new row.

For example, to execute a left end-of row zero turn:

1. Slow down at the end of the row.
2. Move the RIGHT ground speed control lever forward slightly while moving the LEFT ground speed control lever back to center and then slightly back from center.
3. Begin mowing forward again.

This technique turns the rider LEFT and slightly overlaps the row just cut eliminating the need to back up and re-cut missed grass.

As you become more familiar and experienced with operating the Zero Turn rider. You will learn more maneuvers that will make your mowing time easier and more enjoyable.

Remember, the more you practice, the better your control of the Zero Turn will be!

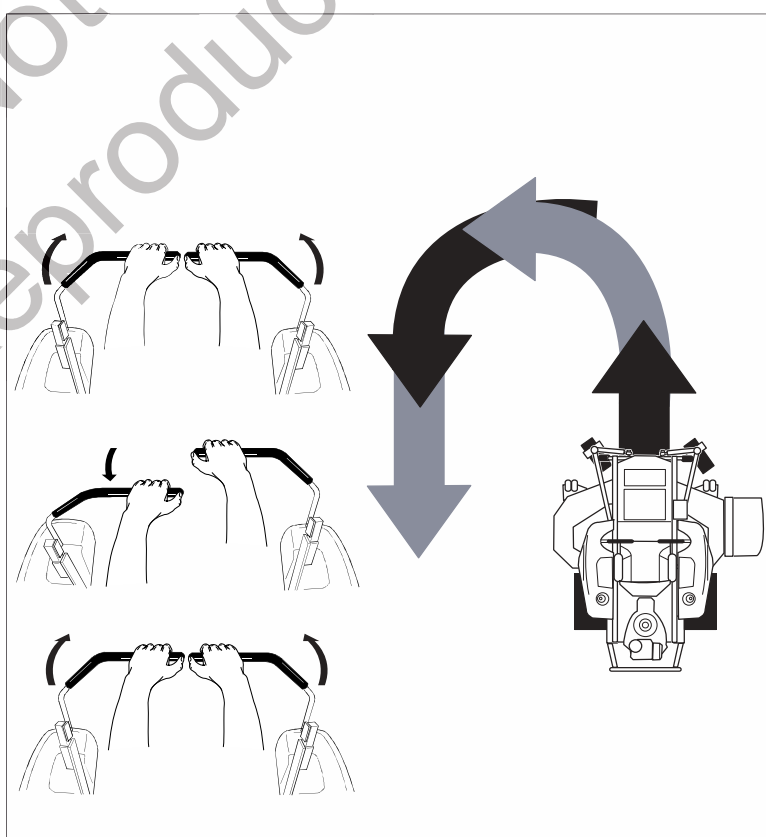
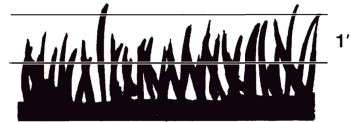


Figure 9. Executing an End-Of-Row Turn

Mowing

1. Engage the parking brake. Make sure the PTO switch is disengaged, the motion control levers are locked in the NEUTRAL position, and the operator is on the seat.
2. Start the engine (see STARTING THE ENGINE).
3. Set the mower cutting height.
4. Set the throttle to FULL.
5. Engage the PTO by pulling up on the PTO switch.
6. Begin mowing.
7. When finished, shut off the PTO.
8. Stop the engine (see STOPPING THE TRACTOR AND ENGINE).



Proper Cutting Height

Mowing Recommendations

Several factors can affect how well your machine cuts grass. Following proper mowing recommendations can improve the performance and life of your machine.

Height of Grass

Often cutting height is a matter of personal preference. Typically, you should mow the grass when it is between three and five inches high. The proper cutting height range for a specific lawn will depend upon several factors including the following: the type of grass, the amount of rainfall, the prevailing temperature, and the lawn's overall condition.

Cutting the grass too short causes weak, thin grass plants, which are easily damaged by dry periods and pests. Cutting too short is often more damaging than allowing the grass to be slightly higher.

Letting grass grow a bit longer especially when it is hot and dry reduces heat build-up, preserves needed moisture, protects the grass from heat damage and other problems. However, allowing grass to grow too high can cause thin turf and additional problems.

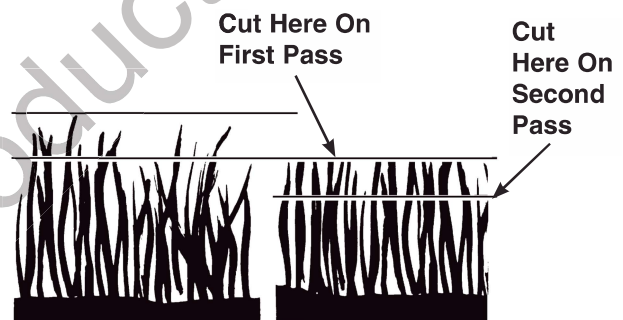
Cutting off too much at one time shocks the plant's growth system and weakens the grass plants. **A good rule of thumb is the 1/3 rule: to cut no more than one third of the grass height, and never more than 1 inch at a time.**

The amount of grass you are able to cut in one pass is also effected by the type of mowing system you are using (for example, broadcasting with side discharge decks can process a much larger volume of grass than mulching does).

Tall Grass Requires Incremental Cutting

For extremely tall grass, set the cutting height at maximum for the first pass, and then reset it to the desired height and mow a second or third time.

Don't cover the grass surface with a heavy layer of clippings. Consider using a grass collection system and starting a compost pile.



Incremental Cutting

When and How Often to Mow

The time of day and condition of the grass greatly affect the results you'll get when mowing. For the best results, follow these guidelines:

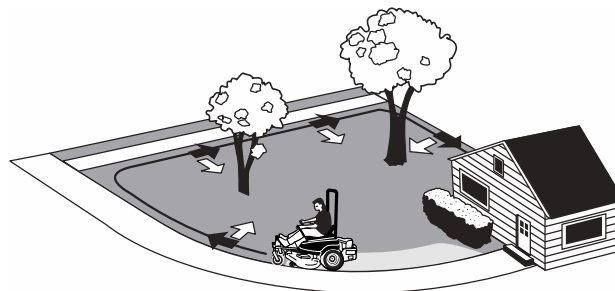
1. Mow when the grass is between three and five inches high.
2. Mow with sharp blades. Short clippings of grass one inch or shorter decompose more quickly than longer blades. Sharp mower blades cut grass cleanly and efficiently, preventing frayed edges which harm the grass.
3. Mow at time of day when the grass is cool and dry. Late afternoon or early evening often provide these ideal mowing conditions.
4. Avoid mowing after rain or even heavy dew. Never mulch when the grass is wet (moist grass does not mulch well and clumps beneath the mower deck).

Mowing Patterns

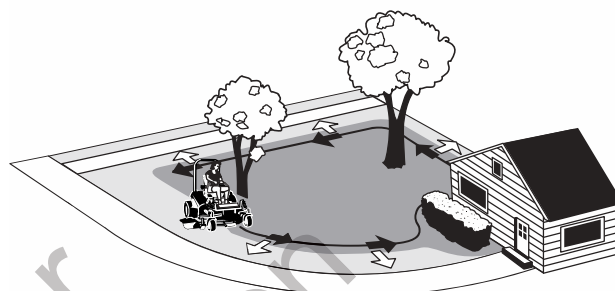
Always start mowing on a smooth, level area.

The size and type of area to be mowed will determine the best mowing pattern to use. Obstructions such as trees, fences, buildings, and conditions such as slopes and grades must also be considered.

1. Cut long straight strips overlapping slightly.
2. Whenever possible, change patterns to eliminate matting, graining, or a corrugated appearance.
3. For a truly professional cut, mow across the lawn in one direction, then recut the lawn by mowing perpendicular to the previous cut.



Where possible, make one or two passes around the outside of the area discharging the grass INTO the lawn to keep the cut grass off fences and walks.



The remainder of the mowing should be done in the opposite direction so that the clippings are dispersed OUT onto the area of lawn previously cut.

Mowing Methods

Proper Broadcast Mowing

Broadcasting (side discharging), disperses fine clippings evenly over the entire lawn. Many golf courses use this method. Your mower has a deep dish deck to allow freer circulation of clippings so they are broadcast evenly over the lawn.

ENGINE SPEED & GROUND SPEED FOR BROADCASTING

ALWAYS operate the engine at full throttle when mowing.

ALWAYS use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual gear models). If you hear the engine slowing down, you are mowing too fast, using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems.

HOW MUCH GRASS TO CUT OFF WHEN BROADCASTING

Mow when the grass is 3-5 inches long. Do NOT cut the grass shorter than 2 to 2-1/2 inches. Do NOT cut off more than 1 inch of grass in a single pass.

Operation

Proper Mulching

Mulching consists of a mower deck which cuts and recuts clippings into tiny particles and then blows them down INTO the lawn. These tiny particles decompose rapidly into by-products your lawn can use. UNDER PROPER CONDITIONS, your mulching mower will virtually eliminate noticeable clippings on the lawn surface.

NOTE: When mulching under heavy cutting conditions, a rumbling sound may be present and is normal.

MULCHING REQUIRES EXCELLENT MOWING CONDITIONS

Mulching mowers cannot function properly if the grass is wet, or if the grass is simply too high to cut. Mulching requires that the grass be dry and the appropriate amount be cut.

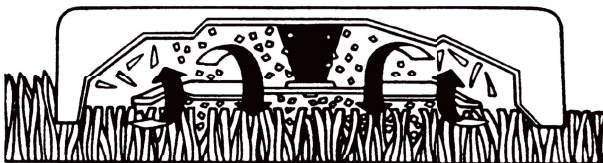
Do NOT use the mower as a mulching mower during the first two or three mowings in the spring. The long grass blades, quick growth, and often wetter conditions are more suitable for broadcasting (side-discharging) or grass bagging operation.

ENGINE SPEED & GROUND SPEED FOR MULCHING

Use full engine throttle matched with a slow ground speed so that clippings will be finely cut. Ground speed while mulching should be HALF of the speed that would be used when broadcasting (side-discharging) under similar conditions. Since mulching requires more horsepower than broadcasting, using a slower ground speed is vitally important for proper mulching operation.

HOW MUCH GRASS TO MULCH

The best mulching action typically results from cutting only the top 1/2 inch to 3/4 inch of grass blade. This provides short clippings which decompose properly. The ideal cutting height will vary with climate, time of year, and quality of your lawn. We recommend that you experiment with both the cutting height and ground speed until you achieve the best cut. Start with a high cutting height and using progressively lower settings until you find a cutting height that is matched to your mowing conditions and preferences.



Mulching Action

Attaching a Trailer

The maximum weight of a towed trailer should be less than 200 lbs (91kg). Secure the trailer with an appropriately sized clevis pin (A, Figure 10) and clip (B).

Excessive towed weight can cause loss of traction and loss of control on slopes. Reduce towed weight when operating on slopes. The surface being driven on greatly impacts traction and stability. Wet or slippery surfaces can greatly reduce traction and the ability to stop or turn. Carefully evaluate the surface conditions before operating the unit and trailer.

NEVER operate on slopes greater than 10°. See SLOPE OPERATION and TOWED EQUIPMENT in the safety section of this manual for additional safety information.

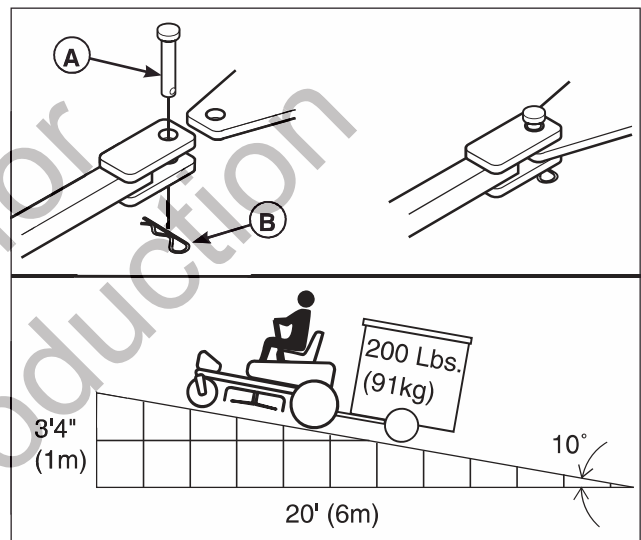


Figure 10. Trailer Weight Recommendations

A. Clevis Pin

B. Clip

Raise & Lower the Roll Bar

To lower the roll bar:

1. Pull the hair pin clips (A, Figure 11) out of the retainer pins (B).
2. Push or pull the top of the roll bar (C) forward against the rubber stops (D) and remove the retainer pins (B).
3. Lower the roll bar and reinstall the retainer pins and hair pin clips to secure the roll bar in the down position (see insert, Figure 11).

To raise the roll bar:

1. Pull the hair pin clips (A) out of the retainer pins (B) and remove the retainer pins.
2. Raise the roll bar (C) until the rubber stops (D) contact the upright tubes.
3. Push or pull the top of the roll bar forward against the rubber stops and reinstall the retainer pins and hair pin clips to secure the roll bar in the raised position.

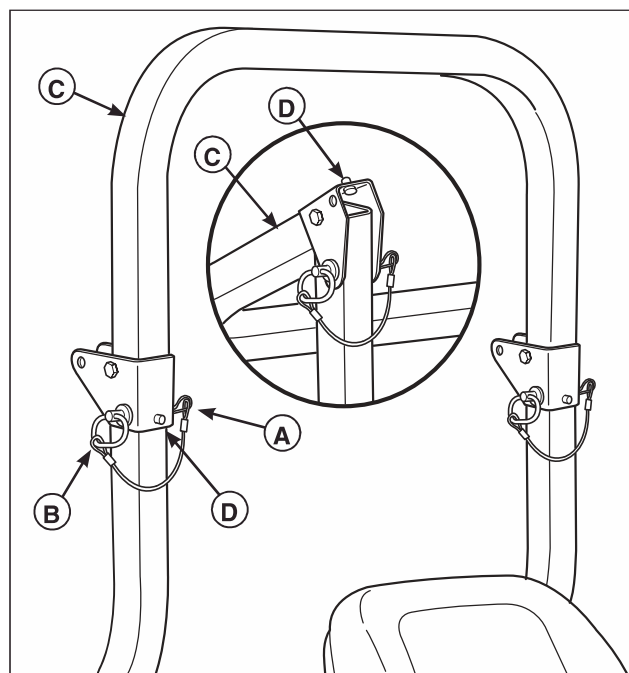


Figure 11. Raise & Lower the Roll Bar

- A. Hair Pin Clip
- B. Retainer Pin
- C. Roll Bar
- D. Rubber Stop

⚠ WARNING

AVOID SERIOUS INJURY OR DEATH FROM ROLL OVER:

Keep roll bar in the raised position and use seat belt.

THERE IS NO ROLL OVER PROTECTION WHEN THE ROLL BAR IS DOWN

Lower the roll bar only when necessary and NEVER remove it.

Do NOT use seat belt when the roll bar is down.

Raise the roll bar as soon as clearance permits.

Do NOT jump off if mower tips.

Storage

Temporary Storage (30 Days Or Less)

Remember, the fuel tank will still contain some fuel, so never store the unit indoors or in any other area where fuel vapor could travel to any ignition source. Fuel vapor is also toxic if inhaled, so never store the unit in any structure used for human or animal habitation.

Here is a checklist of things to do when storing your unit temporarily or in between uses:

- Keep the unit in an area away from where children may come into contact with it. If there's any chance of unauthorized use remove the ignition key.
- If the unit can't be stored on a reasonable level surface, chock the wheels.
- Clean all grass and dirt from the mower.
- If temperature is expected to drop below 35 degrees, refer to Long Term Storage, Item 2.

Long Term Storage (Longer Than 30 Days)

Before you store your unit for the off-season, read the Maintenance and Storage instructions in the Safety Rules section, then perform the following steps:

1. Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when unit is used again.
2. Use an Antifreeze tester to check the cooling system's level of protection. Read the instructions on the Antifreeze container for the appropriate ratio of water to Antifreeze for your geographical area.
3. Prepare the mower deck for storage as follows:
 - a. Remove mower deck from the unit.
 - b. Clean underside of mower deck.
 - c. Coat all bare metal surfaces with paint or light coat of oil to prevent rusting.
4. Clean external surfaces and engine.
5. Prepare engine for storage. See engine owner's manual.
6. Clean any dirt or grass from cylinder head, engine housing and air cleaner element.
7. Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt and insects.
8. Completely grease and oil unit as outlined in the Regular Maintenance section.
9. Clean up unit and apply paint or rust preventative to any areas where paint is chipped or damaged.
10. Be sure the battery is filled to the proper level with water and is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. If battery is left in unit, disconnect the negative cable.
11. Drain fuel system completely or add a diesel fuel stabilizer to the fuel system. If you have chosen to use a fuel stabilizer and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of diesel fumes. Remember, diesel fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

WARNING

Never store the unit, with diesel fuel in engine or fuel tank, in a heated shelter or in enclosed, poorly ventilated enclosures. Diesel fumes may reach an open flame, spark or pilot light (such as a furnace, water heater, clothes dryer, etc.) and cause an explosion.

Handle diesel fuel carefully. It is highly flammable and careless use could result in serious fire damage to your person or property.

Drain fuel outdoors into an approved container and away from open flame or sparks.

NOTE: Diesel fuel, if permitted to stand unused for extended periods (30 days or more), may develop gummy deposits which can adversely affect the fuel pump and injector tubes and cause engine malfunction. To avoid this condition, add a diesel fuel stabilizer to the fuel tank and run the engine a few minutes, or drain all fuel from the unit before placing it in storage.

Starting After Long Term Storage

Before starting the unit after it has been stored for a long period of time, perform the following steps.

1. Remove any blocks from under the unit.
2. Install the battery if it was removed.
3. Unplug the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh fuel. See engine manual for recommendations.
5. See engine owner's manual and follow all instructions for preparing engine after storage.
6. Check crankcase oil level and add proper oil if necessary. If any condensation has developed during storage, drain crankcase oil and refill.
7. Inflate tires to proper pressure. Check fluid levels.
8. Start the engine and let it run slowly. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

Diesel Fuel Recommendations

Fuel companies provide fuel tailored to meet the existing weather conditions. These fuels change at the start of the predominant season according to regional weather trends.

Winter fuels are tailored to give ease of starting for cold weather. Summer fuel may be somewhat heavier than winter fuel resulting in slightly better fuel economy and power. Spring and fall fuel is an average blend between winter and summer blend.

For these reasons an effort should be made to purchase fuels in such quantities that they are not carried over into the next season. Using the wrong blend of fuel can cause problems with the engine.

Refer to the engine manufacturer's manual for specific fuel recommendations.

Maintenance

Maintenance Schedule & Procedures

The following schedule should be followed for normal care of your rider and mower. You will need to keep a record of your operating time. Determining operating time is easily accomplished by observing the hour meter.

RIDER MAINTENANCE
Before Each Use
Check Safety Interlock System
Check Rider Brakes
Check Rider / Mower for loose hardware
Every 100 Hours or Annually*
Check Gearbox Oil Level***
Clean Deck & Check / Replace Mower Blades
Lubricate Rider & Mower**
Clean Battery & Cables
Check Tire Pressure
Check Hydraulic Oil**
Every 250 Hours or Annually*
Change Hydraulic Oil Filter**

* Whichever comes first.

** More often in hot (over 85° F; 30° C) weather or dusty operating conditions

*** Change gearbox oil after first 100 hours and every 500 hours thereafter (*See Gearbox Maintenance*).

ENGINE MAINTENANCE
Before Each Use
Check Engine Oil Level
Check Engine Coolant Level
Check & Clean Radiator Screens
Check / Clean Cooling Fins & Intake**
Every 25 Hours
Check Fuel Filter / Drain Water Separator
Refer to Engine Manufacturer's Owner's Manual
Service Air Filter**
Change Oil & Filter
Check / Replace Spark Plugs
Annually
Change Engine Coolant

* Change original engine oil after first 5 hours of operation.

** More often in hot (over 85° F; 30° C) weather or dusty operating conditions.

Check Tire Pressures

Tire Pressure should be checked periodically, and maintained at the levels shown in the chart. Note that these pressures may differ slightly from the "Max Inflation" stamped on the side-wall of the tires. The pressures shown provide proper traction, improve cut quality, and extend tire life.

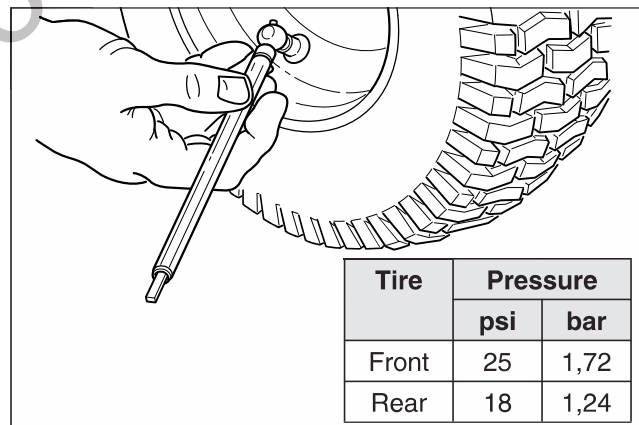


Figure 12. Checking Tire Pressure

Regular Maintenance

Checking / Adding Fuel

To add fuel:

1. Remove the fuel cap (A, Figure 13).
2. Fill the tank to the bottom of the fill tube. This will leave room in the tank for fuel expansion.

NOTE: Do not overfill. Refer to your engine manual for specific fuel recommendations.

3. Install and hand tighten the fuel cap.
4. Repeat same process for opposite tank.

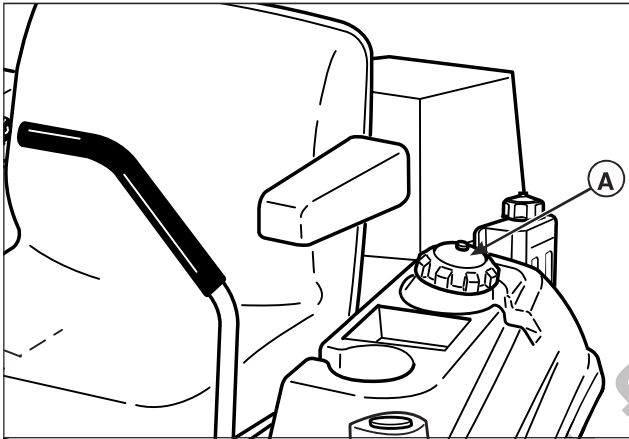


Figure 13. Fill Fuel Tank

A. Fuel Cap



Do not use Kerosene in place of diesel fuel or mix with diesel fuel. Kerosene will damage the engine. Consult the engine manufacturer's manual for specific fuel recommendations.



WARNING

Diesel fuel is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

Do not drain or replace fuel filter when engine is hot, as spilled fuel may ignite. Make sure the filter drain valve is fully closed before returning the unit to service.



WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the ignition switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

Fuel Filter

This unit is equipped with two fuel filters. One is a water separator (A, Figure 14) and the other is a fuel filter (C). Both filters are located in the engine compartment on the right side of the engine. The water separator should be drained every 25 hours or whenever water is visible in the bowl. Replace both fuel filters every 500 hours of operation or as required.

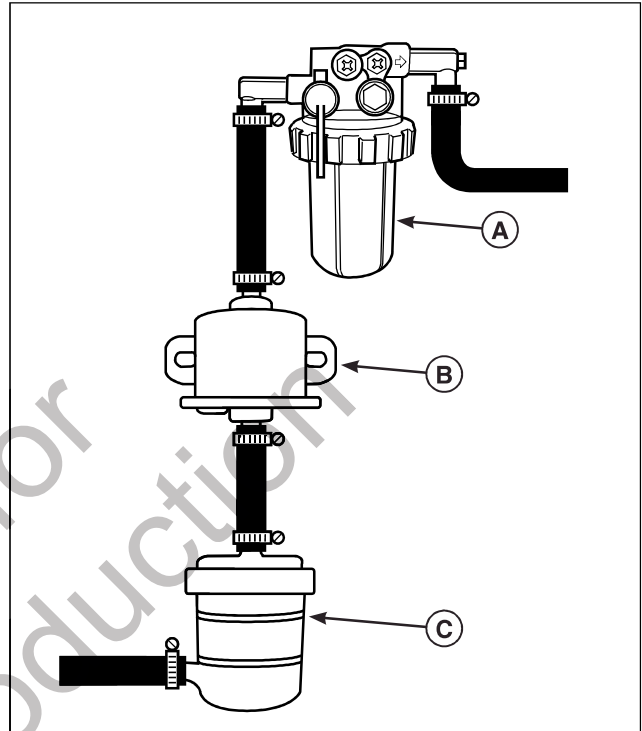


Figure 14. Replacing the Fuel Filter

A. Water Separator

B. Fuel Pump

C. Fuel Filter

To Replace the Fuel Filter:

NOTE: Fuel filter is replaced as an assembly only. The filter element is not replaceable separately.

1. Turn the engine off, set the parking brake, remove the ignition key, and wait for all moving parts to stop.
2. Allow the engine and surrounding areas to cool to room temperature.
3. Close both fuel tank shut off valves (See Figure 2 for location).
4. Open the hood to gain access to the fuel filter. The fuel filter is located in the engine compartment on the right side of the engine.
5. Place an absorbant cloth below the filter to catch any spilled fuel.

6. Loosen the hose clamps that secure the hoses to the fuel filter.
7. Remove the hoses from the filter.
8. Install the new filter in the proper flow direction in the fuel line.
9. Secure with the hose clamps and wipe up any spilled fuel.
10. Reopen the fuel tank shut off valves when complete.

To Drain the Water Separator:

Refer to engine owners manual for specific water separator service procedures.

Service Air Filter

Refer to the engine owner's manual for specific air filter service procedures.

Check / Add Engine Oil Level

Refer to Figure 15 for dipstick and oil fill locations. Refer to the engine owners manual for specific engine oil check and fill procedures. Also refer to the engine owners manual for specific engine oil and filter change procedures

Change Engine Oil & Filter

1. Warm engine by running for a few minutes. (Refer to the engine operator's manual for oil & filter replacement instructions.)
2. Remove the dipstick (A, Figure 15) to vent the crankcase and allow the engine oil to drain easily.
3. Place a small pan under the oil drain cap (D) to catch the oil. Using the appropriate tools, remove the oil drain cap and drain the engine oil.
3. After draining, replace the oil drain cap (see engine owners manual for torque specification) and wipe up any spilled oil.
4. Place an absorbent shop cloth under the engine oil filter (B). Remove the engine oil filter and replace with a new one.
5. Remove the shop cloth and wipe up any spilled oil.
6. Add new oil through the engine oil fill (C). See the engine operator's manual for specific oil recommendations.

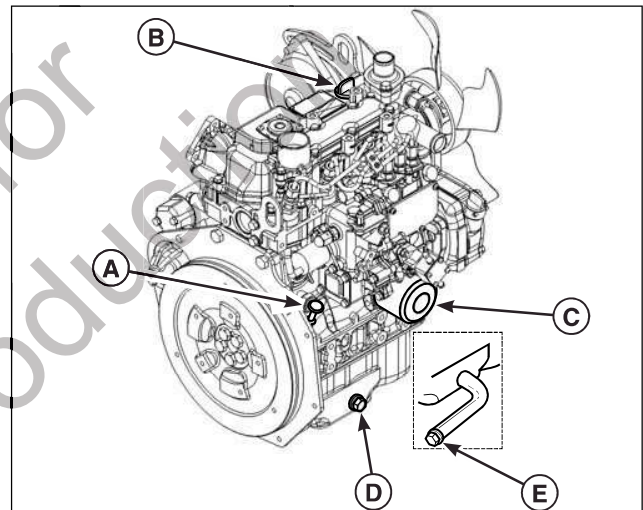


Figure 15. Engine Oil Fill

- A. Dipstick
- B. Engine Oil Fill
- C. Oil Filter
- D. Oil Drain Cap - 3TNM68 Models
- E. Oil Drain Cap - 3TNM72 Models

Regular Maintenance

Check Hydraulic Oil Level

1. Before removing the reservoir cap, make sure the area around the reservoir cap and fill neck of the reservoir is free of dust, dirt, or other debris.
2. Unscrew the reservoir cap (B, Figure 16).
3. Look down the filler neck of the hydraulic oil reservoir (A, Figure 16) and observe the oil level. When cold, the oil level should be approximately 4" (10 cm) below top of the filler neck.
4. If necessary, add either Mobil 1™, 15W-50 synthetic oil or Castrol Syntec™ 5W-50 oil. **DO NOT** use conventional oils.
5. Reinstall the reservoir cap.

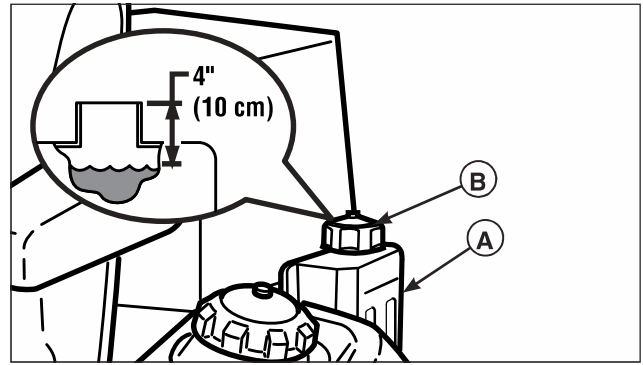


Figure 16. Checking Hydraulic Oil Level

A. Hydraulic Oil Reservoir

B. Reservoir Cap

Change Hydraulic Oil Filter

Change Interval: Every 250 Hours

Filter Part Number: 1719168

NOTE: Removing the oil filter from the filter base will drain the oil reservoir. Have a suitable container ready to catch any spilled oil. Ferris recommends this be a dealer-only service item.

1. Locate the transmission oil filter (A, Figure 17). The transmission oil filter is located underneath the engine deck by the left rear tire of the machine.
2. Lubricate the new filter gasket with a few drops of transmission oil. Fill the filter half full of oil.
3. Clean the area around the filter base and remove the filter. Do NOT drain the hydraulic system oil.
4. Thread the new filter onto the filter base until the gasket makes contact, then tighten 3/4 of a turn more.
5. Run the unit for several minutes and check the transmission oil level.

IMPORTANT NOTE: Use caution after changing the filter; air in the hydraulic system may affect the responsiveness of the control levers. Repeat step 5 until the air is out of the system.

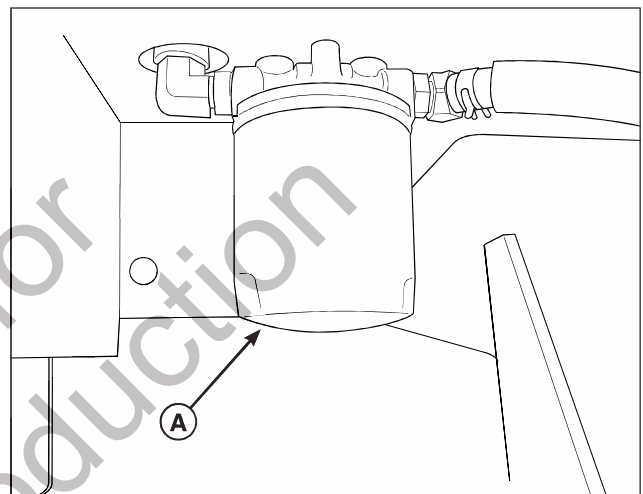



Figure 17. Change Hydraulic Oil Filter

A. Hydraulic Oil Filter

Check Engine Coolant Level

WARNING

 If engine is warm, **DO NOT** remove radiator cap.

 Escaping steam can cause burns.

Never remove the radiator cap or radiator reservoir cap while the engine is hot or running. Severe thermal burns or injury can occur by escaping steam or hot coolant.

- Do NOT touch hot radiator or open reservoir when engine is running.
- Stop and allow engine to cool before removing the radiator cap or the reservoir cap and before changing or adding coolant.

The engine coolant level and quality should be checked before each use, when the engine is cool and off.

The cooling system is a closed type. Never open the radiator cap unless you are flushing the system. Opening the radiator cap may induce air into the cooling system and may cause overheating.

1. Open the hood to gain access to the overflow bottle. (See Figure 18).
2. Check the coolant level only at the overflow reservoir (A, Figure 18). The coolant level should be at the LOW (COLD) mark.
3. If the coolant level is insufficient, remove the cap (E) from the reservoir and add coolant to the LOW (COLD) mark. See engine owners manual for specific engine coolant specifications.
4. Reinstall the cap.

NOTE: Proper coolant mix is a 50/50 mixture of ethylene glycol and distilled water. See engine owners manual for engine coolant specifications.

Change Engine Coolant

See engine owners manual for specific engine coolant procedures. The drain valve is located at the base of the right-hand side of the radiator.

Clean Radiator & Screen

Clean the radiator (A, Figure 19) and screen before each use, or as required (depending on conditions) to allow proper air-flow through radiator and hydraulic oil cooler.

1. Raise the seat plate.
2. Lift the radiator screen (B) straight up to remove the screen. Flush the screen with water or blow clean with air. Flush the radiator core with water or blow clean with air. See engine owners manual for proper radiator cleaning procedures.

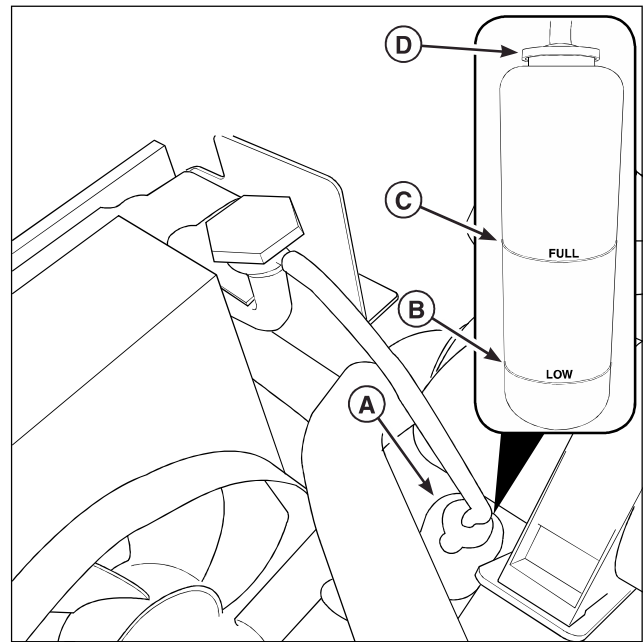


Figure 18. Checking the Engine Coolant Level

- A. Overflow Reservoir
- B. LOW (Cold) Mark
- C. FULL (Hot) Mark
- D. Cap

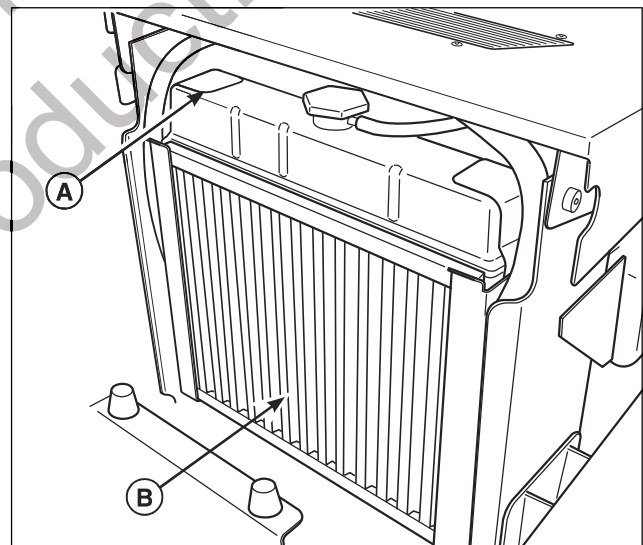


Figure 19. Cleaning the Radiator & Screen

- A. Radiator
- B. Radiator Screen

3. Reinstall the radiator screen. Make sure the screen is fully seated in the carrier.
4. Lower the seat plate.

Regular Maintenance

Lubrication

Lubricate the unit at the locations shown in Figures 20 through 26 as well as the following lubrication points.

Grease:



- front caster wheel axles & yokes
- deck lift pivot blocks
- mower deck spindles
- mower deck idler arm
- pump & PTO drive idler arms
- drive shaft universal joint

Use grease fittings when present. Disassemble parts to apply grease to moving parts when grease fittings are not installed.

Not all greases are compatible. Ferris Red Grease (p/n 5022285) is recommended, automotive-type high-temperature, lithium grease may be used when this is not available.

Oil:



- control handle pivots
- seat plate pivots
- deck lift pivots
- discharge chute hinge

Generally, all moving metal parts should be oiled where contact is made with other parts. Keep oil and grease off belts and pulleys. Remember to wipe fittings and surfaces clean both before and after lubrication.

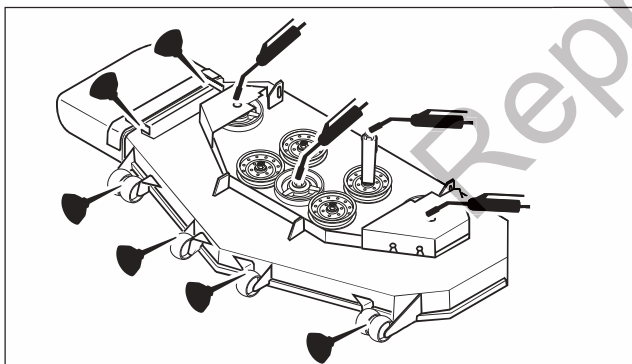


Figure 20. Deck Lubrication

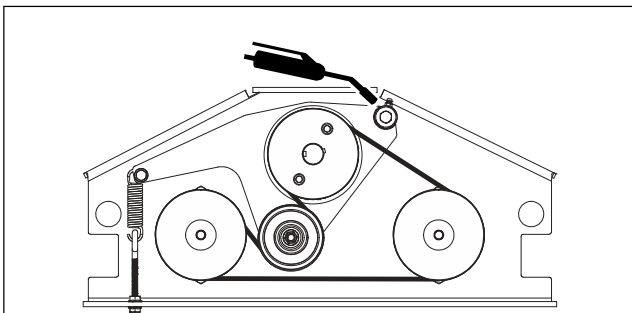


Figure 21. Pump Drive Idler Arm

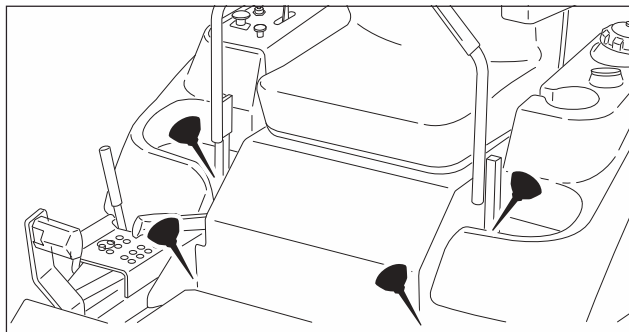


Figure 22. Control Handle Pivots & Seat Plate Pivots

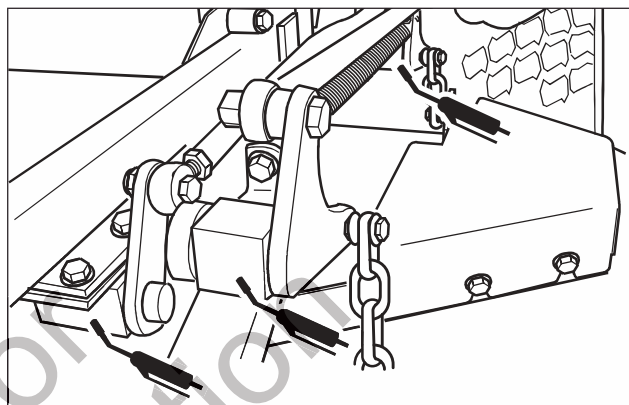


Figure 23. Deck Lift Linkage Pivots

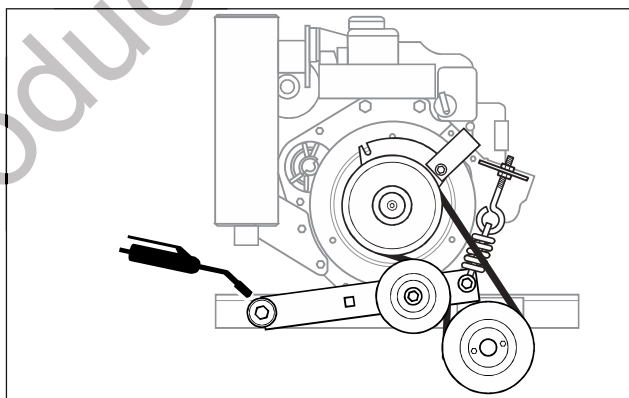


Figure 24. PTO Drive Idler Arm

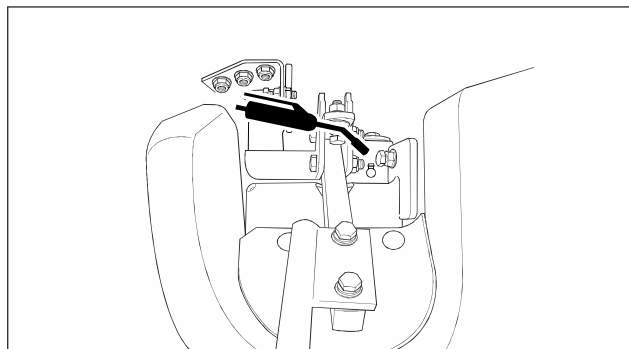


Figure 25. Suspension Pivots

Lubricating the Drive Shaft

Maintenance Interval: Every 250 hours.

1. Position the drive shaft so that the plug (A, Figure 26) can be accessed from beneath the machine through the hole in the engine cradle.
2. Remove the plug and install a 1/4-28 grease fitting.
3. Grease the drive shaft.
4. Remove the 1/4-28 grease fitting and reinstall the plug.

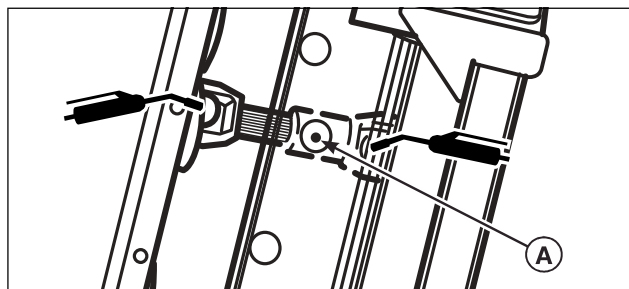


Figure 26. Drive Shaft (Bottom side of unit shown)
A. Plug

Lubricating the Front Casters

Maintenance Interval: Annually.

1. Remove the 1/4-28 bolt (A, Figure 27) screwed into the caster and install a 1/4-28 grease fitting.
2. Grease the front caster
3. Remove the 1/4-28 grease fitting and reinstall the 1/4-28 bolt
4. Repeat the process for the other side of the machine.

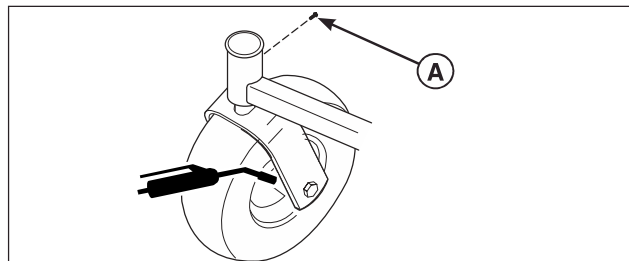


Figure 27. Front Caster & Wheel
A. 1/4-28 Bolt

Regular Maintenance

Cleaning the Battery and Cables

NOTE: This unit is equipped with a maintenance-free BCIU1 battery.

Removing the Floor Pan to Access the Battery:

1. **(CE Models Only):** Loosen and remove the floor pan retaining bolt (D, Figure 28).
2. **(All Models: 2014696070 & Below):** Tilt the left side of the floor pan (C) up so that the locking pins clear the holes in the frame. Slide the floor pan to the left until it stops.
(All Models: 2014696071 & Above): Remove the two hair pins with lanyards (E) from the floor pan retention pins (F).
3. Raise the floor pan straight up and remove from the machine.

Cleaning the Battery and Cables:

1. Disconnect the cables from the battery, negative (black) cable first (B).
2. Clean the battery terminals and cable ends with a wire brush until shiny.
3. Reinstall the battery and reattach the battery cables, positive (red) cable first (A).
4. Coat the cable ends and battery terminals with petroleum jelly or non-conducting grease.

Reinstall the Floor Pan:

1. **(All Models: 2014696070 & Below):** Insert the floor pan so that the right locking pins go into the holes in the right side of the frame. Push the floor pan to the right until it stops and then lower the floor pan into place.
(All Models: 2014696071 & Above): Insert the floor pan onto the machine and install the two hair pins with lanyards (E) from the floor pan retention pins (F).
2. **(CE Models Only):** Reinstall and tighten the floor pan retaining bolt (D).

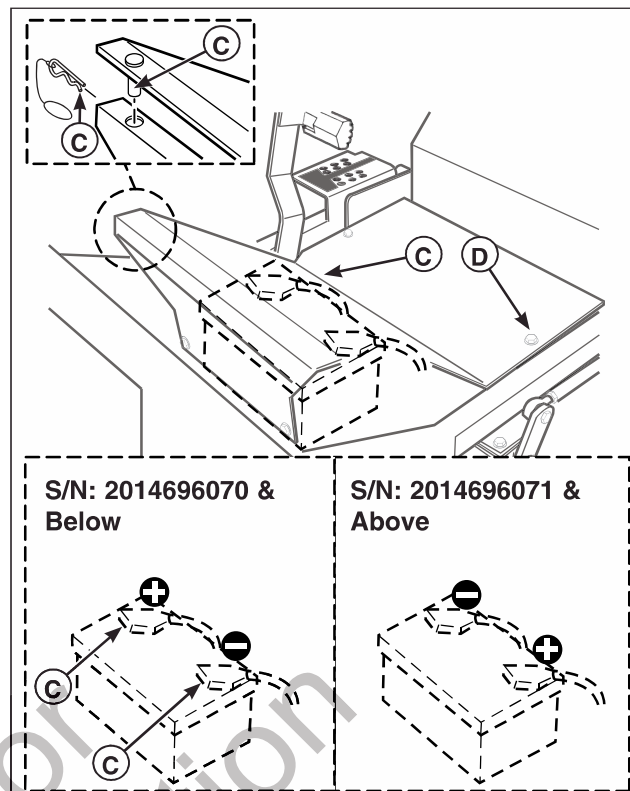


Figure 28. Battery Compartment
A. Positive (+) Cable & Terminal
B. Negative (-) Cable & Terminal
C. Floor pan
D. Floor Pan Retaining Bolt
E. Hair Pins with Retainers
F. Floor Pan Retention Pin

⚠ WARNING

Be careful when handling the battery. Avoid spilling electrolyte. Keep flames and sparks away from the battery.

When removing or installing battery cables, disconnect the negative cable **FIRST** and reconnect it **LAST**. If not done in this order, the positive terminal can be shorted to the frame by a tool.

Servicing the Mower Blades

Removing the Mower Blade

⚠ CAUTION

Avoid injury. Mower blades are sharp.

- Always wear gloves when handling mower blades or working near blades.

1. To remove the mower blade, wedge a wooden block between the mower blade and the mower deck housing to keep the blade from turning and remove the mower blade mounting bolt with a 15/16" wrench (Figure 29).

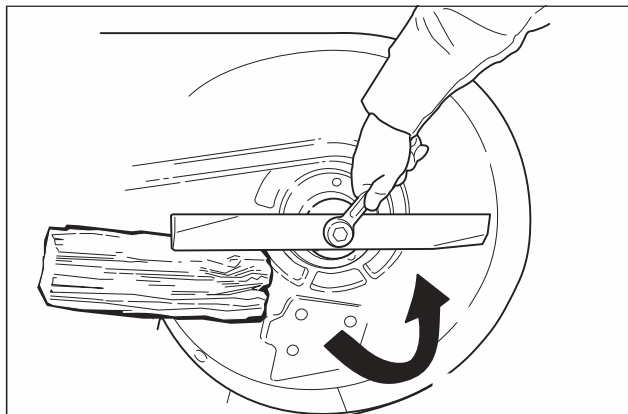


Figure 29. Loosening the Mower Blade for Removal

Inspecting the Mower Blade

⚠ DANGER

Avoid injury. A worn or damaged blade can break, and a piece of the mower blade could be thrown into the operator's or bystander's area, resulting in serious personal injury or death.

- Inspect the mower blade every 25 hours or at least once a year.
- If the mower blade hits a solid object, stop the engine immediately and inspect the mower blade.
- Never weld or straighten bent mower blades.

1. Remove the mower blade from the unit.
2. Inspect the mower blade (Figures 30 & 31). Discard the mower blade if it has any of the below conditions:
 - A.) Has more than .5" (12,7 mm) of the mower blade metal removed from previous sharpening or wear (D, Figure 30).
 - B.) The air lifts are excessively eroded (B & C, Figure 31) and the notch (C) is .25" (6,35 mm) deep or greater.
 - C.) Mower blade is bent or broken.
3. If the cutting edges are not sharp or have nicks, sharpen the blades. See SHARPENING THE MOWER BLADES.

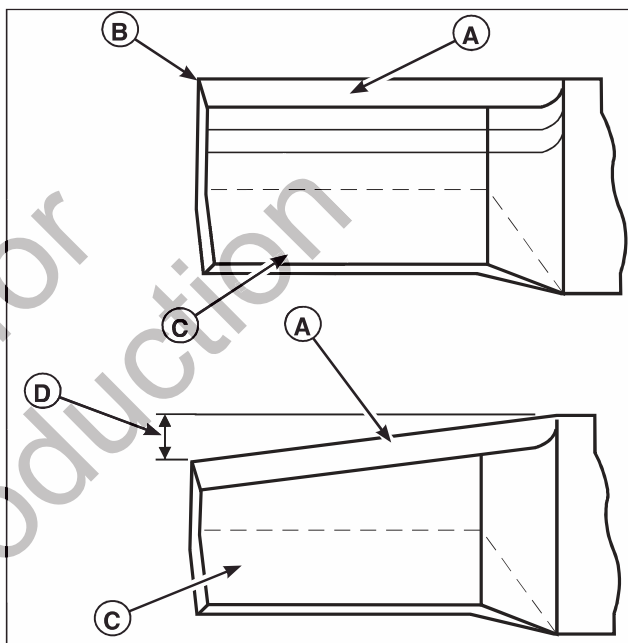


Figure 30. Inspecting the Mower Blade Tips

A. Mower Blade Cutting Edge

B. Square Corner

C. Air Lift

D. Wear Measurement - DISCARD Mower Blade If greater than .5" (12,7 mm)

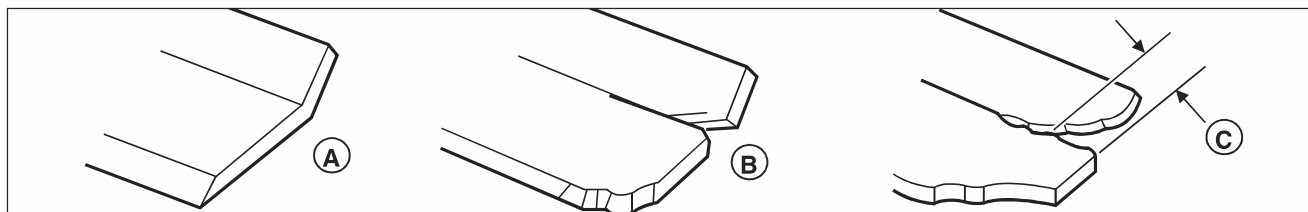


Figure 31. Inspecting the Mower Blade Air Lifts

A. New Mower Blade

B. Mower Blade at Wear Limit (A notch begins to form)

C. Mower Blade in Dangerous Condition (Notch measures .25" (6,35 mm) or greater DO NOT USE. Replace with new mower blade.)

Regular Maintenance

Sharpening the Mower Blades

CAUTION

Avoid injury. Mower blades are sharp.

- Always wear gloves when handling mower blades or working near blades.
- Always wear safety eye protection when grinding

1. Sharpen the mower blade with a grinder, hand file, or electric blade sharpening.
2. Sharpen the mower blade by removing an equal amount of material from each end of the mower blade.
3. Keep the original bevel (A, Figure 32) when grinding. Do NOT change the mower blade bevel.
4. The mower blade should have a maximum 1/64" (0,40 mm) cutting edge (B) or less.
5. Balance the mower blade before installing.

Balancing the Mower Blades

CAUTION

Avoid injury. Keep mower blades balanced.

- An unbalanced mower blade can create excessive vibration and damage the unit or cause mower blade failure.

1. Clean the mower blade to remove any dried grass or other debris.
2. See Figure 33. Put the mower blade on a nail in a vise and turn the blade to the horizontal position.
3. Check the balance of the mower blade. If either end of the mower blade moves downward, sharpen the heavy end until the mower blade is balanced. See SHARPENING THE MOWER BLADES for proper sharpening instructions.
4. Repeat the process until the mower blade remains in the horizontal position.

Reinstalling the Mower Blades

1. Reinstall each mower blade with the air lifts pointing up towards the mower deck as shown in Figure 34. Secure with the mower blade mounting bolt and flat washer (A & B, Figure 34) and torque to 70 ft. lbs (94 Nm).
2. Wedge a wooden block between the mower blade and the mower deck housing to keep the mower blade from turning.

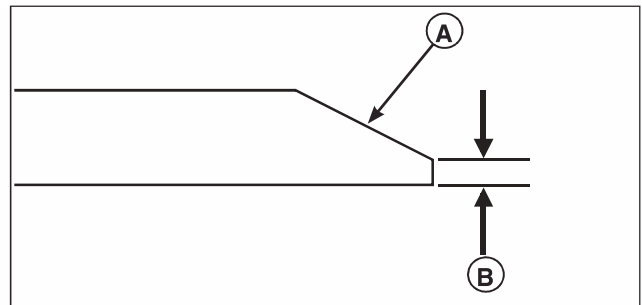


Figure 32. Sharpening the Mower Blade
A. Mower Blade Bevel
B. Mower Blade Cutting Edge

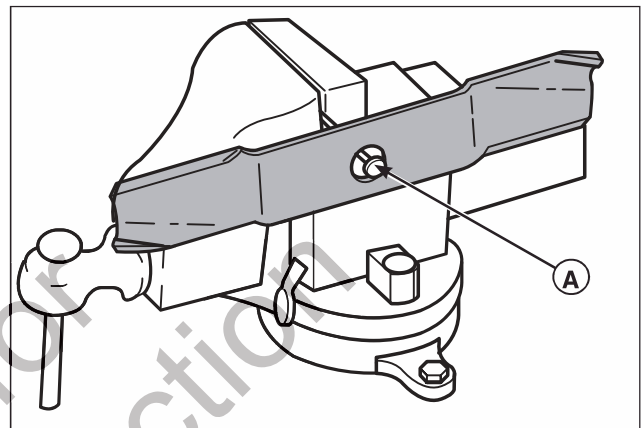


Figure 33. Balancing the Mower Blade
A. Nail

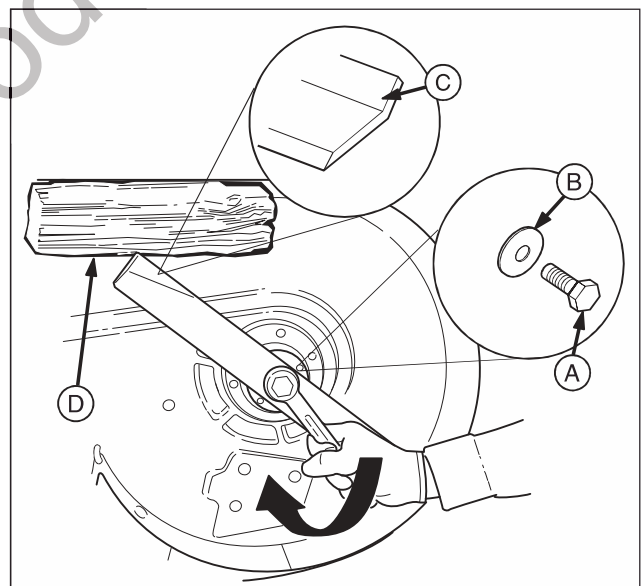


Figure 34. Tightening the Mower Blade for Installation
A. Mower Blade Mounting Bolt
B. Flat Washer
C. Mower Blade Air Lift (Points Up For Installation)
D. 4 X 4 Wooden Block

Fuse Location

The fuse block is located on the side of the instrument control panel mounted on the right hand side fuel tank. Refer to Figure 35 for the location and amperage of the fuses used in this machine.

- A. **PTO Clutch:** 20 amp fuse
- B. **Fuel Solenoid:** 20 amp fuse
- C. **Alternator:** 20 amp fuse
- D. **Main:** 40 amp fuse

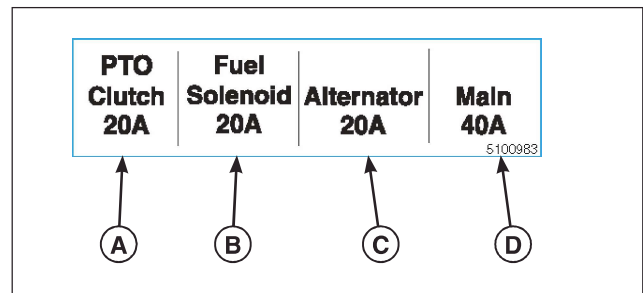


Figure 35. Fuse Location Decal

- A. PTO Clutch
- B. Fuel Solenoid
- C. Alternator
- D. Main

Gearbox Maintenance

Check Gearbox Oil Level

1. Remove fill plug (A, Figure 36) on gearbox.
2. Once plug is removed, oil should seep out of fill plug hole. If no oil drains out, fill with SAE 80-90 weight gear oil until oil starts to seep from hole, then replace fill plug.

Changing Gearbox Oil

NOTE: The gearbox lubricant should be changed after the first 100 hrs. or 30 days of operation, then after 500 hours or 12 months.

1. Remove the mower deck drive belt (see **MOWER DRIVE BELT REMOVAL & REPLACEMENT** for instructions).
2. Rotate the the mower deck drive pulley on the gearbox so the drain plug is aligned with the opening between the pulley spokes.
3. Place a container under the gearbox drain hole and remove the drain plug (B).
4. Replace drain plug and fill with SAE 80-90 weight gear oil until oil starts to seep from hole, then replace fill plug.
5. Using a parts solvent, thoroughly clean any excess oil from the pulley faces and groove.
6. Reinstall the mower deck drive belt (see **MOWER DRIVE BELT REMOVAL & REPLACEMENT** for instructions).

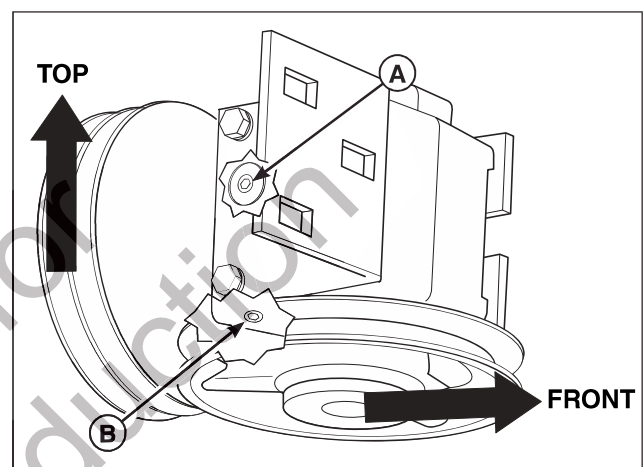


Figure 36. Gearbox Oil Level

- A. Fill Plug
- B. Drain Plug

Troubleshooting, Adjustment & Repair

Troubleshooting

While normal care and regular maintenance will extend the life of your equipment, prolonged or constant use may eventually require that service be performed to allow it to continue operating properly.

The troubleshooting guide below lists the most common problems, their causes and remedies.

See the information on the following pages for instructions on how to perform most of these minor adjustments and service repairs yourself. If you prefer, all of these procedures can be performed for you by your local authorized dealer.

WARNING

To avoid serious injury, perform maintenance on the tractor or mower only when the engine is stopped and the parking brake engaged.

Always remove the ignition key, disconnect the spark plug wire and fasten it away from the plug before beginning the maintenance, to prevent accidental starting of the engine.

Troubleshooting the Rider

PROBLEM	CAUSE	REMEDY
Engine will not turnover or start.	1. Parking brake not engaged. 2. PTO (electric clutch) switch in ON position. 3. Out of fuel. 4. Motion Control Handles not 5. Operator not in seat. 6. Glow plugs not pre-heated. 7. Fuse blown. 8. Battery terminals require cleaning. 9. Battery discharged or dead. 10. Wiring loose or broken. 11. Solenoid or starter motor faulty. 12. Safety interlock switch faulty. 13. Water in fuel. 14. Fuel is old or stale.	1. Engage parking brake. 2. Place in OFF position. 3. If engine is hot, allow it to cool, then refill the fuel tanks. Prime the fuel system. 4. Lock handles in neutral position. locked in neutral position. 5. Assume operator's position in seat. 6. Pre-heat glow plugs. 7. Replace fuse. 8. Clean the battery terminals 9. Recharge or replace. 10. Visually check wiring & replace broken or frayed wires. Tighten loose connections. 11. Repair or replace. See authorized service dealer 12. Replace as needed. See authorized service dealer. 13. Drain fuel & refill with fresh fuel. 14. Drain fuel & replace with fresh fuel.
Engine starts hard or runs poorly.	1. Fuel mixture too rich. 2. Air in fuel system.	1. Clean air filter. 2. Prime the fuel system.
Engine knocks.	1. Low oil level. 2. Using wrong grade oil.	1. Check/add oil as required. 2. See engine manual.
Excessive oil consumption.	1. Engine running too hot. 2. Using wrong weight oil. 3. Too much oil in crankcase.	1. Clean radiator screens and air cleaner. 2. See engine manual. 3. Drain excess oil.
Engine exhaust is black.	1. Dirty air filter. 2. Air in fuel system	1. Replace air filter. See engine manual. 2. Prime the fuel system.