636M, 648M, 652M QuikTrak™ Serial No 110001-

JOHN DEERE

OPERATOR'S MANUAL

QuikTrak™ 636M, 648M, 652M

OMUC34162E ISSUE F2 (ENGLISH)

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

If this product contains a gasoline engine:

⚠ WARNING

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

The State of California requires the above two warnings.

Additional Proposition 65 Warnings can be found in this manual.

John Deere Turf Care
North American Edition
Printed in U.S.A.

Thank You for Purchasing a John Deere Product

We appreciate having you as a customer and wish you many years of safe and satisfied use of your machine.

MX00654,000020B-19-10MAY17

Using Your Operator's Manual

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

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. Knowing how to operate this machine safely and correctly will allow you to train others who may operate this machine.

If you have an attachment, use the safety and operating information in the attachment operator's manual, along with the machine operator's manual, to operate the attachment safely and correctly.

This manual and safety signs on your machine may also be available in other languages (see your authorized dealer to order).

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. A convenient index located at the end of this book will help you find needed information quickly.

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 that the machine will travel when going forward. When you see a broken line (------), the item referred to is hidden from view.

Before delivering this machine, your dealer performed a predelivery inspection to ensure best performance.

MX00654,000020C-19-05JUN17

Special Messages

Your manual contains special messages to bring attention to potential safety concerns and 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.

MX00654,000020D-19-05JUN17

Attachments for Your Machine

There is a John Deere attachment or kit to make your new machine perform more tasks or be more versatile, whether your machine is a lawn tractor, compact utility tractor, or a utility vehicle.

You can check out the entire line of attachments for your machine at JohnDeere.com or ask your John Deere dealer. From aerators to electric lift kits to tillers, there is a John Deere attachment or kit to fill every need.

OUMX068,000051C-19-05JUN17

Service Literature

If you would like to purchase a copy of the Parts Catalog or Technical Manual for this machine, visit The John Deere Technical Information Store at:

https://techpubs.deere.com/

or call:

- **U.S. & Canada:** 1-800-522-7448.
- **All Other Regions:** Your John Deere dealer.

TH84124,0000199-19-29JUN22

Parts

We recommend John Deere quality parts and lubricants, available at your John Deere dealer.

When you order parts, your John Deere dealer needs the serial number or product identification number (PIN) for your machine or attachment. These are the numbers that you recorded in the Product Identification section of this manual.

Order Service Parts Online

Visit **https://partscatalog.deere.com/jdrc/** for your Internet connection to parts ordering and information.

TC00531,00000E9-19-17MAY22

Contents

Original Instructions. All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Record Identification Numbers

QuikTrak™ 600 Series: 636M, 648M, 652M

PIN (110001-)

While contacting an Authorized Service Center for information on servicing, always provide the product model and serial number.

Locate the model and serial number for the machine and for the engine of your machine and record the information in the spaces provided below.

DATE OF PURCHASE:

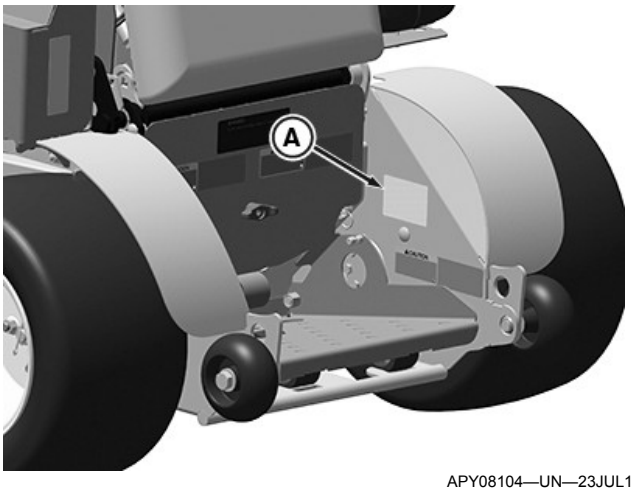
_____

DEALER NAME:

_____

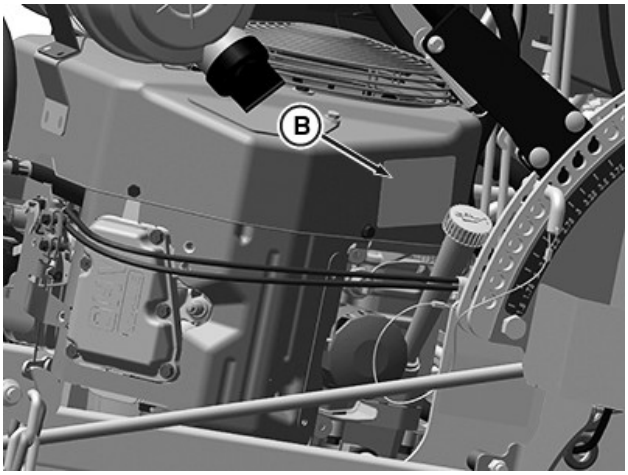
DEALER PHONE:

_____



APY08104—UN—23JUL18

PRODUCT IDENTIFICATION NUMBER (A):



APY08105—UN—23JUL18

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ENGINE SERIAL NUMBER (B):

— — — — — — — — — — — — — — — — — —

ENGINE MODEL CODE:

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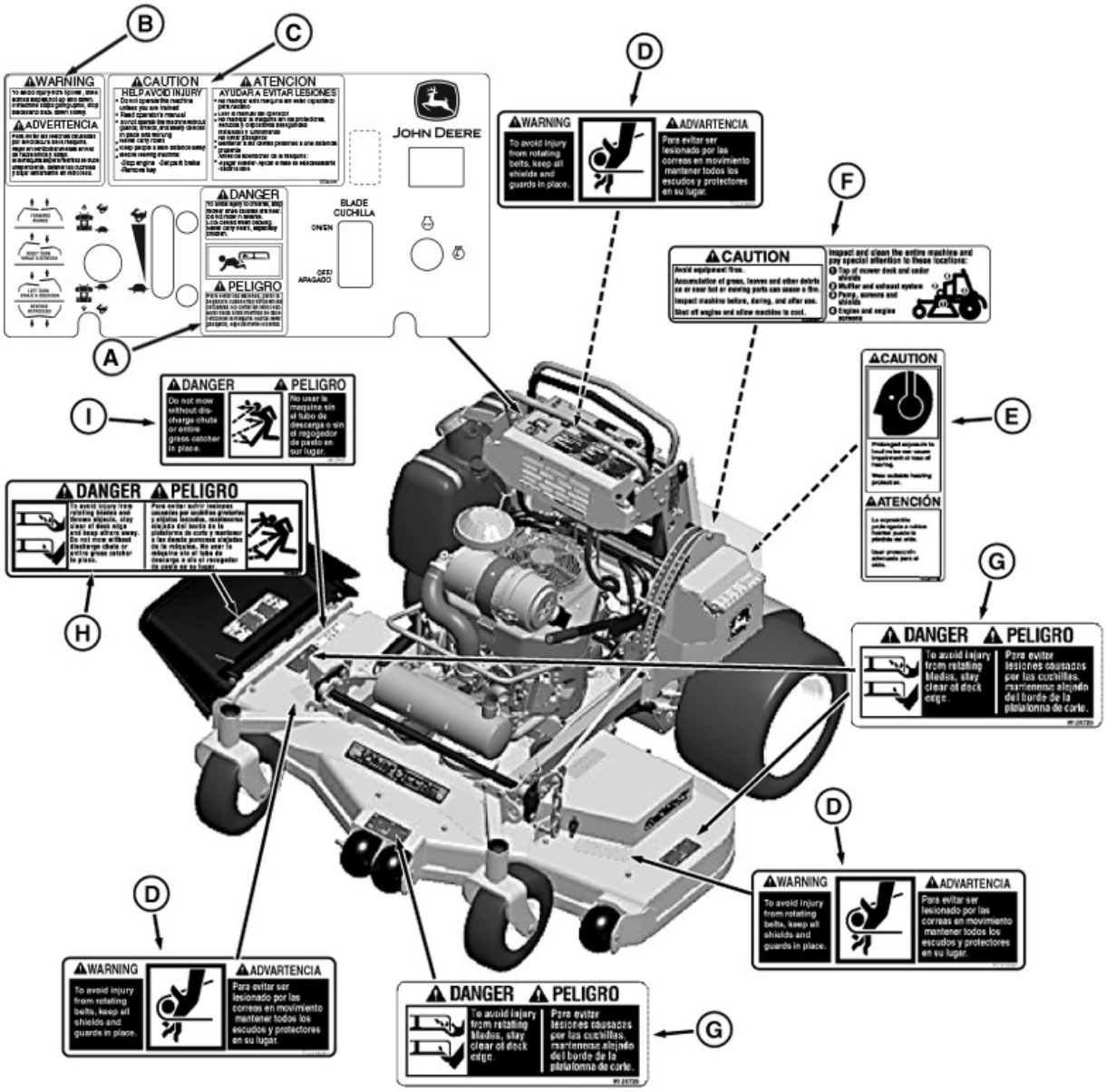
mk71445,1653311378960-19-23MAY22

Safety Label Location



APY515997—UN—12AUG21

A—DANGER UC30242
B—WARNING UC30242
C—CAUTION UC30242
D—WARNING TCU51051
E—CAUTION TCU27738
F—CAUTION TCU37801 (TCU37804 Spanish)
G—DANGER M131739
H—DANGER TCU33341
I—DANGER M137637

VS70618,0000DBD-19-12AUG21

Understanding the Machine Safety Labels

MXAL42363—UN—22MAY13

The machine safety labels shown in this section are placed in important areas on your machine to draw attention to potential safety hazards. DANGER or WARNING safety labels are located near specific 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.

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

- DANGER; The signal word DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- WARNING; The signal word WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION; The signal word CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events which could lead to personal injury.

Replace missing or damaged safety labels. Use this operator's manual for correct safety label placement.

There can be more safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

French or Spanish Safety Labels and Operator's Manual

Operator's manuals and safety labels with content in French or Spanish are available for this machine through authorized John Deere dealers. See your John Deere dealer.

NOTE: Both text and no-text labels are shown. Your machine is only equipped with one of these types of labels.

MP47322,00F4601-19-26OCT21

DANGER

TCT014085—UN—20JUL16

To avoid injury to children, stop mower when children are near. Do not mow in reverse. Look behind when backing. Never carry riders, especially children.

OUMX068,00010D5-19-20JUL16

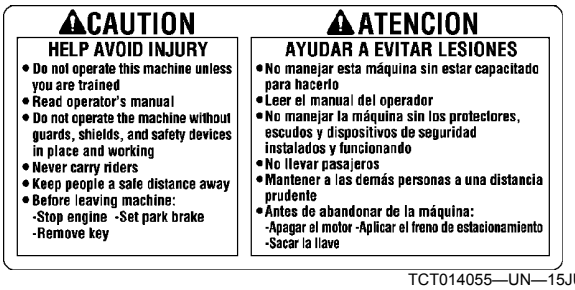
WARNING

TCT014054—UN—15JUL16

To avoid injury from tip-over, drive across slopes, not up and down. If machine stops going uphill, stop blades and back down slowly.

OUMX068,00010AB-19-20JUL16

CAUTION



TCT014055—UN—15JUL16

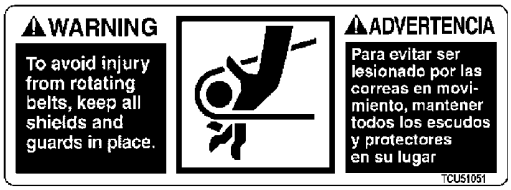
HELP AVOID INJURY

- Do not operate this machine unless you are trained
- Read operator's manual

- Do not operate the machine without guards, shields, and safety devices in place and working
- Never carry riders
- Keep people a safe distance away
- Before leading machine:
  - Stop engine - Set park brake - Remove key

OUMX068,00010AC-19-20JUL16

WARNING



TCAL43588—UN—26MAR13

To avoid injury from rotating belts, keep all shields and guards in place.

BB87125,0001516-19-02OCT14

CAUTION

TCT014052—UN—15JUL16

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear suitable hearing protection.

OUMX068,000058D-19-15JUL16

CAUTION

TCAL48052—UN—11OCT13

Avoid equipment fires.

Accumulation of grass, leaves and other debris on or near hot or moving parts can cause a fire.

Inspect machine before, during, and after use.

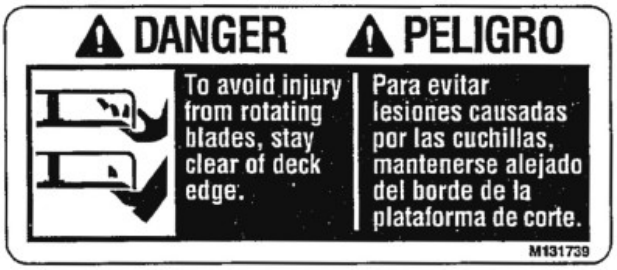
Shutoff engine and allow machine to cool.

Inspect and clean the entire machine and pay special attention to these locations:

1. Top of mower deck and under shields
2. Muffler and exhaust system
3. Pump, screens and shields
4. Engine and engine screens

OUMX068,00010AD-19-15JUL16

DANGER



TCT005699—UN—11SEP12

To avoid injury from rotating blades, stay clear of deck edge.

TH84124,000015A-19-15APR16

DANGER

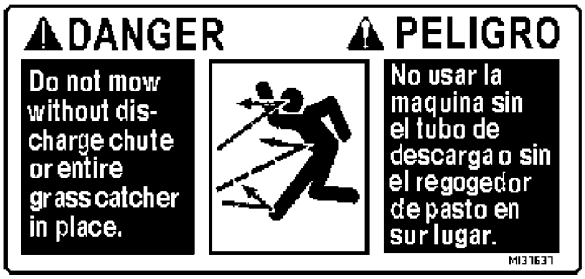
TCAL43590—UN—26MAR13

To avoid injury from rotating blades and thrown objects, stay clear of deck edge and keep others away.

Do not mow without discharge chute or entire grass catcher in place.

BB87125,0001518-19-02OCT14

DANGER



TCAL43591—UN—26MAR13

Do not mow without discharge chute or entire grass catcher in place.

BB87125,0001519-19-18AUG15

Certification

Your product has been certified for compliance with American National Standards Institute B-71.4, Safety Specifications for Commercial Turf Care Equipment.

OUMX068,0000587-19-03FEB14

Operator Training Required

- Read the operator's manual, attachment manuals, and other training material carefully. If the operator or mechanic cannot read English, it is the responsibility of the owner to explain this material to them. This publication is available in other languages.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner of the machine is responsible for training the users.
- Age, physical ability, and mental capacity can be factors in equipment-related injuries. Operators must be mentally and physically capable of operating the machine properly and safely.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people, or property.
- Operate the machine in an open, unobstructed area under the direction of an experienced operator.
- Test drive area with attachment lowered, if equipped, but not running. Slow down when you travel over rough ground.

OUO1082,000657E-19-15MAY18

Preparation

- Evaluate the terrain and determine what accessories and attachments are required to perform the job safely and properly. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including, safety glasses, and hearing protection. Long hair, loose clothing, or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is to be used. Remove all objects such as rocks, toys, and wire which can be thrown by the machine.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
  a. Use only an approved container.
  b. Never remove gas cap or add fuel when engine is running. Do not smoke.
  c. Never refuel or drain the machine indoors.
- Check that the operator presence controls, safety switches, and shields are attached and functioning properly. Do not operate machine unless all safety devices are functioning properly.

OUO1082,000657F-19-15MAY18

Operating Safely

- Never run an engine in an enclosed area where dangerous carbon monoxide fumes can collect.
- Only operate in good light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and park brake is engaged before starting engine. Only start engine from the operator's position. Use seat belts if provided.
- Keep a firm hold on the stationary handle at all times.
- Keep both feet on the operator platform at all times.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. For this machine, drive across hillsides, not up and down. Turf conditions can affect the machine's stability. Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes.
- Never raise the deck with the blades running.
- Never operate with the PTO shield, or other guards, not securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher. Do not operate mower without discharge chute or entire grass catcher in place.
- Do not change the engine governor setting or overspeed the engine. Operating the engine at excessive speed can increase the hazard of personal injury.
- Stop on level ground, lower implements, disengage drives, engage park brake, and shut off engine before leaving the operator's position for any reason including emptying the grass catchers or unclogging the chute.
- Stop equipment and inspect blades after striking objects or if an abnormal vibration occurs. Make necessary repairs before resuming operations.
- Keep hands and feet away from the cutting units.
- Look behind and down before backing up to be sure of a clear path.
- Never carry passengers and keep pets and bystanders away.
- Slow down and use caution when making turns and crossing roads and sidewalks. Stop blades if not mowing. Watch for traffic when operating near or crossing roadways.
- Be aware of the mower discharge direction and do not point it at anyone.
- Do not operate the machine while under the influence of alcohol or drugs.
- Use care when loading or unloading the machine into or off of a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

- 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.
- Before using, always visually inspect to see that the blades, blade bolts and the mower assembly are not worn and damaged. Replace worn and damaged blades and bolts in sets to preserve balance.
- Keep safety labels visible when installing accessories and attachments.
- Do not wear radio or music headphones. Safe service and operation require your full attention.
- When machine is left unattended, stored, or parked, lower the mower deck unless a positive mechanical lock is used.

BB87125,000142C-19-18SEP13

Using a Spark Arrestor

The California Public Resources Code, Section 4442.5 provides as follows:

No person shall sell, offer for sale, lease, or rent to any person any internal combustion engine subject to Section 4442 or 4443, and not subject to Section 13005 of the Health and Safety Code, unless the person provides a written notice to the purchaser or bailee, at the time of sale or at the time of entering into the lease or rental contract, stating that it is a violation of Section 4442 or 4443 to use or operate the engine on any forest-covered, brush-covered, or grass-covered land unless the engine is equipped with a spark arrestor, as defined in Section 4442, maintained in effective working order or the engine is constructed, equipped, and maintained for the prevention of fire pursuant to Section 4443. Cal. Pub. Res. Code 4442.5.

Other states or jurisdictions may have similar laws. A spark arrestor for your machine may be available from your authorized dealer. An installed spark arrestor must be maintained in good working order by the operator.

OUO2005,0000213-19-05JUL17

Checking Mowing Area

MXAL41932—UN—22MAY13

- Clear mowing area of objects that might be thrown. Keep people and pets out of mowing area.
- Low-hanging branches and similar obstacles can injure the operator or interfere with mowing operation. Before mowing, identify potential obstacles, such as low-hanging branches, and trim or remove those obstacles.
- Study mowing area. Set up a safe mowing pattern. Do not mow where traction or stability is doubtful.
- Test drive area with mower lowered (if equipped) but not running. Slow down when you travel over rough ground.
- Survey all mowing sites to determine which slopes are safe for machine operation and which slopes should be maintained through other maintenance techniques.

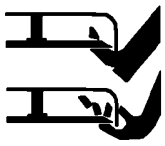
MP47322,00F4617-19-05JUL17

Parking Safely

1. Stop machine on a level surface, not on a slope.
2. Disengage mower blades or any other attachments.
3. Lower attachments to the ground.
4. Lock the park brake.
5. Stop the engine.
6. Remove the key.
7. Wait for engine and all moving parts to stop before you leave the operator's platform.
8. Close fuel shut-off valve, if your machine is equipped.
9. Disconnect the negative battery cable or remove the spark plug wire(s) (for gasoline engines) before servicing the machine.

SU68010,0000154-19-28AUG18

Rotating Blades are Dangerous



MXAL41928—UN—18FEB13

- Rotating blades can cut off arms and legs, and throw objects. Failure to observe safety instructions could result in serious injury or death.
- Keep hands, feet and clothing away from mower deck when engine is running.
- Be alert at all times, drive forward and in reverse carefully. People, especially children can move quickly into the mowing area before you know it.
- Before backing up, stop mower blades or attachments and look down and behind the machine carefully, especially for children.
- Do not mow in reverse.

- Shut off blades when you are not mowing.
- Park machine safely before leaving the operator's station for any reason including emptying the grasscatchers or unplugging the chute.

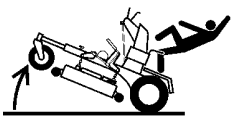
MX00654,000001F-19-27MAR14

Protect Children

- Death or serious injury can occur when young children associate having fun with a lawn mowing machine simply because someone has given them a ride on a machine.
- Children are attracted to lawn mowing machines and mowing activities. They don't understand the dangers of rotating blades or the fact that the operator is unaware of their presence.
- Children who have been given rides in the past may suddenly appear in the mowing area for another ride and be run over or backed over by the machine.
- Tragic accidents with children can occur if the operator is not alert to the presence of children, especially when a child approaches a machine from behind. Before and while backing up, stop mower blades and look down and behind the machine carefully, especially for children.
- Never carry children on a machine or attachment, even with the blades off. Do not tow children in a cart or trailer. They can fall off and be seriously injured or interfere with safe machine operation.
- Never use the machine as a recreational vehicle or to entertain children.
- Never allow children or an untrained person to operate the machine. Instruct all operators not to give children a ride on the machine or in an attachment.
- Keep children indoors, out of the mowing area, and in the watchful eye of a responsible adult, other than the operator, when a mower is being operated.
- Stay alert to the presence of children. Never assume that children will remain where you last saw them. Turn the machine off if a child enters the work area.

OUO2005,0000217-19-05FEB13

Avoid Tipping



TCAL43874—UN—26MAR13

Identify Slopes for Safe Operation

- Establish your own special procedures and rules for operating on slopes. These procedure must include a survey of all mowing sites to determine which slopes are safe for machine operation. Always use common sense and good judgement when performing this survey.
- Lay a straight piece of sturdy lumber 1.2 m (4 ft) long on the slope and measure the angle of the slope with an angle indicator or protractor level.
- Never mow or operate machine on slope angles greater than 25°.
- Exceeding the maximum recommended slope angle of 25° increases the risk of rollover accidents that can result in serious injury or death.
- Always consider potential turf conditions and slope angles when determining the risk of loss-of-control and tip-over accidents.
- On slope angles of 15° or less the risk of rollover is low, but as the slope angle increases to the John Deere recommended maximum of 25° the risk increases to a moderate level.

Operate Safely on Slopes

- Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. Operation on all slopes requires extra caution.
- Use lower speeds while mowing and operating on slopes.
- If you feel uneasy on a hillside, do not mow it.
- Mow across slopes, not up and down.
- Watch for holes, ruts, bumps, rocks, or other hidden objects. Uneven terrain could overturn the machine. Tall grass can hide obstacles.
- Choose a low ground speed so you will not have to stop or shift while on a slope.
- Do not mow or operate machine on wet grass. Tires may lose traction. Tires may lose traction on slopes even though the brakes are functioning properly.
- Avoid starting, stopping or turning on a slope. If the tires lose traction, disengage the blades and proceed slowly, straight down the slope.
- Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction, which could cause the machine to roll over.
- Use extra care while operating machine with grasscatchers or other attachments, they can affect stability of the machine. Do not use on steep slopes.
- Do not mow near drop-offs, ditches, embankments, or bodies of water. The machine could suddenly roll over if a wheel goes over the edge or the edge caves in. Leave a safety area between the machine and any hazard.
- Follow the manufacturer's recommendations for wheel weights or counterweights for added stability when operating on slopes or using front or rear mounted attachments. Remove weights when not required.
- Drive machine very slowly and avoid quick stops when attachment is removed.

- Transport machine with decks lowered to improve stability.

BB87125,0001432-19-17AUG15

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.

OUO2005,000021B-19-05FEB13

Avoid High Pressure Fluids

TCAL25960—UN—24MAY12

- 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. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A. Information may be obtained in the United States and Canada only by calling 1-800-822-8262.

OUO2005,0000220-19-05FEB13

Checking Wheel Hardware

- A serious accident could occur causing serious injury if wheel hardware is not tight.
- Check wheel hardware 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.

OUO2005,000021D-19-05FEB13

Wear Appropriate Clothing

TCT015572—UN—24MAY18

- Always wear safety goggles, or safety glasses with side shields when operating the machine.
- Wear close fitting clothing and safety equipment appropriate for the job.
- While mowing, always wear substantial footwear and long trousers. Do not operate the equipment when barefoot or wearing open sandals.
- Wear a suitable protective device such as earplugs. Loud noise can cause impairment or loss of hearing.

TC00531,000021E-19-17MAY18

Practice Safe Maintenance

- Only qualified, trained adults should service this machine.
- Understand service procedure before doing work. Keep area clean and dry.
- Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.
- Never lubricate, service or adjust the machine or attachment 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 any attachment completely to the ground or to an existing attachment mechanical stop before servicing the attachment. Disengage all power and stop the engine. Lock park brake and remove the key. Let machine cool.
- Disconnect battery or remove spark plug wire (for gasoline engines) before making any repairs.
- Before servicing machine or attachment, carefully release pressure from any components with stored energy, such as hydraulic components and springs.
- Release hydraulic pressure by lowering attachment or cutting units to the ground or to a mechanical stop and move hydraulic control levers.
- Securely support any machine or attachment elements that must be raised for service work. Use

jack stands or lock service latches to support components when needed.

- 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.
- Check all hardware at frequent intervals to be sure the equipment is in safe working condition.
- Do not modify machine or safety devices. Unauthorized modifications to the machine or attachment may impair its function and safety.

MX00654,0000214-19-16NOV12

Maintenance and Storage

TCAL43414—UN—15MAR13

- Never operate machine in a closed area where dangerous carbon monoxide fumes can collect.
- Disengage drives, lower implement (if equipped), lock parking brake, stop engine and remove key or disconnect spark plug (for gas engines). Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean grass and debris from cutting units, drives, mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.
- Let engine cool before storing and do not store near flame.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Park machine on level ground. Never allow untrained personnel to service machine. Understand service procedure before doing work.
- Use jack stands or lock service latches to support components when required. Securely support any machine elements that must be raised for service work.
- Before servicing machine or attachment, carefully release pressure from any components with stored energy, such as hydraulic components or springs.
- Release hydraulic pressure by lowering attachment or cutting units to the ground or to a mechanical stop and move hydraulic control levers back and forth.
- Disconnect battery (if equipped) or remove spark plug (for gas engines) before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking tines or blades. Wrap the tines or blades, or wear gloves, and use caution when servicing them. Only replace tines or blades. Never straighten or weld them.
- Keep hands, feet, clothing, jewelry and long hair away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries (if equipped) in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- Check grass catcher components and the discharge guard frequently and replace with manufacturer's recommended parts, when necessary. Grass catcher components are subject to wear, damage, and deterioration which could expose moving parts or allow objects to be thrown.
- Keep all nuts and bolts tight, especially tines or blades attachment bolts, to be sure the equipment is in safe working condition.
- Check brake operation frequently. Adjust and service as required.
- On multi-bladed machines, take care as rotating one tine or blade can cause others to rotate.

TH84124,00001DF-19-26JUL18

Prevent Fires

- Please review these recommendations with all operators. See your John Deere dealer with questions.
- Always follow all safety procedures posted on the machine and in this operator's manual. Before carrying out any inspection or cleaning, always shut off engine, set parking brake, and remove ignition key.
- Besides routine maintenance, one of the best ways to keep your John Deere equipment running efficiently and to reduce fire risk is to regularly remove debris buildup from the machine.
- After operating, allow machine to cool in an open area before cleaning or storing. Do not park machine near flammable materials, such as wood, cloth, or chemicals, or near an open flame or other sources of ignition, such as a water heater or furnace.
- Completely remove any combustible materials from equipment before storing by emptying any grass catcher bags, containers, and cargo boxes.
- Debris can accumulate anywhere on the machine, especially on horizontal surfaces. Remove grass and debris completely from engine compartment, muffler area, and from the mower deck or cutting units both before and after operating machine. Additional cleaning may be necessary when mowing or mulching in dry conditions.

- In addition to cleaning machine before using and storing, keeping engine area clean provides the greatest impact on fire prevention. Other areas requiring regular inspection and cleaning include behind wheel rims, wire harness, hose or line routing, mowing attachments, etc. Compressed air, leaf blowers, or water assists in keeping these areas clean.
- Frequency of these inspections and cleaning will vary depending on a number of factors, including operating conditions, machine configuration, operating speeds, and weather conditions (particularly dry, hot, and windy conditions). When you are operating in these conditions, inspect and clean these areas frequently throughout the day.
- Excess lubrication or fuel/oil leaks or spills on the machine can also serve as collection sites for debris. Prompt machine repair and oil and fuel clean-up reduces the potential for debris collection.
- Bearing failures or overheating can result in a fire. To reduce this risk, always follow the instructions in the machine operator's manual regarding lubrication intervals and locations. Contact your local dealer if you have any questions about the lubrication intervals or location and if any unusual noises are coming from areas where bearings might be located. Washing the machine while warm may also reduce bearing life and increase potential for premature bearing failure.
- Always shut off fuel when storing or transporting machine, if the machine has a fuel shutoff.
- Check fuel lines, tank, cap, and fittings frequently for cracks or leaks. Replace if necessary.

OUO2005,0000221-19-27MAR19

Tire Safety

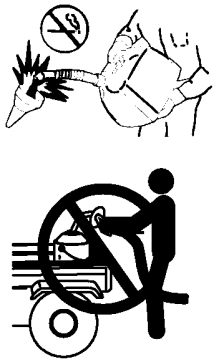
TCAL25965—UN—24MAY12

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.

OUO2005,0000222-19-10MAY17

Handling Fuel Safely



MXAL41938—UN—18FEB13

To avoid personal injury or property damage, use extreme care in handling fuel. Fuel is extremely flammable and fuel vapors are explosive:

- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container. 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.
- Never remove the fuel tank cap or add fuel with the engine running. Allow engine to cool before refueling.
- Never add fuel to or drain fuel from the machine indoors. Move machine outdoors and provide adequate ventilation.
- Clean up spilled fuel immediately. If fuel is spilled on clothing, change clothing immediately. If fuel is spilled near machine, do not attempt to start the engine but move the machine away from the area of spillage. Avoid creating any source of ignition until fuel vapors have dissipated.
- Never store the machine or fuel container where there is an open flame, spark, or pilot light such as on a water heater or other appliance.
- Prevent fire and explosion caused by static electric discharge. Static electric discharge can ignite fuel vapors in an ungrounded fuel container.
- Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before fueling.
- Remove fuel-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment with a portable container, rather than from a fuel dispenser nozzle.

- Keep the nozzle in contact with the rim of the fuel tank or container opening at all times until the fueling is complete. Do not use a nozzle lock-open device.
- Never overfill fuel tank. Replace fuel tank cap and tighten securely.
- Replace all fuel container caps securely after use.
- For gasoline engines, do not use gas with methanol. Methanol is harmful to your health and to the environment.

OUO2005,0000223-19-12OCT16

Handling Waste Product and Chemicals

Waste products, such as, used oil, fuel, coolant, brake fluid, and batteries, can harm the environment and people:

- Do not use beverage containers for waste fluids - someone may drink from them.
- See your local Recycling Center or authorized dealer to learn how to recycle or get rid of waste products.
- A Safety Data Sheet (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. The seller of the chemical products used with your machine is responsible for providing the SDS for that product.

OUO2005,0000224-19-11OCT18

General Cleaning Guidelines

Machine must be inspected periodically throughout the day. Buildup of debris must be removed to ensure proper machine function and to reduce the risk of fire. Frequency of these inspections and cleanings vary depending on a number of factors including operating conditions, machine configuration, operating speeds, and weather conditions. Inspections and cleanings may be required multiple times throughout the day particularly in dry, hot, and windy conditions.

IMPORTANT: Avoid fire! Regular and thorough cleaning of machine combined with other routine maintenance procedures listed in the Operator's Manual greatly reduce the risk of fire, downtime, and improve machine performance.

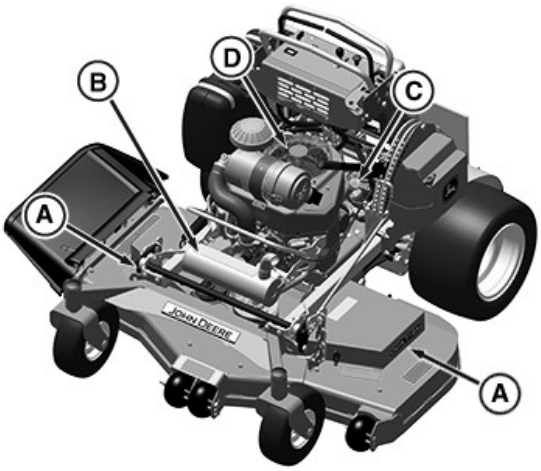
Besides proper maintenance the condition of the material being handled is the most significant factor contributing to fires. Dry, light, and fluffy materials that can create a dust cloud are the most likely to catch fire. Debris can accumulate in various areas especially on horizontal surfaces. Conditions such as wind speed and direction can change where the material accumulates. Be aware of these changing conditions and adjust your cleaning schedule and practices to ensure proper machine function and to reduce the risk of fire.

Always follow all safety procedures posted on the machine and in the Operator's Manual. Before carrying out any inspection or cleaning, always park machine safely. (See Parking Safely in the Safety Section).

The entire machine should be inspected, with extra attention given to the areas noted below.

OUMX068,0001043-19-03NOV21

Cleanout Areas



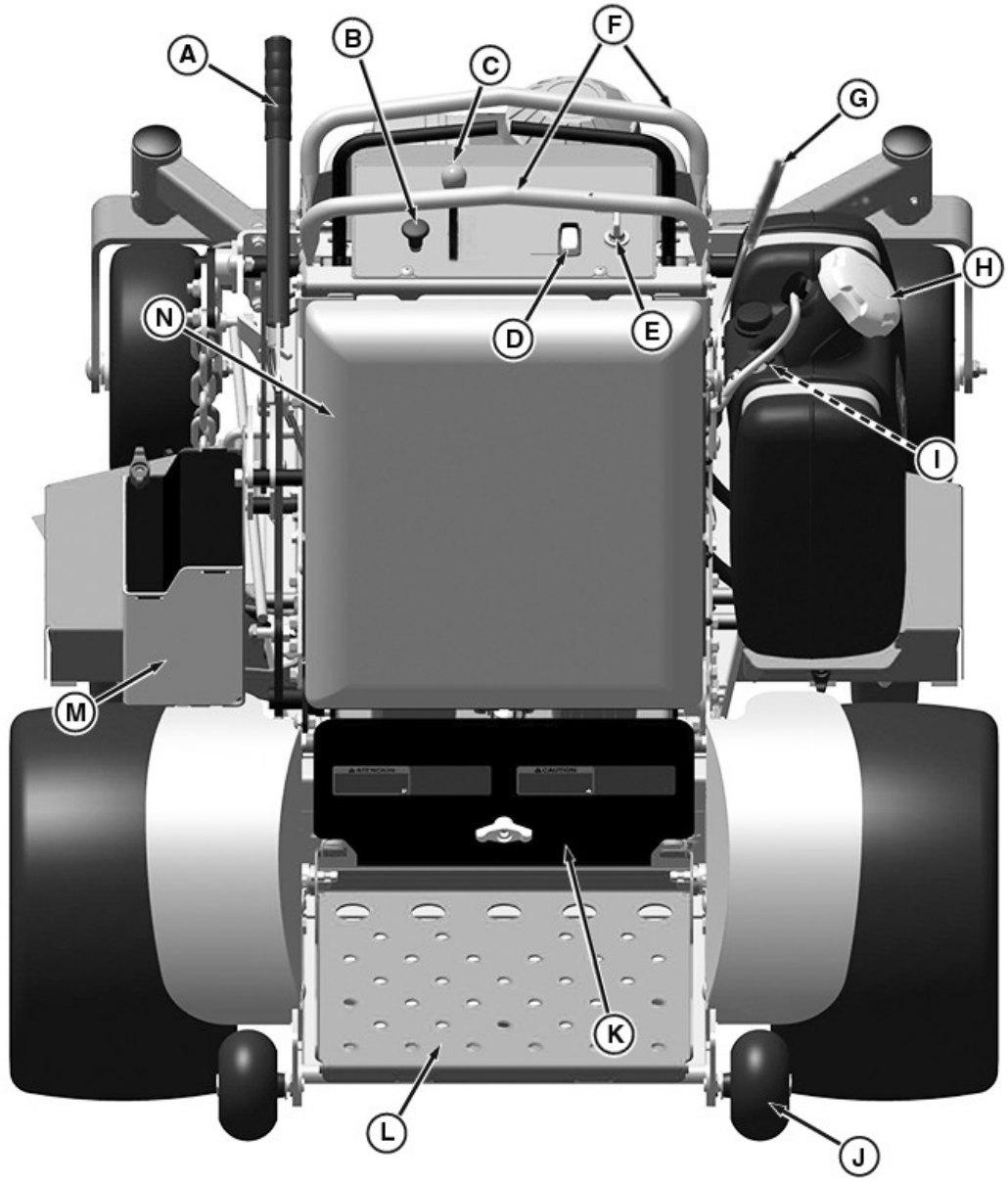
APY08115—UN—28AUG18

Inspect and clean the entire machine and pay special attention to these locations:

- Top of mower deck and under shields (A).
- Muffler and exhaust system (B).
- Pump, screens, and shields (C).
- Engine and engine screens (D).

SU68010,0000155-19-28AUG18

Operator Station Controls

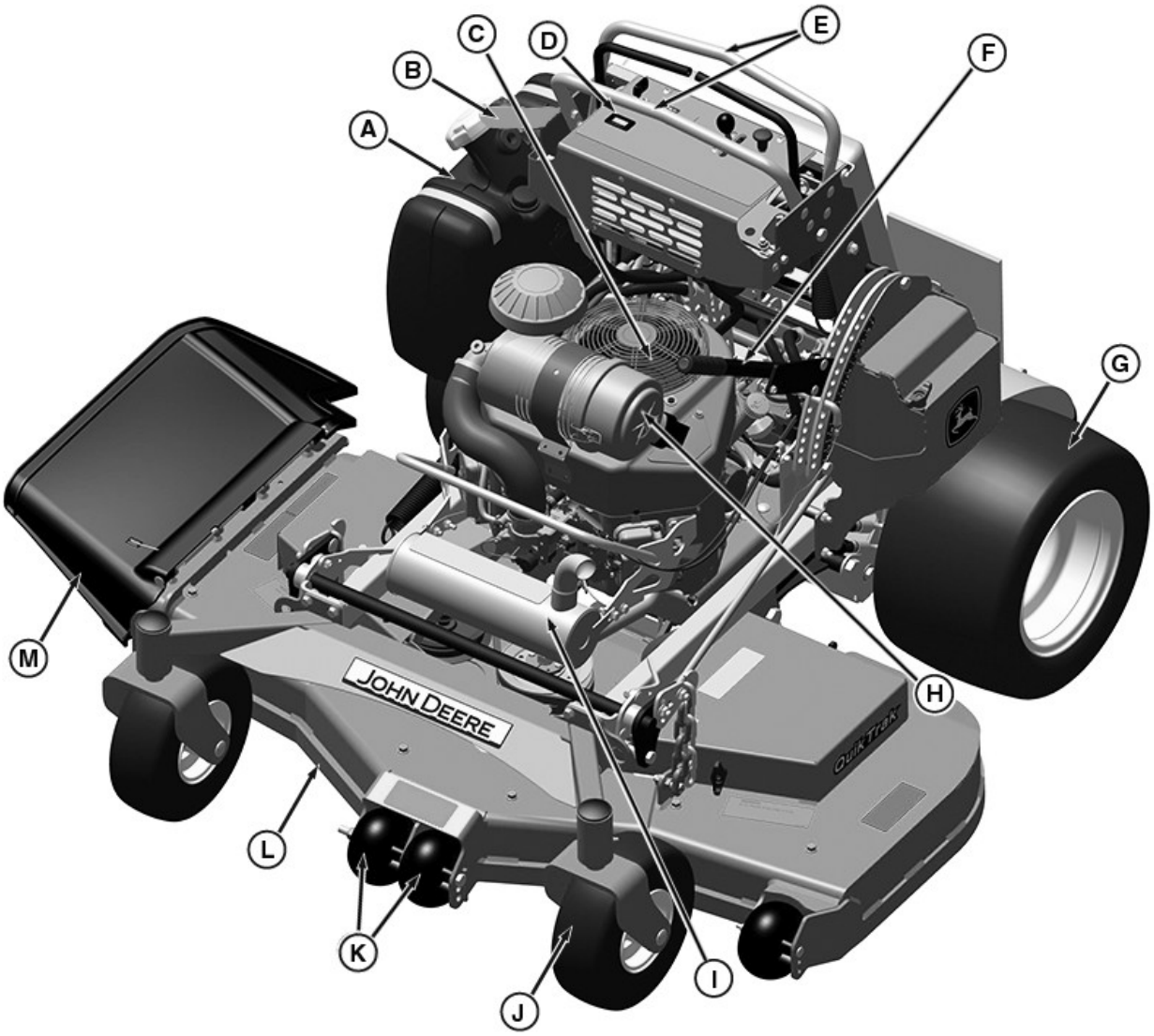


APY08092—UN—24JUL18

A—Deck Lift Lever
B—Choke Knob
C—Throttle Lever
D—PTO Switch
E—Key Switch
F—Stationary Handles
G—Park Brake Lever
H—Fuel Fill Cap
I—Fuel Shutoff
J—Anti-Scalp Wheels
K—Rear Access Panel
L—Operator Platform
M—Battery Box
N—Thigh Pad

SU68010,0000118-19-21JUL18

General Overview



APY08093—UN—24JUL18

A—Fuel Tank
B—Park Brake Lever
C—Engine
D—Hour Meter
E—Control Levers
F—Deck Lift Lever
G—Rear Drive Tire
H—Air Cleaner
I— Muffler
J—Front Caster Tire
K—Anti-Scalp Tires
L—Mower Deck
M—Flexible Chute Deflector

SU68010,0000119-19-21JUL18

Daily Operating Checklist

- ☐ Make sure all necessary guards and shields are safely and securely attached. Check for loose, missing or damaged parts.
- ☐ Remove grass and debris from operator platform, air intake screen, engine cooling fins, hydraulic pumps, wheel motors, engine compartment, and muffler area.
- ☐ Test park brake.
- ☐ Test safety systems.
- ☐ Check engine and hydraulic oil level.
- ☐ Check for oil leaks.
- ☐ Check all belts for damage or cracking.
- ☐ Check tire pressure. Check tires for damage or cracking.
- ☐ Check mower level.
- ☐ Adjust cutting height if necessary.
- ☐ Remove mower deck belt shields. Inspect and clean grass and debris from belt area.
- ☐ Check and adjust steering control linkages.
- ☐ Lubricate front caster spindles and wheels.

BB87125,0001532-19-04OCT13

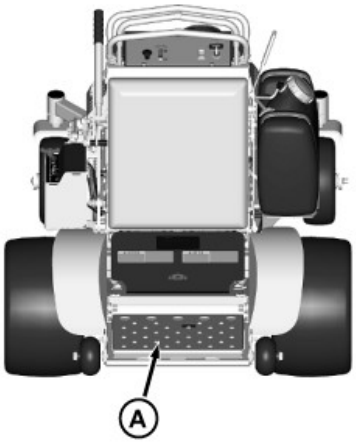
Avoid Damage to Plastic and Painted Surfaces

- Do not wipe plastic parts unless rinsed first. Using a dry cloth may cause scratches.
- Insect repellent spray may damage plastic and painted surfaces. Do not spray insect repellent near machine.
- Be careful not to spill fuel on machine. Fuel may damage surface. Wipe up spilled fuel immediately.
- Prolonged exposure to sunlight will damage hood surfaces.

BB87125,0001533-19-29AUG13

Mounting and Dismounting Machine Safely

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



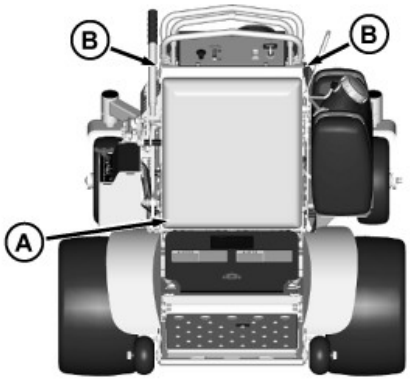
TCT014088—UN—20JUL16

2. Step on operator platform (A) at the rear of machine to mount the machine.
3. Step off operator platform to dismount machine.
4. Keep the operator platform clean.

OUMX068,00010D8-19-20JUL16

Raising and Lowering Thigh Pad

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



TCT014089—UN—20JUL16

2. Lift up on bottom portion of thigh pad (A), allowing it to swivel upward on hinges (B).

NOTE: Thigh pad is not intended to stay up on its own.

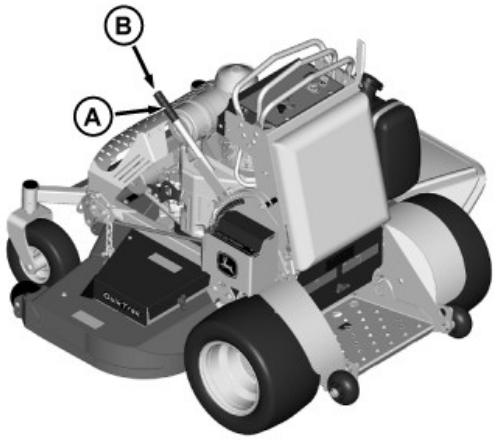
3. Push down on thigh pad (A), allowing it to swivel downward on hinges (B).

OUMX068,00010D9-19-20JUL16

Raising and Lowering Deck

The deck lift handle allows the deck to be placed into the highest position for transporting.

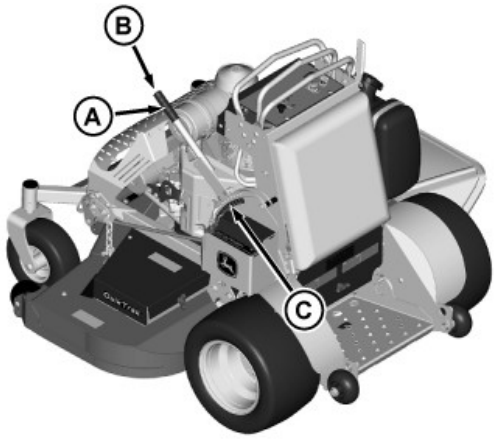
1. Park machine safely. (See Parking Safely in the Safety section.)



TCT014090—UN—20JUL16

2. To raise and lock the mower deck, pull the deck lift handle (A) while pressing push-button (B) until the lift handle is past the highest position. Release push-button and an audible click will be heard. The deck is now locked in the highest position for transporting.

NOTE: The mower deck only lowers to the set height. (See Adjusting Mower Deck Height-of-Cut)



TCT014091—UN—20JUL16

3. To unlock and lower the mower deck, pull the deck lift handle (A) back from the locked position and press push-button (B). Slowly lower the deck lift handle to the deck height setting (C).

OUMX068,00010DA-19-20JUL16

Adjusting Mower Deck Height-of-Cut

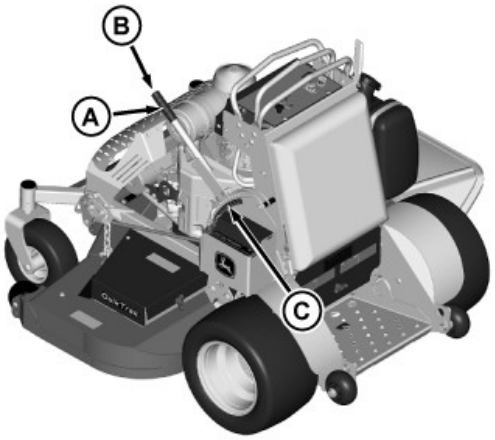
CAUTION: Avoid injury! Rotating parts can catch fingers, loose clothing, or long hair. Wait for engine and all moving parts to stop before leaving operator station to adjust or service machine.

The height-of-cut (HOC) selector adjusts the cut height in 6 mm (1/4 in) increments. To adjust, ensure that the mower deck is in the fully upright and locked position.

NOTE: Ensure that both rear tires have proper air pressure. Check for even tire wear before adjusting.

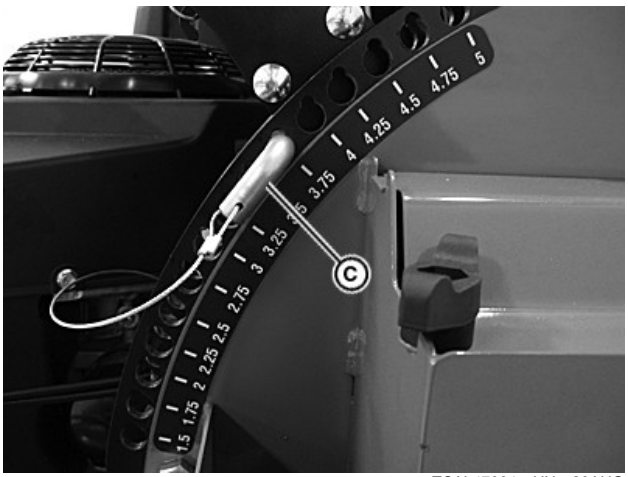
The height-of-cut (HOC) selector has 15 different settings, ranging 38—127 mm (1-1/2—5 in) in 6 mm (1/4 in) increments.

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



TCT014091—UN—20JUL16

2. Pull the deck lift handle (A) while pressing the push button (B). Pull the deck lift handle all the way back and release the push button, locking the deck in the upright position.



TCAL47994—UN—20AUG13

3. Remove the HOC pin (C) from the selected hole.

NOTE: Make sure that the HOC pin is securely seated in both the inner and outer selector plates.

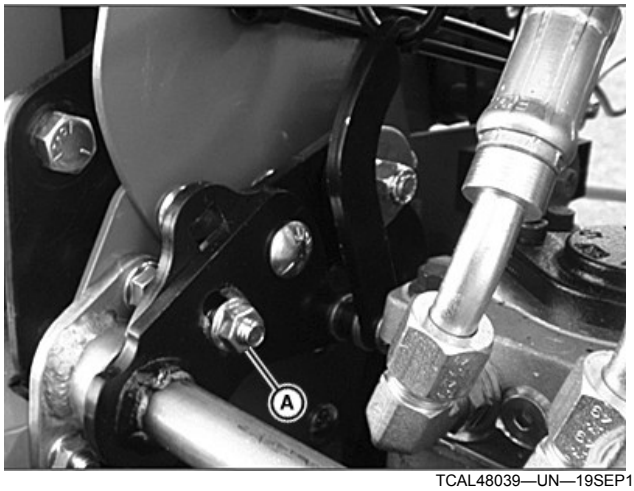
4. Select the desired cut height and replace the HOC pin (C).
5. Once the proper height is set, press push button (B) and pull back on the deck lift handle (A). Lower the lift

handle toward the front of the machine until it stops at the set height-of-cut (HOC).

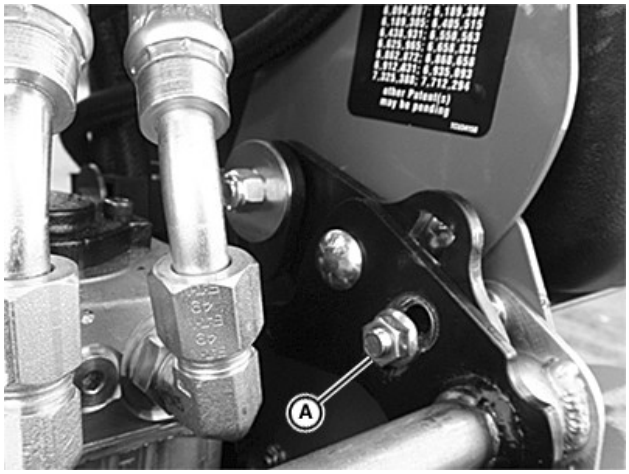
6. If the latch does not correctly line up with the index slot, adjust the rear hangers.

Adjusting the Lift Lever Latch Rear Hangers

1. Place the HOC in the 3 inch position.



TCAL48039—UN—19SEP13



TCAL48040—UN—19SEP13

TCAL48042—UN—20SEP13

2. Loosen the cap screw and nut (A) on bracket lift hangers.
3. Move bracket up or down until the lift lever latch (B) moves freely into the index slot (C).
4. Tighten hardware to specification when latch is adjusted properly.

Specification	
Capscrew—Torque	61 N·m (45 lb·ft)

5. After latch is adjusted, check cutting height. (See Checking and Adjusting Cutting Height.)

OUMX068,00010E1-19-20JUL16

Leveling Mower Deck

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

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

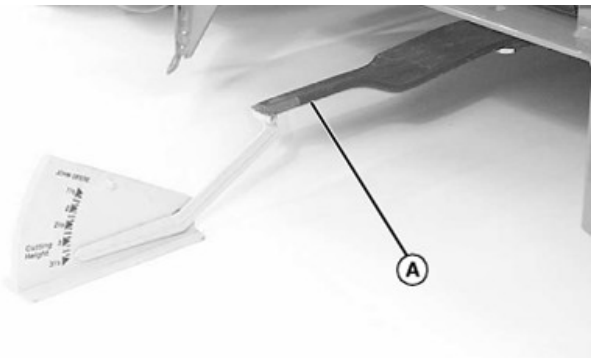
NOTE: Mower deck anti-scalp wheels should not contact the ground.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Inflate tires to correct pressure.
3. Inspect mower blades for:
   - Sharpness.
   - Damage.
   - Bent blades.

Checking Level (Side-to-Side)

NOTE: Mower deck anti-scalp wheels should not contact the ground.

1. Adjust mower deck to 76 mm (3 in) cutting height position.



TCAL43602—UN—26MAR13

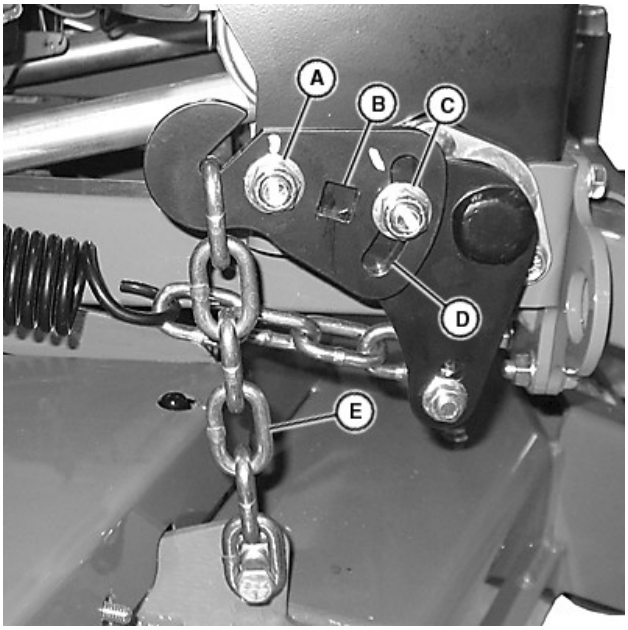
Discharge chute raised for photo clarity.

2. Position right mower blade (A) (discharge side) perpendicular to direction of travel.

NOTE: Use a short ruler or a leveling gauge (Part No. AM130907) to check the mower blade level.

3. Measure from outside blade tip to the ground.
4. Position left mower blade perpendicular to direction of travel.
5. Measure from outside blade tip to the ground.
   - The difference between measurements should be no greater than 3 mm (1/8 in).
6. If side-to-side level is not within the tolerance, an adjustment is necessary.

Adjusting Level (Side-to-Side)



TCAL48033—UN—19SEP13

A—Bolt
B—Square Hole
C—Adjusting Bolt
D—Pivot Bracket
E—Lift Chain

1. Support the weight of the deck with proper lifting device to relive tension from lift chain (E).
2. Loosen bolt (A) on both sides of mower deck.
3. Loosen bolt (C) on pivot bracket (D) on both sides of mower deck.
4. Insert 1/2 in drive ratchet in square hole (B) and reposition pivot bracket (D) and tighten hardware to specification.

Specification

Bolts—Torque. . . . . 61 N·m (45 lb·ft)

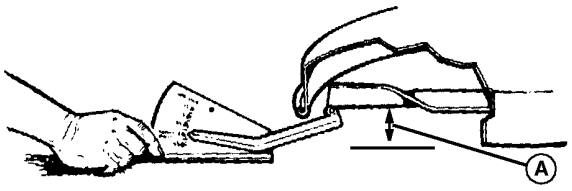
NOTE: Procedure may need to be performed several times to obtain correct measurements.

5. When adjustments have been made, verify measurements.

Checking Level (Front-to-Rear)

1. Set height-of-cut (HOC) to the 76 mm (3 in) cutting height position.
2. Position right mower blade (discharge side) parallel to direction of travel.
3. Measure from front blade tip to the ground.
4. Turn blade 180° and measure from rear blade tip to the ground.

NOTE: The height (A) of the rear blade tip should be between 3-6 mm (1/8-1/4 in) higher than the front blade tip.



TCAL43605—UN—26MAR13

5. If the front-to-rear level is not within the given tolerance, an adjustment is necessary.

KL66860,0000320-19-16AUG17

Checking and Adjusting Cutting Height

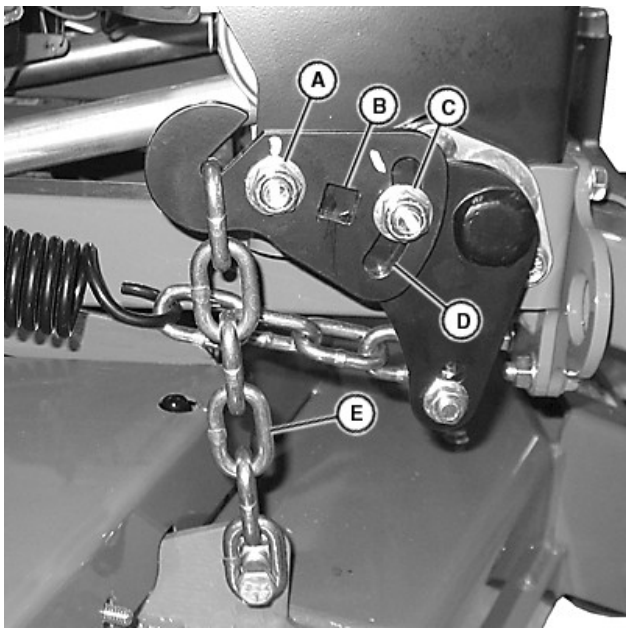
CAUTION: Rotating blades are dangerous. Before adjusting or servicing mower:

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

Checking Overall Cutting Height

1. Inflate tires to correct pressure.
2. Set mower deck to the 76 mm (3 in.) cutting height.
3. Position right mower blade (discharge side) in the front-to-rear position (parallel to the direction of travel).
4. Measure from front of blade tip to the ground.
5. If blade tip height is not within 73-79 mm (2-7/8-3-1/8 in.), an adjustment is needed.

Adjusting Level (Front-to-Rear)



TCAL48033—UN—19SEP13

A—Cap Screw
B—Square Hole
C—Adjusting Cap Screw
D—Pivot Bracket
E—Lift Chain

1. Support the weight of the deck with proper lifting device to relive tension from lift chain (E).
2. Loosen cap screw (A) on both sides of mower deck.
3. Loosen adjusting cap screw (C) on pivot bracket (D) on both sides of mower deck.
4. Insert 1/2 in. drive ratchet in square hole (B) and reposition pivot bracket (D).

NOTE: Procedure may need to be performed several times to obtain correct measurements.

5. Tighten hardware to specification.

Specification	
Bolts—Torque	61 N·m (45 lb.-ft.)

6. When adjustments have been made, verify measurements.

BB87125,000153A-19-20SEP13

Adjusting Deck Lift Spring Tension

NOTE: Deck lift spring tension is adjusted at the factory. If the effort required to raise or lower the mower deck is not satisfactory, an adjustment may be necessary.

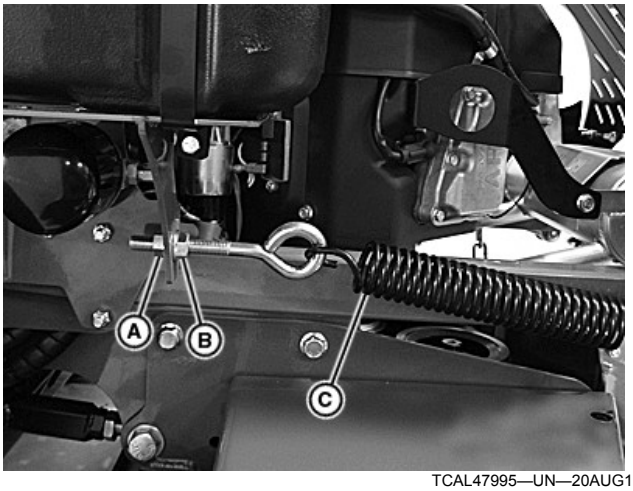
Check Spring Tension

1. Park machine on a hard, level surface.
2. Stop engine and lock park brake.
3. Raise the mower deck lift lever to the transport position.

Adjust Spring Tension

NOTE: Do not over-tension the deck lift arm spring. The further the spring is extended, the more freely the deck will float.

Decrease deck lift spring tension if operating in rough terrain.



TCAL47995—UN—20AUG13

1. Loosen cap screw (B).

NOTE: Using a 3/8 in. ratchet will help in the tension adjustment.

2. Face the front of the machine and adjust the spring tension:
   - To make the deck easier to lift, tighten cap screw (A) forward to increase spring tension (C).
   - To make the deck harder to lift, loosen cap screw (A) rearward to decrease spring tension (C).
3. When adjustments have been made, tighten cap screw (B).

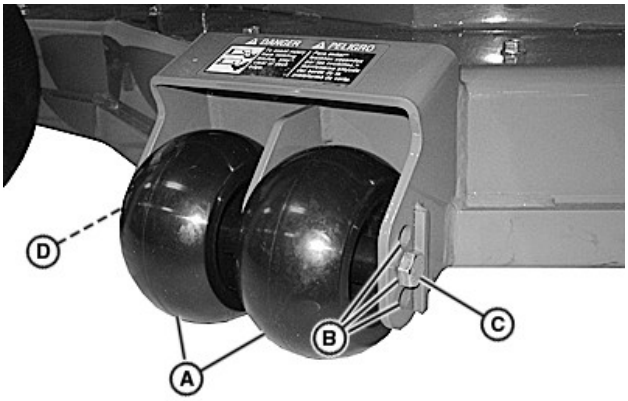
BB87125,000153B-19-04OCT13

Adjusting Mower Deck Anti-Scalp Wheels

NOTE: The flattest cut can be achieved by having all anti-scalp wheels adjusted off the ground. Check anti-scalp wheel adjustments each time the mower deck cutting height is changed.

It is recommended that all anti-scalp wheels be kept off the ground to minimize scuffing.

1. Inflate tires to correct pressure.
2. Adjust mower deck to desired cutting height.

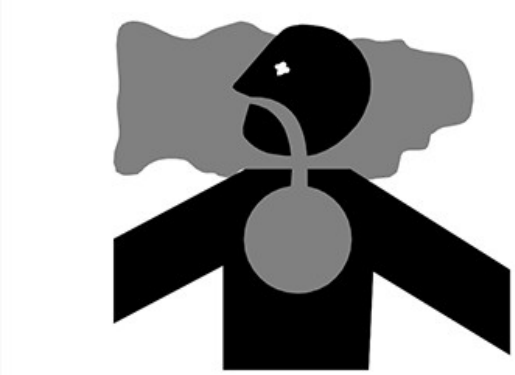


TCAL47941—UN—15AUG13

3. Adjust anti-scalp wheel (A) to one of three positions (B).
   - Remove cap screw (C) and locknut (D).
   - Adjust wheel up or down so it is approximately 6-13 mm (1/4-1/2 in.) above mowing surface.
4. Install wheel with attaching hardware.
5. Adjust all wheels to the same height.

BB87125,000153C-19-29AUG13

Testing Safety Systems



TCAL42193—UN—08MAR13

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

- **Move the machine 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.**

The safety systems installed on your machine should be checked before each machine use. Be sure you have read the machine operator's manual and are completely familiar with the operation of the machine before performing these safety system checks.

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

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

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

BB87125,000153D-19-28AUG13

Testing PTO Switch

1. Stand on the operator platform with motion control levers in the neutral position.
2. Lock park brake.
3. Press PTO switch to ON position to engage.
4. Turn key switch to the start position.

Result: The engine must not crank.

OUMX068,00010EA-19-22JUL16

Testing Blade Clutch/Brake Switch

1. Stand on the operator platform with motion control levers in the neutral position.
2. Lock park brake.
3. Start the engine.
4. Move throttle lever to 3/4 speed setting.
5. Press PTO switch to ON position to engage.
6. Press PTO switch to OFF position to disengage.
7. Repeat steps 5 and 6 several times.

Result: The blade clutch must stop the blades within 7 seconds.

OUMX068,00010EB-19-22JUL16

Testing Park Brake Switch

1. Press PTO switch to OFF position to disengage.
2. Unlock park brake.
3. Turn key switch to the start position.

Result: The engine must not crank.

OUMX068,00010EC-19-22JUL16

Testing Operator Presence Switch

1. Stand on the operator platform with motion control levers in the neutral position.
2. Start engine.
3. Unlock park brake.
4. Move throttle lever to 3/4 speed setting.

CAUTION: Avoid injury! Before engaging mower, make sure that area is clear of bystanders, especially children.

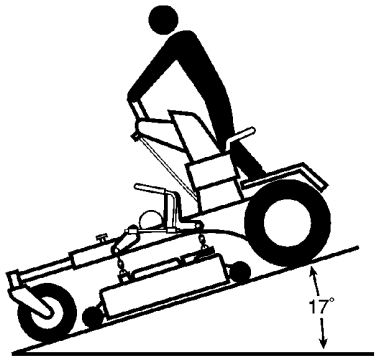
5. Press PTO switch to ON position to engage.
6. Step completely off the operator platform.

Result: The engine must stop.

OUMX068,00010ED-19-22JUL16

Testing Park Brake

1. Inflate tires to correct pressures.



TCAL43612—UN—26MAR13

2. Stop machine on a 17° slope (30% grade). Stop engine and lock park brake.

Result: Park brake must hold the machine stationary. Machine should move no more than 61 cm (24 in.) in one hour. If machine moves more than that, brake needs to be adjusted. See your John Deere dealer or

refer to Adjusting Park Brake in the Service Steering and Brake section.

BB87125,0001542-19-29AUG13

Using Park Brake

Locking Park Brake

TCAL47942—UN—15AUG13

- Raise park brake lever (A) to lock park brake.

Unlocking Park Brake

- Lower park brake lever (A) to unlock park brake.

BB87125,0001543-19-14AUG13

Using the PTO

Engage PTO

CAUTION: Avoid injury! Before engaging mower, make sure that area is clear of bystanders, especially children.

1. Stand on the operator platform with motion control levers in the neutral position.
2. Start engine.
3. Unlock park brake.
4. Move throttle lever to the 1/2 to 3/4 position.

APY08117—UN—28AUG18

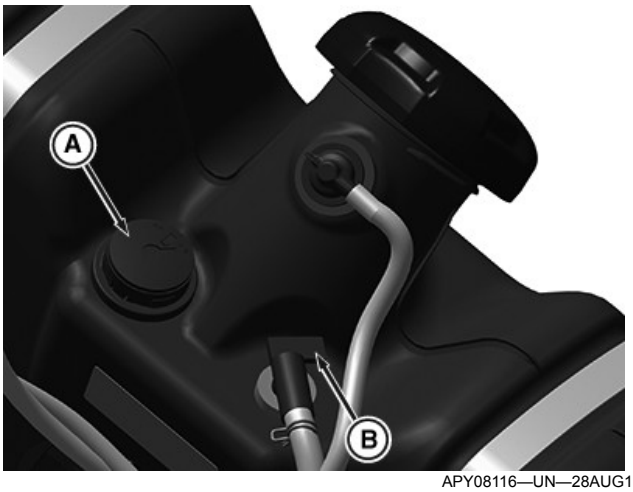
5. Press switch (A) to ON position engaging mower deck.
6. Move throttle lever forward to the fast position for mowing.

Disengage PTO

1. Press switch (A) to OFF position.
2. Lock park brake.

SU68010,0000156-19-28AUG18

Using Fuel Shutoff Valve and Fuel Gauge



APY08116—UN—28AUG18

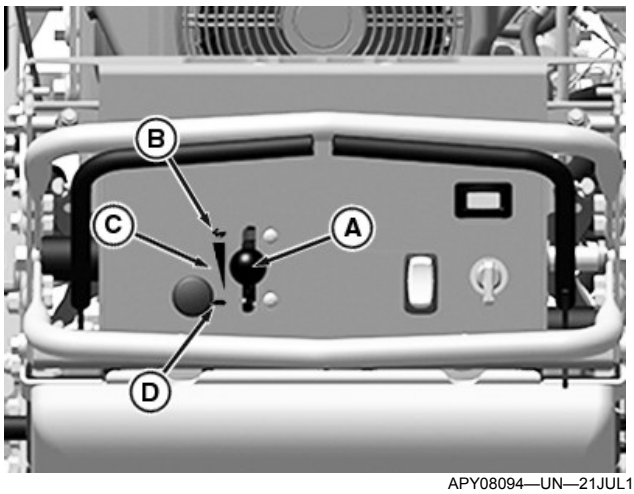
The fuel gauge (A) is located at the top of the tank, and will indicate the level of fuel in the tank.

NOTE: Do not fill the tank completely; allow for expansion. Fill the tank to 25 mm (1 in.) below the filler neck.

The fuel shutoff valve is located at the top of the tank. Move fuel shutoff valve (B) to the on position for normal operation. Move the fuel shutoff valve to the off position when the machine is not in use, and during transport.

SU68010,0000157-19-28AUG18

Using the Throttle



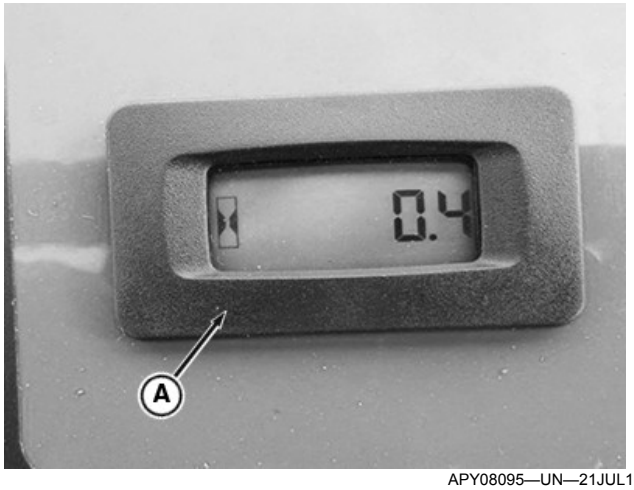
APY08094—UN—21JUL18

- Move throttle lever (A) forward to the fast position (B) when mowing.
- Move throttle lever (A) to the 1/2 fast position (C) when starting and warming the engine.
- Pull throttle lever (A) backward to the slow position (D) to idle engine. Do not run engine at slow idle any longer than necessary.

SU68010,000011A-19-21JUL18

Using the Digital Hour Meter

NOTE: Engine must be running before hours will accumulate.



APY08095—UN—21JUL18

- Hour meter (A) shows number of hours machine has been operated.
- Use hour meter and Service Interval section to determine when machine needs service.

SU68010,000011B-19-21JUL18

Using the Motion Control Levers

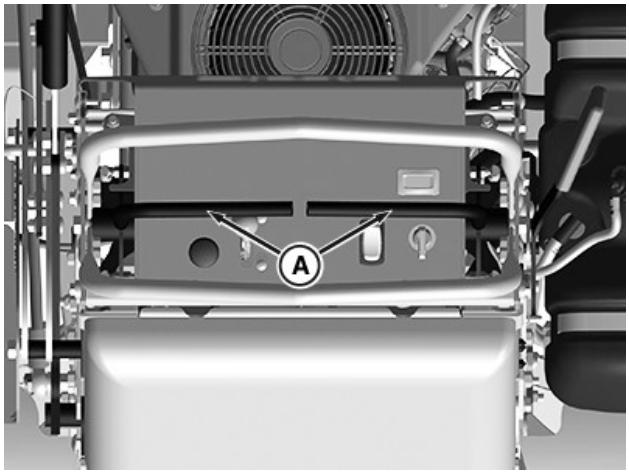
CAUTION: Avoid injury! Learn use of the motion control levers and practice at half throttle until becoming proficient and comfortable with the operation of the machine.

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

The functions of the motion control levers are:

- Steering
- Acceleration
- Deceleration

Neutral Position



APY08118—UN—28AUG18

Motion control levers (A) shown in the neutral position.

- Machine speed, motion, and direction can be controlled when the engine is running and park brake is unlocked.
- Operator can exit the mower with the engine running when the PTO switch is disengaged.

Forward and Reverse Motion

CAUTION: Avoid injury! Children or bystanders can be injured by runover and rotating blades. Before traveling forward or rearward:

- **Carefully check the area around the machine.**
- **Disengage the mower before backing up.**

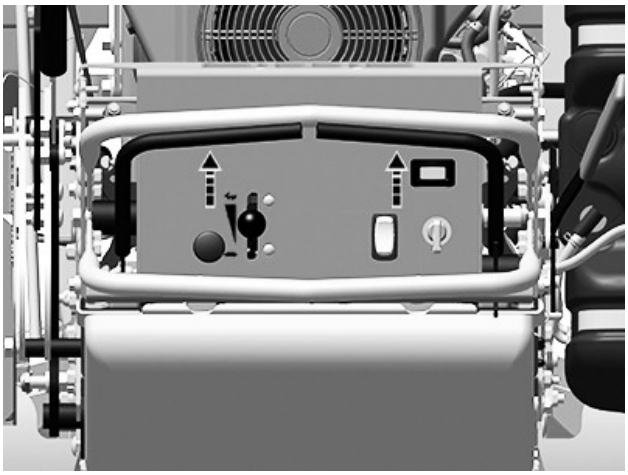
1. Move throttle lever to the fast position.
2. Unlock park brake.
3. Push motion control levers forward to begin forward motion. The farther forward the control levers are moved, the faster the machine travels.

- Forward speed range: 0—13.1 km/h (0—8.2 mph)

4. Pull both motion control levers rearward at the same time to begin reverse motion.
   - Reverse speed range: 0—5.6 km/h (0—3.5 mph)
5. To stop motion, slowly release motion control levers forward or rearward until the machine comes to a stop.

NOTE: The motion control linkages are adjustable. If adjustment is required, see Checking and Adjusting Motion Control Linkages in the Service Transmission section.

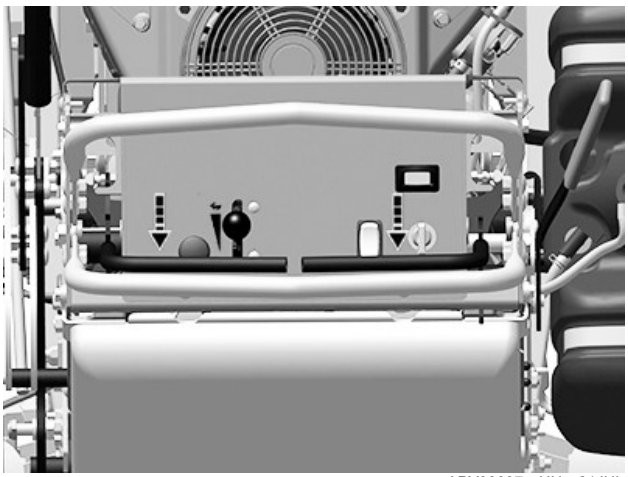
Forward



APY08096—UN—21JUL18

- Push both motion control levers forward at the same time.

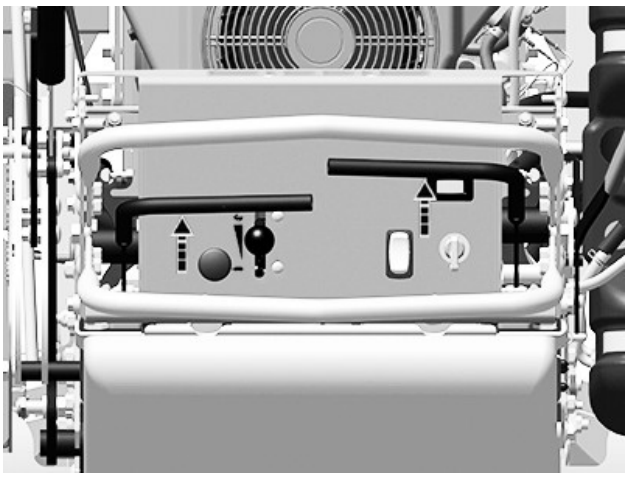
Reverse



APY08097—UN—21JUL18

- Pull both motion control levers past center rearward to stationary bar at the same time.

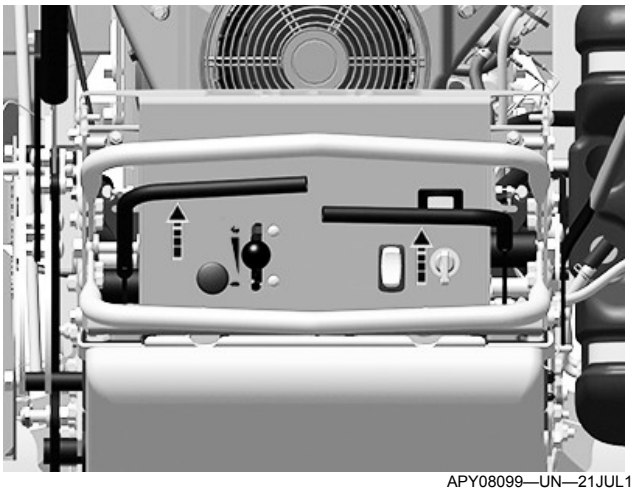
Gentle Left Turn



APY08098—UN—21JUL18

- Push right motion control lever farther forward than the left motion control lever.

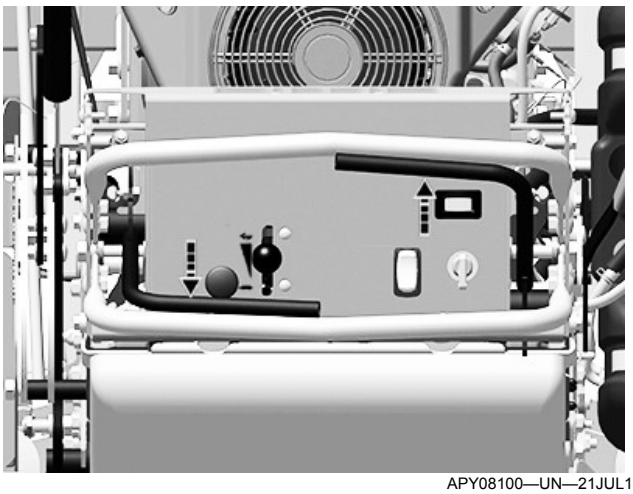
Gentle Right Turn



APY08099—UN—21JUL18

- Push left motion control lever farther forward than the right motion control lever.

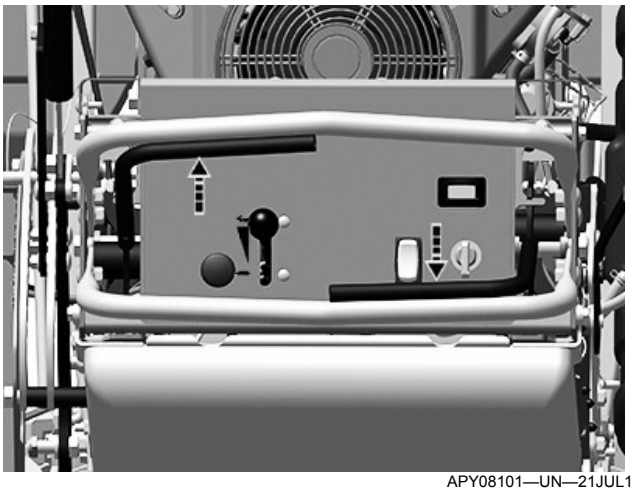
Sharp Left Turn



APY08100—UN—21JUL18

- Push right motion control lever forward and pull left motion control lever rearward at the same time.

Sharp Right Turn



APY08101—UN—21JUL18

- Push left motion control lever forward and pull right motion control lever rearward at the same time.

SU68010,000011C-19-28AUG18

Starting Engine

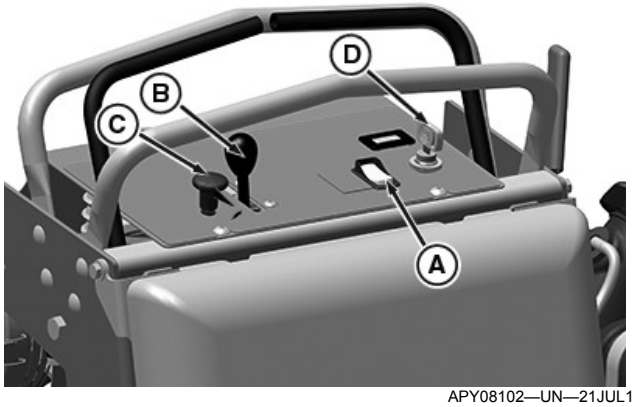
Before Starting the Engine

- Make sure that the motion control levers are in the exact neutral position.
- Lock park brake if it is not already locked.
- Ensure that PTO switch is down to disengage.
- Turn fuel valve to the on position.

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

- **Move the machine 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 out the exhaust fumes.**

1. Turn fuel shutoff valve to the on position.
2. Stand on the operator platform.
3. Lock park brake.
4. Allow motion control levers to return to the neutral position.



APY08102—UN—21JUL18

5. Press PTO switch (A) to OFF position disengaging PTO.
6. Move throttle lever (B) to 1/2 throttle engine speed:
   - **Cold engine:** Set throttle lever at the 1/2—3/4 fast position.
   - **Warm/hot engine:** Set throttle lever to the fast position.
7. Position choke knob (C):
   - **Cold engine (if equipped):** Pull choke knob up to the choke position.
   - **Warm/hot engine:** If necessary, pull choke knob up to the choke position.
8. Turn key switch (D) to the start position.
9. Release key to the run position when engine starts.
10. With engine started:
    - Push choke knob to the off position.
    - Move throttle lever to the fast position.
    - Unlock park brake.

SU68010,000011D-19-28AUG18

Engaging Mower

CAUTION: Avoid injury! Clear mowing area of all bystanders when operating this machine. Thrown objects could cause serious injury or death.

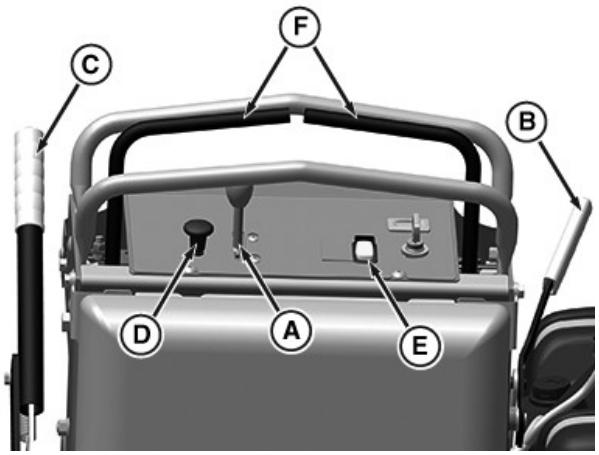
Keep hands and feet away from blades and discharge opening.

Do not mow in reverse unless necessary.

IMPORTANT: Avoid damage! To help prevent damage to PTO clutch:

- **Do not engage PTO with the throttle in the fast position.**

1. Adjust mower deck to desired cutting height.
2. Start engine.



APY08119—UN—28AUG18

3. Move throttle lever (A) to the 1/2 fast position.
4. Unlock park brake (B).
5. Lower deck lift lever (C).

NOTE: In cold weather or with a new machine, it can be necessary to engage choke knob (D) at the same time as PTO switch (E) to prevent engine from stalling.

6. Press PTO switch (E) to ON position engaging mower deck.
7. Move throttle lever to the fast position.

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

8. Push motion control levers (F) forward slowly. Mow at a safe travel speed.

SU68010,0000158-19-28AUG18

Stopping the Engine

IMPORTANT: To help prevent engine backfiring, throttle lever should be set at the 1/2 throttle position and run for 30 seconds prior to stopping the engine.

Do not stop engine when mower is on a slope of more than 30° for an extended period of time. Oil may run through valve train into carburetor and muffler.

1. Lock park brake.
2. Move throttle lever to the 1/2 fast position, and run for 30 seconds.
3. Turn key switch to stop position.

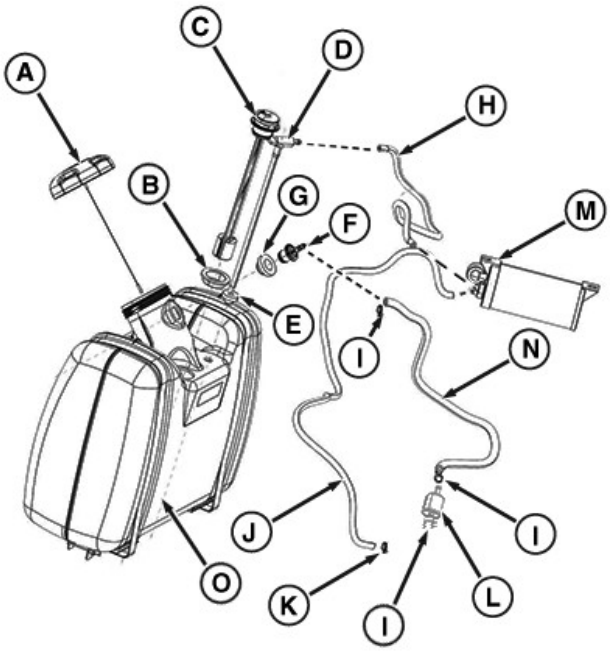
CAUTION: Children or bystanders may attempt to move or operate an unattended machine.

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

4. Remove key.
5. Turn fuel shutoff valve off.

BB87125,000154B-19-07OCT13

Checking Carbon Canister and Fuel Lines



APY08120—UN—28AUG18

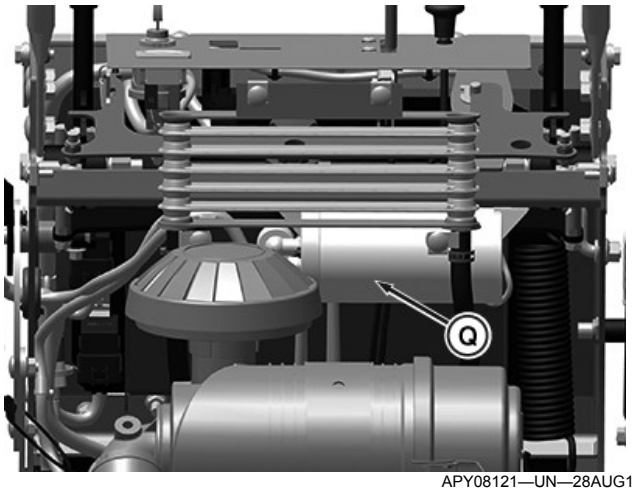
A—Fuel Tank Cap
B—Fuel Gauge Grommet
C—Fuel Level Gauge
D—Fuel Siphon

E—Bushing
F—Fuel Remote Vent
G—Grommet
H—Fuel Line
I—Hose Clamp (5 used)
J—Fuel Hose, 3/16-in. ID
K—Hose Clamp
L—Fuel Filter
M—Carbon Canister
N—Fuel Hose, 3/16-in. ID
O—Fuel Tank

- Do not alter or remove system components.

TCAL47944—UN—15AUG13

- Do not fill tank past “Max Fill Level” line (P).
- Overfilling could result in clogging the rollover vent and/or contaminating the purge canister.



APY08121—UN—28AUG18

- The vapor canister is located under the dash.
- Inspect and clean the dust filter (Q) every 500 hours or annually.

SU68010,0000159-19-28AUG18

Using Pump Bypass Valves

CAUTION: When the bypass valve is open, the machine will have unrestricted motion.

- **Do not open the bypass valve when the machine is stopped on an incline to prevent it from going downhill out of control.**

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

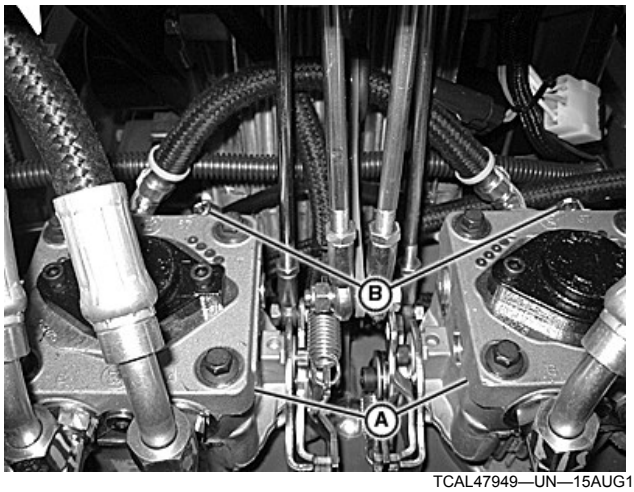
- **Move machine by hand only.**
- **Do not use another vehicle to move machine.**
- **Do not tow machine.**

NOTE: The pump bypass valves must be turned fully clockwise (closed) during normal machine operation.

When the machine needs to be moved without starting the engine, use the pump bypass valves:

1. Lock park brake.

NOTE: The pumps (A) are located at the rear of the engine. The bypass valves (B) are on the forward sides of the pumps and can be accessed by lifting the thigh pad.



TCAL47949—UN—15AUG13

2. Turn both pump bypass valves (B) clockwise approximately 1/2 turn (open position).
3. Unlock park brake.
4. Push machine to desired location. Due to hydraulic system drag, machine will move slowly.
5. Lock park brake.
6. Turn pump bypass valves (B) on both pumps 1/2 turn counterclockwise (closed position). Tighten valves to specification.

Specification	
Valve—Torque	11 N·m (100 lb.-in.)

BB87125,000154D-19-20SEP13

Transporting Machine on a Trailer

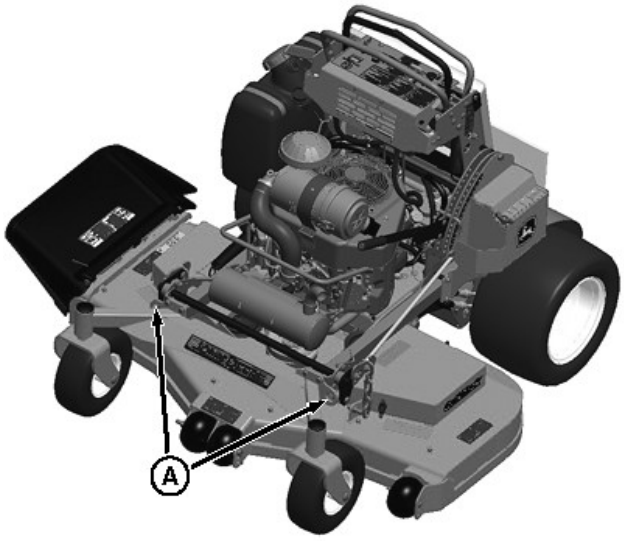
Use a heavy-duty trailer to transport the machine. Trailer must have signs and lights required by law.

NOTE: Trailer capacity must exceed combined machine weight and attachment weight. (See Specifications section in Operator's Manual).

CAUTION: Avoid injury! Use extra care when loading or unloading the machine onto a trailer or truck. Machine wheels can go off the ramp or trailer, causing the machine to tip over.

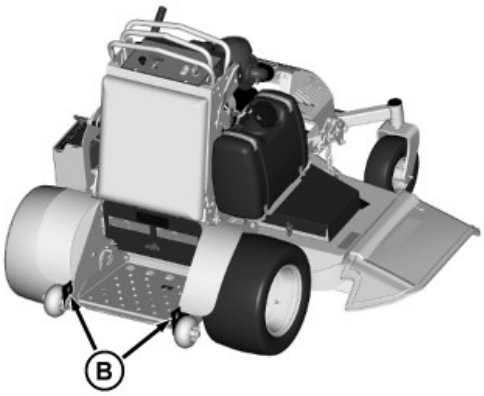
- **To load, back slowly and in a straight line. Keep wheels away from drop-offs and edges.**
- **Do not use two separate loading ramps. Use a full-width loading ramp at least 30 cm (12 in) wider than machine to keep caster wheels from going off the ramp edge.**
- **Use a trailer with sides.**

1. Park trailer on a level surface.
2. Raise mower deck to the transport position.
3. Back machine onto heavy-duty trailer with a full-width ramp.
4. Stop engine and lock park brake.
5. Lower the mower deck completely.
6. Remove key.
7. Turn fuel shutoff valve to the off position.



TCT015462—UN—16AUG17

8. Fasten front of the machine at both sides of the frame at points (A) to trailer with heavy-duty straps, chains, or cables. Straps must be directed down and outward from machine.



TCT014104—UN—20JUL16

9. Fasten rear of the machine at both sides of the frame at points (B) to trailer with heavy-duty straps, chains, or cables. Straps must be directed down and outward from machine.

KL66860,0000333-19-09OCT17

Cut Quality and Mowing Tips

- Mow grass with throttle lever in the full fast/mow position.
- Mow grass when it is dry.
- Keep mower deck and discharge chute clean.
- Mow with sharp blades.
- Properly level mower deck for a smooth cut.
- Mow grass frequently.
- Use a travel speed that fits the conditions:
  - Mow tall or wet grass twice. Cut the first pass at one inch above the desired height - then cut at desired height.
  - Travel slow when mowing tall or thick grass.
  - Avoid damaging grass by slipping or skidding machine drive wheels. Practice smooth control lever movements.
  - When performing sharp turns, do not allow inside machine drive wheel to stop and twist on grass.

MK71445,0000363-19-30JUN20

Mowing Travel Speeds

Use slow travel speeds for:

- Slopes.
- Trimming.
- Close quarters.
- Tall grass.

Use faster travel speeds for:

- Normal mowing on level ground.

Travel Speeds

Forward speed range is approximately 0-13 km/h (0-8.2 mph).

Reverse speed range is approximately 0-5.6 km/h (0-3.5 mph).

BB87125,0001550-19-04OCT13

Dismounting to Inspect Mower

CAUTION: Avoid injury! Help prevent serious injury. Keep hands and feet away from blades and the discharge opening.

Do not step on either side of the mower deck when mounting and dismounting the machine. Mount and dismount the machine using the front foot plate.

1. Park machine on a hard, level surface.
2. Press PTO switch to OFF position to disengage PTO.
3. Ensure motion control levers are in the neutral position.
4. Lock park brake.
5. Stop engine and remove key. Wait for mower blades to stop turning before leaving the operator platform.

OUMX068,00010EE-19-22JUL16

Servicing Your Machine

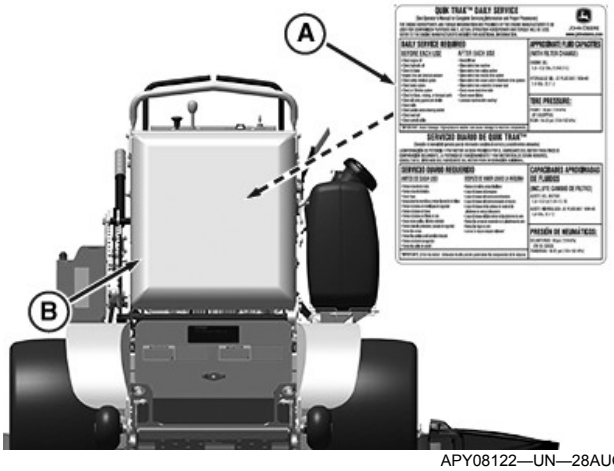
IMPORTANT: Avoid damage! Operating in extreme conditions requires more frequent service intervals:

- **Engine components may become dirty or plugged when operating in extreme heat, dust or other severe conditions.**
- **Engine oil can degrade if machine is operated constantly at slow or low engine speeds or for frequent short periods of time.**

IMPORTANT: Avoid damage! High-pressure washing can cause damage to machine components. It is recommended that your vehicle be washed by hand or with a garden hose using mild soap.

Avoid spraying water with any great force near or into the following places:

- **Air intake**
- **Electrical connections (including battery compartment)**
- **Wheel bearings**
- **Radiator (if equipped)**
- **Warning labels**
- **Other labels**
- **Ignition switch**
- **Instrument panel (gauges and switches)**
- **Breather/tube vents**
- **Mower spindles**
- **Mower idler bearings**
- **Transmission cooling fans**



APY08122—UN—28AUG18

The service interval label (A) is located on the back of the hydraulic reservoir, visible when the thigh pad (B) is raised.

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

Park the vehicle safely. (See Park Safely in the SAFETY section.)

SU68010,0000152-19-28AUG18

Service Intervals

Before Each Use

- Check engine oil.
- Check hydraulic oil.
- Check for leaks.
- Inspect tires and check air pressure.
- Check safety interlock system.
- Check brake system.
- Check air filtration system.
- Check for loose, missing, or damaged parts.
- Check all safety guards and shields.
- Check belts.
- Check pedals and / or steering control.

After Each Use

- Check/fill fuel.
- Clean debris from machine.
- Clean debris from cooling system.
- Clean debris from underside of mower deck.
- Check mower blades.
- Lubricate machine after washing.

Break-In (After First 10 Hours)

- Check and tighten wheel hardware.
- Check hydraulic pump drive belt.
- Check mower deck drive belt tension.

Every 50 Hours or Yearly.

- Lubricate deck components.
- Clean battery terminals and check battery fluid level (if applicable).
- Lubricate traction and brake linkage components.
- Check rotary blade bolt torque.
- Lubricate caster wheels.
- Check belts.
- Check all control cables.

Every 100 Hours or Yearly

- Change engine oil and filter.
- Inspect mower deck drive belt.
- Inspect traction drive belt.
- Remove clean-out panels from cooling shroud and clean cooling fins and oil cooler (if equipped).

Every 200 Hours or Yearly

- Check all hoses and clamps.
- Check all lines and fittings.

Every 300 Hours

- Check primary air filter, replace if needed.
- Check and adjust valve clearance.
- Change transmission oil and filter.
- Change fuel filter.
- Clean dust filter on vapor canister.

Every 500 Hours

- Check engine high and low idle.
- Change secondary air filter, replace if needed.
- Remove combustion chamber deposits.
- Remove cooling shroud and clean cooling fins and oil cooler (if equipped).

Every 1000 Hours

- Inspect deck idler pivot bearing.
- Check deck idler pivot bearings.
- Change spark plugs.

d6vudh3,1656052980490-19-24JUN22

Grease

IMPORTANT: Use recommended John Deere greases to avoid component failure and premature wear.

The recommended John Deere greases are effective within an average air temperature range of -29 to 135 degrees C (-20 to 275 degrees F).

If operating outside that temperature range, contact your Servicing dealer for a special-use grease.

The following greases are preferred:

- John Deere Multi-Purpose SD Polyurea Grease
- John Deere Multi-Purpose HD Lithium Complex Grease
- John Deere Moly High Temperature EP Grease
- John Deere Special-Purpose HD Water Resistant Grease

If not using any of the preferred greases, be sure to 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.

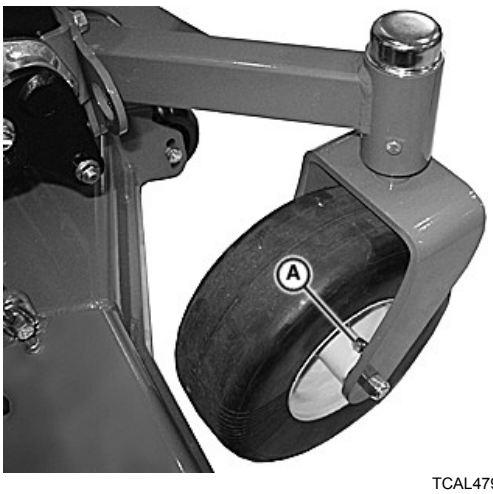
NOTE: Some types of grease thickeners are not compatible with others. Consult your grease supplier before mixing different types of grease.

OUO1082,0000A8D-19-23JUL15

Lubrication

- Lock park brake, stop engine, and remove the key.
- Clean grease fittings using a rag.
- Connect grease gun to fitting and pump until grease begins to ooze from the bearings.
- Wipe off excess grease.
- Do not use spray lube of any kind on choke and/or throttle cables.

Lubricating Front Caster Spindles and Wheels



TCAL47951—UN—15AUG13

- Lubricate axle grease fitting (A) on each front wheel.

BB87125,0001557-19-19SEP13

Emissions Service Information

A qualified repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems with original or equivalent replacement parts. However, warranty, recall and all other services paid for by John Deere must be performed at an authorized John Deere service center.

Within the warranty period, John Deere will reimburse reasonable service costs incurred at service providers outside the John Deere authorized network only in an unsafe, emergency condition if an authorized John Deere dealer is not available and the failure does not arise from the owner's misuse or failure to perform required maintenance. An emergency situation exists under this section if, after 30 days, the authorized John Deere network is unable to perform the repairs or source replacement parts.

Emission Control System Certification Label

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 John Deere 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 John Deere that have been certified by the EPA and/or CARB; and used in the United States and Canada in off-road mobile equipment.

Altitude Adjustment (Gasoline or Propane Converted Engines Only)

If your engine features a carburetor it is calibrated by the engine manufacturer and is not adjustable.

If your engine is operated at altitudes below 610 m (2,000 ft.), a high altitude carburetor jet kit is not required. If your engine is operated at altitudes above 610 m (2,000 ft.), a high altitude carburetor jet kit may be required for proper engine performance and emissions control. Operating the engine with the wrong carburetor configuration at a given altitude may increase the engine's emissions and decrease fuel efficiency and performance.

See a qualified service provider for details on jet kit requirements for your specific product.

TC00531,00000EC-19-28MAR16

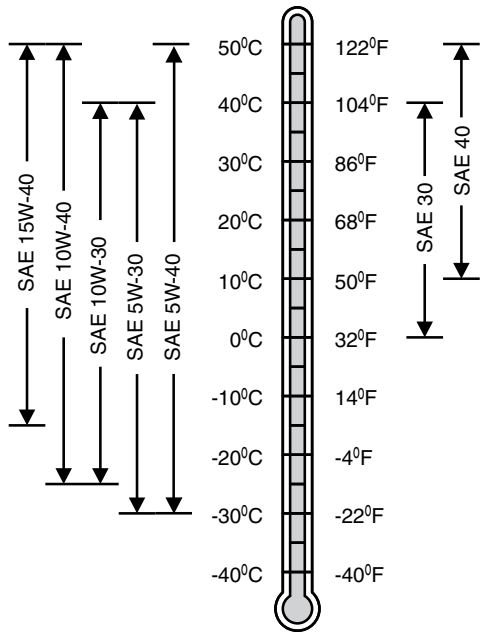
Avoid Fumes

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

- **Move the machine 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.**

TH84124,0000218-19-16JUL13

Gasoline Engine Oil



TS1744—UN—25AUG20

Oil Viscosities for Air Temperature Ranges

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

Using single viscosity grade oils such as SAE 30 or SAE 40 can reduce oil consumption in air cooled engines.

The following oils are approved:

- John Deere Plus-50™ II
- John Deere Turf-Gard™

Other oils may be used if they meet one or more of the following:

Plus-50 is a trademark of Deere & Company
Turf-Gard is a trademark of Deere & Company

- ILSAC GF-6A
- API Service Category SP
- API Service Category SN
- API Service Category SM
- API Service Category SL
- API Service Category SJ
- ACEA Oil Sequence A3/B3
- ACEA Oil Sequence A3/B4
- ACEA Oil Sequence A5/B5
- ACEA Oil Sequence C5
- ACEA Oil Sequence C4
- ACEA Oil Sequence C3
- ACEA Oil Sequence C2
- ACEA Oil Sequence C1

DX,ENOIL2-19-15JUL20

Checking Engine Oil Level

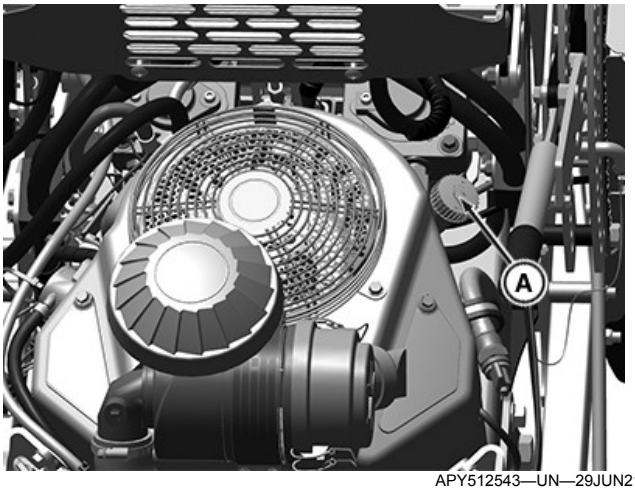
IMPORTANT: Failure to check the oil level regularly could lead to serious engine problems if oil level is low:

- **Check oil level before operating.**
- **Keep oil level between the FULL and the ADD marks.**
- **Check oil level when engine is stopped, level, and is cooled so oil has had time to drain into the sump.**

NOTE: Check oil twice a day if you run engine more than 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. Allow engine to cool.



APY512543—UN—29JUN21

3. Clean area around dipstick cap (A).
4. Remove dipstick cap (A). Wipe dipstick clean.

NOTE: Do not tighten dipstick cap when checking oil level.

5. Insert dipstick in tube. Do not tighten cap.
6. Remove dipstick. Check oil level on dipstick. Oil level should be in crosshatch area between ADD and FULL marks.
   - If oil is low, add oil to bring oil level no higher than FULL mark on dipstick.
   - If oil level is above FULL mark, drain to proper level.
7. Insert dipstick. Tighten cap.

VS70618,0000D29-19-29JUN21

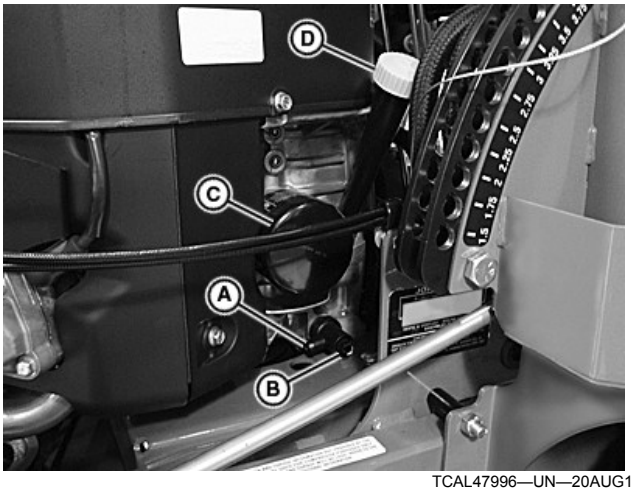
Changing Engine Oil and Filter

CAUTION: Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Allow the engine to cool before servicing or working near the engine and components.

IMPORTANT: Change the oil more often if the machine is used in extreme conditions:

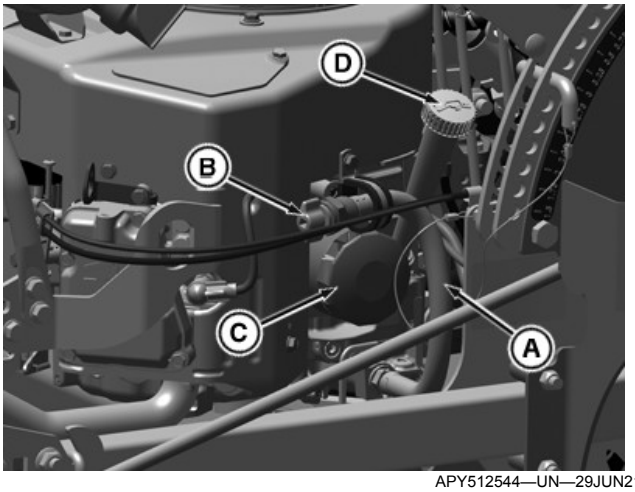
- **Extremely dusty conditions.**
- **Frequent slow or low-speed operation.**
- **Frequent short trips.**

1. Start engine and run until it reaches normal operating temperature.
2. Park machine safely. (See Parking Safely in the Safety section.)



TCAL47996—UN—20AUG13

Drain valve outlet (648M and 652M)



APY512544—UN—29JUN21

Drain Valve Outlet (636M)

3. Attach plastic drain tube to drain valve outlet (A) for 648M and 652M. The 636M has a drain hose (A) attached directly to the engine with a drain hose fitting (B) on the end of the hose.
4. Place oil drain pan under drain tube.
5. Turn drain valve (648M and 652M) (B) or drain hose fitting (636M) (B) counterclockwise to open.
6. Allow oil to drain into oil drain pan.
7. After oil drains, turn drain valve (648M and 652M) (B) or drain hose fitting (636M) (B) clockwise to close. Remove any temporary drain tubes or funnels that may have been added.
8. Turn oil filter (C) counterclockwise to remove.
9. Apply a film of clean engine oil to gasket of new filter.
10. Install filter. Turn filter clockwise until gasket makes contact with mounting surface. Tighten 1/2 to 3/4 turn after gasket contact.
11. Clean area around dipstick cap (D).
12. Remove dipstick cap.
13. Add oil to specification.

Specification

Oil—Capacity (648M and 652M)	2.1 L (2.2 qt.)
Oil—Capacity (636M)	1.7 L (1.8 qt.)

14. Insert dipstick. Tighten cap.
15. Start engine and run at slow throttle for approximately 2 minutes. Check for leaks around filter and drain valve.
16. Stop engine.
17. Check oil level:
    - Remove dipstick cap. Wipe dipstick clean.

    NOTE: Do not tighten dipstick cap when checking oil level.

    - Insert dipstick. Do not tighten cap.
    - Remove dipstick. Oil level should be between the ADD and FULL marks. Add oil if needed.
18. Insert dipstick. Tighten cap.

VS70618,0000D2A-19-29JUN21

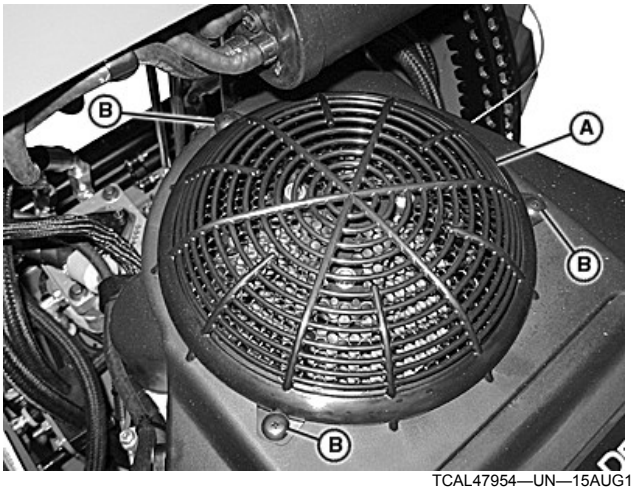
Cleaning Engine Air Intake Screen and Fan

CAUTION: Compressed air can cause debris to fly a long distance.

- **Clear work area of bystanders.**
- **Wear eye protection when using compressed air for cleaning purposes.**
- **Reduce compressed air pressure to 210 kPa (30 psi).**

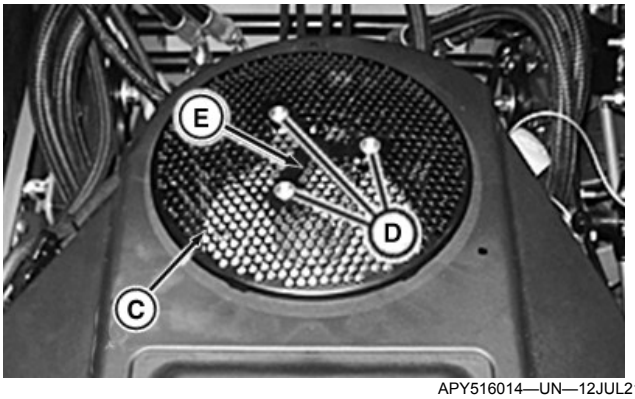
IMPORTANT: An obstructed air intake screen can cause engine damage due to overheating. Keep air intake screen and other external surfaces of the engine, including cooling fins, clean at all times to allow adequate air intake.

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



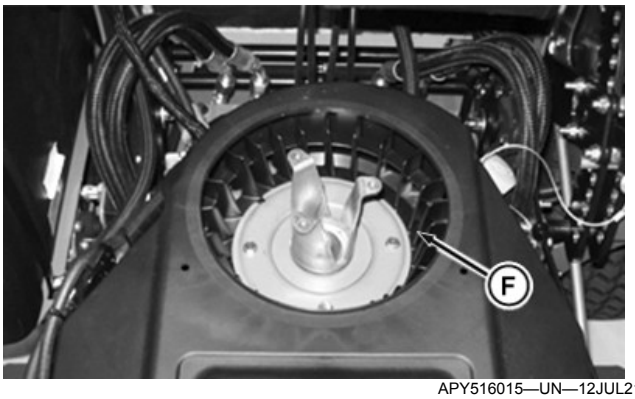
TCAL47954—UN—15AUG13

2. Clean outer air intake screen (A) with a rag, brush, or compressed air.
3. Remove three cap screws (B) and remove outer air intake screen (A).



APY516014—UN—12JUL21

4. Clean inner screen (C) with a rag, brush, or compressed air.
5. Remove three screws (D), inner screen (C), and spacer (E).



APY516015—UN—12JUL21

6. Clean fan (F) using a rag, brush, or compressed air.
7. Install inner screen and spacer, and secure with three screws.
   - Tighten screws to specification.

Specification

Screw—Torque. . . . . 9.9 N·m (88 lb.-in.)

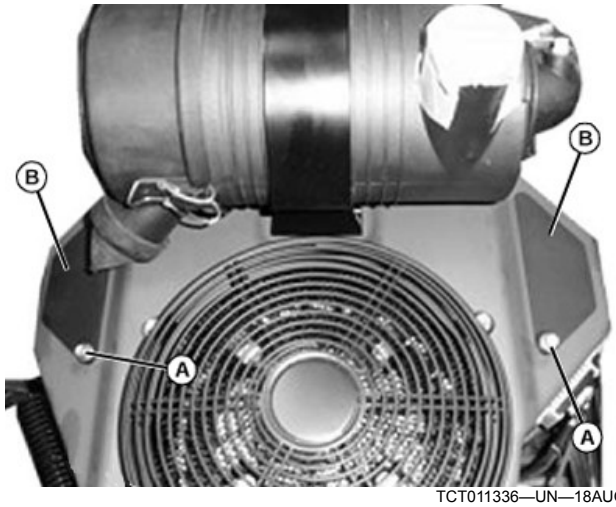
8. Install outer air intake screen and secure it to the engine with cap screws.

VS70618,0000D57-19-12JUL21

Cleaning Engine Cooling Fins

IMPORTANT: An obstructed air intake screen can cause engine damage due to overheating. Keep air intake screen and other external surfaces of the engine, including cooling fins, clean at all times to allow adequate air intake.

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



TCT011336—UN—18AUG15

2. Remove two screws (A) and two covers (B).

CAUTION: Compressed air can cause debris to fly a long distance.

- **Clear work area of bystanders.**
- **Wear eye protection when using compressed air for cleaning purposes.**
- **Reduce compressed air pressure to 210 kPa (30 psi).**

3. With compressed air, thoroughly clean debris buildup.
4. Install two covers on shroud.

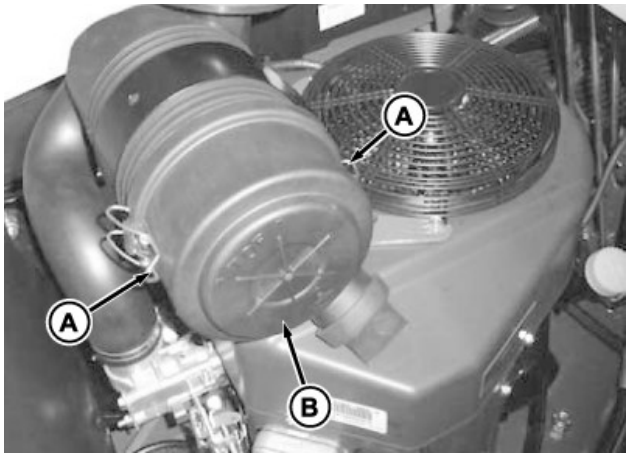
VS70618,0000D2B-19-29JUN21

Servicing Air Cleaner Elements

IMPORTANT: Dirt and debris can enter the engine when removing the air cleaner elements. Service elements only at prescribed intervals.

Servicing Primary Air Cleaner Element

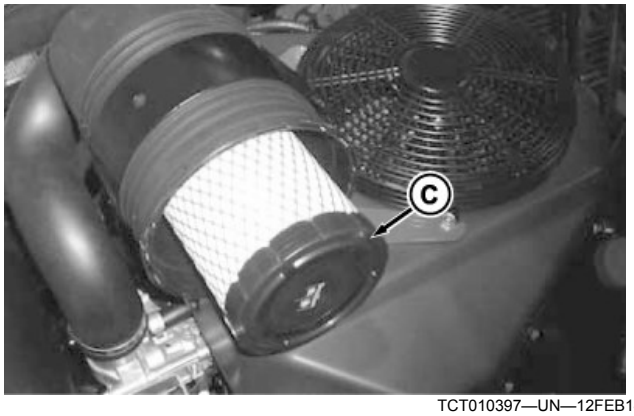
1. Park the machine safely. (See Parking Safely in the safety section.)
2. Allow the engine to cool.



TCT010396—UN—12FEB14

3. Release latches (A) and remove the air cleaner canister cover (B).

NOTE: Inspect the secondary air cleaner element. Replace if necessary.

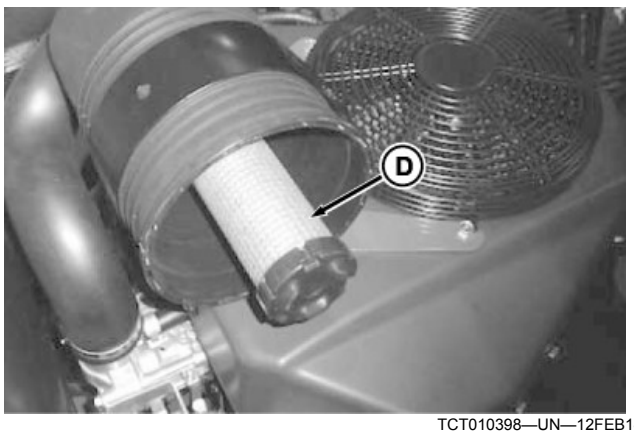


TCT010397—UN—12FEB14

4. Remove and discard the primary element (C). Replace it with the new primary element.
5. Install the air cleaner canister cover with rubber dust unloading valve pointing downward.

Servicing Secondary Air Cleaner Element (648 and 652)

1. Remove the primary air cleaner element.



TCT010398—UN—12FEB14

2. Remove and discard the secondary air cleaner element (D). Install the new secondary element.
3. Install the primary air cleaner element.
4. Install the air cleaner canister cover with rubber dust unloading valve pointing downward.

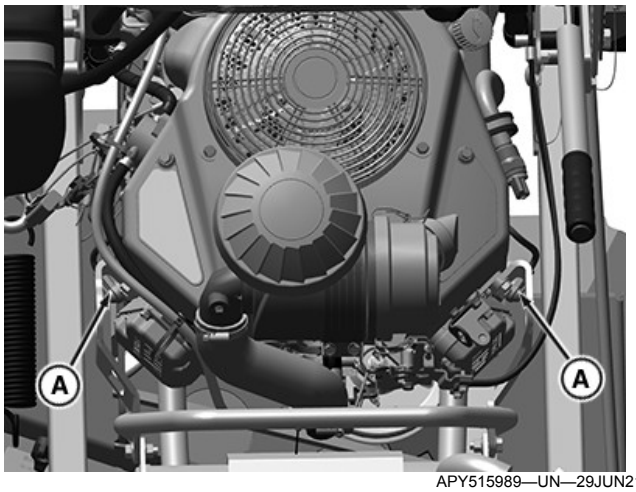
VS70618,0000CCF-19-02JUL21

Checking Spark Plugs

CAUTION: Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Allow the engine to cool before servicing or working near the engine and components.

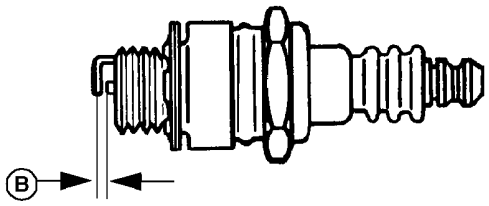
IMPORTANT: Do not clean spark plugs with abrasives.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Clean area around both spark plugs.



APY515989—UN—29JUN21

3. Disconnect the spark plug wire (A) from each plug.
4. Remove and inspect spark plugs:
   - Clean each plug and check for damage. Replace if necessary.
   - If plugs are in good condition, check gap.



TCAL43655—UN—26MAR13

5. Check and adjust spark plug gap (B) to specification.

Specification

Spark Plug—Gap. . . . . 0.75 mm (0.030 in.)

6. Install spark plugs and tighten to specification.

Specification

Spark Plug—Torque. . . . . 22 N·m (16 lb.-ft.)

7. Install both spark plug wires.

VS70618,0000D2C-19-29JUN21

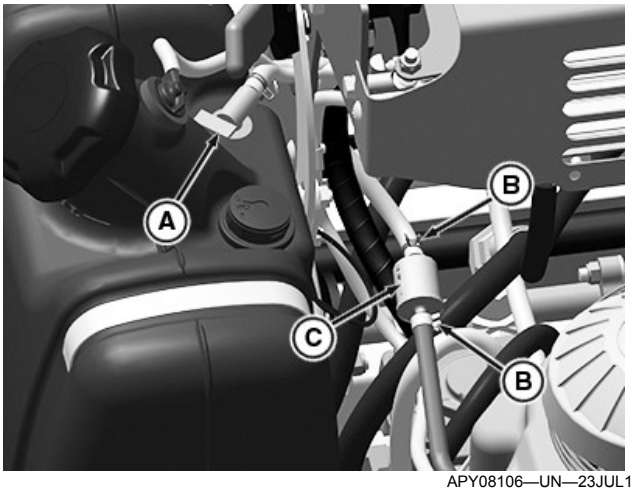
Replacing Fuel Filter

CAUTION: 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.**

IMPORTANT: When installing a new fuel filter, the filter arrow must be pointed in the direction of the fuel flow.

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Allow engine to cool.



APY08106—UN—23JUL18

3. Turn fuel shutoff valve (A) to the off position.
4. Slide hose clamps (B) away from fuel filter (C).
5. Place drain pan under hoses to catch any fuel that may be left in the hoses.
6. Disconnect hoses from fuel filter (C).
7. Install new fuel filter (C).
   - Make sure fuel filter is installed with the arrow pointing in the direction of fuel flow.
8. Connect hoses to new fuel filter (C).
9. Install hose clamps (B).

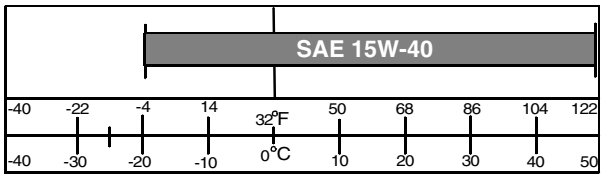
SU68010,000011E-19-23JUL18

Spark Arrestor Maintenance (If Equipped)

Spark arrestor assemblies include a screen element that should be inspected and cleaned periodically. Visually inspect the screen for tears, broken wires, or loose welds. Replace the spark arrestor assembly if any of these conditions exist. If the screen is determined to be in good condition, proceed with cleaning the screen by brushing away loose dirt or carbon using a brush.

RM87422,00002DA-19-05JUL17

Hydraulic Oil



TCAL43657—UN—26MAR13

Use the following oil viscosity based on the air temperature range. Operating outside of the recommended oil air temperature range may cause premature hydrostatic transmission failure.

IMPORTANT: Only use a quality oil in this transmission. Do not mix any other oils in this transmission. Do not use BIO-HY-GARD® in this transmission. Do not use Type F (Red) Automatic Transmission Fluid in this transmission.

The following oil is recommended:

- JD Plus 50® II 15W-40 .

Oil must meet the following:

- API Service Classification SG or higher

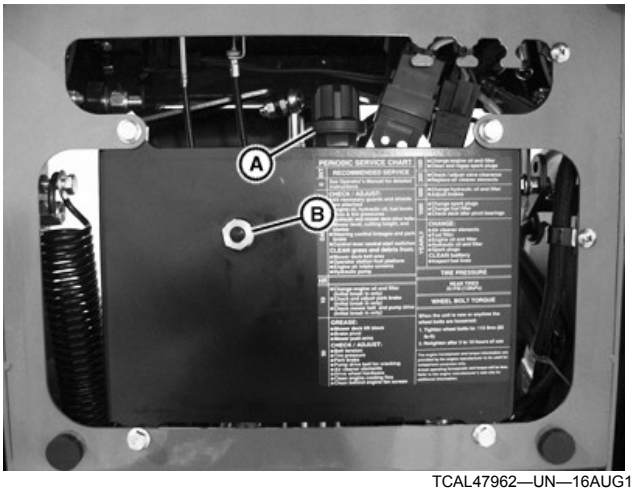
BB87125,0001568-19-04OCT13

Checking Hydraulic Oil Level

IMPORTANT: Check oil level in reservoir tank when oil is cold.

Do not overfill oil reservoir tank. Oil will expand during operation and could overflow.

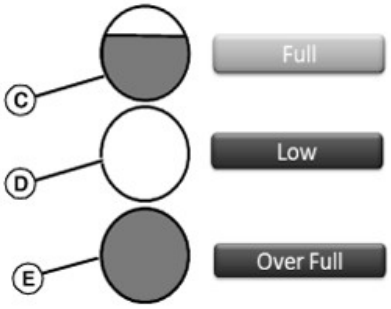
1. Park machine safely. (See Parking Safely in the Safety section.)
2. Lift thigh pad.



TCAL47962—UN—16AUG13

3. Clean area around the breather cap (A) and remove.

NOTE: The oil level should not be below the sight glass and not more than ½ in. above the top of the sight glass.



TCAL43659—UN—26MAR13

4. Locate the reservoir sight glass (B) and verify the hydraulic oil level is at the FULL mark (C):
   - If oil is low (D), add oil to bring oil level no higher than 1/2 in. above the sight glass.
   - If oil is 1/2 in above the sight glass FULL mark (E), drain oil to proper level.
5. Lower thigh pad.

BB87125,0001569-19-11OCT13

Changing Hydraulic Oil and Filter

CAUTION: 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.

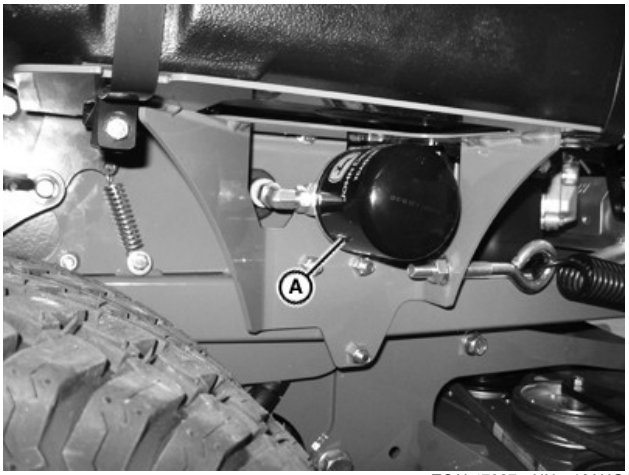
Use caution when filling and draining hydraulic oil. During periods of machine operation, the hydraulic oil reservoir can get hot. Allow engine and oil reservoir to cool before servicing.

IMPORTANT: 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.

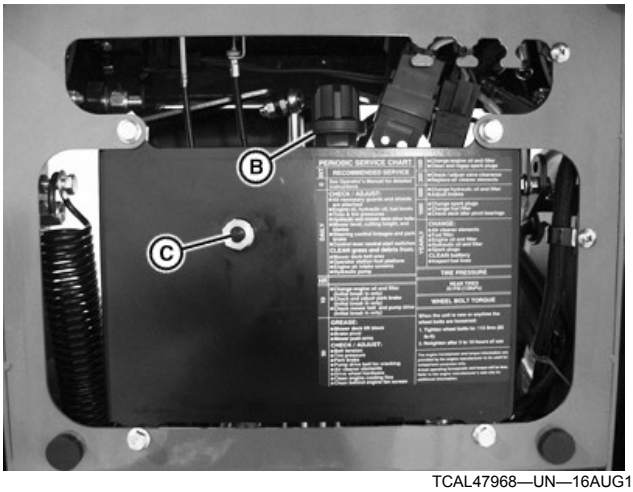
1. Park machine safely. (See to Parking Safely in the Safety section.)
2. Allow engine and hydraulic oil reservoir to cool.
3. Lift thigh pad.

NOTE: Place drain pan directly under filter head.



TCAL47967—UN—16AUG13

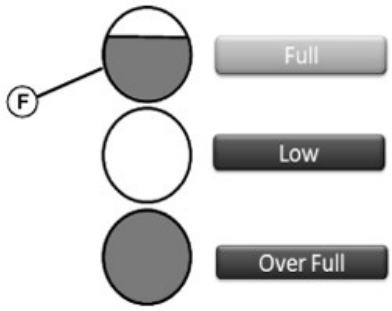
4. Turn oil filter (A) counterclockwise to remove.
5. Allow hydraulic oil to drain into drain pan.
6. Apply a film of clean hydraulic oil to gasket of new filter.
7. Install new filter. Turn filter clockwise until the housing touches the metal edge of the filter to avoid leaking.



TCAL47968—UN—16AUG13

8. Clean area around breather cap (B).

NOTE: The oil level should not be below the sight glass and not more than 1/2 in. above the top of the sight glass.



TCAL43661—UN—26MAR13

9. Remove breather cap (B) and fill oil reservoir to the correct level (F), approximately 1.9 L (2.0 qt) of oil. Install breather cap.
10. Before starting engine bleed the hydraulic system. See Bleeding Air From Hydraulic System.
11. When the hydraulic system is free of all air, start engine.
12. Move throttle lever to the fast position.
13. Unlock park brake.

CAUTION: Help prevent serious bodily injury. Remain alert to other people and the surroundings when operating the machine.

14. Cycle motion control levers forward and rearward several times. Check for leaks around filter.
15. Stop engine. Check oil level, and add oil as necessary to bring oil level to FULL mark on the reservoir sight glass (C).
16. Lower thigh pad.

KL66860,000031F-19-09OCT17

Bleeding Air From Hydraulic System

Due to the effects air has on hydrostatic drives, it is critical that all air is removed or purged from the system whenever the system has been opened for maintenance or repairs.

NOTE: When any of the hydraulic parts are disconnected or removed or when the oil is changed, air must be bled from the system.

Symptoms That Air Is Trapped in the System

- Noisy Operation
- Lack of Power or Drive After Short-Term Operation
- High Temperature and Excessive Expansion of Oil

CAUTION: 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.

Certain procedures require the vehicle engine to be operated and the vehicle to be raised off the ground.

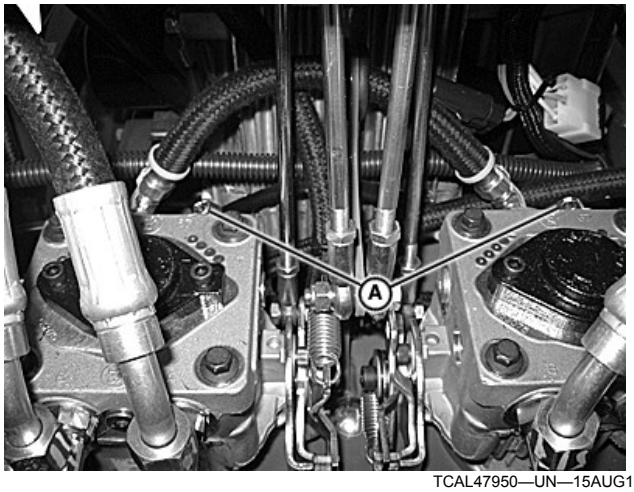
Prevent possible injury to the servicing technician and/or bystanders, insure the vehicle is properly secured.

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

If air enters into the system, loss of power, excessive heat, and damage to the hydraulic pumps may occur.

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Ensure hydraulic reservoir fluid is at the proper level before proceeding.



TCAL47950—UN—15AUG13

3. Open the bypass valves (A) on each hydraulic oil pump approximately 1/2 turn and start the engine.

NOTE: As air is purged from the system, the fluid level in the hydraulic reservoir will drop.

4. Slowly release the park brake, and carefully operate the control levers back and forth 5-6 times.
5. Shut the engine off and close the bypass valves (A).
6. Start the engine again, and slowly operate the control levers back and forth 5-6 times.
7. It may be necessary to repeat this until all the air has been purged from the system.
8. After purging is complete, check the fluid level in the reservoir and add fluid if necessary.
9. When the machine moves at normal speed in forward and reverse and the fluid remains at a constant level, purging is complete.
10. Turn pump bypass valves (A) on both pumps 1/2 turn clockwise (closed position). Tighten valves to specification using a 5/8" hex head socket.

Specification	
Valve—Torque	11 N·m (100 lb.-in.)

BB87125,000156B-19-04OCT13

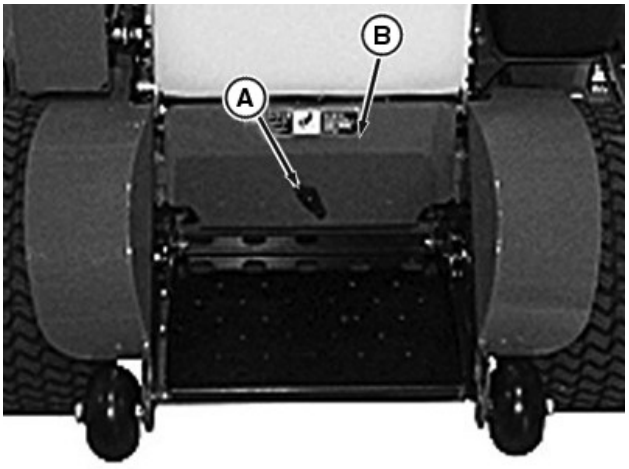
Checking and Replacing Traction Drive Belt

CAUTION: Rotating parts can catch fingers, loose clothing, or long hair. Wait for engine and all moving parts to stop before leaving operator station to adjust or service machine.

NOTE: The traction drive belt will not require a tension adjustment. Belt is self-adjusted using a spring tensioner.

Checking Traction Drive Belt

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

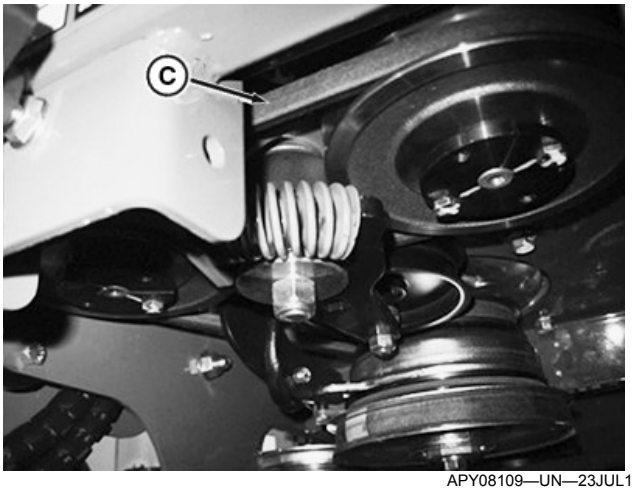


APY08110—UN—23JUL18

2. Remove retaining knob (A), and remove belt access panel (B).

NOTE: Support mower deck securely before performing this procedure. Do not depend on latching mechanism alone to support the mower deck.

3. Raise mower deck to the highest cutting height position.

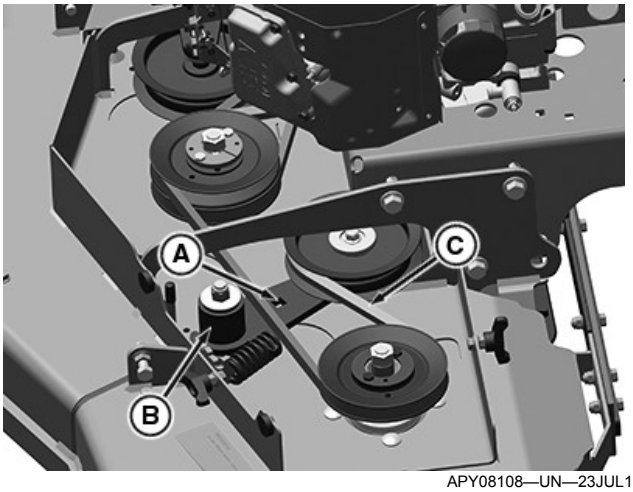


APY08109—UN—23JUL18

4. Inspect belt (C) for excessive wear, damage, or stretching.

Removing Traction Drive Belt

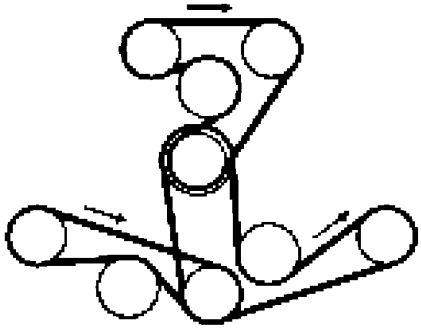
1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Remove mower deck drive belts. See Replacing Mower Deck Drive Belt in the Service Mower section.



APY08108—UN—23JUL18

3. Insert a 1/2 in. drive ratchet or breaker bar in square hole (A) in idler pulley arm (B).
4. Rotate idler pulley arm (B) to remove tension from drive belt (C).
5. While holding idler pulley arm, remove traction drive belt (C).

Installing Traction Drive Belt



TCAL43667—UN—26MAR13

1. Use a 1/2 in. drive ratchet or breaker bar to rotate idler pulley arm as shown and hold in place.
2. Install traction drive belt on drive sheaves.
3. Slowly allow idler arm to rotate into belt.
4. Install belt shield.

SU68010,000011F-19-23JUL18

Checking and Adjusting Motion Control Linkages

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

- **Move the machine 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.**

NOTE: Check and adjust motion control linkages with the machine parked on a firm, level surface.

CAUTION: The machine can fall or slip from an unsafe lifting device or supports.

- **Use a safe lifting device rated for the load to be lifted.**
- **Lower machine onto jack stands or other stable supports and block wheels before servicing.**

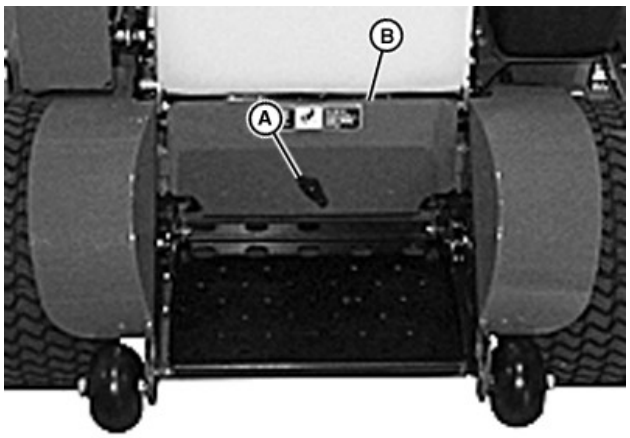
Checking Neutral Position

Neutral refers to mower movement when the engine is at full throttle, parking brake is off, and the control levers are in the neutral position. The mower should not move forward or backward during this time. If the mower is moving forward or backward, the neutral setting must be adjusted.

APY08123—UN—28AUG18

1. Raise rear of machine with safe lifting device:
   - Use wheel chocks to block the front wheels.
   - Support with wood blocks or jack stands.
   - Rear drive wheels must be able to rotate freely.
2. Start engine.
3. Move throttle lever to the fast position.
4. Unlock park brake.
5. If the rear drive wheels begin to creep, an adjustment is required.

Adjusting Neutral Position



TCAL47969—UN—16AUG13

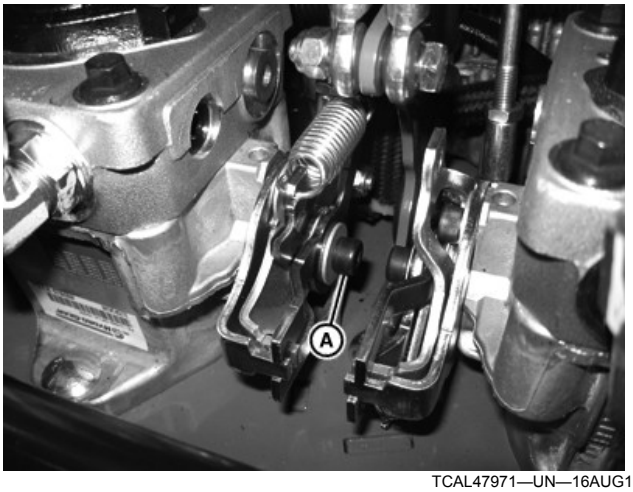
1. Remove retaining knob (A), and remove belt access panel (B).
2. Raise thigh pad.

TCAL43670—UN—26MAR13

3. Raise rear of machine with safe lifting device:
   - Use wheel chocks to block the front wheels.
   - Support with jack stands.
   - Rear drive wheels must be able to rotate freely.
4. Start engine.
5. Move throttle lever to the fast position.
6. Unlock park brake.

NOTE: If the right wheel turns in the neutral position, then the right pump requires adjustment.

Do not over-tighten the return-to-neutral device screw.



TCAL47971—UN—16AUG13

7. Loosen the 1/4-inch screw (A) and rotate the return-to-neutral device on the pump corresponding to the wheel requiring adjustment. Rotate the return-to-neutral device until the neutral position is located. Tighten the screw.
8. Repeat step 7, as needed, for the other pump.

SU68010,000015A-19-28AUG18

Checking and Adjusting Transmission Tracking

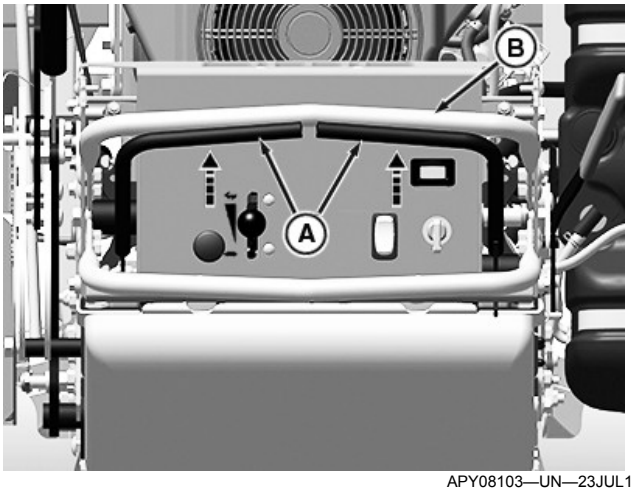
CAUTION: Avoid injury! Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.

- **Move the machine 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 out the exhaust fumes.**

NOTE: Check and adjust transmission tracking with the machine parked on a firm, level surface.

Checking Transmission Tracking

1. Inflate tires to correct pressure.
2. Start engine and run until it reaches normal operating temperature.
3. Move machine to an open, level area for operation.
4. Move throttle lever to the fast position.



APY08103—UN—23JUL18

5. Drive machine forward, pushing both control levers (A) all the way to the speed control bar (B).
6. If machine does not drive in a straight line, an adjustment is required.

Adjusting Transmission Tracking

Tracking is adjusted by shortening or lengthening the control rods.

- Shortening the control rod increases the forward speed capability for the side of the mower.
- Lengthening the control rod slows down that side of the mower.

If the mower is tracking to the left, either the left side needs to go faster (by shortening the left control rod) or the right side needs to go slower (by lengthening the right control rod).

If the mower is tracking to the right, either the right side needs to go faster (by shortening the right control rod) or the left side needs to go slower (by lengthening the left control rod).

The tracking adjustment varies depending on which speed/sensitivity position the control rods are installed in. Use the procedure that matches your application.

Tracking Adjustment

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Raise thigh pad.

TCAL47972—UN—15AUG13

3. Loosen the upper (A) and lower (B) control rod lock nuts.

NOTE: The control rods must not be adjusted so that direct pressure is applied to the internal pump stop. This results in damage to the hydraulic pumps.

4. Rotate the control rod (C) clockwise (shorten) or counterclockwise (lengthen) as needed.
   - Shortening the control rod (C) increases the speed of the forward movement of the mower on that side.
   - Lengthening the control rod (C) slows the speed of the forward movement of the mower on that side.

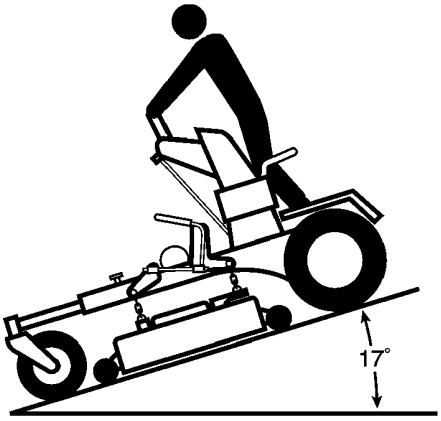
   The only reference point to limit the adjustment from becoming far off is the relative position of the pump stop and the handlebars. If the adjustment is off either due to new parts having been installed or for other reasons:
   - Adjust the tracking one or two turns on either side as needed.
5. Tighten lock nuts.
6. Check tracking. (See Checking and Adjusting Transmission Tracking in this section.) Repeat adjustment procedure as needed.
7. Check neutral position adjustment. (See Checking Neutral Position in this section.) Adjust as needed.

SU68010,0000120-19-28AUG18

Adjusting Park Brake

Testing Park Brake

1. Inflate tires to correct pressures.



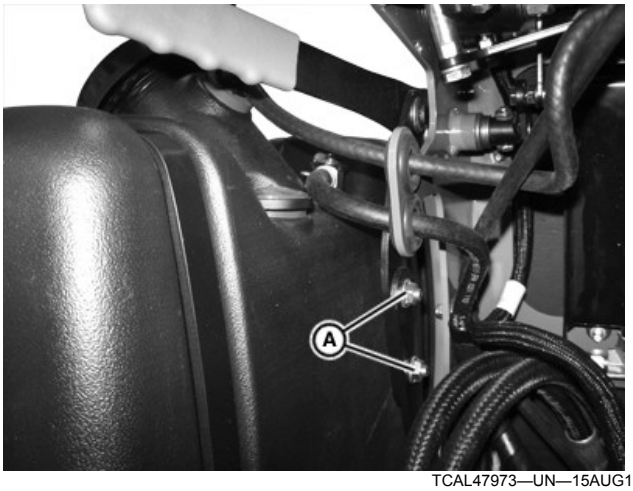
TCAL43677—UN—26MAR13

2. Stop machine on a maximum 17° slope.
3. Lock park brake.
   - A properly adjusted park brake must prevent the drive wheels from turning.
   - If the drive wheels turn, a brake adjustment will be necessary.

Adjusting Park Brake

1. Park machine safely. (See to Parking Safely in the Safety section.)
2. Unlock park brake.

NOTE: Repeat procedure for both sides of machine.



TCAL47973—UN—15AUG13

TCAL47974—UN—15AUG13

3. Loosen two cap screws (A) that attach park brake linkage.
4. Adjust distance (B) between pawl (C) and tire to specification.

Specification

Brake Pawl—Distance. . . . . 9.5-13 mm (3/8-1/2 in.)

5. Tighten park brake linkage cap screws (A). TORQUE CHECK: 25-30Nm (5/16” carriage screw).
6. Test park brake. Adjust again, if required.
7. Release park brake and operate machine to verify tires do not hit brake pawls in the released position.

BB87125,0001570-19-13OCT17

Adjusting Traction Drive Belt Tension

The drive belt is equipped with an automatic belt tensioner. (See Checking and Replacing Traction Drive Belt.)

KL66860,0000322-19-07AUG17

Removing and Installing Mower Deck Drive Belt Shields

CAUTION: Help prevent serious personal injury. Do not operate the mower without the belt shields installed.

Removing Belt Shields

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

TCAL47975—UN—15AUG13

3. Loosen two retaining knobs (A).
4. Remove belt shields (B) by lifting straight up.

Installing Belt Shields

1. Install belt shield (B) by aligning the slots in the belt shield over the studs and pushing down.
2. Tighten retaining knobs (A).

BB87125,0001572-19-16AUG13

Adjusting Traction Drive Belt Tension

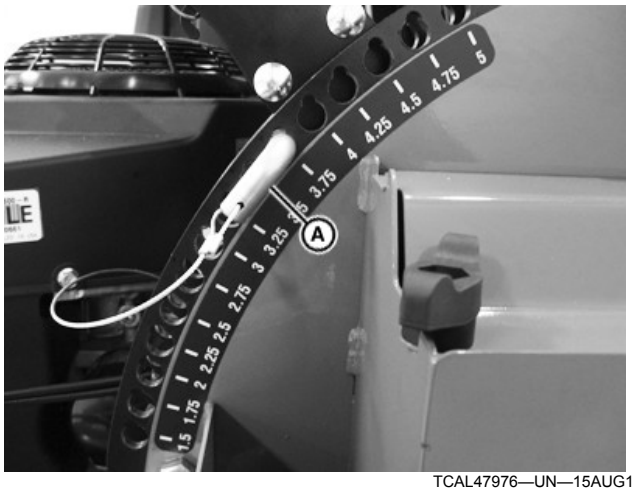
The drive belt is equipped with an automatic belt tensioner. (See Checking and Replacing Traction Drive Belt.)

BB87125,0001573-19-16AUG13

Replacing Mower Deck Drive Belt

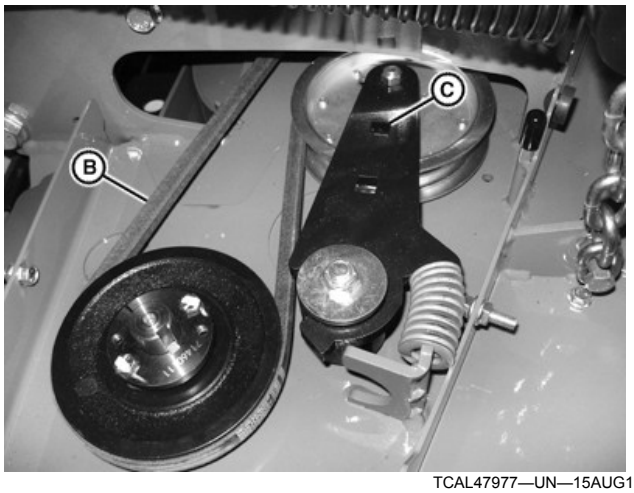
Removing Mower Deck Drive Belt

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Remove both mower deck belt shields.



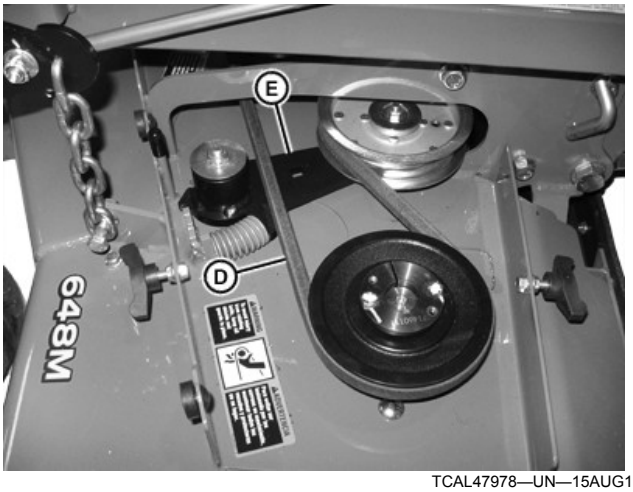
TCAL47976—UN—15AUG13

3. Remove HOC pin (A).
4. Lower mower deck completely to the floor.



TCAL47977—UN—15AUG13

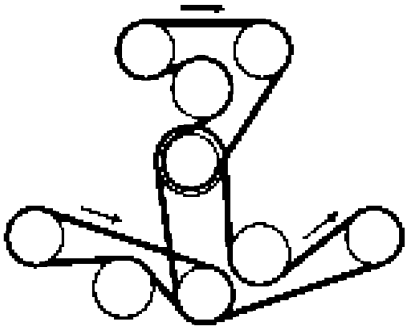
5. Release secondary belt (B) tension, by a 1/2-inch ratchet or breaker bar and extension in the hole (C) in tension bracket, and pivoting the bracket clockwise. Remove the secondary belt.



TCAL47978—UN—15AUG13

6. Release primary belt (D) tension, by a 1/2-inch ratchet and extension in the hole (E) in tension bracket, and pivoting the bracket clockwise. Remove the primary belt.

Installing Mower Deck Drive Belt



TCAL43684—UN—26MAR13

1. Install replacement drive belts in the reverse order. Make sure drive belts are installed properly on PTO clutch sheave, spindle sheaves, and idler pulleys.
2. Install both mower deck belt shields.
3. Adjust mower deck to desired cutting height.

BB87125,0001574-19-16AUG13

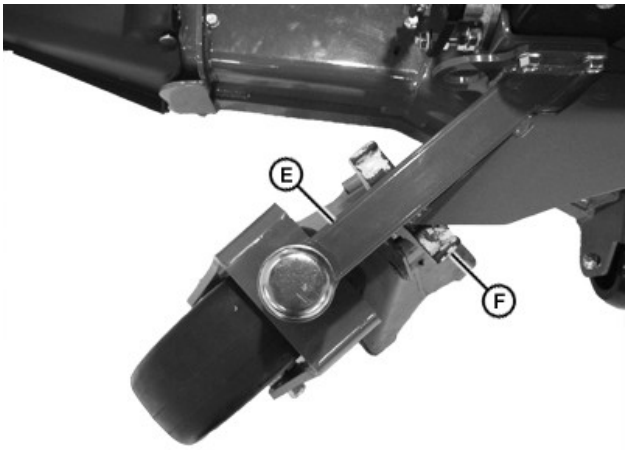
Replacing Mower Blades

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

CAUTION: The machine can fall or slip from an unsafe lifting device or supports.

- **Use a safe lifting device rated for the load to be lifted.**
- **Lower machine onto jack stands or other stable supports and block wheels before servicing.**

TCAL43687—UN—26MAR13



TCAL47979—UN—15AUG13

3. Place jack (C) under the mower deck lip close to the center anti-scalp wheels (D).
4. Lift machine to desired working height.
5. Support the front of the machine with jack stands (F) under the caster arm (E).

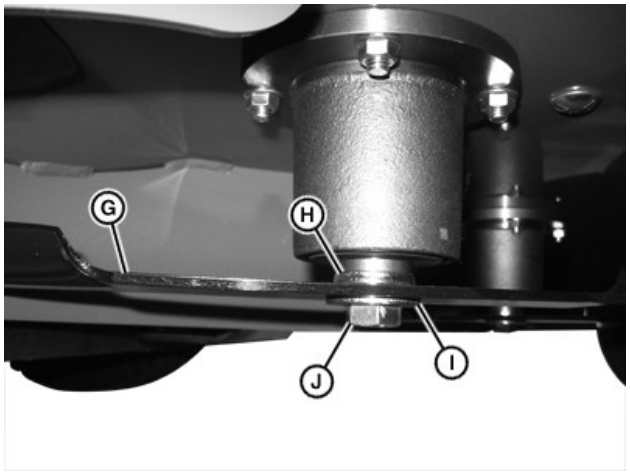
CAUTION: Do not work near raised mower deck unless it is safely supported.

Mower blades are sharp. Wrap blades or wear gloves when servicing.

Before performing any service function, wait for all moving parts to stop turning.

Disconnect battery or remove spark plug wire before making repairs.

IMPORTANT: When replacing mower blades, always use genuine John Deere service parts.



TCAL47980—UN—15AUG13

6. Support the blade (G).
7. Remove cap screw (J), thin washer (I), blade (G), and 1/4 in. spacer (H).
8. Install new or re-sharpened blade:
   - Blade spacers must be reinstalled in the same quantity and location.
   - Blade wing must face toward top of mower deck.

IMPORTANT: When installing the blade:

- **Make sure the blade is properly seated on the spindle.**
- **Make sure the concave side of the large washer faces the blade.**

- Install blade (G), thin washer (I), 1/4 in. spacer (H), and cap screw (J).
- Tighten blade cap screw to specification.

Specification

Cap Screw—Torque. . . . . 95-108 N·m (70-80 lb.-ft.)

9. Lower machine.
10. Adjust mower deck to a desirable cutting height.

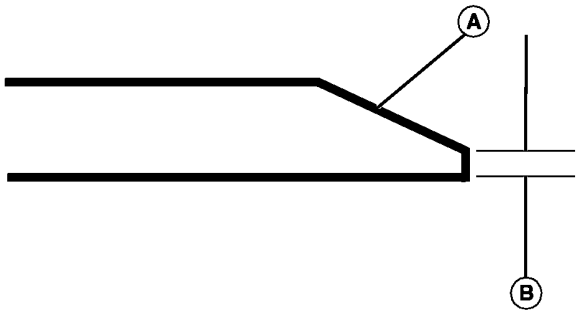
BB87125,0001576-19-07OCT13

Sharpening Blades

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

Always wear safety eye protection when grinding.

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



GXAL42041—UN—04MAR13

- Keep original bevel (A) when grinding.
- The blade cutting edge (B) should meet specifications.

Specification

Mower Blade Cutting Edge—Distance. . . . . 0.40 mm (1/64 in)

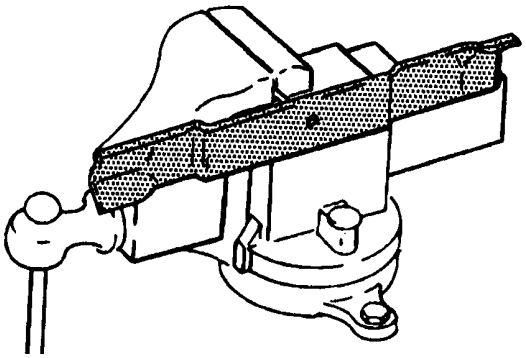
- Balance blades before installing.

MX00654,000039E-19-05JUL17

Balancing Blades

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

1. Clean blade.



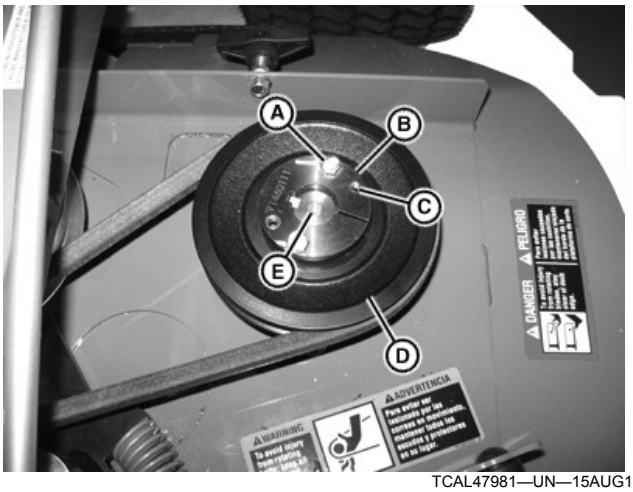
GXAL42042—UN—04MAR13

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.

MX00654,000039F-19-26MAY15

Removing and Installing Spindle and Drive Pulley

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Remove mower deck drive belt. (See Replacing Mower Deck Drive Belt.)
3. Remove mower blade. (See Replacing Mower Blades.)



TCAL47981—UN—15AUG13

4. Remove two cap screws (A) from split hub (B), and install in the threaded holes (C) in the hub.
5. Slowly tighten each cap screw in stages, alternating cap screws until the hub is separated from the pulley (D).
6. Remove pulley (D) and key (E).
7. Install pulley and split hub:
   - Install new cap screws (A).
   - Alternately tighten all cap screws in stages to specification.

Specification

Cap Screw—Torque. . . . . 18-19.0 N·m (13-14 lb.-ft.)

MK71445,0000367-19-02JUL20

Electrical

WARNING: Avoid injury! 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.**

MP47322,00F466E-19-03MAY20

Service the Battery Safely

TCAL41233—UN—18JAN13

CAUTION: 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.**

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.**

BB87125,000157B-19-01AUG13

Service the Battery

The battery used is a 12-volt, maintenance-free battery. Charge the battery only if it will not start the mower effectively. Remove the battery from the mower before charging. Follow instructions of the battery charger for proper and safe charging. Always make sure the positive terminal is connected to the positive battery post and the negative terminal is connected to the negative battery post. Reversal could cause damage to the electrical system.

BB87125,000157C-19-01AUG13

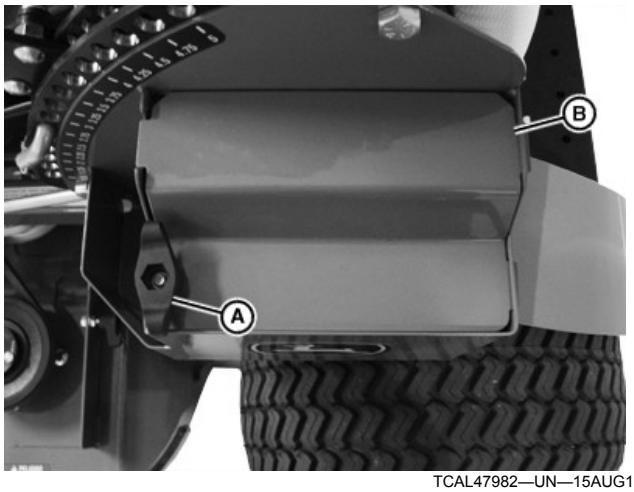
Removing and Installing Battery

Removing

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

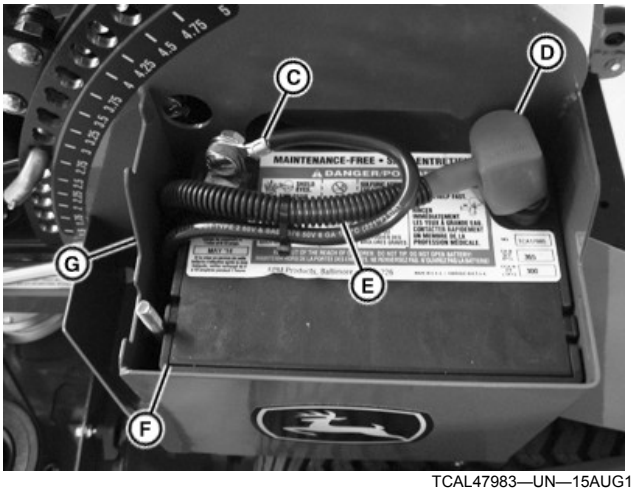
CAUTION: The battery produces a flammable and explosive gas. The battery may explode:

- **Do not smoke or have open flame near battery.**
- **Wear eye protection and gloves.**
- **Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.**
- **Do not jump start or charge a frozen battery. Warm battery to 16°C (60°F).**



TCAL47982—UN—15AUG13

2. Remove retainer knob (A), and remove battery cover (B).



TCAL47983—UN—15AUG13

3. Disconnect negative (-) battery cable (C).
4. Slide back red cover (D) and disconnect positive (+) battery cable (E).
5. Remove battery (F) from battery holder (G).

Installing

1. Place battery in battery holder. Ensure that the terminals are positioned correctly.
2. Connect the positive (+) battery cable first, then negative (-) battery cable.
3. Apply dielectric grease to terminals to prevent corrosion.
4. Slide cover over battery terminal.
5. Install battery cover, and secure using retainer knob.

BB87125,000157D-19-19SEP13

Cleaning Battery and Terminals

1. Park machine safely. (See Parking Safely in the SAFETY section.)
2. Disconnect and remove battery.
3. Wash battery with solution of four tablespoons of baking soda to one gallon of water. Be careful not to get the soda solution into the cells.
4. Rinse the battery with plain water and dry.
5. Clean terminals and battery cable ends with wire brush until bright.
6. Install battery.
7. Attach cables to battery terminals, beginning with the positive cable, using washers and nuts.
8. Apply spray lubricant to terminal to prevent corrosion.

MP47322,00F4671-19-15MAR13

Using Booster Battery

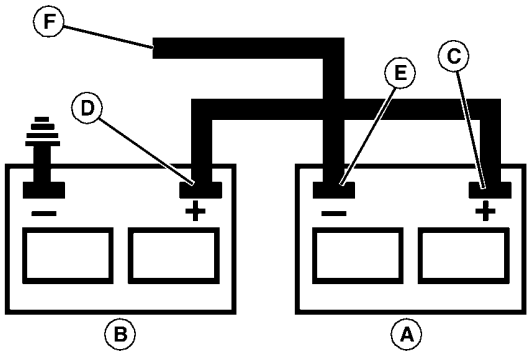
CAUTION: Avoid injury! The battery produces a flammable and explosive gas.

To prevent the battery from exploding:

- **Do not smoke or have open flame near battery.**
- **Wear eye protection and gloves.**
- **Do not jump-start or charge a frozen battery. Warm battery to:**

Specification	
Battery—Temperature	16°C (60°F)

- **Do not connect the negative (-) booster cable to the negative (-) terminal of the discharged battery. Connect at a good ground location away from the discharged battery.**



MXAL42872—UN—09APR13

A—Booster Battery
B—Disabled Vehicle Battery
C—Positive (+) Post
D—Positive (+) Post
E—Negative (-) Post
F—Negative (-) Booster Cable End

1. Connect positive (+) booster cable to booster battery (A) positive (+) post (C).
2. Connect the other end of positive (+) booster cable to the disabled vehicle battery (B) positive (+) post (D).
3. Connect negative (–) booster cable to booster battery negative (–) post (E).

IMPORTANT: Avoid damage! Electric charges from the booster battery damages machine components. Do not install negative booster cable to machine frame. Install only to the engine block.

Install negative booster cable away from moving parts in the engine compartment, such as belts and fan blades.

4. Connect the other end (F) of negative (–) booster cable to a metal part of the disabled machine engine block away from battery.

5. Start the engine of the disabled machine and run machine for several minutes.
6. Carefully disconnect the booster cables in the exact reverse order: negative cable first and then the positive cable.

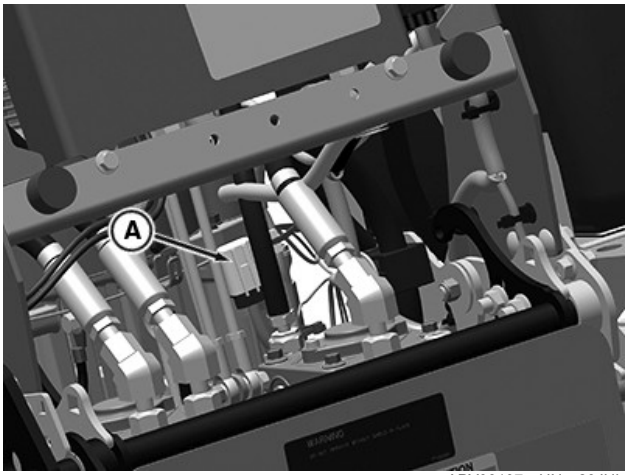
MP47322,00F4672-19-03NOV21

Replacing Fuse

The electric start circuit is protected by a 20 - amp ATC fuse.

IMPORTANT: Help prevent machine circuit damage. Make sure that replacement fuse is the correct size.

1. Locate and replace the electrical system fuse located on RH console wall away from starter motor.



APY08107—UN—23JUL18

2. Remove fuse holder cover (A).
3. Check fuse element in fuse window. Discard fuse if element is broken or shows other signs of damage. Inspect electrical system and wiring for damages and short circuits.
4. Install new 20 - amp ATC fuse in socket.
5. Install fuse holder cover and ensure that plastic locking tab is secure.

SU68010,0000121-19-23JUL18

Using Proper Fuel and Stabilizer

IMPORTANT: Avoid damage! Using stale, contaminated, or improper fuel can result in engine and fuel system damage. Repairs caused by stale, contaminated, or improper fuel are not covered by warranty.

Use regular grade unleaded fuel with an octane rating of 87 octane or higher. Fuel blends containing up to 10% ethanol or up to 15% MTBE reformulated fuel are acceptable. Do not use fuel or additives containing methanol as engine damage can occur.

Always use fresh, clean fuel that is purchased in a quantity that can be used within approximately 30 days. Fuel stabilizer should always be added to the fuel each time fuel is purchased. Add stabilizer before filling the fuel container to insure proper mixing. Such practice helps prevent engine performance problems and allows fuel storage in the machine all year without draining.

Store fuel in plastic containers to reduce condensation. Make sure that the cap on the fuel container is tight to reduce fuel contamination and evaporation. For best fuel storage life, use a self-sealing gas can.

Fuel is blended to give best seasonal performance. To avoid engine performance problems such as hard starting or vapor lock, use in-season fuel. Use fuel during warm weather that was purchased during that season, and use fuel during cold weather that was purchased during that season.

Fuel can become stale in machines with engines that are used seasonally or infrequently during a season. Stale fuel can produce varnish and plug carburetor or EFI components which can affect engine performance.

Keep fuel storage container tightly covered and in a cool area out of direct sunlight. Fuel can break down and degrade if not sealed properly or exposed to sun and heat.

Condensation may collect in the fuel tank because of a variety of operating or environmental conditions and, over time, may affect your machine's operation. Fill machine fuel tank at the end of the day.

MP47322,00F4674-19-26MAY15

Filling Fuel Tank

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

- **Shut engine off before filling fuel tank.**
- **Allow engine to cool before refueling.**
- **Do not smoke while handling fuel.**
- **Keep fuel away from flames or sparks.**
- **Fill fuel tank outdoors or in ventilated area.**
- **Clean up spilled fuel immediately.**
- **Prevent static electric discharge by using a clean, approved, non metal container.**

IMPORTANT: Avoid damage! Dirt and water in fuel causes engine damage:

- **Clean dirt and debris from the fuel tank opening.**
- **Use clean, fresh, stabilized fuel.**
- **Fill the fuel tank at the end of operation each day to prevent condensation and freezing during cold weather.**
- **If using a funnel, make sure it is plastic and has no screen or filter.**

1. Park machine safely. (See Parking Safely in the Safety section.)
2. Allow engine to cool.
3. Remove any debris from area around fuel tank cap.
4. Remove fuel tank cap slowly to allow any pressure built up in tank to escape.
5. Fill fuel tank only to bottom of filler neck. Do not overfill.

NOTE: On some models, the fuel tank cap will click when it is tight.

6. Install fuel tank cap and turn cap until it is tight.

MP47322,00F4675-19-24AUG21

Removing and Installing Rear Drive Wheels

Removing

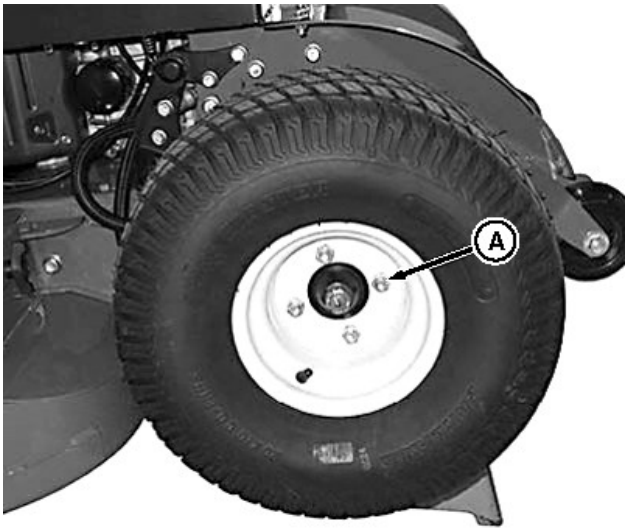
1. Park machine safely. (See to Parking Safely in the Safety section.)

CAUTION: The machine can fall or slip from an unsafe lifting device or supports, injuring anyone beneath it.

- **Remove key before raising machine.**
- **Use a safe lifting device rated for the load to be lifted.**
- **Lower machine onto jack stands or stable supports and block wheels before servicing.**

TCAL43699—UN—26MAR13

2. Raise rear of machine with safe lifting device.
   - Use wheel chocks to block the front wheels.
   - Support with jack stands.



TCT015583—UN—06OCT17

A—Wheel Nut

3. Remove wheel nuts (A).
4. Remove wheel.

Installing

1. Place wheel onto hub of wheel motor.
2. Hand start lug nuts onto studs hand tight. The taper side of the lug nuts should be contacting the hub.
3. Torque lug nuts (3/4") in an alternating pattern to 108-122 N·m (80-90 lb·ft).

Specification

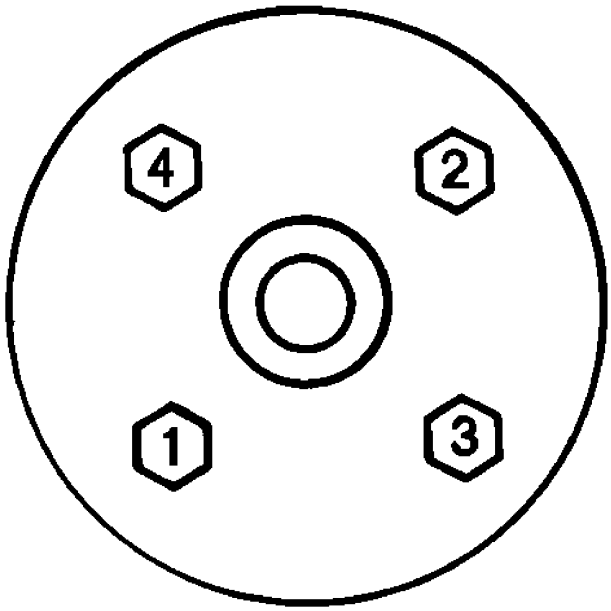
Rear Wheel Nut—Torque. . . . . 108-122 N·m (80-90 lb·ft)

4. Lower machine.
5. Repeat process for opposite side.

KL66860,000035B-19-06OCT17

Tightening Rear Drive Wheel Hardware

1. Tighten rear wheel nuts in an alternate pattern.



TCAL43701—UN—26MAR13

2. Tighten wheel nuts in numbered sequence shown for safe wheel installation. Tighten alternately until recommended torque value is reached.

Specification

Rear Wheel Nut—Torque. . . . . 108-122 N·m (80-90 lb.-ft.)

BB87125,0001584-19-19SEP13

Removing and Installing Front Caster Wheels

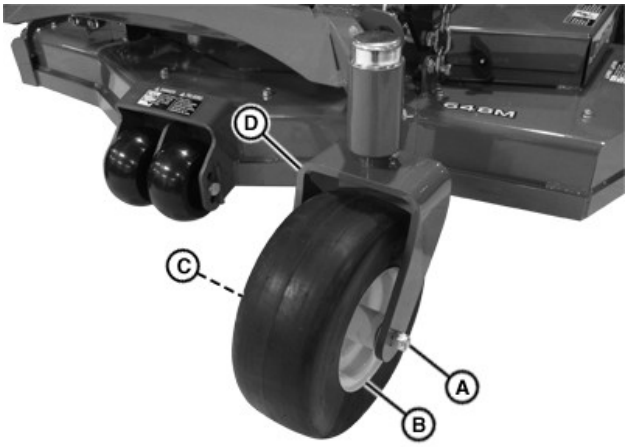
Removal

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

CAUTION: The machine can fall or slip from an unsafe lifting device or supports.

- **Use a safe lifting device rated for the load to be lifted.**
- **Lower machine onto jack stands or other stable supports and block wheels before servicing.**

2. Lift front of machine with a safe lifting device.



TCAL47986—UN—04OCT13

3. Remove hex nut (A) and cap screw (C).
4. Remove wheel and tire assembly (B) from yoke assembly (D).

Installation

1. Install replacement tire assembly (B) onto the yoke assembly (D).
2. Install cap screw (C) and hex nut (A).
3. Tighten hex nut (A) to specification.

Specification

Hex Nut—Torque. . . . . 36.6 N·m (27 lb.-ft.)

4. Lower machine.

BB87125,0001585-19-04OCT13

Checking Tire Pressure

TCAL43703—UN—26MAR13

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

- **Do not attempt to mount a tire without the proper equipment and experience to perform the job.**
- **Do not inflate the tires above the recommended pressure.**
- **Do not weld or heat a wheel and tire assembly. Heat can cause an increase in air pressure resulting in an explosion. Welding can structurally weaken or deform the wheel.**
- **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.**

Replace drive tires with less than 3/32 in. of any tread groove left.

Always keep the correct tire pressure in the drive tires.

Higher pressures will cause the tires to have less traction, creating slower speeds and giving a harder ride.

Front casters are equipped with non-pneumatic tires and do not require any air, but should still be checked for wear and be replaced when excessively worn.

1. Check tires for damage.
2. Check tire pressure with an accurate gauge.
3. Add air, if necessary.

Tire Size	Pressure
Front: 11 x 4 - 5	N/A
Rear (636M): 18 x 8.50 - 10	124-152 kPa (18-22 psi)
Rear (648M) (652M): 18 x 10.50 - 10	124-152 kPa (18-22 psi)

BB87125,0001586-19-04OCT13

Caster Wheel Yoke Assembly Remove and Install

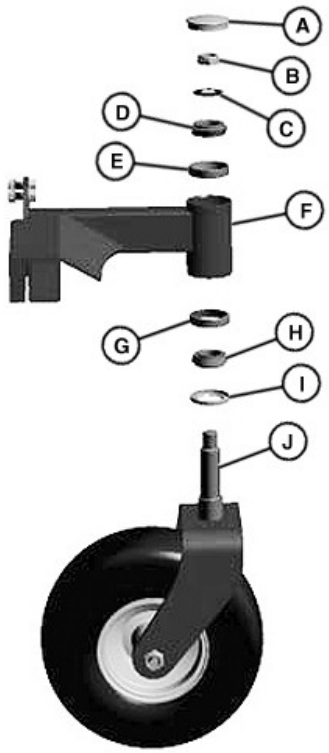
1. Park machine safely. (See Parking Safely in the SAFETY section.)

CAUTION: The machine can fall or slip from an unsafe lifting device or supports.

- **Use a safe lifting device rated for the load to be lifted.**
- **Lower machine onto jack stands or other stable supports and block wheels before servicing.**

2. Raise and securely support the front of the machine.

NOTE: During removal, mark the top of the concave washer (C) with a permanent marker to be sure of direction for installation.



TCAL48049—UN—04OCT13

3. Remove cap (A), lock nut (B), concave washer (C), and wheel assembly (J) from caster yoke (F).

NOTE: It is not necessary to remove the bearing races (E and G) for bearings (D and H), unless the bearings need to be replaced.

4. Remove seal (I) and lower bearing (H).
5. Remove upper bearing (D).
6. Clean and inspect bearings; pack with clean grease. Replace bearings if needed.

Installation

1. Install lower bearing (H) and a new seal (I).
2. Install upper bearing (D).
3. Install caster yoke and wheel assembly (J), concave washer (C), and lock nut (B).

NOTE: Do not overtighten lock nut (B). The caster wheel yoke assembly must be free to rotate.

4. Tighten lock nut to specification. Install cap (A).

Specification

Caster Yoke Lock Nut—Torque. . . . . 61 N·m (45 lb·ft.)

SU68010,000015B-19-28AUG18

Cleaning the Mower

IMPORTANT: Do not use high-pressure water to clean machine.

The underside of the mower deck should be checked and cleaned twice daily and more often if the grass being mowed is lush or wet. The entire mower should be cleaned daily at the end of the work day.

- Cleaning should be done with a leaf blower or low-pressure compressed air.
- Wash with water only when necessary. Do not use a pressure washer or nozzle, as the water can enter bearings and electrical connections, causing an electrical short, rust, and corrosion.
- When washing with water, avoid spraying directly onto the PTO clutch just below the engine or near the hydro cap.
- Wait until the machine has cooled down. Washing a hot machine can cause various unseen system damage.
- If water is used for cleaning, immediately dry the machine with a leaf blower or low-pressure compressed air and run with blades engaged for approximately 10 minutes.
- Once the wash is complete, always lubricate and grease all applicable areas.

MK71445,0000365-19-02JUL20

Cleaning Plastic Surfaces

IMPORTANT: Improper care of machine plastic surfaces can damage that surface:

- **Do not wipe plastic surfaces when they are dry. Dry wiping will result in minor surface scratches.**
- **Use a soft, clean cloth (bath towel, diaper, automotive mitt).**
- **Do not use abrasive materials, such as polishing compounds, on plastic surfaces.**

1. Wash surface with clean water and a mild liquid automotive washing soap.
2. Dry thoroughly to avoid water spots.

BB87125,0001589-19-29AUG13

Cleaning and Repairing Metal Surfaces

Cleaning:

Follow automotive practices to care for your machine's painted metal surfaces. Use a high-quality automotive wax regularly to maintain the factory look of your machine's painted surfaces.

Repairing Minor Scratches (surface scratch):

1. Clean area to be repaired thoroughly.

IMPORTANT: Do not use rubbing compound on painted surfaces.

2. Use automotive polishing compound to remove surface scratches.
3. Apply wax to entire surface.

Repairing Deep Scratches (bare metal or primer showing):

1. Clean area to be repaired with rubbing alcohol or mineral spirits.
2. Use paint stick with factory-matched colors available from your authorized dealer to fill scratches. Follow directions included on paint stick for use and for drying.
3. Smooth out surface using an automotive polishing compound. Do not use power buffer.
4. Apply wax to surface.

BB87125,000158A-19-29AUG13

Using Troubleshooting Chart

If you are experiencing a problem that is not listed in this chart, see your Technical Manual or authorized dealer for service.

MP47322,00F467B-19-13NOV18

Engine

If	Check
Poor Engine Performance	Fuel: • Dirt in fuel system or fuel is old. Replace fuel with fresh, stabilized fuel. Obtain 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 or Is Hard to Start	• Park brake lever not in the proper position. • Check that motion control levers are in neutral and roller bearing adjustment is correct. • PTO engaged. • Fuel shutoff valve in off position. • Stale or improper fuel/fuel level. • Plugged fuel filter. • Plugged air intake filter. • Spark plug wires loose or disconnected. • Spark plugs not gapped correctly. • Blown fuse. • Electrical problem - dead battery. • Choke adjusted incorrectly. See your John Deere dealer.
Engine Will Not Slow Idle	• Carburetion problems. See your John Deere dealer. • Bent or kinked throttle cable. • Bent governor control. • Incorrect governor idle control.
Engine Runs Rough or Stalls	• Plugged fuel filter. • Plugged air intake system. • Fuel cap vent dirty. • Stale or improper fuel/fuel level. • Spark plugs not gapped correctly. • Replace spark plugs. • Choke adjusted incorrectly. See your John Deere dealer. • Check carbon canister and fuel lines.
Engine Knocks	• Engine oil level low. • Reduce load. (Slower ground speed.) • Fuel is bad. Fill tank with fresh fuel, correct octane. • Idle speed too slow.
Engine Overheats	• Clean cooling fins. • Low oil level. • Do not operate at slow idle. Operate at fast idle. • Cooling air intake screen is dirty. • Plugged carburetor air intake filter. • Plugged air intake filter. • Operating at ground speed too fast for conditions.
Engine Lacks Power	• Reduce load.

If	Check
	• Plugged air intake system. • Plugged fuel filter. • Improper type of fuel. Drain tank and fill with correct fuel. • Clean cooling fins to help prevent overheating. • Replace spark plugs.
Engine Uses Too Much Oil	• Find and correct oil leaks. • Incorrect engine oil. • Plugged oil filter. • Plugged air intake filter.
Engine Backfires Through Muffler	• Throttle lever should be at 1/2 fast position for 30 seconds before turning off machine.
High Fuel Consumption	• Improper type of fuel. • Plugged air intake system. • Operating at ground speed too fast for conditions. • Improper valve clearance. See your John Deere dealer. • Restricted air intake system.

BB87125,000158C-19-19SEP13

Electrical System

If	Check
Starter Will Not Work	• Blown fuse. • Park brake switch is faulty. • Loose or corroded battery connections. • Key switch or starter faulty. See your John Deere dealer. • PTO engaged. • Motion control levers and park brake lever not in proper position.
Battery Will Not Charge	• Loose or corroded connections. • Blown fuse.
PTO Switch Does Not Work/Engage	• Operator not on platform. • Faulty PTO Switch.
Starter Turns Slowly	• Loose or corroded battery connections. • Low battery power – charge battery. • Engine oil viscosity too heavy.

BB87125,000158D-19-14OCT17

Machine

If	Check
Excessive Machine Vibration	• Engine speed too slow. • Deck drive belt not tensioned correctly. • Mower blades not balanced.

Machine Will Not Move with Engine Running	• Park brake locked. • Transmission oil level low. • Transmission oil cold – allow engine to warm up. • Pump drive belt slipping or broken. • Pump free-wheel valves open. • Transmission problems. See your John Deere dealer.
Machine Creeps with Engine Running and Control Levers in a Neutral Position	• Needs motion control linkage adjustment. • Engine speed too slow.

BB87125,000158E-19-01AUG13

Park Brake

If	Check
Park Brake Not Working Correctly	• Park brake out of adjustment - adjust linkage.

BB87125,000158F-19-19SEP13

Steering

If	Check
Steering Not Working	• Pump free-wheel valves partially open. • Improper tire inflation. • Hydrostatic transmission oil level low.

BB87125,0001590-19-01AUG13

Mower

If	Check
Discharge Chute Plugged	• Grass is wet - mow grass only when dry. • Raise cutting height. • Mow at full fast throttle. • Ground speed too fast for conditions. • Correct installation of deck drive belt.
Mower Deck Vibrates	• Run engine at fast throttle. • Loose hardware. • Check/replace deck drive belt. • Blade bolts are loose. • Blades are bent or worn. • Sharpen and balance blades. • Remove belt shields and clean debris from sheaves. • Check sheaves for proper alignment or damage. See your John Deere dealer.
Mower Blades Do Not Engage	• Deck drive belt slipping or broken. • Pump drive belt slipping or broken.

	• Deck belt tension spring not installed or broken. • PTO switch failure. • Fuse is blown. • Loose electrical connections.
Mower Mows Unevenly	• Mower deck not properly leveled. • Ground speed too fast for conditions. • Run engine at fast throttle. • Reduce ground speed when making turns. • Sharpen or replace blades. • Change mowing pattern. • Check air pressure in all traction unit tires.

BB87125,0001591-19-01AUG13

Storing Safety

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

Engine exhaust fumes contain carbon monoxide and cause serious illness or death:

- **Run the engine only long enough to move the machine to or from storage.**
- **If a machine is stored before allowing it to cool, machine fires and structure fires can occur. Fires can occur if debris is not removed from around the engine and muffler, or if stored near combustible materials.**
- **Do not store vehicle with fuel in the tank inside a building where fumes reach an open flame or spark.**
- **Allow the engine to cool before storing the machine in any enclosure.**

MP47322,00F4680-19-06MAY15

Preparing Fuel and Engine For Storage

Fuel:

If you have been using “Stabilized Fuel,” add stabilized fuel to the 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. (See Parking Safely in the Safety section.)

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. For machines equipped with an ignition key switch, turn the ignition key switch to the OFF position.

IMPORTANT: Avoid damage! Stale fuel can produce varnish and plug carburetor or injector components and affect engine performance.

- **Add fuel conditioner or stabilizer to fresh fuel before filling tank.**

4. Mix fresh fuel and fuel stabilizer in a 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 the fuel system.

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 the engine air intake screen.
4. On gas engines:
   - Remove spark plugs. Put 30 mL (1 oz) of clean engine oil in cylinders.
   - Install spark plugs, but do not connect spark plug wires.
   - Crank the engine 5 or 6 times to allow oil to be distributed.
5. Clean the engine and engine compartment.
6. Remove battery.
7. Clean the battery and battery posts. Check the electrolyte level, if your battery is not maintenance free.
8. Close fuel shutoff valve, if your machine is equipped.
9. Store the battery in a cool, dry place where it will not freeze.

NOTE: The stored battery should be recharged every 90 days.

10. Charge the battery.

IMPORTANT: Avoid damage! Prolonged exposure to sunlight could damage the hood surface. Store machine inside or use a cover if stored outside.

11. Store the vehicle in a dry, protected place. If vehicle is stored outside, put a waterproof cover over it.

MP47322,00F4682-19-20APR21

Preparing Machine for Storage

1. Repair any worn or damaged parts. Replace parts if necessary. Tighten loose hardware.
2. To prevent rust, repair scratched or chipped metal surfaces.
3. Remove grass and debris from machine.
4. Clean under the rotary deck and remove grass and debris from inside chute and bagger, if applicable.
5. Wash the machine and apply wax to metal and plastic surfaces.
6. To dry belts and pulleys, run machine for five minutes.

7. To prevent rust, apply light coat of engine oil on pivot and wear points.
8. Lubricate grease points and check tire pressure.

MP47322,00F4681-19-13JUL16

Removing Machine From Storage

1. Check tire pressure.
2. Check engine oil level.
3. Check battery electrolyte level if your battery is not maintenance free. Charge battery if necessary.
4. Install battery.
5. On gas engines: 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 5 minutes without the mower or any attachments running to allow oil to be distributed throughout engine.
9. Be sure all shields and guards or deflectors are in place.

MP47322,00F4683-19-05JUL17

Engine

Model 636M

Make	Kawasaki
Model	FX600V
Power Rating Information	http://www.kawasaki-criticalpower.com
Type	Vertical - V TWIN - 4 cyc. - OHV
Displacement	603 cm³ (36.8 in³)
PTO-Crank Shaft	25.4 mm (1.0 in) x L88 mm
Cylinders	Two-V Twin
Fast Idle	3600 rpm
Oil Crankcase Capacity/Dry	2.1 L (2.2 qt) / Filter
Oil Filter	Spin-on Full Flow - Cartridge Type
Lubrication	Fully Pressurized
Cooling System	Forced Air
Air Cleaner (Canister)	Dry Type with Unloader Valve
Bore	73 mm (2.88 in)
Stroke	72 mm (2.8 in)
Compression Ratio	8.2:1
Valving	OHV
Muffler	Horizontal Discharge Below Frame
Spark Plug	NGK BPR4ES
Spark Plug Gap	0.75 mm (0.030 in)
Spark Plug Torque	22 N·m (16 lb·ft)
Valve Clearance (Intake and Exhaust) (Cold)	0.10—0.15 mm (0.004—0.006 in)

Model 648M and 652M

Make	Kawasaki
Model	FX691V
Power Rating Information	http://www.kawasaki-criticalpower.com
Maximum Power	22 hp (16.4 kW) @3600 rpm
Displacement	726 cm3 (44.3 in³)
Cylinders	Two
Fast Idle (No Load)	3650 ± 100 rpm
Low Idle	1800 ± 150 rpm
Operating Range	1650-3750 rpm
Oil Filter	Cartridge Type Full Flow
Cooling System	Air
Air Cleaner (Canister)	Dry Type with Unloader Valve
Bore	78 mm (3.07 in)
Stroke	76 mm (3.0 in)
Compression Ratio	8.2:1
Valving	OHV
Spark Plug Gap	0.75 mm (0.030 in)
Spark Plug Torque	22 N·m (16 lb·ft)
Valve Clearance (Intake and Exhaust)	0.05—0.10 mm (0.002—0.004 in)

VS70618,0000CD0-19-16JUN21

Drivetrain and Travel Speeds

Drivetrain	
Type	Hydrostatic
Number of Speeds	Variable
Hydrostatic Pump Make	Hydro-Gear
Hydrostatic Pump Type	Axial Piston
Hydrostatic Pump Series	PE
Hydrostatic Pump Displacement	12 cm³/rev (0.73 cu. in./rev)
Wheel Motor Make	Hydro-Gear HGM-P Series
Wheel Motor Displacement	196.0 cm³/rev (12.0 cu. in./rev)
Wheel Motor Design	4 Bolt Mount - 25.4 cm (1 in) Tapered Shaft
Drive System Filtration	Spin on Full Flow - 25 Micron
Travel Speeds	
Forward	0—13.2 km/h (0—8.2 mph) at full engine rpm
Reverse	0—5.6 km/h (0—3.5 mph) at full engine rpm

OUMX068,00010E5-19-21JUL16

Electrical System

Charging System	12 V 15-amp @ 3600 rpm
Battery Voltage	12 volt
Cold Cranking Amp	300 amp
Starter	Solenoid Shift
Hour Meter	Digital
Operator Presence Control System	Mechanical Over Electrical
Ignition	Fly Wheel

SU68010,0000122-19-21JUL18

Fuel System

Fuel Type	Gasoline, Regular Unleaded
Fuel System Certification	EPA - CARB Cert. w/Vapor Recovery
Fuel Tank Location	On Right Side of Operator

BB87125,000159F-19-29AUG13

Steering and Brakes

Steering	Twin Motion Control Levers/Hydrostatic
Braking	Twin Motion Control Levers/Hydrostatic
Park Brake	Mechanical Lever / Tire Engagement
Park Brake Actuation	Over Center Hand Lever

BB87125,00015A0-19-29AUG13

PTO

Type	Electro-Magnetic-ccw (125 lb. ft.) w/Brake
Deck Drive	Dual B-Section V-belt w/Kevelar Cord

BB87125,00015AF-19-21AUG13

Mower Deck

Width / Type	91.44 cm. (36 in.) Side Discharge
Width / Type	121.9 cm. (48 in.) Side Discharge
Width / Type	132.1 cm (52 in.) Side Discharge
Deck construction	Steel Fabricated w/Steel Reinforcements
Deck Shell Thickness	7 Gauge 4.5 mm (0.177 in.)
Cutter Housings	Sealed Ball Bearings
Deck Drive Pulleys	Wedge Lock Adjustable
Height-of-Cut Range	3.8 to 12.7 cm. (1.5 to 5.0 in.)
HOC Increments	0.25 in.
Cutter Deck Anti-Scalp Rollers (36 in. Deck)	N/A
Cutter Deck Anti-Scalp Rollers (48 in. Deck)	Double Captured Center
Cutter Deck Anti-Scalp Rollers (52 in. Deck)	Single Left - Double Captured Center

BB87125,00015B0-19-04OCT13

Deck Blades

Blade Size (36 inch and 52 inch decks)	6.35 cm. (2.5 in) x 45.72 cm (18.0 in.) 5.16 mm (0.203 in.) Thick
Blade Size (48 inch deck)	6.35 cm. (2.5 in) x 41.91 cm (16.5 in.) 5.16 mm (0.203in.) Thick
Blade Tip Speed	18,900 rpm
Blade Mount	5/8 in.-11 x 8 in. Grade 5 Bolt
Number / Type (36 in. Deck)	Two / High Lift
Number / Type (48 in. and 52 in. Deck)	Three / High Lift

MK71445,0000369-19-02JUL20

Tires

Drive (Rear) Tires	18 x 8.50 - 10 4PR Turf Master
Drive (Rear) Tires Capacity	1200 lb. (544 kg) @ 22 psi
Front Casters	11 x 4 - 5 No Flat - Semi Pneumatic w/Grease-able Roller Bearings
Front Caster Yoke	Steel Tapered Bearings

OUMX068,00010E6-19-21JUL16

Specifications

Battery

Voltage	12 volt
CCA	300 amp
CA	365 amp
Reserve Capacity	38 minutes
BCI Group Size	U1

BB87125,00015A2-19-29AUG13

Capacities

Fuel Tank	20.8 L (5.5 gal.)
Hydraulic Oil (With Filter/Wet)	1.9 L (2.0 qt.)
Hydraulic Oil (With Filter/Dry)	2.7 L (2.9 qt.)
Engine Oil (With Filter)	2.1 L (2.2 qt.)

KL66860,0000321-19-06OCT17

Dimensions

Overall Length (36 in. Deck)	157.2 cm (62 in.)
Overall Length (48 in. Deck)	151.8 cm (59.75 in.)
Overall Length (52 in. Deck)	151.8 cm (59.75 in.)
Overall Width (36 in. Deck with Chute Down)	125.7 cm (49.5 in.)
Overall Width (48 in. Deck with Chute Down)	157.4 cm (62 in.)
Overall Width (52 in. Deck with Chute Down)	167.6 cm (66 in.)
Overall Height (36 in. Deck)	117 cm (46 in.)
Overall Height (48 in. Deck)	117 cm (46 in.)
Overall Height (52 in. Deck)	119 cm (46 in.)

BB87125,00015A5-19-29AUG13

Weights

Weight (With Engine Oil, Hydraulic Oil, and Fuel)

636M	332 kg (731 lb)
648M	372 kg (820 lb)
652M	375 kg (828 lb)

OUMX068,00010E8-19-21JUL16

Torque Values

Wheel Motor Bolts (Securing the Motor to Support), with Loctite 2760	54—68 N·m (40—50 lb·ft)
Clutch to Engine Shaft, with Loctite 2760	68—75 N·m (50—55 lb·ft)
Wheel Hub to Wheel Motor	187—214 N·m (138—158 lb·ft)
Wheel Lug Nuts	108—122 N·m (80—90 lb·ft)
Split Hub - Spindle Drive	18—19 N·m (13—14 lb·ft)

Blade Bolts	95—108 N·m (70—80 lb·ft)

OUMX068,00010E7-19-21JUL16

Recommended Lubricants

Engine Oil	TURF-GARD™, Plus-50™ II
Hydraulic Oil	JD Plus-50™ II 15W-40

Grease (This may change for high-speed applications such as cutting units):

	John Deere Multi-Purpose SD Polyurea Grease
	John Deere Multi-Purpose HD Lithium Complex Grease

(Specifications and design subject to change without notice.)

d6vudh3,1656053384304-19-24JUN22

Product Warranty

John Deere offers a standard warranty on new John Deere products. For a copy of the product warranty statement or for details on the warranty terms and conditions for products purchased in the United States and Canada, please contact your local John Deere Dealer or utilize the following resources:

United States

Website:

http://www.deere.com/en_US/services_and_support/warranty/warranty.page

Toll Free: 1-800-537-8233

Dealer Locator:

http://dealerlocator.deere.com/servlet/country=US

Canada

Website (English):

http://www.deere.ca/en_CA/services_and_support/service_plans_warranties/service_plans_warranties.page

Website (French):

http://fr.deere.ca/en_CA/services_and_support/service_plans_warranties/service_plans_warranties.page

Toll Free: 1-800-537-8233

Dealer Locator:

http://dealerlocator.deere.com/servlet/country=CA

Emission-related warranties are included in this Operator's Manual, and applicable if required by law or regulation.

For products purchased in a country other than the United States or Canada, please contact your local John Deere dealer for assistance.

MP47322,00F4690-19-01JUN22

California and U.S. EPA Emissions Control System Warranty Statement (Off-Road Gas Engines)

Your Warranty Rights and Obligations

The California Air Resources Board, John Deere, and the United States Environmental Protection Agency are pleased to explain the emissions control system's warranty on your model year 2023 or 2024 spark ignited off-road engine equipment. In California, new equipment that uses small or large (less than 1 liter) spark ignited off-road engines must be designed, built and equipped to meet the state's stringent anti-smog standards. John Deere must warrant the emissions control system on your spark ignited off-road engine equipment for the period listed below provided there has been no abuse, neglect or improper maintenance of your equipment leading to the failure of the evaporative emissions system.

Your emissions control system may include parts such as: carburetors or fuel-injection system, ignition system, catalytic converters, fuel tanks, valves, filters, clamps, connectors, fuel lines (for liquid fuel and fuel vapors) and other associated components. Also included may be hoses, belts, sensors and other emission-related assemblies.

Where a warrantable condition exists, John Deere will repair your spark ignited off-road engine equipment at no cost to you including diagnosis, parts and labor.

Manufacturer's Warranty Coverage

This emissions control system is warranted for two years for models S100, S110, S120, S130, S140, S150, S160, S170, S180, S220, X330, Z315E, Z325E, Z515E, Z545R, Z735E, Z735M, 1220, and three years for all other models referenced in this operator's manual. If any emissions related part on your equipment is defective, the part will be repaired or replaced by John Deere.

Owner's Warranty Responsibilities

- As the spark ignited off-road engine equipment owner, you are responsible for the performance of the required maintenance listed in your Operator's Manual. John Deere recommends that you retain all receipts covering maintenance on your spark ignited off-road engine equipment, but John Deere cannot deny warranty coverage solely for lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the spark ignited off-road engine equipment owner, you should be aware that John Deere may deny you warranty coverage if your spark ignited off-road engine equipment or a part has failed due to abuse, neglect, or improper maintenance or unapproved modifications.
- You are responsible for presenting your spark ignited off-road engine equipment to a John Deere Turf and Utility distribution center or service center as soon as a problem exists. The warranty repairs shall be completed in a reasonable amount of time, not to exceed 30 days. If you have a question about your emissions warranty coverage, how to make an emissions warranty claim or how to make arrangements for emissions-related authorized repairs, you should contact your John Deere Turf and Utility retailer, or the John Deere Customer Contact Center at 1-800-537-8233, or email John Deere from https://www.deere.com/en/our-company/contact-us/.

General Emissions Warranty Coverage

The warranty period begins on the date the equipment is delivered to an ultimate purchaser. John Deere

warrants to the ultimate purchaser and each subsequent purchaser that the spark ignited off-road engine equipment is:

- Designed, built and equipped so as to conform to all applicable regulations adopted by the California Air Resources Board;
- Designed, built and equipped so as to conform at the time of sale to the ultimate purchaser with applicable U.S. Environmental Protection Agency regulations under 40 CFR Parts 1054 and 1060: and,
- Free from defects in materials and workmanship which cause such engine to fail to conform with applicable regulations for the Emissions Control System Warranty period provided herein.
- For owners located more than 100 miles from a John Deere authorized service center, John Deere will pay either for shipping costs to and from an authorized service center, provide for a service technician to come to the owner to make the warranty repair, or pay for the repair to be made at a local non-authorized service center. These provisions do not apply to Alaska, Hawaii, Arizona, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, Texas, Utah, and Wyoming.

Emissions Warranty Interpretation

- Any warranted part that is not scheduled for replacement as required by the maintenance instructions in the Operator's Manual is warranted as provided herein. If any such part fails during the period of warranty coverage it will be repaired or replaced by John Deere. Any such part repaired or replaced under warranty is warranted for the remaining warranty period.
- Any warranted part that is scheduled only for regular inspection in the maintenance instructions in the Operator's Manual is warranted as provided herein. A statement in the Operator's Manual to the effect of "repair or replace as necessary" does not reduce the period of warranty coverage. Any such part repaired or replaced under warranty is warranted for the remaining warranty period.
- Any warranted part that is scheduled for replacement as required maintenance in the Operator's Manual is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by John Deere. Any such part repaired or replaced under warranty is warranted for the remainder of the period prior to the first scheduled replacement point for the part.
- Repair or replacement of any warranted part under the warranty will be performed at no charge to the owner at any authorized John Deere Turf and Utility retailer.
- The owner will not be charged for diagnostic labor which leads to the determination that a warranted part is defective, provided such work is performed by John Deere or an authorized John Deere service provider.
- John Deere will repair damages to other engine components proximately caused by a failure under warranty of any emissions-related warranted part.
- Add-on or modified parts that are not exempted by the California Air Resources Board may not be used. The use of any non-exempted add-on or modified parts will be grounds for disallowing a warranty claim. John Deere will not be liable to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part.

Emission Warranty Parts List

Coverage under this warranty includes, but is not limited to, the parts listed below (the emissions control system parts) to the extent these parts were on the engine and equipment purchased.

Fuel Metering System:

- Carburetor and internal parts (or fuel injection system)
- Air/fuel ratio feedback and control system
- Cold start enrichment system

Evaporative System:

- Fuel tank, fuel cap and tether
- Fuel hose, line, fittings, clamps
- Fuel pump, fuel shut-off valve
- Fuel vapor hoses, fittings
- Carbon canister
- Rollover/slant valve for fuel vapor control
- Purge and vent line

Air Induction System:

- Air cleaner
- Intake manifold

Ignition System:

- Spark plugs
- Magneto or electronic ignition system
- Spark advance/retard system
- Gaskets

Exhaust System:

- Exhaust manifold
- Catalyst muffler

Miscellaneous Items Used in Above Systems

- Valves and Switches: vacuum, temperature, position, check, time-sensitive

- Electronic controls
- Hoses, belts, connectors and assemblies

Limited Liability

a) The liability of John Deere under this Emissions Control System Warranty is limited solely to the remedying of defects in materials or workmanship. Except as otherwise expressly provided herein, this warranty does not cover inconvenience or loss of use of the non-road equipment or engine or transportation of the equipment or engine to or from the John Deere Turf and Utility retailer. John Deere shall not be liable for any other expense, loss, or damage, whether direct, incidental, consequential (except as listed above under “coverage”) or exemplary arising in connection with the sale or use of or inability to use the non-road equipment or engine for any other purpose.

b) No express emissions control system warranty is given by John Deere with respect to the equipment or engine except as specifically set forth in this document. Any emissions control system warranty implied by law, including any warranty of merchantability or fitness for a particular purpose, is expressly limited to the emissions control system warranty terms set forth in this document.

c) No dealer is authorized to modify this Federal, California and John Deere Emissions Control System Warranty.

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Tire Warranty

John Deere warranty applies for tires available through the John Deere parts system. For tires not available through the John Deere parts system, the tire manufacturer’s warranty applicable to your machine may not apply outside the U.S. (See your John Deere dealer for specific information.)

MX00654,0000314-19-21AUG14

Limited Battery Warranty For Factory Installed Batteries

NOTE: Applicable in North America only. For complete machine warranty, reference a copy of the John Deere warranty statement. Contact your John Deere dealer to obtain a copy.

TO SECURE WARRANTY SERVICE

The purchaser must request warranty service from a John Deere dealer authorized to sell John Deere batteries, and present the battery to the dealer with the top cover plate codes intact.

FREE REPLACEMENT PERIOD

Any new battery which becomes unserviceable (not merely discharged) due to defects in material or workmanship within the FREE REPLACEMENT PERIOD will be replaced free of charge. Installation costs will be covered by warranty if the unserviceable battery was installed by a John Deere factory or dealer and the replacement battery is installed by a John Deere dealer.

PRO RATA ADJUSTMENT (batteries with letter code identification only)

Any new battery which becomes unserviceable (not merely discharged) due to defects in material or workmanship within the Pro Rata Warranty Period will be replaced upon payment of the battery’s current list price less a pro rata credit for unused months of service. The applicable adjustment period is determined from the Warranty Code printed at the top of the battery and table below. Installation costs are not covered after the battery warranty period has ended.

THIS WARRANTY DOES NOT COVER

A. Breakage of the container, cover, or terminals.

B. Depreciation or damage caused by lack of reasonable and necessary maintenance or by improper maintenance.

C. Transportation, mailing, or service call charges for warranty service.

D. Batteries that are merely discharged.

LIMITATION OF IMPLIED WARRANTIES AND PURCHASER’S REMEDIES

To the extent permitted by law, neither John Deere nor any company affiliated with it makes any warranties, representations, or promises as to the quality, performance or freedom from defect of the products covered by this warranty. IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TO THE EXTENT APPLICABLE, SHALL BE LIMITED IN DURATION TO THE APPLICABLE ADJUSTMENT PERIOD SET FORTH HERE. THE PURCHASER’S ONLY REMEDIES IN CONNECTION WITH THE BREACH OR PERFORMANCE OF ANY WARRANTY ON JOHN DEERE BATTERIES ARE THOSE SET FORTH HERE. IN NO EVENT WILL THE DEALER, JOHN DEERE OR ANY COMPANY AFFILIATED WITH JOHN DEERE BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. (Note: Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages. So these limitations and exclusions may not apply to you.) This warranty gives you specific legal rights, and you may also have some rights which vary from state to state.

NO DEALER WARRANTY

The selling dealer makes no warranty of its own and the dealer has no authority to make any representation or promise on behalf of John Deere, or to modify the terms or limitations of this warranty in any way.

WARRANTY TERMS TABLE

NOTE: If your battery is not labeled with a warranty code, it is a warranty code 6.

Warranty Code	Free Replacement Period	Pro Rata Warranty Period
A	90 Days	40 Months
B	90 Days	36 Months
C	90 Days	24 Months
D	12 Months	48 Months
E	90 Days	12 Months
F	90 Days	60 Months
G	12 Months	60 Months
H	12 Months	60 Months
6	6 Months	0 Months
12	12 Months	0 Months
18	18 Months	0 Months

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John Deere Quality Statement

John Deere Quality

John Deere equipment is more than just a purchase, it's an investment in quality. That quality goes beyond our equipment to your John Deere dealer's parts and service support. This support is needed to keep you a satisfied customer.

That's why John Deere has initiated a process to handle your questions or problems, should they arise. The following three steps will help guide you through the process.

Step 1

Refer to your operator's manual

A. It has many illustrations and detailed information on the safe and proper operation of your equipment.

B. It gives troubleshooting procedures, and specification information.

C. It gives ordering information for parts catalogs, service and technical manuals.

D. If your questions are not answered in the operator's manual, then go to Step 2.

Step 2

Contact your dealer

A. Your John Deere dealer has the responsibility, authority, and ability to answer questions, resolve problems, and fulfill your parts and service needs.

B. First, discuss your questions or problems with your dealer's trained parts and service staff.

C. If the parts and service people are unable to resolve your problem, see the dealership manager or owner.

D. If your questions or problems are not resolved by the dealer, then go to Step 3.

Step 3

Contact John Deere

A. Your John Deere dealer is the most efficient source in addressing any concern, but if you are not able to resolve your problem after checking your operator's manual and contacting your dealer, contact John Deere for assistance.

B. For prompt, effective service, please have the following ready before you call:

- The name of the dealer with whom you've been working.
- Your equipment model number.
- Number of hours on machine (if applicable).
- Your serial number which you recorded on the inside front cover of this manual.
- If the problem is with an attachment, your attachment identification number.

C. Then call 1-800-537-8233 (United States and Canada) and our advisor will work with your dealer to investigate your concern. If you are outside the United States and Canada, visit the following website:

https://www.deere.com/en/global-country-selector/

Select your country and then click on the Contact Us link at the bottom of the page.

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Record Service Dates

Oil Change	Oil Filter Change (If Equipped)	Lubricate Machine	Air Cleaner Element Check/Clean	Fuel Filter Change

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Index