648R, 652R, 652R MOD, 652R EFI, 652R EFI MOD, 661R,

661R EFI QuikTrak Pro

OPERATOR'S MANUAL QuikTrak Pro

648R, 652R, 652R MOD, 652R EFI, 652R EFI MOD, 661R, 661R EFI

OMTCU37846 ISSUE K3 (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.

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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.

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

Reading your operators 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 operators manual along with the machine operators 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 operators 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 to 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 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.

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

CAUTION: Avoid injury! This symbol and text highlight potential hazards or deat h 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 c onditions that might result in damage to the machine.

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

Attachments for Your Machine Theres a John Deere attachment or kit to make your new machine performmore tasks or be more versatile, whether your machine is a lawn tractor or compact utility tractor or a utility machine.

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, theres a John Deere attachment or kit to fill every need.

Introduction

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[Page 3]

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.

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Record Identification Numbers QuikTrak 600 Series; 648R, 652R, 652R MOD, 652-EFI, 652-EFI MOD, 661R, 661 EFI PIN (025001-)

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

You will need to 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:

_____

TCAL43582UN26MAR13

PRODUCT IDENTIFICATION NUMBER (A):

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

TCAL43583UN26MAR13

ENGINE SERIAL NUMBER (B):

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

ENGINE MODEL CODE

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

Product Identification

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Safety Label Location

TCAL48058UN18OCT13

A CAUTION TCU27738 B Battery Label C DANGER M131739 D WARNING TCU51051 E DANGER M137637

F DANGER M131748 G CAUTION/WARNING TCU33828 H DANGER TCU17622 I Caution/Clean Out Label

Safety Labels

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Understanding The Machine Safety Labels

TCAL25951UN23MAY12

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

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

The operators 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.

Caution - Clean Out Label

TCAL48052UN11OCT13

Caution 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 before

cleaning.

Inspect and clean the entire machine and pay special attention to these locatio ns: 1. Top of mower deck and under shields.

2. Pump, screens and shields.

3. Engine and engine screens.

4.Muffler and exhaust system.

Hearing Protection

TCAL43585UN26MAR13

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

Wear suitable hearing protection.

WARNING / CAUTION - TCU33828

TCAL43586UN26MAR13

CAUTION HELP AVOID INJURY Do not operate this machine unless you are trained Read operators 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

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

Safety Labels

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DANGER 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.

DANGER

TCAL43587UN26MAR13

Shield Eyes: Explosive gases can cause blindness or injury.

NO:

Sparks Flames Smoking

Sulfuric acid can cause blindness or severe burns.

Flush eyes immediately with water. Get medical help fast.

Keep out of reach of children.

Do not tip.

Do not open battery.

WARNING

TCAL43588UN26MAR13

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

DANGER M131739

TCAL43589UN26MAR13

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

DANGER - M131748

TCAL43590UN26MAR13

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.

DANGER - M137637

TCAL43591UN26MAR13

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

Safety Labels

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DANGER

TCAL43592UN26MAR13

To avoid injury from rotating blades, stay clear of fan.

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

Safety Labels

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Operator Training Required Read the operators manual and other training material.

If the operators or mechanics cannot read English, it is the owners responsibility 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.

Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.

The owners/users can prevent and are 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.

Preparation Evaluate the terrain to determine what accessories and

attachments are needed to properly and safely perform the job. Only use accessories and attachments approved by the manufacturer.

Wear appropriate clothing including hard hat, 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 and 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 control, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

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 operators 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 machines 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 operators 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.

Safety

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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.

Checking Mowing Area

TCAL41689UN08APR13

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 but not running. Slow down when you travel over rough ground.

Parking Safely 1. Stop machine on a level surface, not on a slope.

2. Disengage mower blades.

3. Lock the park brake.

4. Stop the engine.

5. Remove the key.

6. Wait for engine and all moving parts to stop before you leave the operator platform.

7. Close fuel shut-off valve, if your machine is equipped.

8. Disconnect the negative battery cable or remove the spark plug wire (for gasoline engines) before servicing the machine.

Rotating Blades are Dangerous

TCAL43410UN15MAR13

HELP PREVENT SERIOUS OR FATAL ACCIDENTS: 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 carefully. People, especially children can move quickly into the mowing area before you know it.

Do not mow in reverse. Shut off blades when you are not mowing. Park machine safely before leaving the operator

platform for any reason including emptying the catchers or unplugging the chute.

Protect Children

TCAL43873UN26MAR13

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 dont 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 machine or to entertain children.

Never allow children or an untrained person 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.

Safety

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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.

Avoid Tipping

TCAL43874UN26MAR13

Slopes are a major factor related to loss-of-control and tipover accidents, which can result in severe injury or death. Operation on all slopes requires extra caution.

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 manufacturers 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.

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 operators view resulting in the machine being operated in an unsafe manner.

Avoid High Pressure Fluids

TCAL41686UN03APR13

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. Informationmay be obtained in the United States and Canada only by calling 1-800- 822-8262.

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.

Wear Appropriate Clothing

TCAL41682UN08MAR13

Always wear safety goggles, or safety glasses with side shields, and a hard hat when operating the machine.

Wear close fitting clothing and safety equipment appropriate for the job.

While operating this machine, 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.

Service Machines Safely

TCAL43875UN26MAR13

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace

when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Use Proper Tools Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

Maintenance and Storage

TCAL43414UN15MAR13

Never operate machine in a closed area where dangerous carbon monoxide fumes can collect.

Disengage drives, lower implement, lock park 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 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 blades. Wrap the blades or wear gloves, and use caution when servicing them. Only replace blades. Never straighten or weld them.

Keep hands, feet, clothing, jewelry and long hair away frommoving parts. If possible, do not make adjustments with the engine running.

Charge batteries 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 manufacturers 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 blade 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 blade can cause other blades to rotate.

Prevent Fires Machine fires and structure fires can occur if a machine

is stored before allowing it to cool, if debris is not removed from critical areas of the machine, or if machine is stored near combustible materials.

Remove grass and debris completely from engine compartment and muffler area, and from on top of the mower deck, before and after operating machine, especially after mowing or mulching in dry conditions.

Empty any grasscatcher bags or containers completely before storing.

Always shut off fuel when storing or transporting machine, if the machine has a fuel shutoff.

Do not store machine near an open flame or source of ignition, such as a water heater or furnace.

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Check fuel lines, tank, cap, and fittings frequently for cracks or leaks. Replace if necessary.

Tire Safety

TCAL41684UNO8MAR13

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

Do not attempt to mount a tire without the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly.

Check tires for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

Handling Fuel Safely

TCAL41685UNO8MAR13

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 Underwriters Laboratories (UL) or ASTM International. 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 machine 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.

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 Material Safety Data Sheet (MSDS) 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 MSDS for that product.

Safety

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Operator Station Controls

TCAL48060UN18OCT13

A Operator Platform B Height-of-Cut Adjustment C Thigh Pad D Battery Box E Brake Handle F Stationary Handles G Choke Knob (if equipped) H Throttle Lever I Electric PTO Switch

J Key Switch K Deck Lift Handle L Fuel Shutoff M Fuel Fill Cap N Anti-Scalp Wheels O Operator Presence Control (OPC) Access Panel P Operator Platform Adjustment Springs Q Mulch-On-Demand (MOD) Switch (if equipped)

Operating Controls

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General Overview

TCAL48061UN18OCT13

A Flexible Chute Deflector B Rear Drive Tire C Fuel Tank D Deck Lift Handle E Co ntrol Levers F Hour Meter G Engine

**H Air Cleaner I Muffler J Anti-
Scalp Wheels K Front Caster Tire L Cutter Deck M Mulch-On-
Demand (MOD) Feature (if equipped)**

Operating Controls

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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 the operator platform, air intake screen, engine cooling fins, hydraulic pumps, 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.

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.

Mounting and Dismounting Machine Safely

TCAL43595UN26MAR13

1. Step on the operator platform (A) at the rear of machine to mount the machine.

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

3. Step off the operator platform to dismount machine.

4. Keep the operator platform clean.

Raising and Lowering Thigh Pad 1. Park machine safely. (See Parking Safely in the

Safety section.)

TCAL43596UN26MAR13

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

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

Adjusting Operator Platform Suspension *NOTE: Operator platform suspension is a djusted at the*

factory. If the setting is not satisfactory, the springs and cap screws (A) can be mov ed from the forward position. Both cap screws must be positioned similarly, with nei ther cap screw more forward or rearward than the other. An optional forth spring an d cap screw (C) can be added for additional stiffness. The third spring and cap scre w (B) and the optional forth spring and cap screw (C) are not adjustable.

Operating

TCAL43597UN26MAR13

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

2. Loosen both cap screws (A) just enough to slide the springs and cap screws. If loosened too much, the nut may fall off and the operator platform will have to be removed to reinstall the nut.

3. Slide springs and cap screws (A) forward or rearward as needed; Slide springs and cap screws forward for less

stiffness. Slide springs and cap screws rearward for more

stiffness.

4. Tighten cap screws with an impact wrench. If tightened with a hand wrench, the nut may spin.

Raising and Lowering Deck The deck lift handle allows the deck to be placed into the highest position for transporting.

NOTE: If the deck lift handle is pulled back beyond the audible click, the mower deck will not lock into position.

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

TCAL43598UN26MAR13

2. To raise and lock the mower deck, pull the deck lift handle (A) until an audible click is heard.

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

TCAL43599UN26MAR13

3. To unlock and lower the mower deck, pull the deck lift handle back from the locked position, and slowly lower the mower deck.

Adjusting Mower Deck Height-of-
Cut CAUTION: Rotating parts can catch fingers, loose clothing, or long hair. Wait for engine and all moving parts to stop before leaving operators station to adjus t or service machine.

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

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

The height-of-cut (HOC) selector has fourteen different settings, ranging from 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.)

TCAL43600UN26MAR13

2. Pull the deck lift handle (A) all the way back, locking it in the upright position.

TCAL43601UN26MAR13

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

NOTE: Make sure the HOC pin is securely seat in both the inner and outer selector pl ates.

4. Select the desired cut height and replace the HOC pin (B).

5. Once the proper height is set, pull back on the deck lift handle (A) and lower the lever toward the front of the machine until it stops at the set height-of-cut (HOC).

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 accidently.

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.

Operating

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TCAL43602UN26MAR13 *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)

TCAL43603UN26MAR13 *Front of deck shown*

TCAL43604UN26MAR13 *Rear of deck shown*

1.Adjust bolts (A) (two on each side of deck) until deck is within 3 mm (1/8 in.) of level from side-to-side:

Adjust bolts (A) on all four adjusters until side-to-side level is reached.

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.

TCAL43605UN26MAR13

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

Adjusting Level (Front-to-Rear)

IMPORTANT: Adjust the left and right deck lift assist rods equally.

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NOTE: Adjust side-to-side mower level before adjusting front-to-rear level. Adjust both sides of the mower deck equally.

This adjustment is for a course adjustment. The mower deck can be adjusted for pitch and side-to side levels. Pitch is the relationship between the front of the deck and the rear of the deck in regards to height of cut. In most cases, a positive pitch (front of the deck is lower than the rear of the deck) of 1/4 is the optimum setting.

TCAL43606UN26MAR13

1. Loosen jam nuts (C) on deck lift rod (D).

2. Remove cap screw (A) securing the rod end (E) from the lift bracket (B).

3. Adjust front portion of mower deck: Turn rod end (E) clockwise to raise front of mower

deck. Turn rod end (E) counterclockwise to lower front of

mower deck.

4. Verify that adjustment on right and left sides is equal.

5. Tighten jam nuts (C).

6. Check front-to-rear mower level.

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)

TCAL43607UN26MAR13 *Front of deck*

TCAL43608UN26MAR13 *Rear of deck*

1. Adjust bolts (A) (two on each side of deck) until deck is within 3 mm (1/8 in.) of level from side-to-side:

Adjust bolts (A) on all four adjusters until side-to-side level is reached.

When adjustments have been made, verify measurements.

Operating

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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 adjustme nt 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 springs. If the springs are compressed too tightly, the mower de ck will float too freely. Both deck lift spring assemblies must be adjusted equally. De crease deck lift spring tension if operating in rough terrain.

TCAL43609UN26MAR13

1. Loosen cap screws (A and C).

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

2. Face the front of the machine and adjust spring tension:

3. To make the deck easier to lift, turn bracket (B) forward to increase spring tension. making the deck easier to lift.

4. To make the deck harder to lift, turn bracket (B) rearward to decrease spring tension.

5. When adjustments have been made, tighten cap screws (A and C).

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 tim e 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.

TCAL43610UN26MAR13

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.

Testing Safety Systems

TCAL42193UN08MAR13

Operating

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s **CAUTION: Engine exhaust fumes contain carbon monoxide and can cause seri ous 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 operators 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.

Testing PTO Switch 1. Stand on the operator platform with motion control

levers in the neutral position.

2. Lock park brake.

3. Pull PTO switch up to engage.

4. Turn key switch to the start position.

Result: The engine must not crank.

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. Pull PTO switch up to engage.

6. Push PTO switch down to disengage.

7. Repeat steps 5 and 6 several times.

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

Testing Park Brake Switch 1. Push PTO switch down to disengage.

2. Unlock park brake.

3. Turn key switch to the start position.

Result: The engine must not crank.

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: Before engaging mower, make sure that area is clear of bystanders, especially children.**

5. Pull PTO switch up to engage.

6. Step completely off the operator platform.

Result: The engine must stop.

Testing Park Brake 1. Inflate tires to correct pressures.

TCAL43612UN26MAR13

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.

Operating

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TCAL43613UN26MAR13

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

Unlocking Park Brake Lower park brake lever (A) to unlock park brake.

Using the PTO Engage PTO

CAUTION: Before engaging mower, make sure that area is clear of bystanders, e specially 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 fast position.

TCAL43614UN26MAR13

5. Pull PTO switch (A) up to engage mower deck.

6. Move throttle lever forward to the fast position for mowing.

Disengage PTO 1. Push PTO switch (A) down.

2. Lock park brake.

Using Fuel Shutoff Valve and Fuel Gauge

TCAL43615UN26MAR13

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.

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

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

Using the Throttle

TCAL43616UN26MAR13

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.

Operating

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Pull throttle lever (A) backward to the slow position (D) to idle engine. Do not run engine at slow idle any longer than necessary.

Using the Digital Hour Meter *NOTE: The machine is equipped with an electric start. The*

hour meter will continue to run with the key switch in the run position.

TCAL43617UN26MAR13

Hour meter (A) shows number of hours the machine has been operated.

Use hour meter and Service Interval section to determine when machine needs service.

Shut off engine: The hour meter will display how many times the engine has been started.

Operating/Resetting Procedure Press button (B) as described to program or reset the hour meter.

Default display: Hours Press button once (TMR1): Timer 1, press for 3

seconds to reset. Press button twice (TMR2): Timer 2, press for 3

seconds to reset. *NOTE: Beginning 5 hours before the next service interval,*

the hour meter will flash svc ENG every 5 seconds in the remaining hours.

Press button three times (svc ENG): The hour meter will display the time until the next service interval. Hold the button down to reset.

Using the Motion Control Levers The functions of the motion control levers are:

CAUTION: Learn use of the motion control levers and practice at half throttle un til becoming proficient and comfortable with the operation of the machine. Do n ot move motion control levers from forward to reverse or from reverse to forwar d position rapidly. Sudden direction changes could cause loss of control or dam age the machine.

Steering. Acceleration. Deceleration.

Neutral Position

TCAL43618UN26MAR13 *Motion control levers (A) shown in the nuetral 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: Children or bystanders may be injured by runover and rotating blade s. 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 will travel. Forward speed range: 0-15.3 km/h (0-9.5 mph)

4. Pull both motion control levers rearward at the same time to begin reverse motion. Reverse speed range: 0-8.85 km/h (0-5.5 mph)

5. To stop motion, slowly release motion control forward or rearward until the machine comes to a stop.

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

Forward

TCAL43619UN26MAR13

Push both motion control levers forward at the same time.

Reverse

TCAL43620UN26MAR13

Pull both motion control levers past center rearward to cruiser bar (B) at the same time.

Gentle Left Turn

TCAL43621UN26MAR13

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

Gentle Right Turn

TCAL43622UN26MAR13

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

Sharp Left Turn

TCAL43623UN26MAR13

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

Sharp Right Turn

TCAL43624UN26MAR13

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

Starting Engine Before Starting the Engine Make sure the motion control levers are in the exact

neutral position. Lock park brake if it is not already locked. Ensure PTO switch is down to disengage. Turn fuel valve to the on position.

CAUTION: Engine exhaust fumes contain carbon monoxide and can cause serio us 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.

1. Turn fuel shutoff valve to the on position.

2. Stand on the operator platform.

3. Lock park brake.

4. Put motion control levers in the neutral position.

TCAL43625UN26MAR13

5. Push PTO switch (A) down to disengage 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 knob up to the

choke position. **Warm/hot engine:** If necessary, pull 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.

Engaging Mower CAUTION: Clear mowing area of all bystanders when operating this machine. Thrown objects could cause serious injury or death. Keep hands a nd feet away from blades and discharge opening. Do not mow in reverse unless absolutely necessary.

IMPORTANT: To help prevent damage to PTO clutch: Do not engage PTO with throttle in the fast

position.

1. Adjust mower deck to desired cutting height.

2. Start engine.

3. Move throttle lever (A) to the 1/2 fast position.

4. Unlock park brake (B).

NOTE: In cold weather or with a new machine, it may be necessary to engage choke knob (C) (if equipped) at the same time as PTO switch (D) to prevent engine from st alling.

5. Pull PTO switch (D) up to engage mower deck.

6. Move throttle lever to the fast position.

7. Lower deck lift lever (E).

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

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

Operating Mulch-On-Demand If Equipped 1. Push and hold deck mode switch (A) forward until

MOD is fully engaged for mulch position.

TCAL48053UN21OCT13

A Deck Mode Switch

2. Push and hold deck mode switch (A) rearward until discharge gate is fully open for side discharge position.

Stopping the Engine IMPORTANT: To help prevent engine backfiring,

throttle lever should be set at the 1/4 throttle position and run for 30 seconds p rior to stopping the engine. Do not stop engine when mower is on a slope of mor e than 30 for an extended period of time. Oil may run through valve train into ca rburetor and muffler.

1. Lock park brake.

2. Move to 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 le aving the machine unattended.**

4. Remove key.

5. Turn fuel shutoff valve off.

Operating

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Checking Carbon Canister and Fuel Lines

TCAL43627UN26MAR13

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.

TCAL43628UN26MAR13

Do not fill tank past Max Fill Level line (P). Overfilling could result in clogging the rollover vent

and/or contaminating the purge canister.

TCAL43629UN26MAR13

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

annually.

Operating

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Using Pump Free-Wheel 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 machine to move

machine. Do not tow machine.

NOTE: The pump free-
wheel valves must be fully turned clockwise (closed) during normal machine operati on.

When the machine needs to be moved without starting the engine, use the pump free-wheel valves:

1. Lock park brake.

NOTE: The pumps (A) are located at the rear of the engine. The free-
wheel valves (B) can be accessed by lifting the thigh pad.

TCAL48037UN17SEP13

2. Turn both pump freewheel valves (B) counterclockwise 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 free-wheel valves (B) on both pumps 1/2 turn clockwise (closed position). Tighten valves to specification.

Specification Valve Torque. . . . . .11 Nm (100 lb.-in.)

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 weig ht. (See Specifications section in Operators Manual). **CAUTION: Use extra care whe n loading or unloading the machine onto a trailer or truck. Machine wheels can g o 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 level surface.

2. Raise mower deck to the transport position.

3. Back machine onto heavy-duty trailer with full-width ramp.

4. Stop engine and lock park brake.

5. Lower mower deck completely.

6. Remove key.

7. Turn fuel shutoff valve to the off position.

TCAL43631UN26MAR13

8. Fasten front of 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.

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TCAL43632UN26MAR13

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

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 grass at 1/2 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.

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 0-15.4 km/h (0-9.6 mph).

Reverse speed range is approximately 0-8.85 km/h (0-5.5 mph).

Dismounting to Inspect Mower CAUTION: Help prevent serious injury. Keep hand s and feet away from blades and the discharge opening. Do not step on either si de 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. Push knob down 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.

Service Literature If you would like a copy of the Parts Catalog or Technical Manual for this machine call:

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

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 **http://JDParts.deere.com** for your Internet connection to parts ordering and information.

Replacement Parts

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Servicing Your Machine IMPORTANT: Operating in extreme conditions may

require more frequent service intervals: Engine components may become dirty or

plugged when operating in extreme heat, dust or other severe conditions.

Engine oil can degrade if machine is operated constantly at slow or low engine speeds or for frequent short periods of time.

TCAL43633UN26MAR13

The service interval label (A) can be located on the underside of the thigh pad (B) when lifted.

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

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) Change engine oil and filter Change transmission oil and filter 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 front caster wheels Check belts Check all control cables

Every 100 Hours or Yearly Change engine oil and filter Inspect mower deck drive belt Remove cooling shroud and remove debris

Every 200 Hours or Yearly Check all hoses and clamps Check all lines and fittings

Break-In (After First 300 Hours) Change transmission oil and filter

Every 300 Hours Change paper air cleaner element Check and adjust valve clearance

Every 500 Hours or 24 Months Check valve clearance Check engine high and low idle Inspect valves Remove combustion chamber deposits Remove cooling shroud and remove debris

Every 1000 Hours Inspect deck idler pivot bushing

Service Intervals

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Grease IMPORTANT: Use recommended John Deere greases

to avoid component failure and premature wear. The recommended John Deere greases are effectivewithin 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-PurposeHD Lithium Complex Grease John Deere Moly High Temperature EP Grease John Deere Special Purpose HD Water Resistant NM

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 you r grease supplier before mixing different types of grease.

Lubrication Set 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 Mulch-On-Demand (MOD) Baffle Pivot Bushing.

TCAL48057UN21OCT13

A Grease Fitting

B Pivot Shield Access Hole

NOTE: There is an access hole in the pivot shield (B) and grease fitting (A) is accessi ble directly from the front. On right front of machine, lubricate MOD pivot

shaft grease fitting (A).

Lubricating Front Caster Spindles and Wheels

TCAL43634UN26MAR13

Lubricate spindle grease fitting (A) on each front caster spindle.

Lubricating Deck Lift Pivot Points

TCAL43635UN26MAR13

Service Lubrication

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Lubricate two front deck lift pivot lubrication fittings (A).

Lubricating Park Brake Linkage

TCAL43636UN26MAR13

Lubricate park brake lubrication fitting (A).

Service Lubrication

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Engine Emissions Information Engine Warranty Maintenance Statement Mainten ance, repair, or replacement of the emission control devices and systems on this engine, which are being done at the customers expense, may be performed by any non-road engine repair establishment or individual. Warranty repairs must be performed by an authorized John Deere dealer.

Emission Control System Certification Label

NOTE: Tampering with emission controls and components by unauthorized personn el may result in severe fines or penalties. Emission controls and components can onl y be adjusted by EPA and/or CARB authorized service centers. Contact your John D eere 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.

Avoid Fumes CAUTION: Engine exhaust fumes contain carbon monoxide and ca n 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.

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

32

0 10 20 30 40-10-20-30

-20 0 20 40 60 80 100

50

122

-40

-40 F

C

SAE 15W-40

SAE 10W-40

SAE 10W-30

SAE 5W-30

TCAL43637UN26MAR13

John Deere TURF-GARD is preferred.

The following oils are also recommended: John Deere Plus-4 John Deere Plus-50 II

Other oils may be used if they meet one or more of the following: ILSAC GF-4 ILSAC GF-3 ILSAC GF-2 API Service Category SM API Service Category SL API Service Category SJ ACEA Oil Sequence A3 ACEA Oil Sequence A2 ACEA Oil Sequence A1

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.

Service Engine

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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.

Changing Engine Oil and Filter (Kawasaki) 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 an d components.

IMPORTANT: Change the oil more often if the machine is used in extreme condit ions: 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.)

TCAL43639UN26MAR13

3. Attach plastic drain tube to drain valve outlet (A).

4. Place oil drain pan under drain tube.

5. Turn drain valve (B) counterclockwise to open.

6. Allow oil to drain into oil drain pan.

7. After oil drains, turn drain valve (B) clockwise to close. Remove plastic drain tube.

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 . . . . . 2.1 L (2.2 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.

Service Engine

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Changing Engine Oil and Filter (Kohler) CAUTION: Touching hot surfaces can bur n skin. The engine, components, and fluids will be hot if the engine has been run ning. Allow the engine to cool before servicing or working near the engine and c omponents.

IMPORTANT: Change the oil more often if the machine is used in extreme condit ions: 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.)

TCAL47854UN29JUL13 *Some components removed for clarity.*

3. Locate the flexible drain tube (A) and position it for draining.

4. Place oil drain pan under drain tube.

5. Remove drain cap (C).

6. Allow oil to drain into an oil drain pan.

7. After oil drains, install drain cap (C).

8. Turn oil filter (B) 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.

TCAL47855UN29JUL13

11. Clean area around dipstick cap (D).

12. Remove dipstick cap.

13. Add oil to specification. **Specification**

Oil (Kohler) Capacity . . . . . 1.9 L (2.0 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.

Cleaning Engine Air Intake Screen and Fan (Kawasaki)

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 o verheating. Keep air intake screen and other external surfaces of the engine, inc luding cooling fins, clean at all times to allow adequate air intake.

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

TCAL43640UN26MAR13

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).

TCAL43641UN26MAR13

4. Clean inner screen (C) with a rag, brush, or compressed air.

5. Remove three screws (D), inner screen (C), and spacer (E).

TCAL43642UN26MAR13

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 Nm (88 lb.-in.)

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

Cleaning Engine Air Intake Screen and Fan (Kohler)

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 o verheating. Keep air intake screen and other external surfaces of the engine, inc luding cooling fins, clean at all times to allow adequate air intake.

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

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TCAL47856UN29JUL13

2. Clean outer air intake screen (A) with a rag, brush, or compressed air.

3. Remove three cap screws (B) and remove the outer air intake screen (A).

TCAL47857UN29JUL13

4. Clean inner screen (C) with a rag, brush, or compressed air.

5. Remove four cap screws (D) securing inner screen (C).

6. Clean fan using a rag, brush, or compressed air.

NOTE: When removing the studs, note the orientation of the spring washers.

TCAL47858UN29JUL13

7. Remove four studs (E) and spring washers.

NOTE: When installing the spring washers, place the concave side down.

8. Install inner screen and spacer, and secure with three screws. Tighten screws to specification.

Specification Screw Torque . . . . . .9.9 Nm (88 lb.-in.)

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

Cleaning Engine Cooling Fins (Kawasaki) CAUTION: Compressed air can cause d ebris 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 o verheating. Keep air intake screen and other external surfaces of the engine, inc luding cooling fins, clean at all times to allow adequate air intake.

NOTE: Cleanout panels should also be removed and all debris cleaned with this proc edure.

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

2. Raise thigh pad.

Service Engine

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TCAL43643UN26MAR13

3. Remove spark plug wires (A) from both spark plugs.

TCAL43644UN26MAR13

4. Clean outer air intake screen (B) with a rag, brush, or compressed air.

5. Remove three cap screws (C), and remove outer air intake screen (B).

TCAL43645UN26MAR13

6. Clean inner screen (D) with a rag, brush, or compressed air.

7. Remove three screws (E), inner screen (D), and spacer (F).

TCAL43646UN26MAR13 *Rear of engine cover shown.*

TCAL43647UN26MAR13 *Right side of engine cover shown.*

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TCAL43648UN26MAR13 *Left side of engine cover shown.*

8. Remove six screws (G), and raise engine cover.

TCAL43649UN26MAR13 *Rear of engine cover shown.*

9. With compressed air, thoroughly clean grass buildup and debris from the following areas: Engine cooling fins (H) at rear of engine. Area behind each spark plug wire access hole. Area between engine and machine frame.

TCAL43650UN26MAR13

10. Install spark plug wires (A).

11. Install engine cover and intake screens.

Cleaning Engine Cooling Fins (Kohler) CAUTION: Compressed air can cause debr is 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 o verheating. Keep air intake screen and other external surfaces of the engine, inc luding cooling fins, clean at all times to allow adequate air intake.

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

2. Disconnect spark plug wires from both spark plugs.

TCAL47859UN29JUL13

3. Remove cap screws (A) and inspection cover (B).

TCAL47860UN29JUL13

4. With compressed air, thoroughly clean grass buildup and debris from the following areas: Engine cooling fins (C). Area at the rear of the engine. Area between engine and machine frame. Area behind each spark plug wire access hole.

5. Install spark plug wires.

6. Install inspection cover and cap screws.

Servicing HD Air Cleaner Elements IMPORTANT: Dirt and debris can enter the en gine

when removing the air cleaner elements. Service elements only at prescribed in tervals.

Servicing Primary Air Cleaner Element 1. Park the machine safely. (See Park Safely in the

Safety section.)

2. Allow engine to cool.

TCAL43651UN26MAR13

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

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

TCAL43652UN26MAR13

4. Remove and discard primary element (C). Replace with new primary element.

5. Install air cleaner canister cover with rubber dust unloading valve pointing downward.

Servicing Secondary Air Cleaner Element 1. Remove primary air cleaner element.

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TCAL43653UN26MAR13

2. Remove and discard secondary air cleaner element (D). Install new secondary element.

3. Install primary air cleaner element.

4. Install air cleaner canister cover with rubber dust unloading valve pointing downward.

Checking Spark Plugs CAUTION: Touching hot surfaces can burn skin. The engin e, components, and fluids will be hot if the engine has been running. Allow the e ngine 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.

TCAL43654UN26MAR13

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.

TCAL43655UN26MAR13

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 Nm (16 lb.-ft.)

7. Install both spark plug wires.

Adjusting Carburetor *NOTE: Carburetor is calibrated by the engine*

manufacturer and is not adjustable. If engine is operated at altitudes above 1829 m (6000 ft.), some carburetors may require a special high altitude main jet. See your au thorized dealer.

If engine is hard to start or runs rough, check the Troubleshooting section of this manual.

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

If your engine is still not operating correctly after performing the checks in the Troubleshooting section, contact your authorized dealer.

Service Engine

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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.

TCAL43656UN26MAR13

3. Turn fuel shutoff valve (A) to 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 arrow pointing

in direction of fuel flow.

8. Connect hoses to new fuel filter (C).

9. Install hose clamps (B).

Replacing Fuel Filter (Kohler) 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.

TCAL47861UN29JUL13

3. Turn fuel shutoff valve (A) to OFF position.

TCAL47862UN29JUL13

4. Slide hose clamps (B) away from fuel filter (C).

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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 arrow pointing

in direction of fuel flow.

8. Connect hoses to new fuel filter (C).

9. Install hose clamps (B).

10. Install new cable ties securing the filter to the frame.

Service Engine

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Hydraulic Oil

32

0 10 20 30 40-10-20-30

-22 -4 14 50 68 86 104

50

122

-40

-40 F

C

SAE 15W-40

TCAL43657UN26MAR13

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 Synthetic Blend

Oil must meet the following:

API Service Classification SG or higher

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 co uld overflow.

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

2. Lift thigh pad.

TCAL43658UN26MAR13

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

TCAL43659UN26MAR13

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 FULL mark. If oil is above full mark (E), drain oil to proper level.

5. Lower thigh pad.

Changing Hydraulic Oil and Filter CAUTION: Escaping fluid under pressure can p enetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnectinghydraulic or other lines. Tighten all connections before ap plying 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 period s 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 Parking Safely in the Safety section.)

2. Allow engine and hydraulic oil reservoir to cool.

3. Lift the thigh pad.

Service Transmission

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NOTE: Place drain pan directly under filter head.

TCAL43660UN26MAR13

4. Loosen hose connection (A), and disconnect filter inlet line (B).

5. Allow hydraulic oil to drain into a drain pan with a capacity of at approximately 2.8 L (3 qt.).

6. Turn oil filter (C) counterclockwise to remove.

7. Apply a film of clean hydraulic oil to gasket of new filter.

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

9. Connect filter inlet line (B), and secure connection (A).

10. Clean area around breather cap (D).

IMPORTANT: Do not add oil beyond FULL mark. Oil capacity after draining may b e less than dry fill capacity. Check oil level before filling completely.

TCAL43661UN26MAR13

11. Remove breather cap (D) and fill oil reservoir to the correct level (E), approximately 2.7 L (2.9 qt.). of oil. Install socket head plug.

12. Before starting engine bleed the hydraulic system. See (Bleeding Air From Hydraulic System).

13. When the hydraulic system is free of all air, start engine.

14. Move throttle lever to the FAST position.

15. Unlock park
brake. **CAUTION: Help prevent serious bodily injury. Remain alert to other people and the surroundings when operating the machine.**

16. Cycle motion control levers forward and rearward several times. Check for leaks around filter.

17. Stop engine. Check oil level, and add oil as necessary to bring oil level to FULL mark (F) on the reservoir sight glass (E).

18. Lower thigh pad.

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 disconnectinghydraulic or other lines. Tighten all connections before applying pressure. Search for leaks w ith a piece of cardboard. Protect hands and body from high pressure fluids. Cer tain procedures require the machine engine to be operated and the machine to be raised off the ground. Prevent possible injury to the servicing technician and /or bystanders, insure the machine 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.

Service Transmission

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IMPORTANT: Contamination of hydraulic fluid could cause transmission damage or failure. Do not open oil reservoir cap unless absolutely necessary. If air enter s into the system, loss of power, excessive heat, and damage to the hydraulic p umps 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.

TCAL43662UN26MAR13

3. Open the bypass valve (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 free-wheel valves (A) on both pumps 1/2 turn clockwise (closed position). Tighten valves to specification.

Specification Valve Torque. . . . . .11 Nm (100 lb.-in.)

Cleaning Hydraulic Oil Pump Cooling Fans 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: To ensure proper cooling, keep the cooling fins clean at all times. O perating the machine with obstructed cooling fins could cause damage due to o verheating.

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

TCAL43663UN26MAR13

2. Clean hydraulic oil pump cooling fan cover (C) with a rag, brush, or compressed air.

3. Clean area around hydraulic pumps and frame.

4. Remove hex nut (A) and remove the retainer bracket (B).

5. Carefully press the tabs (E) on the hydraulic oil pump cooling fin cover (C).

6. Lift the cooling fan cover from the hydraulic oil pump.

7. Clean the cooling fan (D) with a rag, brush, or compressed air.

8. Repeat the process for the second hydraulic oil pump cooling fan.

9. Install the hydraulic oil pump cooling fan cover (C) and ensure the four tabs (E) snap into place.

10. Install the retainer bracket (B) and secure with hex nut (A).

Service Transmission

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Checking and Replacing Traction Drive Belt CAUTION: Rotating parts can catch f ingers, loose clothing, or long hair. Wait for engine and all moving parts to stop b efore leaving operators 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.)

TCAL43664UN26MAR13

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

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

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

TCAL43665UN26MAR13

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.

TCAL43666UN26MAR13

3. Insert a 1/2 in. drive ratchet or breaker bar in square hole (A) in idler pulley arm (B).

4. Rotate tension idler pulley arm (B) to remove tension from drive belt (C).

5. While holding idler pulley arm, remove traction drive belt (C).

Service Transmission

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Installing Traction Drive Belt

TCAL43667UN26MAR13

1. Use a 1/2 in. drive ratchet or breaker bar to rotate idler pulley arm as shown above 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.

Checking and Adjusting Motion Control Linkages

CAUTION: Engine exhaust fumes contain carbon monoxide and can cause serio us 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 hard, 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, park 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.

TCAL43668UN26MAR13

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

TCAL43669UN26MAR13

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

2. Raise thigh pad.

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TCAL43670UN26MAR13

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

TCAL43671UN26MAR13

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.

Changing the Speed Sensitivity Adjustment The control system torsion bar has two sets of holes where he control linkage can be installed. The holes farthest from the operator position are for slower, less sensitive setting, and the holes closest to the operator position are the faster, more sensitive setting.

The controls are initially set with the speed/sensitivity adjustment in the faster, more sensitive position. If an operator is not completely familiar with the mower operation, the operator may desire to decrease the ground speed.

The slower setting has a corresponding decrease in the sensitivity of the controls. In other words, a given amount of movement of the control levers will cause about a 25- 30% change in the ground speed, making the controls less sensitive.

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

2. Stop engine.

3. Lock park brake.

4. Raise thigh pad.

TCAL43672UN26MAR13

5. Remove lock nut (A) and disconnect control linkage rod end (B) from the control system torsion bar (C).

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TCAL43673UN26MAR13

6. Install the rod end (B) into the alternate hole (D).

7. Repeat steps 5 and 6 for the other control linkage rod.

8. Perform Checking and Adjusting Transmission Tracking.

Checking and Adjusting Transmission Tracking

CAUTION: Engine exhaust fumes contain carbon monoxide and can cause serio us 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 transmission tracking with the machine parked on a hard, le vel 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.

TCAL43674UN26MAR13

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 will increase the forward speed capability for the side of the mower.

Lengthening the control rod will slow 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 will vary depending on which speed/sensitivity position the control rods are installed in. Use the procedure that matches your application.

Tracking Adjustment (Speed Sensitivity in Slow Position) 1. Park machine safely. (See Parking Safely in the

Safety section.)

2. Raise thigh pad.

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TCAL48038UN17SEP13

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

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

4. Rotate the control rod (C) clockwise (shorten) or counterclockwise (lengthen) as needed. Shortening the control rod (C) will increase the

speed of the forward movement of the mower on that side.

Lengthening the control rod (C) will slow the speed of the forward movement of the mower on that side.

The only reference point to limit the adjustment from becoming extremely far off is the relative position of the pump stop and the handlebars in the speed sensitivity adjustment. If the adjustment is off either due to new parts having been installed or for other reasons: Position the control rods in the fast speed

sensitivity setting. (See Changing the Speed Sensitivity Adjustment.)

Adjust the tracking using the Tracking Adjustment (Speed Sensitivity in Fast Position) procedure.

Reposition the control rods to the slow position (See Changing the Speed Sensitivity Adjustment.)

Adjust the tracking one or two turns on either side as needed.

5. Tighten jam nuts.

6. Check tracking. (See Checking Transmission Tracking.) Repeat adjustment procedure as needed.

7. Check neutral position adjustment. (See Checking Neutral Position.) Adjust as needed.

Tracking Adjustment (Speed Sensitivity in Fast Position) 1. Park machine safely. (See Parking Safely in the

Safety section.)

2. Raise thigh pad.

TCAL48038UN17SEP13

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

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

4. Rotate the control rod (C) clockwise (shorten) or counterclockwise (lengthen) as needed. Shortening the control rod (C) will increase the

speed of the forward movement of the mower on that side.

Lengthening the control rod (C) will slow the speed of the forward movement of the mower on that side.

The only reference point to limit the adjustment from becoming extremely far off is the relative position of the pump stop and the handlebars in the speed sensitivity adjustment. If the adjustment is off either due to new parts having been installed or for other reasons: Position the control rods in the fast speed

sensitivity setting. (See Changing the Speed Sensitivity Adjustment.)

Adjust the tracking using the Tracking Adjustment (Speed Sensitivity in Fast Position) procedure.

Reposition the control rods to the slow position (See Changing the Speed Sensitivity Adjustment.)

Adjust the tracking one or two turns on either side as needed.

5. Tighten jam nuts.

Service Transmission

6. Check tracking. (See Checking Transmission Tracking.) Repeat adjustment procedure as needed.

7. Check neutral position adjustment. (See Checking Neutral Position.) Adjust as needed.

Service Transmission

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Adjusting Park Brake Testing Park Brake 1. Inflate tires to correct pressures.

TCAL43677UN26MAR13

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 Parking Safely in the

Safety section.)

2. Unlock park brake.

NOTE: Repeat procedure for both sides of machine.

TCAL43678UN26MAR13

3. Loosen two cap screws (C) that retain brake pawl (B).

4. Adjust distance (A) between pawl and tire to specification.

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

5. Tighten brake pawl retaining cap screws (C).

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.

Service Steering and Brakes

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Adjust Mower Deck Lift Latch If the mower deck lift latch does not function properly, the latch spring anchor will need to be adjusted:

If the mower deck lift lever does not disengage when pulled back, the spring anchor needs to be repositioned in the lower position.

If the mower deck lift lever does not latch when moved to the raised position, the spring anchor needs to be repositioned in the upper position.

1. Park machine safely. (See Parking Safely in the Safety section.) **CAUTION: Do not work near raised mower deck unless it is safely supp orted. Mower blades are sharp. Wrap blades or wear gloves when servicing. Bef ore performing any service function, wait for all moving parts to stop turning. Di sconnect battery or remove spark plug wire before making repairs.**

2. Place blocks under the outer edges of the mower deck.

3. Lower the mower deck onto the blocks.

TCAL43679UN26MAR13

4. Loosen nut (A), and reposition the spring anchor (B) as needed: If the mower deck lift lever does not disengage

when pulled back, the spring anchor needs to be repositioned in the lower position. (C).

If the mower deck lift lever does not latch when moved to the raised position, the spring anchor needs to be repositioned in the upper position (D).

5. Tighten nut (A).

6. Raise the mower deck, and remove the blocks.

Adjusting Mulch-On-Demand (MOD) Linkages If Equipped

CAUTION: Blades are sharp. Always wear gloves when handling blades or workin g near blades. Replace blades if defective. Never straighten or weld them.

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

2. Set deck to mulch mode.

3. Raise mower deck to highest position to access blades.

TCAL48054UN21OCT13

A Jam Nut (2 used) B Tie Rod C Block - Off Plate

4. Detach right gate tie rod from pivot shaft.

5. Loosen jam nut (A) on both ends of tie rod (B).

6. Rotate tie rod ends to increase or decrease length of tie rod assembly so that the block-off plate (C) is closed within a 1/8 in. gap between block-off plate (C) and mower deck.

7. Tighten jam nut (A). **Specification**

Gap Distance . . . . . 3.2 mm (1/8 in.)

8. Reattach right gate tie rod end to pivot shaft.

Right Gate Adjustment

CAUTION: Blades are sharp. Always wear gloves when handling blades or workin g near blades. Replace blades if defective. Never straighten or weld them.

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

2. Set deck to side discharge position.

3. Raise the mower deck to the highest position or transport mode.

NOTE: Stationary plate is used for reference point (X).

TCAL48055UN21OCT13

D Tie Rod E Gate F Mower Deck G Jam Nut (2 used) X Reference Point

4. Pull pin and detach left gate tie rod.

5. Loosen jam nut (G) on both ends of tie rod (D). Rotate ends to increase or decrease length of tie rod assembly so that leading face of gate (E) is parallel with reference point (X) within 1/8 in between the gate and mower deck (F).

Specification Gap Distance . . . . . 3.2 mm (1/8 in.)

6. Tighten Jam nut (G) before operating machine.

7. Reattach left gate tie rod with pin.

Left gate adjustment

CAUTION: Blades are sharp. Always wear gloves when handling blades or workin g near blades. Replace blades if defective. Never straighten or weld them.

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

2. Set deck to side discharge position.

3. Raise the mower deck to the highest position or transport mode.

NOTE: Stationary plate is used for reference point (X).

TCAL48056UN21OCT13

H Jam Nut I Tie Rod J Mower Deck K Gate L Cotter Pin X Reference Point

4. Loosen jam nut (H) on right end of tie rod (I).

5. Remove cotter pin (H) from left tie rod end and remove tie rod end from gate bracket.

6. Manually move gate (K) to mulch position and lower left tie rod (I) end so it can be rotated. Rotate tie (I) rod to increase or decrease length of tie rod assembly as necessary.

7. Install left tie rod end temporarily into gate bracket.

8. Check to make sure the leading face of gate (K) is parallel to the reference point (X). There should be a minimum of 1/8 in. gap between gate (K) and the mower deck (F). Readjust as necessary.

Specification Gap Distance . . . . . 3.2 mm (1/8 in.)

9. Tighten Jam nut (H) before operating machine.

Removing and Installing Mower Deck Drive Belt Shields

CAUTION: Help prevent serious personal injury. Do not operate the mower witho ut the belt shields installed.

Removing Belt Shields 1. Park machine safely. (See Parking Safely in the

Safety section.)

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2. Lower mower deck to the lowest cutting height position.

TCAL43680UN26MAR13

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).

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

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.

TCAL43681UN26MAR13

3. Remove HOC pin (A).

4. Lower mower deck completely to the floor.

5. Remove retaining knob (B), and remove belt access panel (C).

TCAL43682UN26MAR13

6. Remove two screws and nuts (D), and remove clutch stop bracket (E).

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

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

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TCAL43683UN26MAR13

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

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

Installing Mower Deck Drive Belt

NOTE: Make sure the clutch stop bracket is installed.

TCAL43684UN26MAR13

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.

Checking for Bent Mower Blades CAUTION: Blades are sharp. Always wear glove s when handling blades or working near blades. Replace blades if defective. Nev er straighten or weld them.

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

2. Raise mower deck to highest position to access blades.

TCAL43685UN26MAR13 *Mower deck with side discharge used for illustration.*

3. Measure distance (A) between blade tip and flat ground surface.

4. Rotate blade 180 and measure distance between other blade tip and flat ground surface.

5. Install new blade if the difference between the two measurements is more than specification.

Specification Blade Distance . . . . . .3 mm (1/8 in.)

6. Repeat for all blades.

Replacing Mower Blades *NOTE: MOD decks should use standard blades and NOT*

mulch blades.

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

2. Lower mower deck to the lowest cutting height position.

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TCAL43686UN26MAR13

3. Loosen two retaining knobs (A).

4. Remove belt shield (B) by lifting straight
up. **CAUTION: The machine can fall or slip from an unsafe lifting device or suppor ts.** 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.

TCAL43687UN26MAR13

TCAL43688UN26MAR13

5. Place jack (C) under the mower deck lip close to the center anti-scalp wheels (D).

6. Lift machine to desired working height.

7. Support the front of the machine with jack stands (F) under the caster arm (E).

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CAUTION: Do not work near raised mower deck unless it is safely supported. Mo wer blades are sharp. Wrap blades or wear gloves when servicing. Before perfor ming 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 ser vice parts.

TCAL43689UN26MAR13

TCAL43690UN26MAR13

8. Support the blade (J) and cap screw (L).

9. Remove hex nut (G) by turning counterclockwise.

10. Remove three washers (H).

11. Remove cap screw (L), washer (K), blade (J), and three washers (I).

12. 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 towards the blade.

Install blade (J), washer (K), three washers (I), and cap screw (L).

Install three washers (H) and hex nut (I). Tighten blade cap screw to specification.

Specification Cap Screw Torque. . . . . 95-108 Nm (70-80 lb.-ft.)

13. Lower machine.

14. Adjust mower deck to a desirable cutting height.

Sharpening Blades CAUTION: Blades are sharp. Always wear gloves when handli ng blades or working near blades. Always wear safety eye protectionwhen grind ing.

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

TCAL43691UN26MAR13

Keep original bevel (A) when grinding. Blade should have 0.40 mm (1/64 in.) cutting edge (B)

or less. Balance blades before installing.

Service Mower

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Balancing Blades CAUTION: Blades are sharp. Always wear gloves when handling blades or working near blades.

1. Clean blade.

TCAL43692UN26MAR13

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.

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.)

TCAL43693UN26MAR13

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). Tighten cap screws to specification.

Specification Cap Screw Torque. . . . . 18-19.0 Nm (13-14 lb.-ft.)

Service Mower

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

Service the Battery Safely

TCAL41233UN18JAN13

CAUTION: Battery electrolyte contains sulfuric acid. It is poisonous and can cau se 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.

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.

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 ma y 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 16C (60F).

TCAL43695UN26MAR13

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

TCAL43696UN26MAR13

Service Electrical

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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 oriented 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.

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 4 tablespoons of baking soda to 1 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.

Using Booster Battery CAUTION: The battery produces a flammable and explosi ve gas. The battery may explode: 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 16C (60F). 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.

TCAL41235UN18JAN13

A Booster Battery B Disabled machine Battery

1. Connect positive (+) booster cable to booster battery (A) positive (+) post (C).

2. Connect the other end of positive (+) booster cable to the disabled machine battery (B) positive (+) post (D).

3. Connect negative () booster cable to booster battery negative () post (E).

IMPORTANT: Electric charge from booster battery can damage machine compo nents. 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 engi ne 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.

Service Electrical

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

IMPORTANT: Help prevent machine circuit damage. Make sure replacement fus e is the correct size.

1. Locate and replace faulty electric start fuse located near the starter motor.

TCAL43698UN26MAR13

2. Remove fuse holder cover (A).

3. Check metal clip in fuse window. Discard fuse if clip is broken.

4. Install new 20-amp fuse in socket.

5. Install fuse holder cover. Ensure that plastic tab is securely fastened.

Service Electrical

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Using Proper Fuel and Stabilizer IMPORTANT: Using stale, contaminated or impro per

fuel can result in engine and fuel system damage. Repairs caused by stale, cont aminated 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 ensure 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 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 if 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 machines operation. Fill machine fuel tank at the end of the day.

Filling Fuel Tank CAUTION: 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 well-ventilated

area. Clean up spilled fuel immediately. Use clean approved non-metal container to

prevent static electric discharge.

IMPORTANT: Dirt and water in fuel can cause engine damage: Clean dirt and debris from the fuel tank

opening. Use clean, fresh, stabilized fuel. Fill the fuel tank at the end of each days

operation to keep condensation out of the fuel tank.

Use a non-metallic funnel with a plastic mesh strainer when filling the fuel tank or container.

Fill fuel tank at the end of each days operation to prevent condensation and freezing during cold weather.

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

2. Allow engine to cool.

3. Remove any trash 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.

6. Install fuel tank cap.

Removing and Installing Rear Drive Wheels Removing 1. Park machine safely. (See Parking Safely in the

Safety section.)

Service Miscellaneous

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CAUTION: The machine may 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 stable supports or jack

stands and block wheels before servicing.

TCAL43699UN26MAR13

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

TCAL43700UN26MAR13

3. Remove wheel nuts (B).

4. Remove wheel.

Installing 1. Install new wheel.

2. Install and tighten wheel nuts alternately to specification.

Specification Rear Wheel Nut Torque . . . . . 108-122 Nm (80-90 lb.-ft.)

3. Lower machine.

Tightening Rear Drive Wheel Hardware 1. Tighten rear wheel nuts in an alternate pattern.

TCAL43701UN26MAR13

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 Nm (80-90 lb.-ft.)

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 s upports.** 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.

Service Miscellaneous

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TCAL43702UN26MAR13

3. Remove hex nut (A) and cap screw (D).

4. Remove wheel (B) and tire (C) from yoke assembly (E).

Installation 1. Install replacement wheel (B) and tire (C) onto the

yoke assembly (E).

2. Install cap screw (D) and hex nut (A).

3. Tighten hex nut (A) to specification. **Specification**

Hex Nut Torque. . . . . 36.6 Nm (27 lb.-ft.)

4. Lower machine.

Checking Tire Pressure

TCAL43703UN26MAR13

CAUTION: Explosive separation of tire and rim parts is possible when they are s erviced 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: 13 x 6.50 N/A Rear: 20 x 10.00 124-152 kPa (18-22 psi)

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 s upports.** 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.

Service Miscellaneous

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

TCAL43704UN26MAR13

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

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

4. Remove seal (H) and lower bearing (G).

5. Remove upper bearing (E).

6. Clean and inspect bearings; pack with clean grease. Replace bearings if needed.

Installation 1. Install lower bearing (G) and a new seal (H).

2. Install upper bearing (E).

3. Install caster yoke and wheel assembly (I), washers (C), and (D), 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. . . . . 51.5 Nm (38 lb.-ft.)

5. Apply grease to lubrication fitting (J).

Cleaning the Mower 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 at the end of each 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 near the hydro cap and do so when the unit has cooled down.

Washing a hot machine can cause various unseen system damage.

If water is used for cleaning the machine, immediately dry it with a leaf blower or low-pressure compressed air and run it with blades engaged for approximately 10 minutes.

Once the wash is complete, always lubricate and grease all applicable areas.

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.

Cleaning and Repairing Metal Surfaces Cleaning: Follow automotive practices to care for your machines painted metal surfaces. Use a high-quality automotive wax regularly to maintain the factory look of your machines painted surfaces.

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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.

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Using Troubleshooting Chart If you are experiencing a problem that is not listed in this chart, see your authorized dealer for service.

If you are still experiencing the problem after you have checked all the possible causes listed, see your authorized dealer.

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.

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If Check 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.

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.

Electrical System

If Check Starter Will Not Work Blown fuse.

Park brake switch is faulty.

Loose or corroded battery connections.

Neutral switches faulty or not adjusted properly. See your John Deere dealer.

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 fusible link. See your John Deere dealer. PTO Switch Does Not Work Blown fuse.

Bad switch. Starter Turns Slowly Loose or corroded battery connections.

Low battery power charge battery.

Engine oil viscosity too heavy.

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.

Troubleshooting

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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 Motion Control Levers in a Neutral Position

Needs motion control linkage adjustment.

Engine speed too slow.

Park Brake

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

Steering

If Check Steering Not Working Pump free-wheel valves partially open.

Improper tire inflation.

Hydrostatic transmission oil level low.

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.

Deck 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.

Troubleshooting

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Mulch-On-Demand Material Dispersion Not Satisfactory (if equipped) Check linkage adjustments.

Check gate bushings for wear.

Clean debris buildup from underside of deck.

Check blades for sharpness and damage.

Check discharge chute for damage.

Change blades.

Run engine at fast throttle.

Mowing too fast for grass conditions.

Ensure correct blades are installed. (MOD deck is designed to use standard blades, NOT mulch blades.)

Troubleshooting

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Storing Safety CAUTION: Fuel vapors are explosive and flammable. Engine exhau st fumes contain carbon monoxide and can cause serious illness or death: Run the engine only long enough to move the

machine to or from storage. Machine fires and structure fires can occur if a

machine is stored before allowing it to cool, or if debris is not removed from around the engine and muffler, or if stored near combustible materials.

Do not store machine with fuel in the tank inside a building where fumes may reach an open flame or spark.

Allow the engine to cool before storing the machine in any enclosure.

Preparing Fuel and Engine for Storage Fuel: If you have been using stabilized fuel, add stabilized fuel to tank until the tank is full.

NOTE: Filling the fuel tank reduces the amount of air in the fuel tank and helps reduc e 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 key switch, turn key to off position.

IMPORTANT: Stale fuel can produce varnish and plug carburetor or injector com ponents and affect engine performance. Add fuel conditioner or stabilizer to fresh fuel

before filling tank.

4. Mix fresh fuel and fuel stabilizer in separate container. Follow stabilizer instructions for mixing.

5. Fill fuel tank with stabilized fuel.

6. Run engine for a few minutes to allow fuel mixture to circulate through carburetor on gas engine or fuel injectors on diesel engine.

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

1. Change engine oil and filter while engine is warm.

2. Service air filter if necessary.

3. Clean debris from engine air intake screen.

4. On gas engines: Remove spark plugs. Put 30 mL (1 oz.) of clean

engine oil in cylinder(s). Install spark plugs, but do not connect spark plug

wires. Crank the engine five or six 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: Prolonged exposure to sunlight could damage the hood surface. St ore machine inside or use a cover if stored outside.

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

Preparing Machine for Storage 1. Repair any worn or damaged parts. Replace parts if

necessary. Tighten loose hardware.

2. Repair scratched or chipped metal surfaces to prevent rust.

3. Remove grass and debris from machine.

4. Clean under the deck and remove grass and debris from inside chute and bagger.

5. Wash the machine and apply wax to metal and plastic surfaces.

6. Run machine for 5 minutes to dry belts and pulleys.

7. Apply light coat of engine oil to pivot and wear points to prevent rust.

8. Lubricate grease points and check tire pressure.

Removing Machine from Storage 1. Check tire pressure.

2. Check engine oil level.

Storage

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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 shutoff valve, if your machine is equipped.

8. Run the engine for 5 minutes without the mower or any attachments running to allow oil to be distributed throughout engine.

9. Be sure all shields and guards or deflectors are in place.

Storage

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Prepare for Assembly Remove machine from the shipping crate:

- Cut plastic tie straps fastening the back of the machine to the shipping crate.

- Cut plastic tie straps fastening the front wheels to the shipping crate.

- Cut plastic tie straps holding the discharge chute up. - Cut plastic tie straps securing the motion control levers to the machine.

IMPORTANT: Check all fluid levels before attempting to start the machine. Mach ine should be parked on a hard, level surface with the key switch in the STOP po sition.

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 co uld overflow.

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

2. Lift thigh pad.

TCAL43705UN26MAR13

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

TCAL43706UN26MAR13

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 FULL mark. If oil is above full mark (E), drain oil to proper level.

5. Lower thigh pad.

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.

Assembly

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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.

Connect Battery CAUTION: The battery produces a flammable and explosive ga s. 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 16C (60F).

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

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2. Connect positive (red) cable (C) to battery positive (+) terminal. Install red terminal cover (D).

3. Connect negative (black) cable (E) to battery negative (-) terminal.

4. Install battery cover.

Assembly

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Check Mower Deck Level The mower deck is assembled and adjusted at the factory. After machine is completely assembled, check the mower front-to-rear and side-to-side deck level.

Check Machine Safety Systems Perform safety system check to make sure the electronic safety interlock circuit is functioning properly.

Assembly

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Engine For Kawasaki Certified Power Info: www.kawasaki- criticalpower.com

Models 648R

Make . . . . . Kawasaki Engine Model Number . . . . . .FX691V Displacement. . . . . 726 cm (44.3 cu in.) Cylinders. . . . . Two Bore . . . . . 78 mm (3.07 in.) Stroke . . . . . 76 mm (3.0 in.) Compression Ratio . . . . . 8.2:1 Speed, Fast Idle (No Load) . . . . . .3650 100 rpm Speed, Low Idle. . . . . .1800 150 rpm Operating Range . . . . . 1650-3750 rpm Valving . . . . .

. . . . OHV Oil Filter . . . . Cartridge Type Full Flow Cooling Type . . . . Air Air Cleaner (Canister) . . . . .Dry Type with Unloader Valve Spark Plug Gap. . . . . 0.75 mm (0.030 in.) Spark Plug Torque . . . . 22 Nm (16 lb.-ft.) Valve Clearance (Intake and Exhaust). . . . . .0.05-0.10 mm (0.002-0.004 in.)

Models 652R, 652R MOD and 661R

Make . . . . Kawasaki Engine Model Number . . . . .FX730V Displacement. . . . . 726 cm (44.3 cu in.) Cylinders. . . . . Two Bore . . . . 78 mm (3.07 in.) Stroke . . . . 76 mm (3.0 in.) Compression Ratio . . . . 8.2:1 Speed, Fast Idle (No Load) . . . . .3650 100 rpm Speed, Low Idle. . . . . .1800 150 rpm Operating Range . . . . 1650-3750 rpm Valving . . . . OHV Oil Filter . . . . Cartridge Type Full Flow Cooling Type . . . . Air Air Cleaner (Canister) . . . . .Dry Type with Unloader Valve Spark Plug Gap. . . . . 0.75 mm (0.030 in.) Spark Plug Torque . . . . 22 Nm (16 lb.-ft.) Valve Clearance (Intake and Exhaust). . . . . .0.05-0.10 mm (0.002-0.004 in.)

Models 652R EFI, 652R EFI MOD and 661R EFI

Make . . . . . .Kohler Engine Model Number . . . . . ECV740 EFI Displacement. . . . . 747 cm (45.6 cu in.)
Cylinders. . . . . Two Bore . . . . . 83 mm (3.27 in.) Stroke . . . . . 69 mm (2.72 in.)
Compression Ratio . . . . . 9.1:1 Speed, Fast Idle (No Load) . . . . . .3650 100 rpm Speed, Low Idle. . . . . .1800 150 rpm

Specifications

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Operating Range . . . . . 1650-3750 rpm Valving . . . . . OHV Oil Filter . . . . . Cartridge Type Full Flow Cooling Type . . . . . Air Air Cleaner (Canister) . . . . . .Dry Type with Unloader Valve Spark Plug Gap. . . . . 0.75 mm (0.030 in.) Spark Plug Torque . . . . . 27 Nm (20 lb.-ft.) Valve Clearance (Intake) . . . . . 0.04-0.78 mm (0.0016-0.0031 in.) Valve Clearance (Exhaust) . . . . . 0.05-0.09 mm (0.002-0.0035 in.)

Drive Train

Type . . . . . Hydrostatic Number of Speeds. . . . . .Variable Hydrostatic Pump Make . . . . . Hydro-Gear Hydrostatic Pump Type . . . . . Axial Piston Hydrostatic Pump Series . . . . . PK Hydrostatic Pump

Displacement . . . . . .12 cm/rev (0.73 cu in./rev) Wheel Motor Make. . . . . Hydro-Gear Wheel Motor Type . . . . . .Geroller Wheel Motor Series . . . . . HGM-P Wheel Motor Displacement. . . . . 245.8 cm/rev (15.0 cu in./rev)

Electrical System

Charging System . . . . . 20-amp Regulated Ignition . . . . . Fly Wheel Starter. . . . . Solenoid Shift

Fuel System

Fuel Type . . . . . . .Gasoline, Regular Unleaded Fuel Tank Location. . . . . On Right Side of Operator

Steering and Brakes

Steering . . . . . Dual Control Levers Steering . . . . . .Mechanical Over Hydraulic Park Brake . . . . . .Tire Contact

Tires

Front. . . . . 13 x 6.5 Rear . . . . . 20 x 10 Inflation Rear (Maximum) . . . . . .124-152 kPa (18-22 psi)

Battery

Voltage . . . . . .12 volt CCA . . . . . 300 amp CA . . . . . .

. . . . . 365 amp Reserve Capacity . . . . . 38 minutes BCI Group Size U1

Specifications

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Capacities

Fuel Tank . . . . . 20.8 L (5.5 gal) Hydraulic Oil (With Filter/Wet) . . . . . 2.7 L (2.9 qt.) Hydraulic Oil (With Filter/Dry) . . . . . 4.7 L (5.0 qt.) Engine Oil (With Filter) . . . . . 2.1 L (2.2 qt.)

Travel Speeds at Full Engine RPM

Forward . . . . . .0-15.4 km/h (0-9.6 mph) Reverse . . . . . .0-8.85 km/h (0-5.5 mph)

Dimensions

Wheel Base. . . . . 1.05 m (41.37 in.) Overall Height . . . . . 119 cm (47 in.) Overall Length (Model 648R) . . . . . 167.6 cm (66 in.) Overall Width (48 Inch Deck With Chute Up) . . . . . .128.2 cm (50.5 in.) Overall Width (48 Inch Deck With Chute Down). . . . . 157.4 cm (62 in.) Overall Width (52 Inch Deck With Chute Up) . . . . . .138.4 cm (54.5 in.) Overall Width (52 Inch Deck With Chute Down). . . . . 167.6 cm (66 in.) Overall Width (61 Inch Deck With Chute Up) . . . . . .161.2 cm (63.5 in.) Overall Width (61 Inch Deck With Chute Down). . . . . 190.5 cm (75 in.)

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

648R. . . . . 413 kg (910 lb.) 652R. . . . . 420.4 kg (927 lb.) 652R MOD . . . . . 429.5 kg (947 lb.) 652R-EFI . . . . . 420.4 kg (927 lb.) 652R-EFI MOD . . . . . 429.5 kg (947 lb.) 661R. . . . . 452.6 kg (998 lb.) 661R-EFI . . . . . 452.6 kg (998 lb.)

Recommended Lubricants

Engine Oil . . . . . TURF-GARD, Plus-4, Plus-50 II Hydraulic Oil . . . . . JD Plus-50 II 15W-40 Synthetic Blend

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

. . . . . John Deere Special Purpose HD Water Resistant NM Grease (Specifications and design subject to change without notice.)

Torque Specifications

Wheel Motor Bolts (Securing the Motor to Support), with Loctite 2760. . . . . .54-68 Nm (40-50 lb.-ft.) Clutch to Engine Shaft, with Loctite 2760 . . . . . 68-75 Nm (50-55 lb.-ft.) Wheel Hub to Wheel Motor . . . . . 187-214 Nm (138-158 lb.-ft.) Wheel Lug Nuts. . . . . 108-122 Nm (80-90 lb.-ft.)

Specifications

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Split Hub - Spindle Drive . . . . . .18-19 Nm (13-14 lb.-ft.) Blade Bolts . . . . . 68-108 Nm (70-80 lb.-ft.)

Specifications

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Product Warranty Product warranty is provided as part of John Deeres support program for customers who operate and maintain their equipment as described in this manual.

Engine related warranties stated in this manual refer only to emissions related parts and components of your engine. The complete engine warranty, less emission-related parts and components, is provided separately as the Limited Warranty for New John Deere Equipment.

John Deere Federal and California Emission Control System Warranty (Small Non 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 systems warranty on your model year 2014 or 2015 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 States 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.

Your emissions control system may include parts such as: carburetors or fuel-injection system, ignition system, catalytic converters, fuel tanks, valves, filters, clamps, connectors, 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.

Manufacturers Warranty Coverage This emissions control system is warranted for two years. If any emissions related part on your equipment is defective, the part will be repaired or replaced by John Deere.

Owners Warranty Responsibilities As the spark ignited off-road equipment owner, you are

responsible for the performance of the required maintenance listed in your Operators 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 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 however be aware that John Deere may deny you warranty coverage if your spark ignited off-road 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 an authorized John Deere Turf and Utility retailer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have a question regarding your warranty coverage, you should contact your John Deere Turf and Utility retailer, or the John Deere Customer Contact Center at 1- 800-537- 8233, or e-mail John Deere from www.Deere.com.

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 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 a period of two years of engine use from the date of sale to the ultimate purchaser.

Emissions Warranty Interpretation Any warranted part that is not scheduled for

replacement as required by the maintenance instructions in the Operators Manual is warranted for two years. 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 Operators Manual is warranted for two years. A statement in the Operators 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 Operators 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.

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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.

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 extends only 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

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. 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.

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 manufacturers warranty applicable to your machine may not apply outside the U.S. (See your John Deere dealer for specific information.)

Limited Battery Warranty for Factory Installed Batteries *NOTE: Applicable in Nort h 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.

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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 batterys 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 PURCHASERS 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 PURCHASERS 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 COMPANYAFFILIATED 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

Warranty

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John Deere Quality

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

Thats 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 operators manual

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

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

B. It gives troubleshooting procedures, and specification information. D. If your questions are not answered in the operators 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.

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

B. First, discuss your questions or problems with your dealers trained parts and service staff.

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 operators 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 youve 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, contact us at the following website: www.deere.com/wps/dcom/en_US/regional_home.page.

John Deere Quality Statement

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Record Service Dates

Oil Change Oil Filter Change (If Equipped)

Lubricate Machine Air Cleaner Element Check/Clean

Fuel Filter Change

Service Record

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