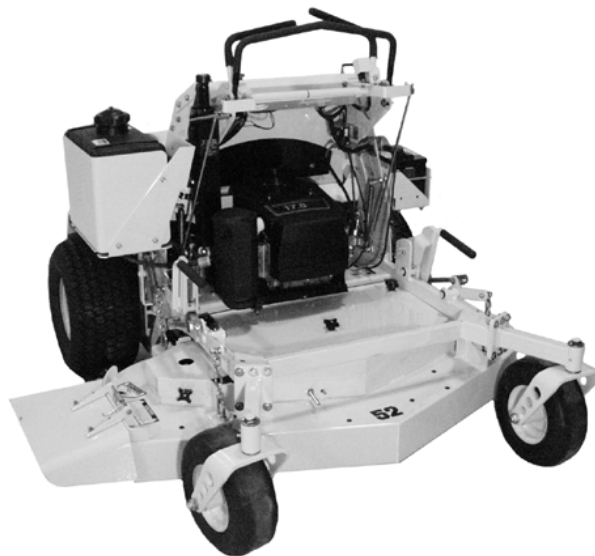




Super Surfer
GDSS15KA, GDSS17KA, GDSS17KAE,
GDSS22KHE, GDSS23KAE



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.

California Proposition 65 Warning

OMGDU10005 B2

D02-104

North American Version
Litho in U.S.A.

INTRODUCTION

Using Your Operator's Manual

This manual is an important part of your machine and should remain with the machine when you sell it.

An engine manufacturer's owner's manual has been provided with your machine. This will provide maintenance and troubleshooting information for the engine installed in your machine.

Reading your operator's manual will help you and others avoid personal injury or damage to the machine. Information given in this manual will provide the operator with the safest and most effective use of the machine.

Sections in your operator's manual are placed in a specific order to help you understand all the safety messages and learn the controls so you can operate this machine safely. You can also use this manual to answer any specific operating or servicing questions.

The machine shown in this manual may differ slightly from your machine, but will be similar enough to help you understand our instructions.

RIGHT-HAND and LEFT-HAND sides are determined by facing in the direction the machine will travel when going forward. When you see a broken line (-----), the item referred to is hidden from view.

Special Messages

Your manual contains special messages to bring attention to potential safety concerns, machine damage as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.



CAUTION: Avoid injury! This symbol and text highlight potential hazards or death to the operator or bystanders that may occur if the hazards or procedures are ignored.

IMPORTANT: Avoid damage! This text is used to tell the operator of actions or conditions that might result in damage to the machine.

NOTE: General information is given throughout the manual that may help the operator in the operation or service of the machine.

Record Identification Numbers

Super Surfer

GDSS15KA Serial No. (439000 - 439999)

GDSS17KA Serial No. (440000 - 440999)

GDSS17KAE Serial No. (441000 - 441999)

GDSS22KHE Serial No. (444000 - 444999)

GDSS23KAE Serial No. (445000 - 446999)

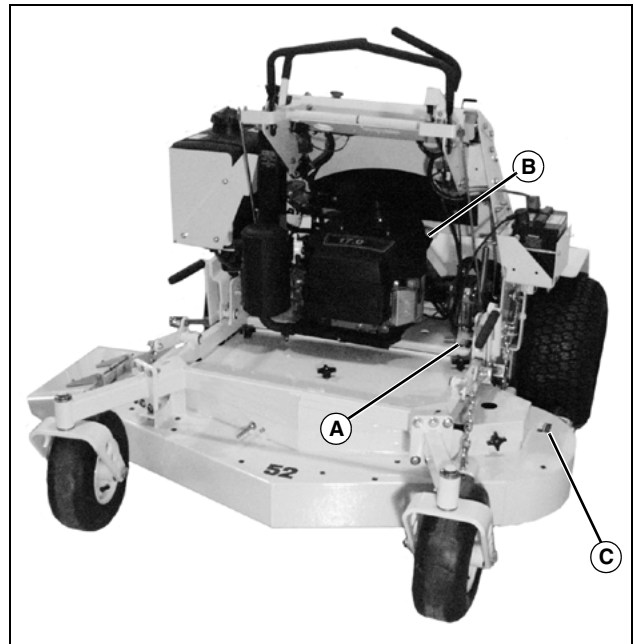
If you need to contact an Authorized Service Center for information on servicing, always provide the product model and serial numbers.

You will need to locate the model and serial numbers for the machine and for the engine of your machine and record the information in the spaces provided.

DATE OF PURCHASE:

DEALER NAME:

DEALER PHONE:



MX9273

MODEL NUMBER (A):

SERIAL NUMBER (POWER UNIT) (B):

ENGINE SERIAL NUMBER (B):

ENGINE SPECIFICATION NUMBER (C):

TABLE OF CONTENTS

Safety	1
Operating	7
Replacement Parts	11
Service Intervals	12
Service Lubrication	13
Service Engine	14
Service Transmission	16
Service Mower	19
Service Electrical	23
Service Miscellaneous	26
Troubleshooting	28
Storage	31
Assembly	32
Specifications	34
Index	35
Service Record GD	36

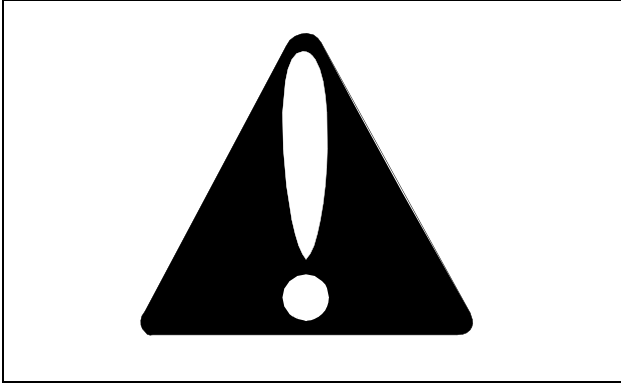
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OMGDU10005 B2 - English

SAFETY

Understanding The Machine Safety Labels



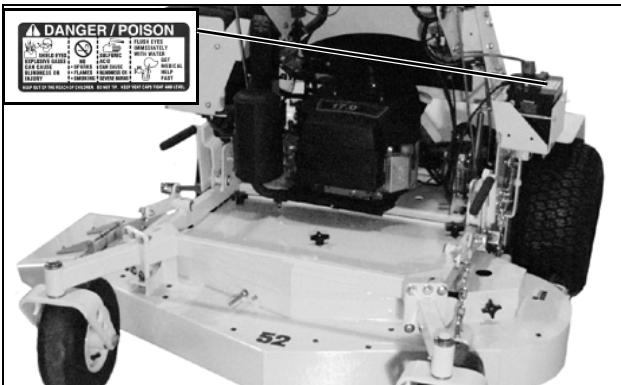
MIF

The machine safety labels shown in this section are placed in important areas on your machine to draw attention to potential safety hazards.

On your machine safety labels, the words DANGER, WARNING and CAUTION are used with this safety-alert symbol. DANGER identifies the most serious hazards.

The operator's manual also explains any potential safety hazards whenever necessary in special safety messages that are identified with the word CAUTION and the safety-alert symbol.

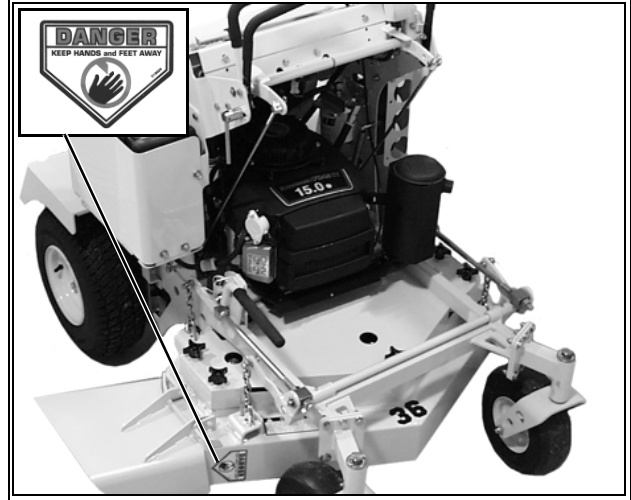
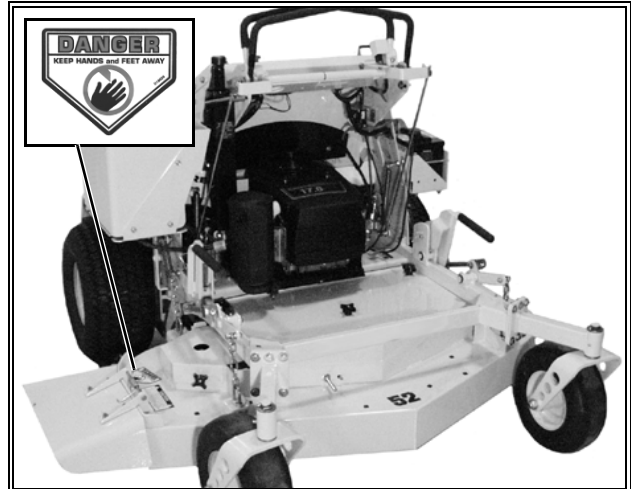
DANGER/POISON



MX9292 MX9273

- Shield eyes explosive gases can cause blindness or injury.
- No sparks, flames, smoking.
- Sulfuric acid can cause blindness or severe burns.
- Flush eyes immediately with water get medical help fast.
- Keep out of the reach of children.
- Do not tip.
- Keep vent caps tight and level.

DANGER



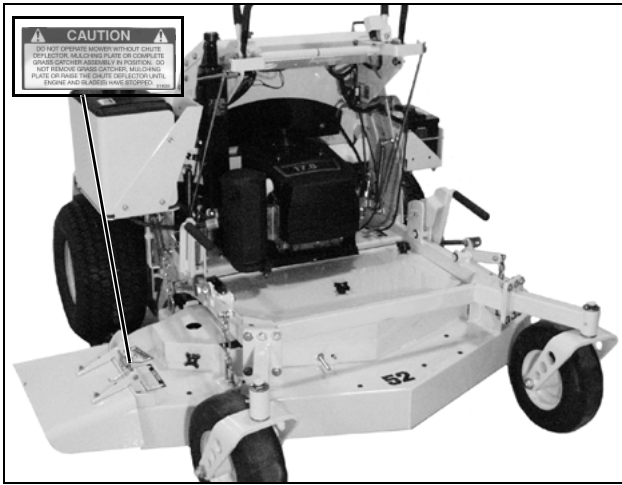
MX9293 MX9272

**Picture Note: Top picture shows 52 in. deck.
Bottom picture shows 36 in. deck.**

- Keep hands and feet away.

SAFETY

CAUTION



MX9294 MX9272

- Do not operate mower without chute deflector, mulching plate or complete grass catcher assembly in position.
- Do not remove grass catcher, mulching plate or raise the chute deflector until engine and blade(s) have stopped.

CAUTION



MX9295 MX9269

- This product is designed for professional and commercial users.
- Operation training is required.
- Carefully read safety instructions.
- Know function of controls before operating.
- Practice with cutter blades off until confident.
- Clear mowing area of all debris.
- Keep all guards, covers and shields in place while working.
- Do not disable or bypass any safety device.

- Always wear safety goggles while operating.
- Always park machine on level surface.
- Avoid contact with cutter blades; they may be rotating.
- Keep children and others clear from area.
- Set ground speed control to safe speed.
- Slowly and smoothly move speed control levers to start and stop machine.
- Reduce speed and avoid sharp turns.
- Always hold onto safety bar while operating.
- Be careful on slopes, do not mow where stability or traction is in doubt.
- To obtain additional operator manual and safety instructions, contact your Great Dane dealer or write Great Dane Power Equipment, 4700 New Middle Rd., Jeffersonville, IN 47130, USA.

Emission Control System Certification Label (Small Off-Road Gas Engines)

NOTE: Tampering with emission controls and components by unauthorized personnel may result in severe fines or penalties. Emission controls and components can only be adjusted by EPA and/or CARB authorized service centers. Contact your Great Dane Equipment Retailer concerning emission controls and component questions.

The presence of an emissions label signifies that the engine has been certified with the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB).

The emissions warranty applies only to those engines marketed by Great Dane that have been certified by the EPA and/or CARB; and used in the United States and Canada in off-road mobile equipment.

Emission Compliance Period (Small Off-Road Gas Engines)

If your engine has the emission compliance category listed on the emission control system certification or air index label, this indicates the number of operating hours for which the engine has been certified to meet EPA and/or CARB emission requirements. The following table provides the engine compliance period in hours associated with the category found on the certification label.

Agency	Category	Hours
EPA	C	250

SAFETY

Agency	Category	Hours
EPA	B	500
EPA	A	1000
CARB	Moderate	125
CARB	Intermediate	250
CARB	Extended	500

Operating Safely

- Do not allow operation or service of the machine by children or untrained adults.
- Read the operator's manual and study the safety and operation sections before operating the machine.
- Operate the machine in an open, unobstructed area under the direction of an experienced operator.
- Learn the use of all controls.
- Operator experience is required to learn the moving, stopping, turning and other operating characteristics of the machine.
- Inspect machine before you operate. Be sure hardware is tight. Repair or replace damaged, badly worn or missing parts. Be sure guards and shields are in good condition and fastened in place. Make any necessary adjustments before you operate.
- Do not operate mower without discharge chute or entire grass catcher in place.
- Check before each use that operator presence controls are functioning correctly. Test safety systems. Do not operate unless they are functioning correctly.
- Do not change the engine governor setting or overspeed the engine.
- Check brake action before you operate. Adjust or service brakes as necessary.
- Stop machine if anyone enters the area.
- Never raise mower decks when blades are running.
- If you hit an object, stop and inspect the machine. Make repairs before you operate. Keep machine and attachments properly maintained and in good working order.
- Do not leave machine unattended when it is running.
- Only operate during daylight or with good artificial light.
- Slow down and be careful of traffic when operating near or crossing roadways. Stop blades before crossing roads or sidewalks. Use care when approaching blind corners, shrubs, trees or other objects that may obscure vision.

- Be aware of the mower discharge direction and make sure that no one is in the path of the discharge direction.
- Use only accessories and attachments approved by the manufacturer of the machine.
- Wear close fitting clothing and safety equipment appropriate for the job.
- Always wear safety goggles or safety glasses with side shields when operating the mower.
- Wear a suitable protective device such as earplugs. Loud noise can cause impairment or loss of hearing.
- Do not wear radio or music headphones. Safe service and operation requires your full attention.

Checking Mowing Area

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job.
- Clear mowing area of objects that might be thrown. Keep people and pets out of mowing area.
- Study mowing area. Set up a safe mowing pattern. Do not mow where traction or stability is doubtful.
- Test drive area with mower lowered but not running. Slow down when you travel over rough ground.

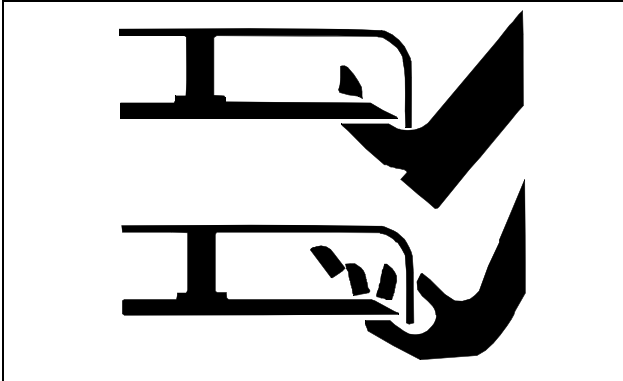
Parking Safely

1. Stop machine on a level surface, not on a slope.
2. Disengage PTO.
3. Lower attachments to the ground.
4. Lock park brake.
5. Stop engine.
6. Remove key.
7. Wait for engine and all moving parts to stop before you leave the operator's station.

SAFETY

Rotating Blades are Dangerous

HELP PREVENT SERIOUS OR FATAL ACCIDENTS:



MIF

- Rotating blades can cut off arms and legs.
- Keep hands, feet and clothing away from mower deck when engine is running.
- Be alert at all times; drive forward carefully. People, especially children, can move quickly into the mowing area before you know it.
- Before backing up, shut off PTO and look down and behind the machine carefully, especially for children.
- Do not mow in reverse.
- Shut off blades when you are not mowing.
- Do not operate machine if you are under the influence of drugs or alcohol.
- Park machine safely before inspecting or unplugging mower or bagger.

PROTECT CHILDREN:

- Never assume that children will remain where you last saw them. Children are attracted to mowing activity; stay alert to the presence of children.
- Keep children indoors when you are mowing. Turn the machine off if a child enters the mowing area.
- Use extra care when you come to blind corners, shrubs, trees or other objects that may block your vision.
- Do not let children or an untrained person operate the machine.
- Do not carry or let children ride on any attachment or machine even with the blades off. Do not tow children in a cart or trailer.

Avoid Tipping

- Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death.

- Drive across a hill - not up and down. If necessary, turn slowly and in the downhill direction. Do not shift to neutral and coast downhill.
- Avoid starting and stopping on a slope. If machine stops, disengage mower blades and back down slowly.
- Do not drive where machine could slip or tip.
- Stay alert for holes and other hidden hazards in the terrain.
- Keep away from drop-offs, ditches, and embankments.
- Slow down before you make a sharp turn or operate on a slope. On gear models, choose a low gear so that shifting and stopping will not be necessary while on the slope.
- Transport machine with decks lowered to improve stability.
- Drive machine very slowly and avoid quick stops when attachment is removed.
- Mowing when grass is wet can cause reduced traction and sliding.

Keep Riders Off

- Only allow the operator on the machine. Keep riders off.
- Riders on the machine or attachment may be struck by foreign objects or thrown off the machine causing serious injury.
- Riders obstruct the operator's view resulting in the machine being operated in an unsafe manner.

Checking Wheel Bolts

- A serious accident could occur causing serious injury if wheel bolts are not tight.
- Check wheel bolt tightness often during the first 100 hours of operation.
- Wheel hardware must be tightened to specified torque using the proper procedure anytime it is loosened.

Driving Safely on Public Roads

Avoid personal injury or death resulting from a collision with another vehicle on public roads:

- Use safety lights and devices; slow moving machines when driven on public roads are hard to see, especially at night.
- Use extra care when loading or unloading the machine into a trailer or truck.
- Whenever driving on public roads, use flashing warning lights and turn signals according to local regulations. Extra

SAFETY

flashing warning lights may need to be installed.

Practice Safe Maintenance

- Only qualified, trained adults should service this machine.
- Understand service procedure before doing work. Keep area clean and dry.
- Never lubricate, service or adjust machine while it is moving. Keep safety devices in place and in working condition. Keep hardware tight.
- Keep hands, feet, clothing, jewelry, and long hair away from any moving parts to prevent them from getting caught.
- Lower attachments to the ground before servicing machine. Disengage all power and stop the engine. Lock park brake and remove the key. Let machine cool.
- Disconnect battery or remove spark plug wire before making any repairs.
- Before servicing machine, carefully release pressure from components with stored energy such as hydraulic components.
- Keep all nuts and bolts tightened, especially blade attachment bolts.
- Securely support any machine elements that must be raised for service work. Lock service latches before working on machine with raised attachments.
- Never run engine unless park brake is locked.
- Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Replace all worn or damaged safety and instruction decals.
- To prevent fires, remove any buildup of grease, oil or debris from the machine, especially the engine compartment.
- Charge batteries in an open, well-ventilated area, away from sparks. Unplug battery charger before connecting or disconnecting from the battery. Wear protective clothing and use insulated tools.
- Do not modify machine or safety devices. Unauthorized modifications may impair its function and safety.
- Do not wear radio or music headphones while servicing the machine. Safe service requires your full attention.

Avoid High Pressure Fluids

- Hydraulic hoses and lines can fail due to physical damage, kinks, age and exposure. Check hoses and lines regularly. Replace damaged hoses and lines.
- Hydraulic fluid connections can loosen due to physical damage and vibration. Check connections regularly.

Tighten loose connections.

- Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.
- Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.
- If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

Prevent Fires

- Never remove fuel cap, or add fuel with engine running or hot. Allow engine to cool for several minutes.
- Never store equipment with fuel in the tank inside a building where fumes may reach an open flame or spark.
- Allow engine to cool before storing in any enclosure.
- To reduce fire hazard, keep engine free of grass, leaves or excessive grease.

Tire Safety

Explosive separation of a tire and rim parts can cause serious injury or death:

- Do not attempt to mount a tire without the proper equipment and experience to perform the job.
- Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.
- When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and not in front of or over the tire assembly.
- Check tires for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

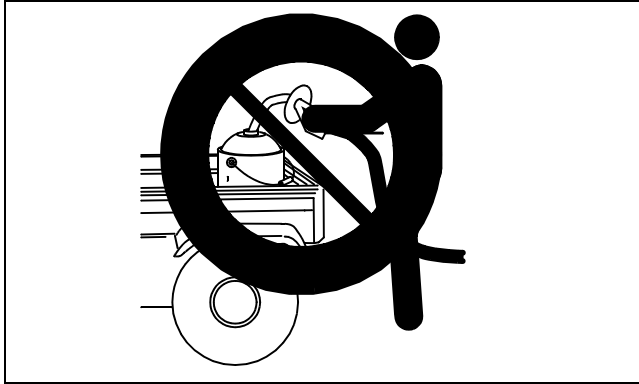
Handling Fuel Safely

Fuel and fuel vapors are highly flammable and explosive:

- Do not refuel machine while you smoke, when machine is near an open flame or sparks, or when engine is running. Stop engine and allow to cool before filling.
- Never remove the fuel cap or add fuel with the engine running.

SAFETY

- Never fill fuel tank or drain fuel from a machine in an enclosed area. Fill fuel tank outdoors.
- Prevent fires. Clean up spilled fuel immediately.
- Do not store machine with fuel in tank in a building where fumes may reach an open flame or spark.
- Prevent fire and explosion caused by static electric discharge. Use only non-metal, portable fuel containers approved by the Underwriter's Laboratory (U.L.) or the American Society for Testing & Materials (ASTM). If using a funnel, make sure it is plastic and has no screen or filter.



MIF

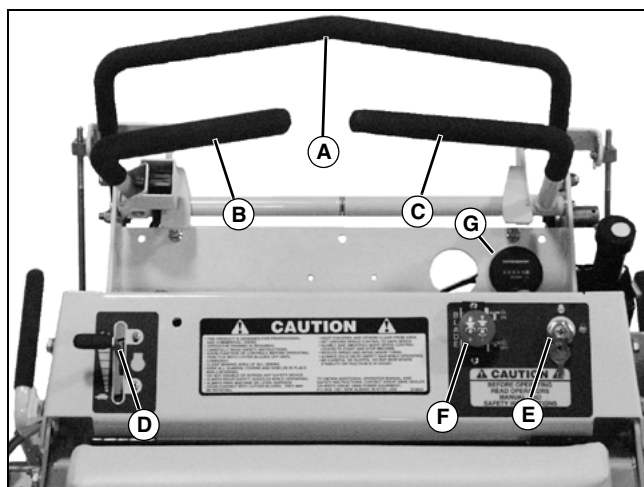
- Static electric discharge can ignite gasoline vapors in an ungrounded fuel container. Remove the fuel container from the bed of a vehicle or the trunk of a car and place on the ground away from the vehicle before filling. Keep nozzle in contact with container opening while filling.
- When practical, remove equipment from trailers or truck beds and refuel them on the ground. If this is not possible, use a portable, plastic fuel container to refuel equipment on a truck bed or trailer.
- For gasoline engines, do not use gas with methanol. Methanol is harmful to your health and to the environment.

OPERATING

Daily Operating Checklist

- ☐ Test safety systems.
- ☐ Check tire pressure.
- ☐ Check fuel level.
- ☐ Check engine oil level.
- ☐ Check transmission oil level.
- ☐ Remove grass and debris from machine.
- ☐ Clean air intake screen.
- ☐ Check area below machine for leaks.

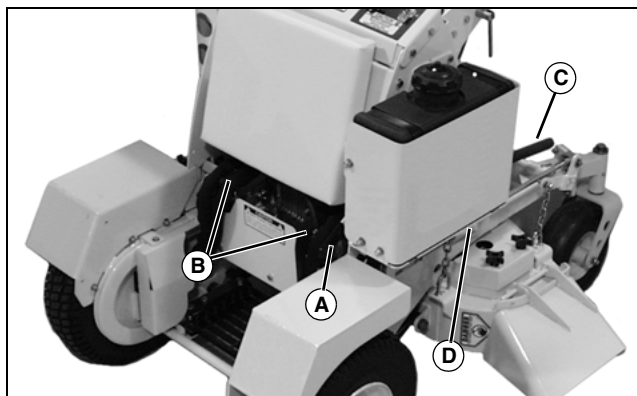
Console Controls



MX9269

- A - Safety Bar
- B - Left Control Lever
- C - Right Control Lever
- D - Throttle Lever (with choke incorporated, choke may be separate control on some models)
- E - Key Switch
- F - PTO/Clutch Switch
- G - Hourmeter

Miscellaneous Controls



MX9281

- A - Park Brake Lever (lever may be on opposite side for some models)
- B - Hydraulic Pump Free-Wheel Levers
- C - Height-of-Cut (HOC) Lever
- D - Fuel Shutoff Valve

Testing Safety Systems



CAUTION: Avoid injury! Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.

Move the vehicle to an outside area before running the engine.

Do not run an engine in an enclosed area without adequate ventilation.

- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear the exhaust fumes out.

Use the following checkout procedure to check for normal operation of machine.

If there is a malfunction during one of these procedures, do not operate machine. See your Great Dane dealer for service.

Perform these tests in a clear open area. Keep bystanders away.

Testing Park Brake

Stop the machine on a maximum 17° slope. Stop the engine and lock the park brake.

Result: Park brake must hold the machine stationary. If the machine moves more than 61 cm [24 in.] in one hour,

OPERATING

brakes need to be adjusted. See your Great Dane dealer.

Testing Operator Presence Safety Interlock System

1. Start engine.
2. Unlock park brake.
3. Move throttle to wide open position.
4. Move left control lever in to engage the operator presence switch.
5. Move PTO/clutch switch to on position.

Result: Mower deck should start.



CAUTION: Avoid injury! Keep bystanders away.
The mower will begin as soon as the left control lever is moved in.

6. Release left control lever to disengage the operator presence safety switch.

Result: The mower deck must stop.

Testing the PTO/Clutch Safety Switch

1. Lock the park brake.
2. Move the control levers to the neutral position and release the left control lever.
3. Move the PTO/clutch switch to the on position.
4. Turn the key to the start position or pull recoil starter.

Result: The engine must not start.

Testing the Park Brake Safety Switch

1. Start engine.
2. Move throttle to the wide open position.
3. Lock the park brake.
4. Move the left control lever in to engage the operator presence safety switch.

Result: The engine must stop.

Using the Park Brake



CAUTION: Avoid injury! Children or bystanders may attempt to move or operate an unattended machine.

Always lock the park brake and remove the key before leaving the machine unattended.

Move park brake lever to the raised (engaged) position to lock the park brake.

Starting the Engine



CAUTION: Avoid injury! Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.

Move the vehicle to an outside area before running the engine.

Do not run an engine in an enclosed area without adequate ventilation.

- **Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.**
- **Allow fresh outside air into the work area to clear the exhaust fumes out.**

1. Open the fuel shutoff valve.
2. Adjust the safety bar halfway back and tighten the right side lever for moderate mowing speed.
3. Lock park brake.
4. Move control levers to neutral position.
5. Move PTO/clutch switch to off position.
6. Move throttle lever to half-speed position. (full detent for integrated choke models)
7. Adjust choke as required.
8. **Manual Start Engines Only:** Turn key switch to run position. Pull recoil starter until the engine starts.

IMPORTANT: Avoid damage! Starter may be damaged if starter is operated for more than 20 seconds at a time:

- **Wait two minutes before trying again if the engine does not start.**

9. **Electric Start Engines Only:** Turn key switch to start position for no more than five seconds. Release key to the run position when engine starts.

- If the engine does not start, wait 10 seconds.

OPERATING

- Turn key to start position again for no more than 5 seconds.
- Repeat the procedure if necessary.

IMPORTANT: Avoid damage! Unnecessary engine idling may cause engine damage. Excessive idling can cause engine overheating, carbon build-up and poor performance.

10. Let the engine run at half-speed position for several minutes to warm-up, before operating the machine. Reduce choke setting as the engine warms up.

Stopping the Engine

1. Move the throttle lever to the half-speed position, and let the engine run at low throttle for a few seconds.
2. Turn the key switch to the stop position.
3. Remove key.
4. Lock park brake.

Operating the Machine

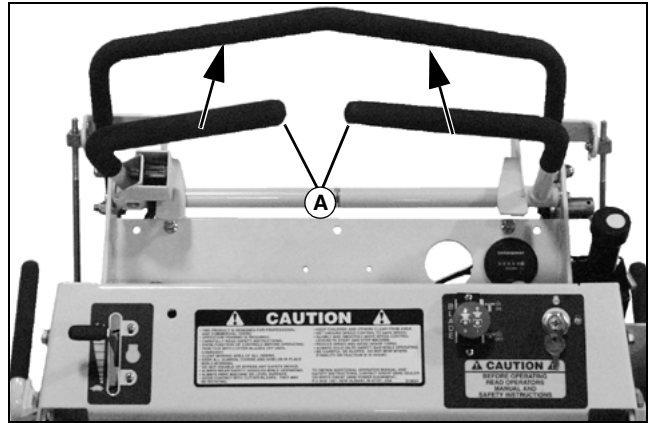


CAUTION: Avoid injury! Learn the use of the control levers. Practice at half throttle until becoming proficient and comfortable with the operation of the machine.

Do not move control levers from forward to reverse or reverse to forward position rapidly. Sudden direction changes could cause loss of control or damage the machine.

1. Adjust mower deck to desired cutting height.
2. Start and warm up engine.
3. Move throttle lever to wide open position.
4. Move PTO/clutch switch to on position.
5. Unlock park brake.
6. Move the left control lever in to engage the operator presence safety switch.
7. Grasp safety bar.

NOTE: The travel speed and turn rate will vary with the amount that the control levers are moved.



MX9269

8. Drive the machine:

To drive the machine forward: Push both control levers (A) forward smoothly and evenly.

To turn the machine: Pull the control lever back on the same side as the direction of the desired turn. Push the other lever forward.

To stop the machine: Return both control levers to the neutral position.

To drive the machine in reverse: Pull both control levers back evenly.

Stopping the Machine

1. Return both control levers to neutral position.
2. Lock park brake.
3. Move the PTO/clutch switch to the off position.
4. Move the throttle lever to the half-speed position, and let the engine run at low throttle for a few seconds.
5. Turn the key switch to the stop position.
6. Remove key.

NOTE: For emergency stop of blades and unit drive, release operator presence control levers.

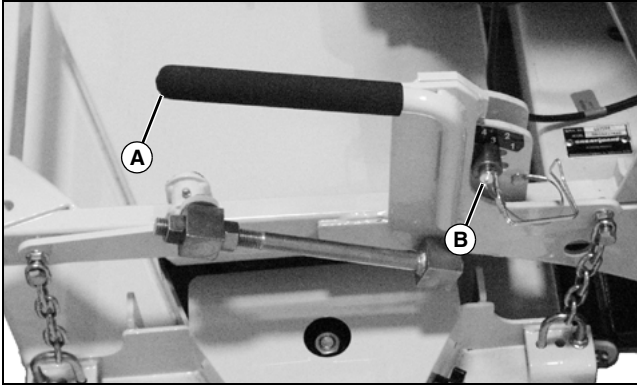
Adjusting Cutting Height

Cutting height can be adjusted from approximately 36 to 120 mm (1-1/2 to 5 in.). Each hole adjusts the height of cut (HOC) in 13 mm (1/2 in.) increments.

The deck can also be raised and locked in a transport position to provide maximum ground clearance when moving the machine from one area to another.

1. Check tire pressure.

OPERATING

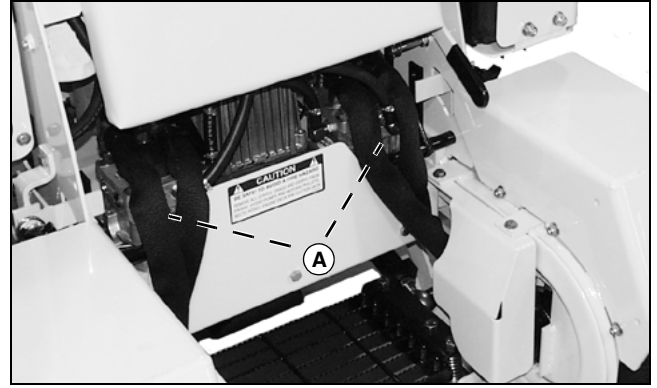


MX9271

2. Depress the HOC lever (A) to release pressure on the stop pin (B).
3. Raise or lower deck and position the HOC stop pins in the proper holes for the desired height of cut.
4. Release the HOC lever and allow it to rest against the stop pin.

Using the Fuel Shutoff Valve

Move the fuel shutoff valve to the on position for normal operation. Move the fuel shutoff valve to the off position when the machine is not in use.



MX9281

2. Turn free-wheeling levers (A) one full turn counterclockwise (open position).
3. Unlock park brake.
4. Push machine to desired location. Due to internal hydraulic system resistance, the machine will move slowly.
5. Turn free-wheeling levers one full turn clockwise (closed position).
6. Lock park brake.

Moving the Machine Manually



CAUTION: Avoid injury! With the free-wheeling valve open, the machine will have unrestricted motion.

- The machine may free-wheel out of control if the free-wheeling valve is opened with the machine on an incline.
- Park the machine on a level surface before opening the free-wheeling valve.

IMPORTANT: Avoid damage! Transmission damage may occur if the machine is moved or towed incorrectly:

- Move unit by hand only.
- Do not use another vehicle to move unit.
- Do not tow unit.

1. Park machine safely. (See Parking Safely in the Safety section.)

REPLACEMENT PARTS

Parts

We recommend Great Dane quality parts available at your Great Dane dealer.

Part numbers may change; use part numbers listed below when you order. If a number changes, your dealer will have the latest number.

When you order parts, your Great Dane dealer needs your machine serial number and engine serial number. These are the numbers that you recorded in the Product Identification section of this manual.

Part Numbers

Item	Part Number
Battery	D18169
Fuel Tank Cap	D18097
Oil Reservoir Cap	D18333
Oil Filter (Hydraulic System)	D18094
Traction (Hydro) Drive Belt	D18388 (36 in. deck) D18303 (all other decks)
Mower Deck Drive Belts: • 92 cm (36 in.) Deck • 1,22 m (48 in.) Deck • 1,32 m (52 in.) Deck • 1,55 m (61 in.) Deck	D18007 D18348 D18352 D18361
Mower Blades: • 32 cm (12.6 in.) • 40 cm (16 in.) • 45 cm (18 in.) • 53 cm (21 in.)	D18406 D18086 D18037 D18036

(Part numbers are subject to change without notice. Part numbers may be different outside the U.S.A.)

SERVICE INTERVALS

Servicing Your Machine

IMPORTANT: Avoid damage! Operating in extreme conditions may require more frequent service intervals:

- Engine components may become dirty or plugged when operating in extreme heat, dust or other severe conditions.
- Engine oil and spark plugs may lose efficiency if vehicle is operated constantly at slow or low engine speeds or with frequent short trips.

Please use the following timetables to perform routine maintenance on your machine.

NOTE: The following initial break-in items *MUST* be performed and verified to validate the warranty (dealer service invoice accepted).

Break-In (After First 8 Hours of Operation)

Change engine oil and filter.
Check drive belt tension.
Check transmission neutral adjustment.
Check wheel nut torque.

Break-In (After First 24 Hours of Operation)

Check drive belt tension.

Break-In (After First 40 Hours of Operation)

Change transmission oil and filter.

Daily, Before Each Use

Check oil level.
Remove and clean engine air filter.
Clean engine intake screen and cooling fins.
Clean debris from mower drive belts.
Inspect all belts for damage.
Sharpen and balance cutter blades.

Every 40 Hours

Change engine oil.
Grease HOC shafts (four places).
Grease caster wheel pivot bearings (two places).
Grease mower deck spindle bearings (three places).

Grease HOC shafts (four places).
Grease caster wheel bearings (two places).
Grease cutter deck thrust arms (two places).
Remove debris from the underside of the cutter deck.
Check drive belt tension.
Check tire pressure.
Check battery electrolyte level.
Clean engine air filter.
Check wheel nut torque.

Every 160 hours

Clean and inspect spark plugs.
Change engine oil and filter.
Check transmission oil level.
Lubricate cutter deck idler pulley pivots (three places).
Lubricate control lever pivot shafts (two places).
Lubricate throttle cable.
Lubricate choke control cable.

Every 500 Hours

Change transmission oil and filter.

Annually

Replace all spindle bearings.
Replace all cutter deck idler pulleys.
Remove caster wheel roller bearings; clean and relube.
Replace drive belts. Run-in and adjust tension.
Clean power unit.
Change transmission oil and filter.
Check all bolts and nuts; tighten as needed.
Remove battery. Clean battery and holder.
Replace spark plugs.

SERVICE LUBRICATION

Grease

- Lubricate choke control cable (K).

IMPORTANT: Avoid damage! If operating outside that temperature range, contact your Servicing dealer for a special-use grease.

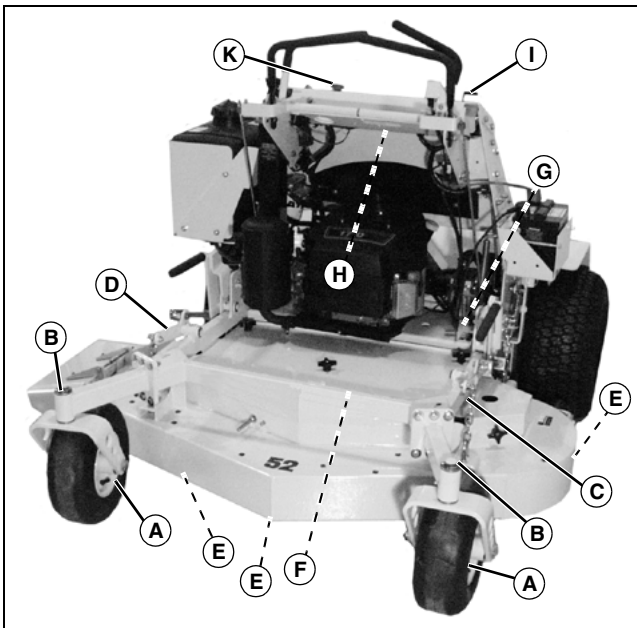
Use a general all-purpose grease with an NLGI grade No.2 rating.

Wet or high speed conditions may require use of a special-use grease. Contact your Servicing dealer for information.

Spray Lubricant

Use a general-purpose petroleum-based spray lubricant.

Lubrication Points



MX9273

- Grease the caster wheel bearings (A).
- Grease caster wheel pivot bearings (B).
- Grease HOC shafts (C).
- Grease mower deck thrust arms (D).
- Grease mower deck spindle bearings (E) if equipped.

NOTE: Use spray lubricant to lubricate the following items:

- Lubricate mower deck idler pulleys (F).
- Lubricate hydraulic pump control arms (G) at the rear of the mower deck.
- Lubricate control lever pivot shaft (H).
- Lubricate throttle cable (I).

SERVICE ENGINE

Avoid Fumes



CAUTION: Avoid injury! Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.

Move the vehicle to an outside area before running the engine.

Do not run an engine in an enclosed area without adequate ventilation.

- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear the exhaust fumes out.

Engine Oil

Use oil viscosity based on the expected air temperature range during the period between oil changes.

Use oil that meets the following specification:

- API Service Classification SG or higher

Checking Engine Oil Level

IMPORTANT: Avoid damage! Failure to check the oil level regularly could lead to serious engine problems if oil level is low:

- Check oil level before operating.
- Check oil level when the engine is cold and not running.
- Keep level between the FULL and the ADD marks.
- Shut off engine before adding oil.

NOTE: Check oil twice a day if you run engine over 4 hours in a day.

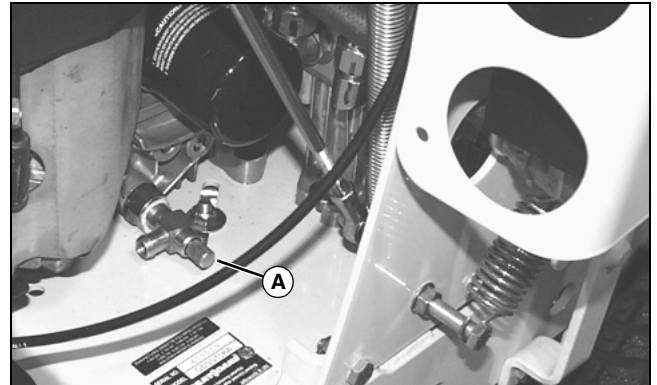
Make sure engine is cold when checking engine oil level.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Clean area around dipstick to prevent debris from falling into crankcase.
3. Remove dipstick. Wipe with a clean cloth.
4. **Kawasaki Engines Only:** Allow the dipstick to rest against the top of the tube.
5. **All Other Engines:** Install and tighten the dipstick.

6. Remove dipstick and check oil level on dipstick. Oil must be between ADD and FULL marks. If oil is low, add oil to bring oil level no higher than FULL mark on dipstick. Do not overfill.

7. Install and tighten dipstick.

Changing Engine Oil and Filter



MX9416

NOTE: An oil drain tube is provided with your machine. Attach the tube to the oil drain fitting on your engine, and open the valve (A) to drain the used oil. Close the valve, and remove the drain tube from the fitting after the oil has been drained. Store the drain tube after use.

Change engine oil and filter at the intervals recommended in the Service Intervals section. See the engine manufacturer's owner's manual provided with your machine for the complete procedure.

Cleaning Air Intake Screen and Engine Fins

IMPORTANT: Avoid damage! The engine is air-cooled and requires a large amount of air intake when running. Reduced air intake can cause overheating:

- Keep air intake screen and cooling fins clean.
- Keep covers and screens in place.

Keep air intake screens and engine cooling fins clear of debris to ensure proper cooling. See the engine manufacturer's owner's manual provided with your machine for the complete procedure.

SERVICE ENGINE

Checking and Cleaning Air Filter Elements



CAUTION: Avoid injury! Touching hot surfaces can burn skin. The engine and components will be hot if the engine has been running. Allow the engine to cool before servicing.

IMPORTANT: Avoid damage! Dirt and debris can enter the engine through a damaged filter element:

- Do not wash paper element.
- Do not attempt to clean paper element by tapping against another object.
- Do not use pressurized air to clean element.
- Replace element only if it is very dirty, damaged or the seal is cracked.

Check and clean air filter elements at the intervals recommended in the Service Intervals section. See the engine manufacturer's owner's manual provided with your machine for the complete procedure.

Checking Spark Plugs



CAUTION: Avoid injury! Touching hot surfaces can burn skin. The engine and components will be hot if the engine has been running. Allow the engine to cool before servicing.

Check spark plugs at the intervals recommended in the Service Intervals section. See the engine manufacturer's owner's manual provided with your machine for the complete procedure.

Adjusting Carburetor

NOTE: Carburetor is calibrated by the engine manufacturer and is not adjustable.

If engine is operated at altitudes above 1829 m (6000 ft), some carburetors may require a special high altitude main jet.

If engine is hard to start or runs rough, see the troubleshooting section of the engine manufacturer's owner's manual provided with your machine.

Possible engine surging will occur at high throttle with transmission in (N) NEUTRAL and mower engagement lever disengaged. This is a normal condition due to the emission control system.

After performing the checks in the troubleshooting section and your engine is still not performing correctly, contact

your dealer.

Replacing Fuel Filter



CAUTION: Avoid injury! Fuel vapors are explosive and flammable:

- Do not smoke while handling fuel.
- Keep fuel away from flames or sparks.
- Shut off engine before servicing.
- Cool engine before servicing.
- Work in a well-ventilated area.
- Clean up spilled fuel immediately.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Turn fuel shutoff valve to OFF position.
3. Disconnect the fuel hose from the outlet side of the fuel filter, and drain gasoline into a properly marked container.
4. Remove the fuel filter from the inlet fuel hose. Discard filter.

IMPORTANT: Avoid damage! When installing a new fuel filter, the filter arrow must be pointing in the direction of fuel flow.

5. Connect a new fuel filter to hoses.
6. Turn fuel shutoff valve to ON position.

SERVICE TRANSMISSION

Avoid Fumes



CAUTION: Avoid injury! Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.

Move the vehicle to an outside area before running the engine.

Do not run an engine in an enclosed area without adequate ventilation.

- **Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.**
- **Allow fresh outside air into the work area to clear the exhaust fumes out.**

drain oil into a properly marked container with a capacity of at least 3.8 L (1 gal).

5. Apply a film of clean oil to gasket of new filter.

6. Install filter. Turn filter clockwise until gasket makes contact with the mounting surface. Tighten 1/2 to 3/4 turn after contact.

7. Clean area around filler cap and remove the filler cap from the reservoir.

NOTE: Reservoir capacity is approximately 1.4 - 1.9 L (1.5 - 2 qt). Total system capacity is approximately 2.8 L (3 qt).

8. Fill reservoir with approximately 1.4 - 1.9 L (1.5 - 2 qt) of oil.

9. Install filler cap on reservoir.

10. Bleed air from hydraulic system.

Transmission Oil

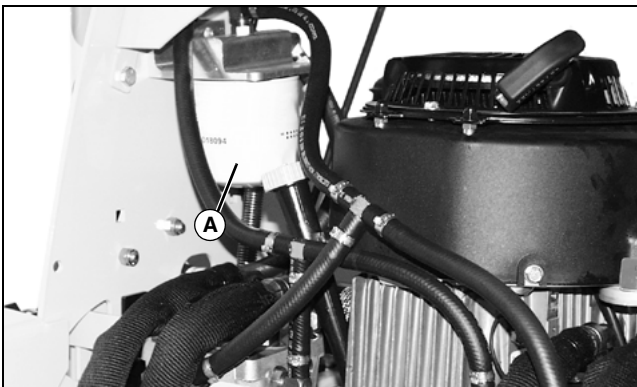
Use only Quaker State® 5W-50 or Mobil-1® 15W-50 all synthetic oil.

Checking Transmission Oil Level

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Remove hydraulic reservoir cap; the oil level should be 76 mm (3 in.) from the top of the filler pipe. Add oil as needed.

Changing Transmission Oil and Filter

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Allow engine and hydraulic reservoir to cool.
3. Clean area around filler cap and remove the filler cap from the reservoir.



MX9279

4. Turn hydraulic filter (A) counterclockwise to remove and

Adjusting Transmission Neutral Position

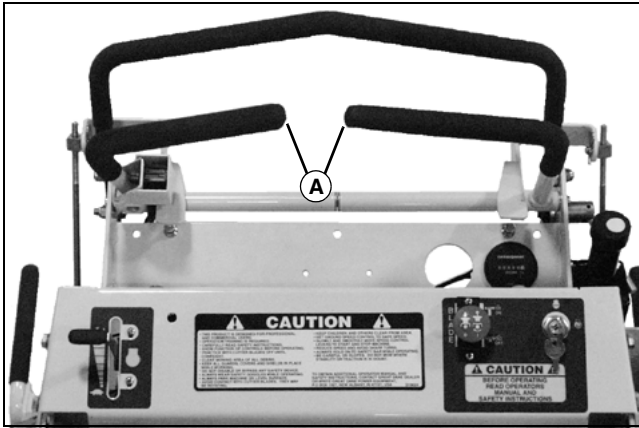
1. Park machine safely. (See Parking Safely in the Safety section.)



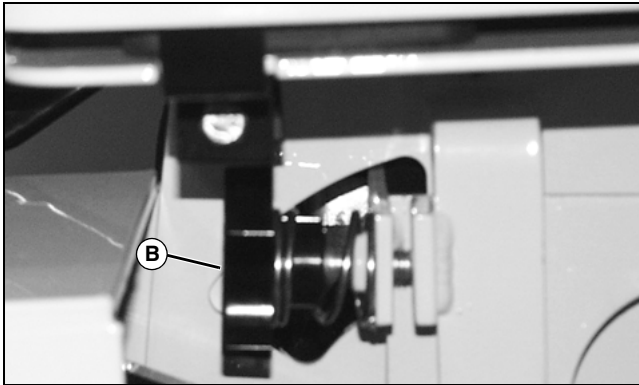
CAUTION: Avoid injury! Machine must be safely supported on jackstands before removing or installing wheels. Do not use a hoist or floor jack to support the machine.

2. Raise drive wheel off the ground and securely support the machine and block caster wheels.
3. Start and run the engine until it reaches normal operating temperature.
4. Observe wheel movement as control levers are moved back and forth. The wheels should travel in the correct direction as the levers are moved.

SERVICE TRANSMISSION



MX9269



MX9270

5. Move control levers (A) to neutral position; the wheels should stop rotating. If the wheels continue to rotate, adjust the neutral adjustment knob(s) (B), located on left and right sides of the machine in front of each rear fender until wheel(s) stop rotating.
6. Shut engine off.
7. Lower the machine to the ground.

Adjusting Transmission Tracking

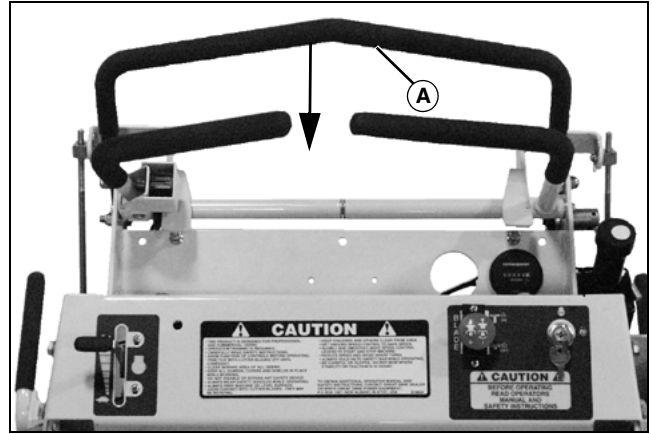


CAUTION: Avoid injury! Clear area of all bystanders before performing this service procedure.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Start and run engine until it reaches normal operating temperature.
3. Move machine to an open area for operation.
4. Mark position of safety bar on side of bracket.

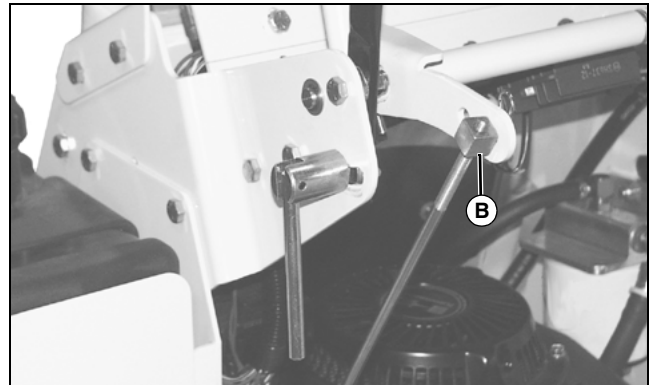


CAUTION: Avoid injury! Do not operate machine at a high speed when checking for tracking. Adjust safety bar to limit forward speed.



MX9270

5. Move safety bar (A) back toward control panel.
6. Drive machine forward, pushing both control levers all the way to safety bar.
7. Check machine tracking.



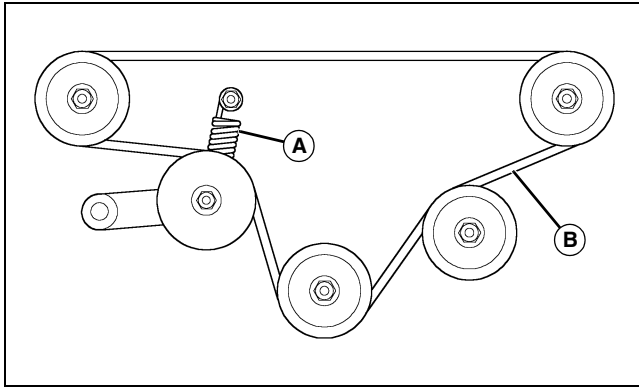
MX9280

- If machine does not drive in straight line, adjust control rod swivel (B) located on both sides of the machine to compensate.
8. Adjust safety bar back to original operating position.

Removing and Installing Traction Drive Belt

1. Park machine safely. (See Parking Safely in the Safety section.)

SERVICE TRANSMISSION



MX9242

Picture Note: Drive belt routing as viewed from the top of machine.

2. Remove mower deck drive belt.
3. Disconnect tension spring (A) from the anchor pin.
4. Remove drive belt (B).
5. Install new drive belt (B).
6. Connect tension spring (A) to anchor pin.
7. Install mower deck drive belt.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Check hydraulic oil level. Adjust as necessary.



CAUTION: Avoid injury! Machine must be safely supported on jackstands before removing or installing wheels. Do not use a hoist or floor jack to support the machine.

3. Raise drive wheels off the ground and block caster wheels.



MX9279

Bleeding Hydraulic System



CAUTION: Avoid injury! Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

Use caution when filling and draining hydraulic oil. During periods of machine operation, the hydraulic oil reservoir can get hot. Allow engine and oil reservoir to cool before servicing.

IMPORTANT: Avoid damage! Contamination of hydraulic fluid could cause transmission damage or failure. Do not open oil reservoir cap unless absolutely necessary.

Severe or unusual conditions may require a more frequent service interval.

NOTE: Whenever hydraulic components are removed from the system, hoses are disconnected, or the system has been drained, trapped air must be removed from the hydraulic system.

4. Open free-wheeling valves (A) one full turn counterclockwise and start engine.
5. Slowly move the control levers in both forward and reverse directions five to six times. As the air is purged from the unit, the oil level will drop.
6. Turn off engine and check oil level. Adjust as necessary.
7. Close the free-wheeling valves and tighten to 9-14 N•m (80-120 lb-in.).
8. Start engine and slowly move the control levers in both forward and reverse directions five to six times.
9. Turn off engine and lower machine to ground. Check oil level and adjust as necessary. Mower should move in forward and reverse at normal speed, if not, repeat procedure.

SERVICE MOWER

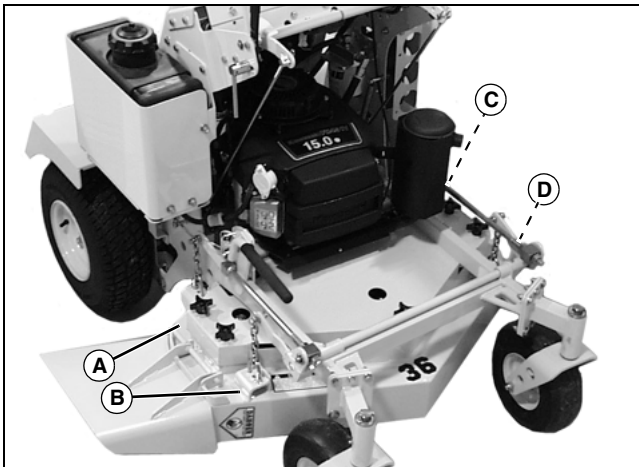
Adjusting Mower Level



CAUTION: Avoid injury! Rotating blades are dangerous. Before adjusting or servicing mower:

- Disconnect spark plug wire(s) to prevent engine from starting accidentally.
- Always wear gloves when handling mower blades or working near blades.

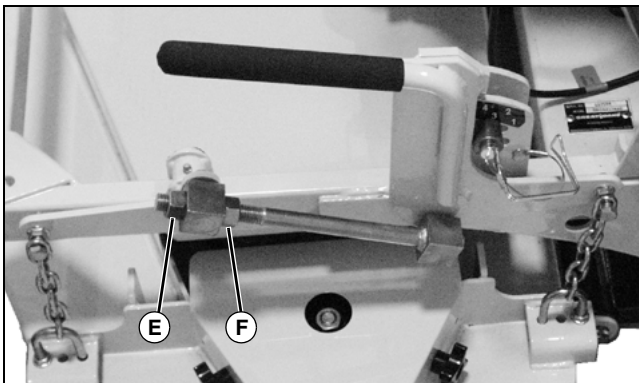
1. Park machine safely. (See Parking Safely in the Safety section.)
2. Inflate tires to the correct pressure.
3. Adjust cutting height and lower mower to cutting position.



MX9274

4. Measure the distance from the top of the mower deck to the ground at positions A and B. The height at position A must be 3-6 mm (1/8-1/4 in.) higher than position B.

- If adjustment is required, proceed to Step 5.
- If no adjustment is required, proceed to Step 6.



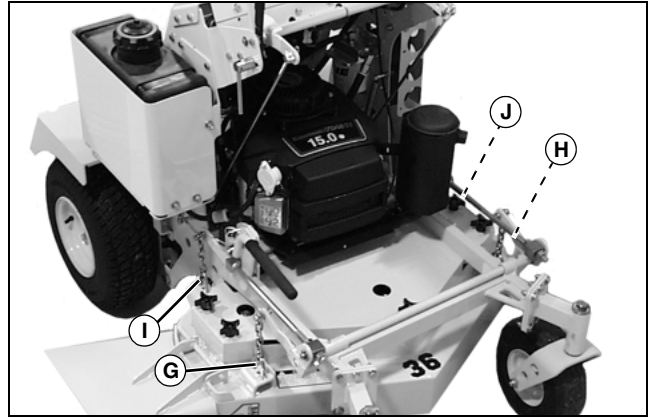
MX9271

5. Loosen jam nuts (E) and (F) on the swivel adjuster rod. Turn the jam nuts as required to obtain the desired height

of position A.

6. Measure the distance from the top of the mower deck to the ground at positions B and D. The heights of position B and D should be equal, ± 3 mm (1/8 in.).

- If adjustment is required, proceed to Step 7.
- If no adjustment is required, proceed to Step 8.



MX9274

7. Adjust jam nuts (G) and (H) to obtain the desired height of position B and D.

8. Measure the distance from the top of the mower deck to the ground at positions C and D. The height at position C must be 3-6 mm (1/8-1/4 in.) higher than position D.

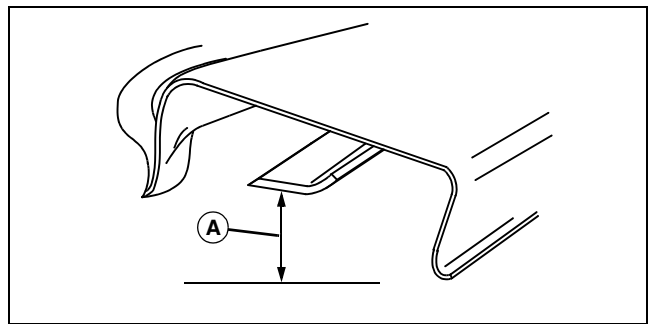
- If adjustment is required, proceed to Step 9.
- If no adjustment is required, proceed to Adjust Cutting Height.

9. Adjust jam nuts (I) and (J) to obtain the desired height of position A and C.

Adjust Cutting Height

1. Set the cutting height to 76 mm (3 in.), and lower mower to cutting position.

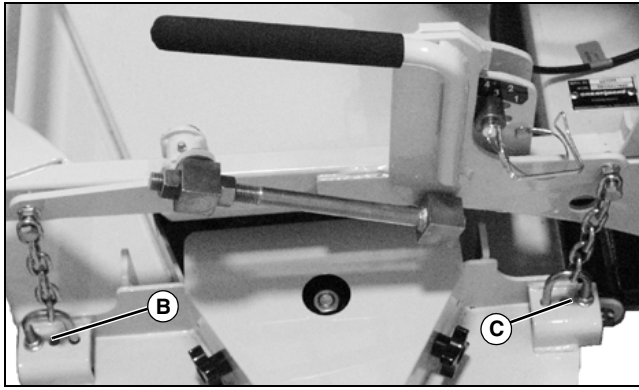
2. Turn right blade so that the blade tip is pointing out of the middle of the discharge chute.



MIF

3. Measure from outside blade tip to flat ground surface. If the blade height (A) is not 76 mm (3 in.), adjust the cutting height.

SERVICE MOWER

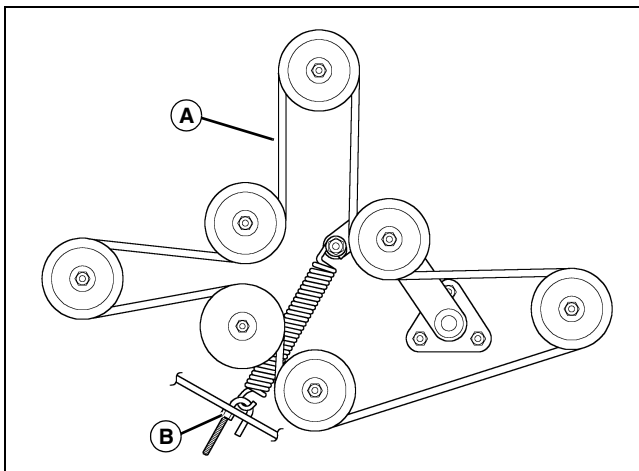


MX9271

4. Adjust nuts (B) and (C) on each side of the mower deck equally until the blade height is 76 mm (3 in.).

Checking and Adjusting Mower Deck Drive Belt Tension

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Adjust the mower deck for the lowest cutting height and lower the deck.



MX9248

Picture Note: 52-in. deck shown.

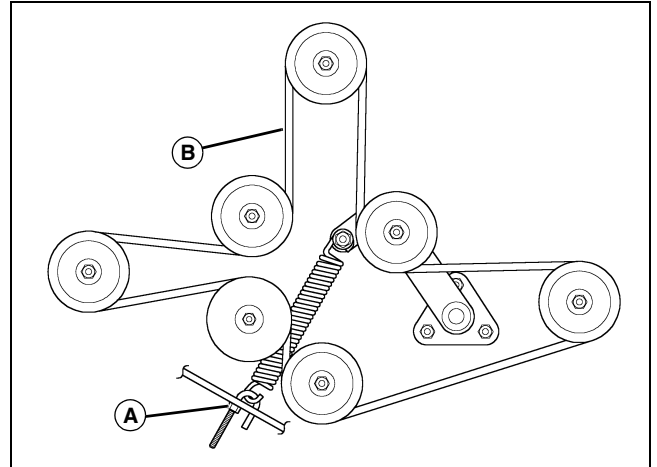
3. Check the mower deck drive (A) belt tension. The belt should deflect a maximum of 13 mm (1/2 in.) when a force of 4.5 kg (10 lb) is applied to the center of the longest span.

- **To Increase Belt Tension:** Turn nut (B) clockwise.
- **To Decrease Belt Tension:** Turn nut (B) counterclockwise.

Removing and Installing Mower Deck Drive Belt

1. Park machine safely. (See Parking Safely in the Safety section.)

2. Remove mower deck belt covers.



MX9248

Picture Note: 52-in. deck shown.

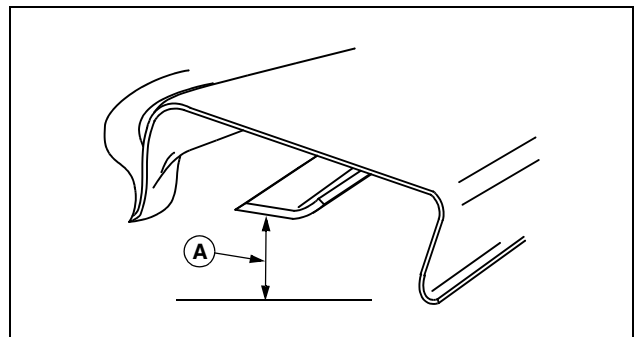
3. Release mower deck drive belt tension by turning the tension adjuster nut (A) counterclockwise.
4. Remove mower deck drive belt (B).
5. Install new mower deck drive belt (B).
6. Increase mower deck drive belt tension by turning the tension adjuster nut (A) clockwise.
7. Install mower deck belt covers.

Checking for Bent Mower Blades



CAUTION: Avoid injury! Mower blades are sharp. Always wear gloves when handling mower blades or working near blades.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Lower mower deck to mowing position.



MIF

3. Measure distance (A) between blade tip and flat ground surface.
4. Turn blade 180°. Measure distance between other blade

SERVICE MOWER

tip and flat ground surface.

5. Install new blade if the difference between the two measurements is more than 3 mm (1/8 in.).

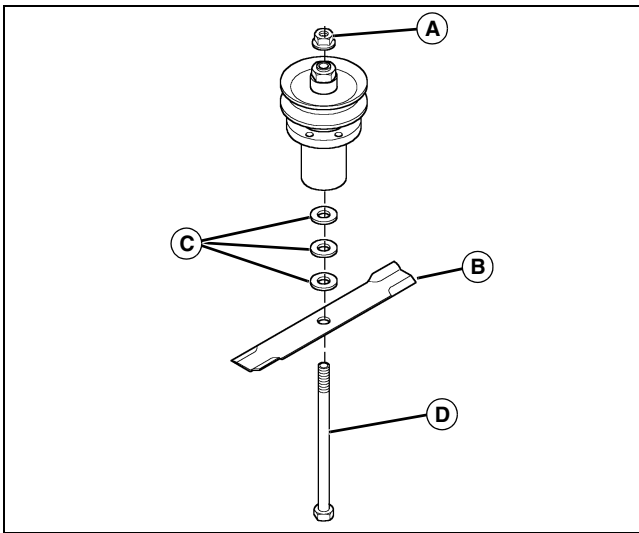
Servicing Mower Blades



CAUTION: Avoid injury! Mower blades are sharp. Always wear gloves when handling mower blades or working near blades.

Removing and Installing Mower Blades

1. Park machine safely. (See Parking Safely in the Safety section.)

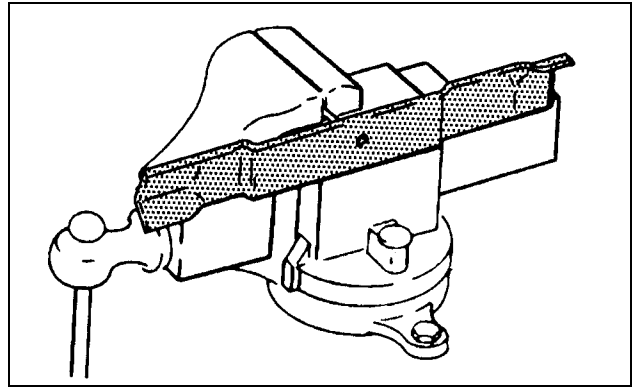


MX9231

2. Remove flanged nut (A), blade (B), blade washers (C), and bolt (D).
3. Install blade (B), blade washers (C), bolt (D) and secure using flanged nut (A). Tighten nut to 80 N•m (60 lb-ft).

Balancing Mower Blades

1. Clean blade.



M61524

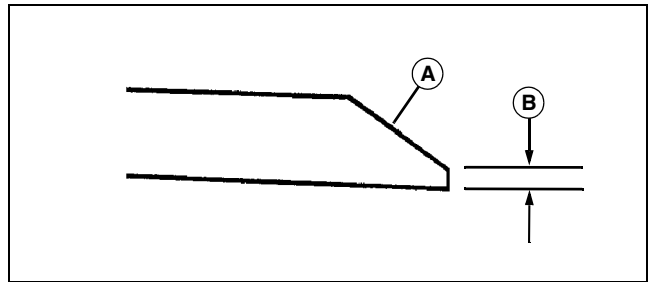
2. Put blade on nail in a vise. Turn blade to horizontal position.
3. Check balance. If blade is not balanced, heavy end of blade will drop.
4. Grind bevel of heavy end. Do not change blade bevel.

Sharpening Blades



CAUTION: Avoid injury! Always wear safety eye protection when grinding.

- Sharpen blades with grinder, hand file, or electric blade sharpener.



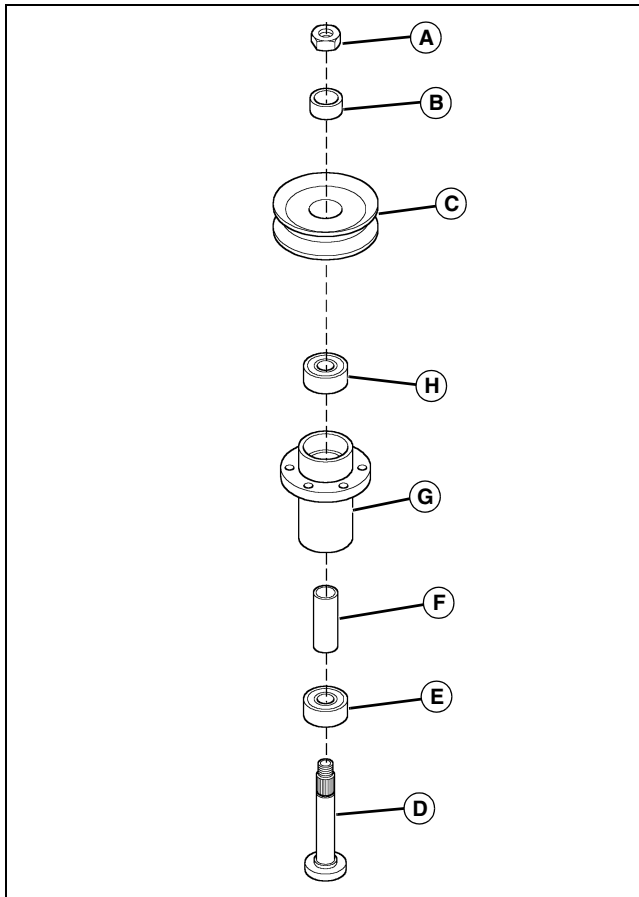
M61830

- Keep original bevel (A) when grinding.
- Blade should have 0.40 mm (1/64 in.) cutting edge (B) or less.
- Balance blades before installing.

Replacing Mower Spindle Bearings

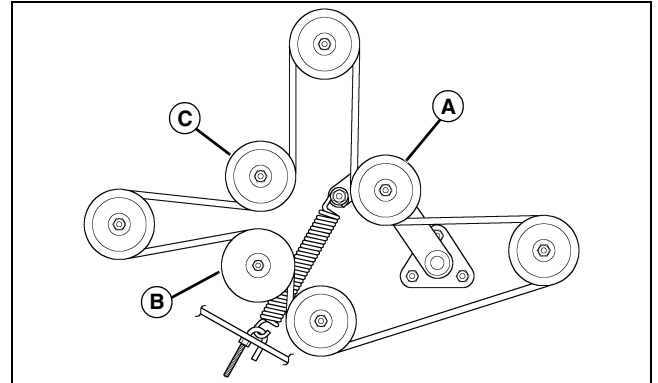
1. Park machine safely. (See Parking Safely in the Safety section.)
2. Remove mower deck drive belt.
3. Remove mower blade.

SERVICE MOWER



MX9227A

2. Remove the mower deck drive belt.



MX9248

3. Remove mower deck drive tension idler pulley (A) and mower deck drive fixed idler pulleys (B) and (C).

4. Install new idler pulleys.

5. Install mower deck drive belt.

6. Adjust belt tension.

4. Remove nut (A), spacer (B) and pulley (C).

5. Remove spindle shaft (D), lower bearing (E) and spacer sleeve (F) from the spindle housing (G). Discard bearing.

6. Remove and discard upper bearing (H).

7. Clean entire assembly.

8. Install a new lower bearing (E) and spacer sleeve (F) on the spindle shaft (D).

IMPORTANT: Avoid damage! The clearance between the lower bearing and the housing is only 0.05 mm (0.002 in.). Do not force bearing into housing.

9. Install the spindle shaft (D), and lower bearing (E) assembly into the spindle housing (G).

10. Install the upper bearing (I).

11. Install pulley (C), spacer (B) and nut (A). Tighten nut to 80 N•m (60 lb-ft.).

12. Install mower blade. Tighten nut to 80 N•m (60 lb-ft.).

Replacing Mower Deck Idler Pulleys

1. Park machine safely. (See Parking Safely in the Safety section.)

SERVICE ELECTRICAL

Removing and Installing the Battery

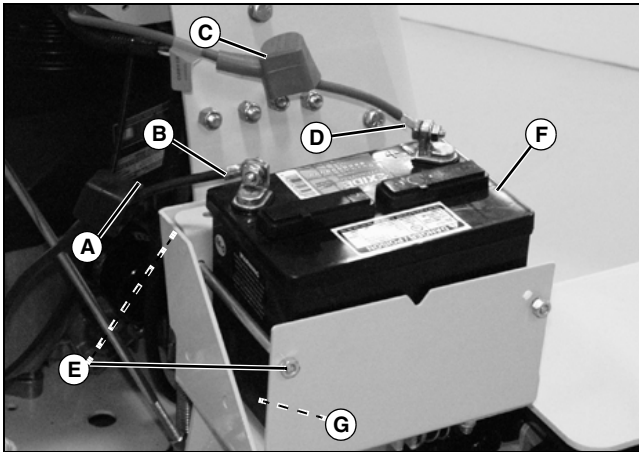


CAUTION: Avoid injury! The battery produces a flammable and explosive gas. The battery may explode:

- Do not smoke near battery.
- Wear eye protection and gloves.
- Do not allow direct metal contact across battery posts.
- Remove negative cable first when disconnecting.
- Install negative cable last when connecting.

Removing:

1. Park the vehicle safely. (See Parking Safely in the Safety section.)



MX9402

2. Slide black cover (A) away from the negative (-) battery terminal and disconnect the negative (-) battery cable (B).
3. Slide red cover (C) away from the positive (+) battery terminal and disconnect the positive (+) battery cable (D).
4. Loosen the cap screws and nuts (E) on both sides of the battery tray.
5. Remove battery (F) and isolator pad (G).

Installing:

1. Place isolator pad (G) in the battery tray.
2. Install battery (F) in the battery tray, making sure that the isolator pad (G) is between the bottom and sides of the battery tray.
3. Tighten the cap screws and nuts (E) to secure the battery in the battery tray. Do not overtighten.
4. Connect the positive (+) battery cable (D) first, then the negative (-) cable (B).

5. Apply general purpose grease or silicone spray to the terminals to prevent corrosion.
6. Slide covers (A and C) over battery terminals.

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

Checking Battery Electrolyte Level



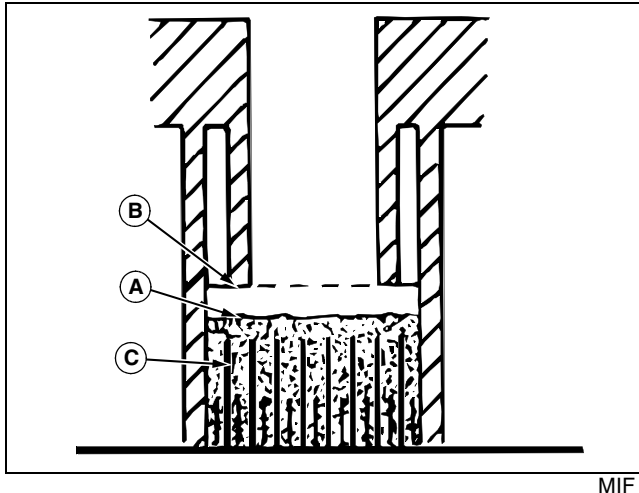
CAUTION: Avoid injury! Battery electrolyte contains sulfuric acid. It is poisonous and can cause serious burns:

- Wear eye protection and gloves.
- Keep skin protected.
- If electrolyte is swallowed, get medical attention immediately.
- If electrolyte is splashed into eyes, flush immediately with water for 15-30 minutes and get medical attention.
- If electrolyte is splashed onto skin, flush immediately with water and get medical attention if necessary.

NOTE: Add only distilled water to replace normal electrolyte loss.

1. Park the vehicle safely. (See Parking Safely in the SAFETY section.)
2. Remove battery from vehicle and set it on a level surface.
3. Remove battery cell caps. Make sure cap vents are not plugged.

SERVICE ELECTRICAL



4. Check electrolyte level. Electrolyte (A) should be approximately halfway between bottom of filler neck (B) and top of plates (C).

IMPORTANT: Avoid damage! Do not overfill battery. Electrolyte can overflow when battery is charged and cause damage.

5. Add only distilled water if necessary.
6. Install battery cell caps.
7. Install battery.

Cleaning Battery and Terminals



CAUTION: Avoid injury! The battery produces a flammable and explosive gas. The battery may explode:

- Do not smoke near battery.
- Wear eye protection and gloves.
- Do not allow direct metal contact across battery posts.
- Remove negative cable first when disconnecting.
- Install negative cable last when connecting.

1. Disconnect and remove battery.
2. Wash battery with a solution of four tablespoons of baking soda to one gallon of water. Be careful not to get the soda solution into the battery cells.
3. Rinse the battery with plain water and dry.
4. Clean terminals and battery cable ends with wire brush until bright.
5. Install battery.

6. Attach cable clamps to battery posts.
7. Apply petroleum jelly or silicone spray to terminal to prevent corrosion.

Replacing Fuses

IMPORTANT: Avoid damage! When replacing fuses, use only 20-amp fuses or you may damage the circuit.

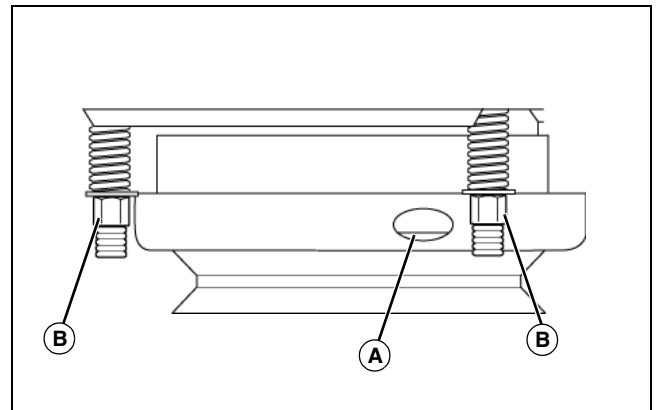
The machine is equipped with two 20-amp fuses (electric start units) and one 20-amp fuse (manual start units) to protect the electric start and/or charging circuit. These fuses are located under the control panel area.

1. Remove defective fuse from socket.
2. Check metal clip in fuse window and discard fuse if clip is broken.
3. Install new fuse into socket.

Check and Adjust PTO Clutch Air Gap

NOTE: If clutch is not equipped with adjusting nuts (B), no adjustment is required.

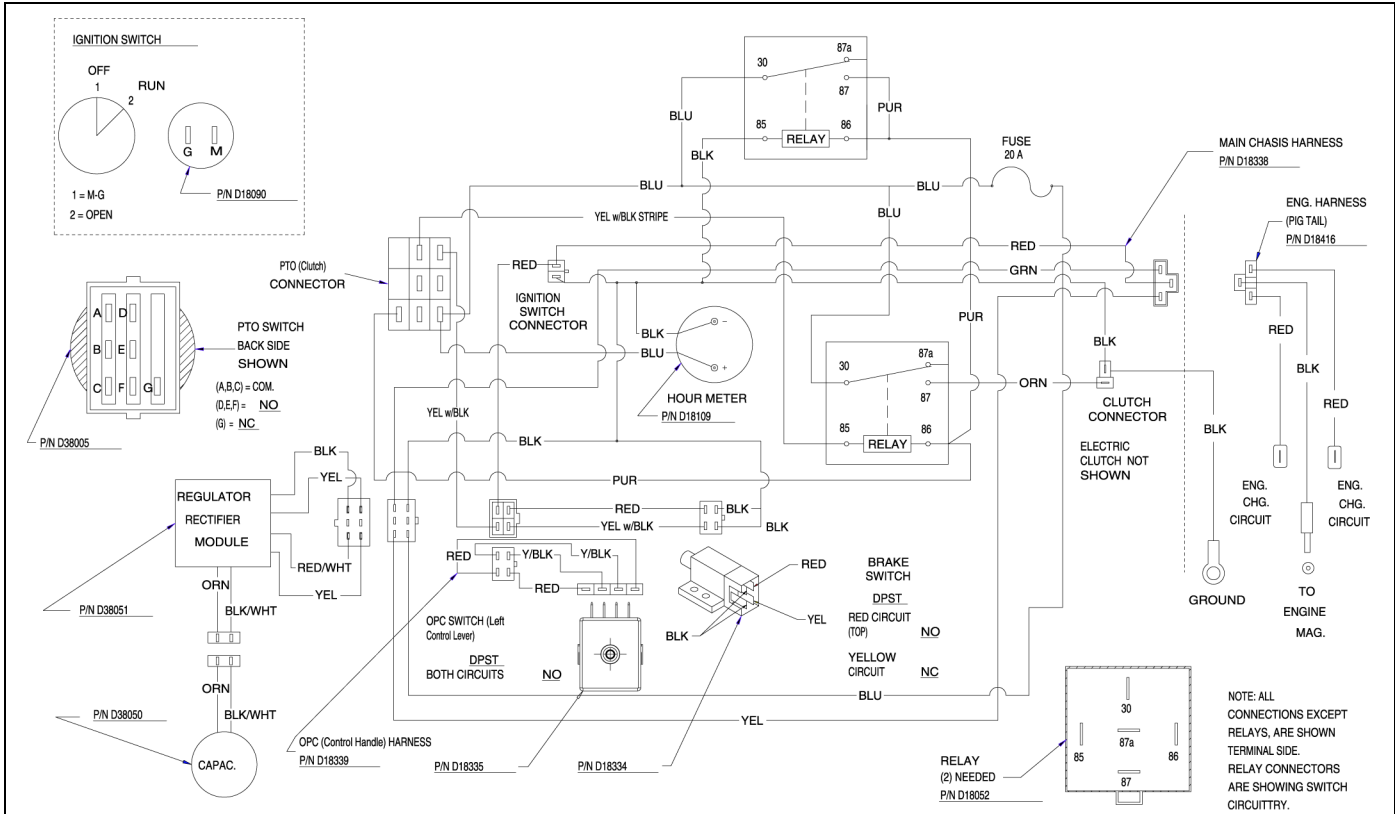
1. Park the vehicle safely. (See Parking Safely in the Safety section.)



2. Check the air gap at the three openings (A) around the clutch using a feeler gauge. The air gap should be within 0.012-0.584 mm (0.005-0.023 in.). If the gap is not within specifications, adjust the air gap.
3. Adjust the air gap to 0.34 mm (0.12 in.), by tightening or loosening the three adjustment nuts (B).

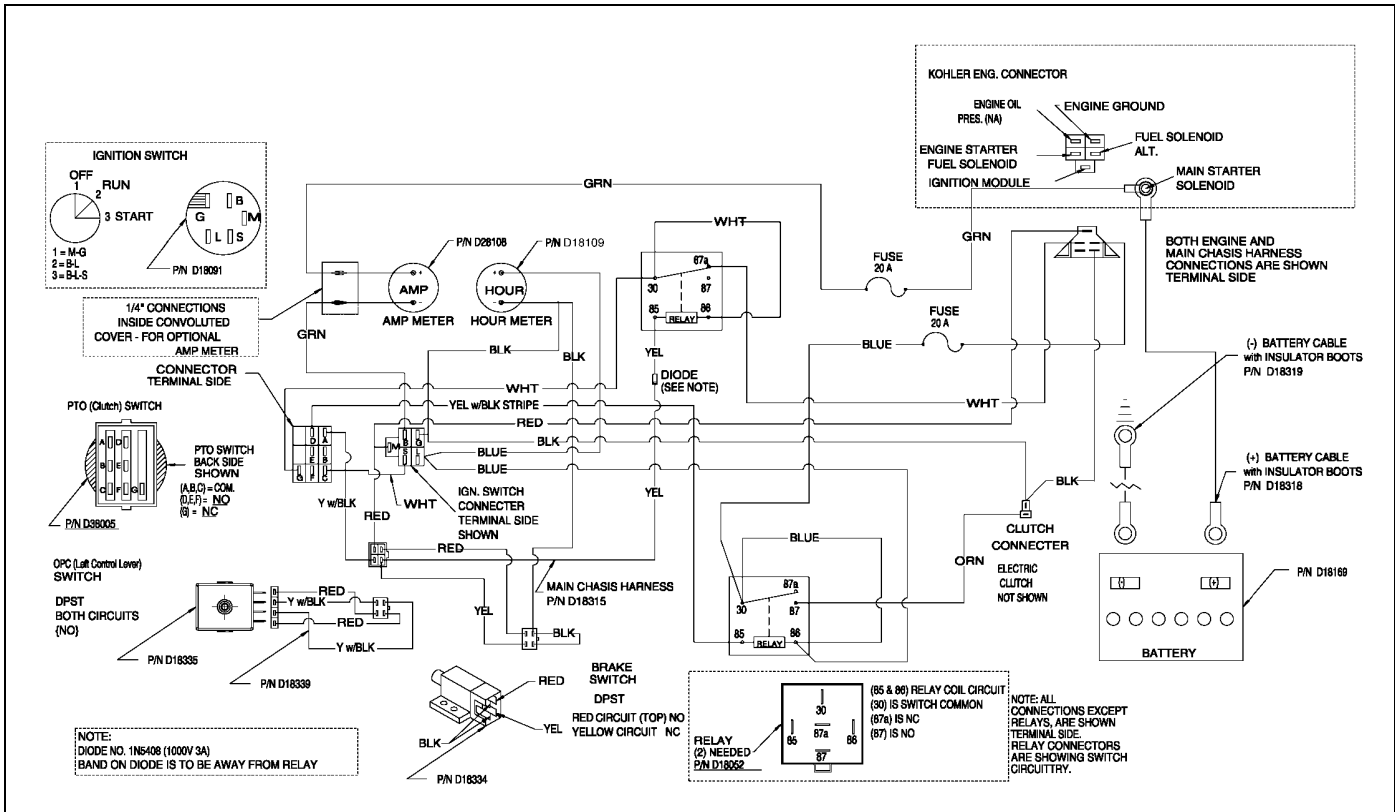
SERVICE ELECTRICAL

Wiring Schematic



MX9406

Picture Note: 17 H.P. Kawasaki Manual Start



MX9407A

Picture Note: 18 and 23 H.P. Kohler Electric Start

SERVICE MISCELLANEOUS

Filling Fuel Tank

Use regular grade 87 octane unleaded fuel.

Add fuel stabilizer to fuel before using it in your machine to prevent engine damage due to stale fuel. Follow directions on stabilizer container.



CAUTION: Avoid injury! Fuel vapors are explosive and flammable:

- Shut engine off before filling fuel tank.
- Do not smoke while handling fuel.
- Keep fuel away from flames or sparks.
- Fill fuel tank outdoors or in well-ventilated area.
- Clean up spilled fuel immediately.
- Use clean, approved non-metal container to prevent static electric discharge.
- Use clean, approved plastic funnel without screen or filter to prevent static electric discharge.

IMPORTANT: Avoid damage! Dirt and water in fuel can cause engine damage:

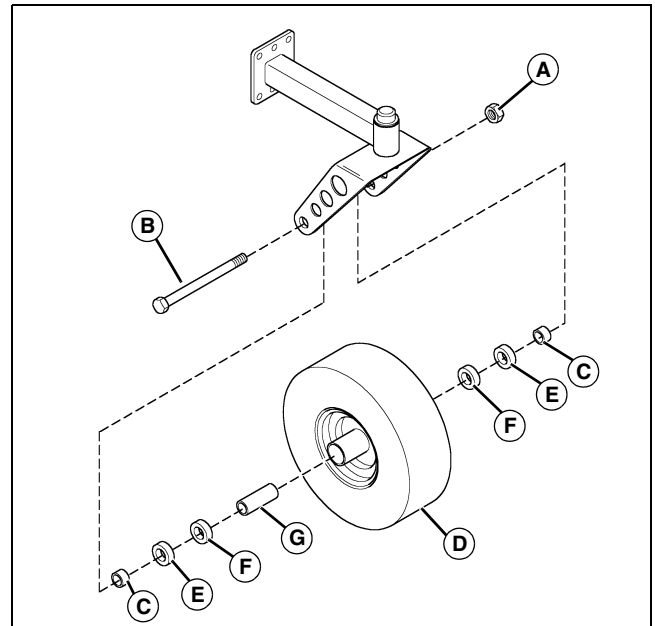
- Clean dirt and debris from the fuel tank opening.
- Use clean, fresh, stabilized fuel.
- Fill the fuel tank at the end of each day's operation to keep condensation out of the fuel tank.
- Use a non-metallic funnel with a plastic mesh strainer when filling the fuel tank or container.

Checking Wheel Bolts

Tighten rear wheel nuts in an alternating pattern to 68 N•m (50 lb-ft.).

Servicing Caster Wheel Roller Bearings

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Raise and securely support the front of the mower deck.



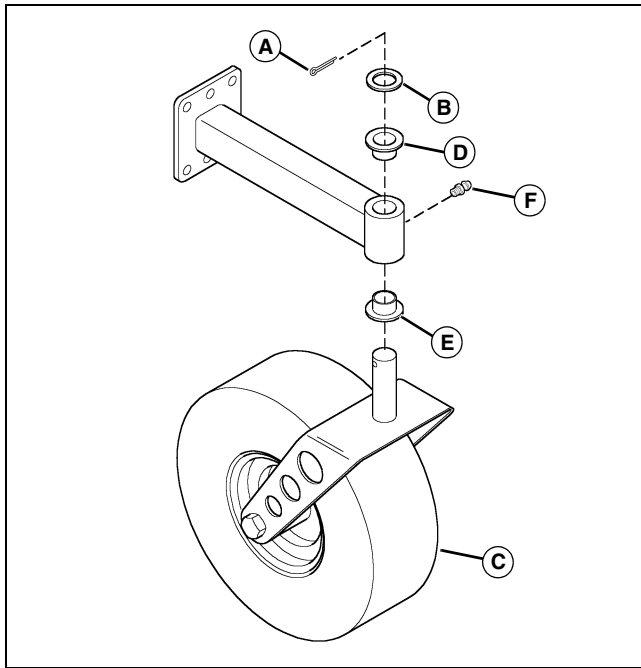
MX9223

3. Remove lock nut (A), bolt (B), two spacers (C) and wheel assembly (D).
4. Remove seals (E), bearings (F) and spacer tube (G) from wheel.
5. Clean and inspect bearings (F) and pack with clean grease. Replace bearings as needed.
6. Install spacer tube (G), bearings (F) and new seals (E).
7. Install wheel assembly (D), two spacers (C), bolt (B) and lock nut (A).

Replacing Caster Pivot Bearing Bushings

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Raise and securely support the front of the mower deck.

SERVICE MISCELLANEOUS



MX9235

3. Remove cotter pin (A), bushing (B) and caster yoke and wheel assembly (C).
4. Remove and discard upper (D) and lower (E) bushings.
5. Install new bushings (D and E).
6. Install caster yoke and wheel assembly (C), bushing (B) and cotter pin (A).
7. Apply grease to lubrication fitting (F).

TROUBLESHOOTING

Using Troubleshooting Chart

If you are experiencing a problem that is not listed in this chart, see your Great Dane dealer for service.

When you have checked all the possible causes listed and you are still experiencing the problem, see your Great Dane dealer

Engine

NOTE: *This engine troubleshooting chart covers items that are unique to the machine operation. See the engine manufacturer's owner's manual provided with your machine for detailed engine troubleshooting procedures.*

If	Check
Poor Engine Performance	Dirt in fuel system or fuel is old; obtain fresh fuel from another supplier before suspecting machine problems. Suppliers blend fuels differently and changing suppliers will generally solve any performance problems. Fuel blended with alcohol or ether may contribute to performance problems by causing gum and varnish deposits, especially if fuel is stored for several weeks or more. Obtain fresh fuel.
Engine Will Not Start	Park brake not engaged. Control lever is not in neutral position. PTO/clutch switch is in engaged position. Fuel shutoff valve in off position. Spark plug wire(s) loose or disconnected. Improper fuel. Plugged fuel filter. Electrical problem-See Electrical Troubleshooting section
Engine Stops Or Misses When Operating On Hillsides	Fuel tank less than half full of fuel.

Electrical

If	Check
Starter Does Not Work Or Will Not Turn Engine	Park brake is not locked. PTO/clutch switch is in on position. Battery terminals are corroded. Battery not charged.
Battery Will Not Charge	Dead cell in the battery. Battery cables and terminals are dirty. Low engine speed or excessive idling.

TROUBLESHOOTING

Machine Operation

If	Check
Machine Vibrates Too Much Or Rattles Excessively	Attachment drive belts worn or damaged. Traction drive belt damaged or worn. Dirt on drive sheaves.
Machine Will Not Move With Engine Running	Park brake locked. Transmission hydraulic oil level low. Traction drive belt damaged or worn.
Machine Will Not Follow a Straight Path	Steering tracking out of adjustment.
Machine Moves To The Left Or Right With Engine Running And Transmission In NEUTRAL	Pump linkage (neutral position) out of adjustment.

Mower

If	Check
Discharge Chute Plugged	Travel speed too fast. Grass too long. Grass too wet. Engine rpm not at wide open throttle. Restricted air flow. Belt installed incorrectly.
Patches Of Grass Uncut	Travel speed too fast. Engine rpm not at wide open throttle. Mower deck needs cleaning.
Belt Slipping	Debris in sheaves. Worn belt.
Too Much Vibration	Debris on mower deck or in sheaves. Damaged sheaves or sheaves out of alignment. Damaged drive belt. Blades out of balance.
Blades Scalping Grass	Cutting too low. Mower wheels not adjusted correctly. Turning speed too fast. Ridges in terrain. Rough or uneven terrain. Low tire pressure.

TROUBLESHOOTING

If	Check
Mower Loads Down Engine	Engine rpm too low. Travel speed too fast. Debris wrapped around mower spindles.
Uneven Cut	Mower deck not leveled properly. Travel speed too fast. Blades dull. Mower wheels not adjusted correctly. Tire pressure unequal.
Grass Tips Are Jagged And Turn Grayish Brown After Mowing	Dull mower blades. Mower deck not leveled properly.

STORAGE

Storing Safely



CAUTION: Avoid injury! Fuel vapors are explosive and flammable. Engine exhaust fumes contain carbon monoxide and can cause serious illness or death:

- Run the engine only long enough to move the machine to or from storage.
- Do not store vehicle with fuel in the tank inside a building where fumes may reach an open flame or spark.
- Allow the engine to cool before storing the machine in any enclosure.

Preparing Machine for Storage

1. Repair any worn or damaged parts. Replace parts if necessary. Tighten loose hardware.
2. Repair scratched or chipped metal surfaces to prevent rust.
3. Clean under the deck and remove grass and debris from inside chute and bagger.
4. Wash the machine and apply wax to metal and plastic surfaces.
5. Run machine for five minutes to dry belts and pulleys.
6. Apply light coat of engine oil to pivot and wear points to prevent rust.

Preparing Fuel and Engine for Storage

Fuel:

If you have been using "Stabilized Fuel," add stabilized fuel to tank until the tank is full.

NOTE: Filling the fuel tank reduces the amount of air in the fuel tank and helps reduce deterioration of fuel.

If you are not using "Stabilized Fuel":

1. Park machine safely in a well-ventilated area.

NOTE: Try to anticipate the last time the machine will be used for the season so very little fuel is left in the fuel tank.

2. Turn on engine and allow to run until it runs out of fuel.
3. Turn key to OFF position.
4. Mix fresh fuel and fuel stabilizer in separate container. Follow stabilizer instructions for mixing.
5. Fill fuel tank with stabilized fuel.
6. Run engine for a few minutes to allow fuel mixture to

circulate through carburetor.

Engine:

Engine storage procedure should be used when vehicle is not to be used for longer than 60 days.

1. Change engine oil and filter while engine is warm.
 2. Service air filter if necessary.
 3. Clean debris from engine air intake screen.
 4. Remove spark plugs. Put 30 mL (1 oz) of clean engine oil in cylinders.
 5. Install spark plugs, but do not connect spark plug wires.
 6. Crank the engine five or six times to allow oil to be distributed.
 7. Clean the engine and engine compartment.
 8. Remove battery.
 9. Clean the battery and battery posts. Check the electrolyte level.
 10. Close fuel shut-off valve, if your machine is equipped.
 11. Store the battery in a cool, dry place where it will not freeze.
- NOTE: The stored battery should be recharged every 90 days.**
12. Charge the battery.
 13. Store the vehicle in a dry, protected place. If vehicle is stored outside, put a waterproof cover over it.

Removing Machine From Storage

1. Check tire pressure.
2. Check engine oil level.
3. Check battery electrolyte level. Charge battery if necessary.
4. Install battery.
5. Check spark plug gap. Install and tighten plugs to specified torque.
6. Lubricate all grease points.
7. Open fuel shut-off valve, if your machine is equipped.
8. Run the engine for 5 minutes without the mower or any attachments running to allow oil to be distributed throughout the engine.
9. Be sure all shields and guards or deflectors are in place.

ASSEMBLY

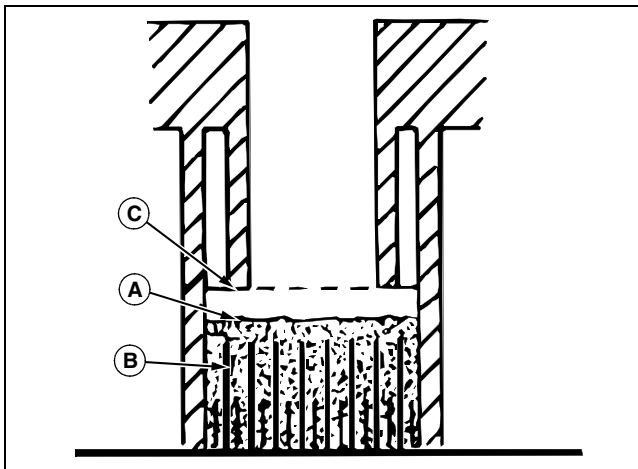
Activate and Charge Battery



CAUTION: Avoid injury! Battery electrolyte contains sulfuric acid. It is poisonous and can cause serious burns:

- Wear eye protection and gloves.
- Keep skin protected.
- If electrolyte is swallowed, get medical attention immediately.
- If electrolyte is splashed into eyes, flush immediately with water for 15-30 minutes and get medical attention.
- If electrolyte is splashed onto skin, flush immediately with water and get medical attention if necessary.

1. Park the vehicle safely. (See Parking Safely in the Safety section.)
2. Remove battery from machine and set it on a level surface.
3. Remove battery cell caps. Make sure cap vents are not plugged.



MIF

4. Fill the battery:
 - Only use battery acid with a 1.265 specific gravity.
 - Slowly add acid (A) to each cell. The solution should be 6 mm (1/4 in.) above plates (B), but than 6 mm (1/4 in.) from the bottom of the filler neck (C).
5. Install the battery caps before charging the battery.

IMPORTANT: Avoid damage! Wait 20 minutes before charging the battery to allow the plates to “absorb” the acid, so they will take a charge well.

Battery must be charged before operation. Adding acid without charging will result in battery damage.

6. Charge the battery for a minimum of 30 minutes at 5-10 amps. If your battery charger has a Deep Cycle or Maintenance Free setting, use this setting to charge the battery. Failure to charge the battery before use will reduce battery performance and life.

7. Install the battery in the machine.

Check Fluid Levels

IMPORTANT: Avoid damage! Check all fluid levels before attempting to start the machine. Machine should be parked on a hard, level surface with the key switch in the STOP position.

Check Engine Oil Level

Oil level should be between the ADD and FULL marks on the dipstick. Add oil as necessary.

Check Transmission Oil Level

Hydraulic oil level should be to the top of the FULL COLD mark on the reservoir dipstick. Add oil as necessary.

- If your mower has no dipstick, the oil should be 7.6 cm (3 in.) from the top of the filler pipe. Add oil as needed.

Check Safety System

For a complete checkout procedure of the safety interlock system, see Testing the Safety Interlock System in the Operating section.

Check Tire Pressure



CAUTION: Avoid injury! Explosive separation of tire and rim parts is possible when they are serviced incorrectly:

- Do not inflate the tires above the recommended pressure.
- Do not stand in front or over the tire assembly when inflating. Use a clip-on chuck and extension hose long enough to allow you to stand to one side.

1. Check tires for damage.

ASSEMBLY

2. Check tire pressure with an accurate gauge.
3. Check that tires have equal pressure. Add or remove air, if necessary.

Tire Size	Pressure
Front	110-139 kPa (16-20 psi)
Rear	69-83 kPa (10-12 psi)

Initial Adjustments



CAUTION: Avoid injury! Clear area of bystanders before performing this service procedure.

1. Raise the rear of the machine until the drive wheels are off the ground. Support the machine with jackstands.
2. Start and run the engine until it reaches normal operating temperature.
3. Move control levers to the forward position and observe drive wheel rotation; the drive wheels should rotate in the correct direction.
4. Move the control levers to the reverse position and observe drive wheel rotation; the drive wheels should rotate in the correct direction.

NOTE: Neutral position and transmission linkage adjustments will needed to be rechecked after several hours of operation.

5. Release control levers; the levers should return to the neutral position and wheel rotation should stop. If the wheels do not stop, adjust the neutral adjustment knob on each wheel motor.
6. Move PTO/clutch switch to on position; mower clutch should engage. Run blades for several minutes.
7. Move PTO/clutch switch to off position and shut the engine off.
8. Check all belts for proper tension.
9. Start the engine and test drive the machine in an open area. Drive the machine forward if the machine drifts to the right or left, adjust the transmission control linkage.

SPECIFICATIONS

Engine

NOTE: See engine manufacturer's owner's manual provided with your machine for engine specifications.

Battery

Voltage 12 volt
CCA 235 amp @ 0°
Reserve Capacity 25 minutes
BCI Group Size U1

Travel Speeds

Forward 0-13.2 km/h (0-8 mph)
Reverse 0-6.5 km/h (0-4 mph)

Tires

Front (36 in. Deck) 11 x 4-5
Rear (36 in. Deck) 18 x 6.50-8
Front (48, 52 and 61 in. Decks) 13 x 5-6
Rear (48 in. Deck) 20 x 8-8
Rear (52 and 61 in. Decks) 20 x 10-8
Inflation Front 110-139 kPa (16-20 psi)
Inflation Rear 69-83 kPa (10-12 psi)
Wheel Nut Torque 68 N•m (50 lb-ft)

Capacities

Fuel Tank (Machine with 36 in. Deck) 11.4 L (4 gal)
Fuel Tank (Other Machines) 22.7 L (6 gal)
Transmission Oil (With Filter) 2.8 L (3 qt)

Net Weight (With Mower Deck and No Fuel)

Machine and 36-in. Mower Deck 299 kg (660 lb)
Machine and 48-in Mower Deck 329 kg (725 lb)
Machine and 52-in. Mower Deck 340 kg (750 lb)
Machine and 61-in. Mower Deck 352 kg (775 lb)

36-Inch Mower Deck

Mower Type Side Discharge
Cutting Blades 3
Blade Bolt Torque 80 N•m (60 lb-ft)

Cutting Width 90 cm (35-1/2 in.)
Cutting Height 51-127 mm (2-5 in.)
Height Adjustment 13 mm (1/2 in.) increments

48-Inch Mower Deck

Mower Type Side Discharge
Cutting Blades 3
Blade Bolt Torque 80 N•m (60 lb-ft)
Cutting Width 121 cm (47.5 in.)
Cutting Height 38-135 mm (1-1/2 to 5-1/2 in.)
Height Adjustment 13 mm (1/2 in.) increments

52-Inch Mower Deck

Mower Type Side Discharge
Cutting Blades 3
Blade Bolt Torque 80 N•m (60 lb-ft)
Cutting Width 1,32 m (52 in.)
Cutting Height 38-135 mm (1-1/2 to 5-1/2 in.)
Height Adjustment 13 mm (1/2 in.) increments

61-Inch Mower Deck

Mower Type Side Discharge
Cutting Blades 3
Blade Bolt Torque 80 N•m (60 lb-ft)
Cutting Width 1,54 m (61 in.)
Cutting Height 38-135 mm (1-1/2 to 5-1/2 in.)

(Specifications and design subject to change without notice.)

INDEX

A

Air Cleaner Elements, Replacing	15
Air Cleaner Elements, Servicing	15

B

Battery and Terminals, Cleaning	24
Battery, Removing and Installing	23
Belt, Replacing Mower Drive (Primary)	20
Blades, Checking Mower	20
Blades, Servicing Mower	21
Brake, Using Park	8

C

Carburetor, Adjusting	15
Chart, Service Interval	12
Cleaning Air Intake Screen	14

D

Daily Operating Checklist	7
---------------------------------	---

E

Engine Oil Level, Checking	14
Engine and Fuel Storage, Preparing	31
Engine, Starting	8
Engine, Stopping	9
Engine, Troubleshooting	28

F

Filter, Changing Engine	14
Filter, Changing Transmission	16
Fuel Safety	5
Fuel Storage	31
Fuel Tank, Filling	26

G

Grease	13
--------------	----

L

Leveling Mower Side-to-Side	19
-----------------------------------	----

M

Mower Blades, Checking	20
Mower Blades, Servicing	21
Mower Drive (Primary) Belt, Replacing	20
Mower Level (Side-to-Side), Adjusting	19
Mower Specifications	34

O

Oil Level, Checking Engine	14
Oil Level, Checking Transmission	16
Oil, Changing Engine	14
Oil, Transmission	16
Operating Checklist, Daily	7

P

Park Brake, Using	8
Part Numbers, Replacement	11
Parts, Replacement	11
Plug, Checking Spark	15

S

Safety Systems, Testing	7
Safety, Tire	5
Service Interval Chart	12
Service Record	36
Spark Plug, Checking	15
Specifications	34
Storage, Preparing Fuel and Engine for	31
Storage, Preparing Machine for	31
Storage, Removing Machine from	31
Storing Safety	31

T

Testing Safety Systems	7
Tire Pressure, Check	32
Transmission Oil	16
Transmission Oil Level, Checking	16
Transmission Oil, Changing	16

NOTES
