

180 E-Cut™ and 220 E-Cut™ Hybrid Walk Greens Mower



JOHN DEERE

OPERATOR'S MANUAL

Walk Greens Mower 180 E-Cut™
and 220 E-Cut™ Hybrid

OMTCU37344 ISSUE K5 (ENGLISH)

John Deere Turf Care

Export Edition
Printed in U.S.A.



Introduction

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 Operator's Manual

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

Reading your operator's manual will help you and others avoid personal injury or damage to the machine. Information given in this manual will provide the operator with the safest and most effective use of the machine. Knowing how to operate this machine safely and correctly will allow you to train others who may operate this machine.

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

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

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

Machine Use

This machine is designed solely for use in customary lawn and turf operations. Use in any other way is considered as contrary to the intended use.

The manufacturer accepts no liability for damage or injury resulting from this misuse, and these risks must be borne solely by the user. Compliance with and strict adherence to the conditions of operation, service and repair as specified by the manufacturer also constitute essential elements for the intended use.

This machine should be operated, serviced and repaired only by persons familiar with all its particular

characteristics and acquainted with the relevant safety rules (accident prevention). The accident prevention regulations, all other generally recognized regulations on safety and occupational medicine and the road traffic regulations must be observed at all times.

Setting fuel delivery beyond published factory specifications or otherwise overpowering will result in loss of warranty protection for this machine.

Any arbitrary modifications carried out on this machine will relieve the manufacturer of all liability for any resulting damage or injury.

Special Messages

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



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

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

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

Contents

Introduction	2
Product Identification	4
Safety Labels No-Text	5
Safety	7
Operating Controls	12
Operating	14
Operating—Cutting Units	20
Replacement Parts	24
Service Intervals	25
Service Lubrication	26
Service Engine	30
Service—Cutting Units	36
Service Electrical	53
Service - Belts	54
Troubleshooting	57
Storage	60
Assembly	62
Specifications	79
Declaration of Conformity	81
John Deere Quality Statement	83
Service Record	84

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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Product Identification

Record Identification Numbers

Walk Greens Mower

180 E-Cut™ Hybrid PIN (020001-)

220 E-Cut™ Hybrid PIN (050001-)

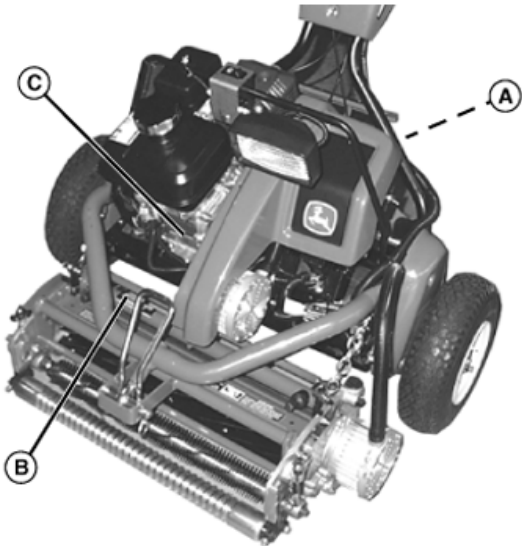
If you need to contact an Authorized Service Center for information on servicing, always provide the product model and serial number.

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:



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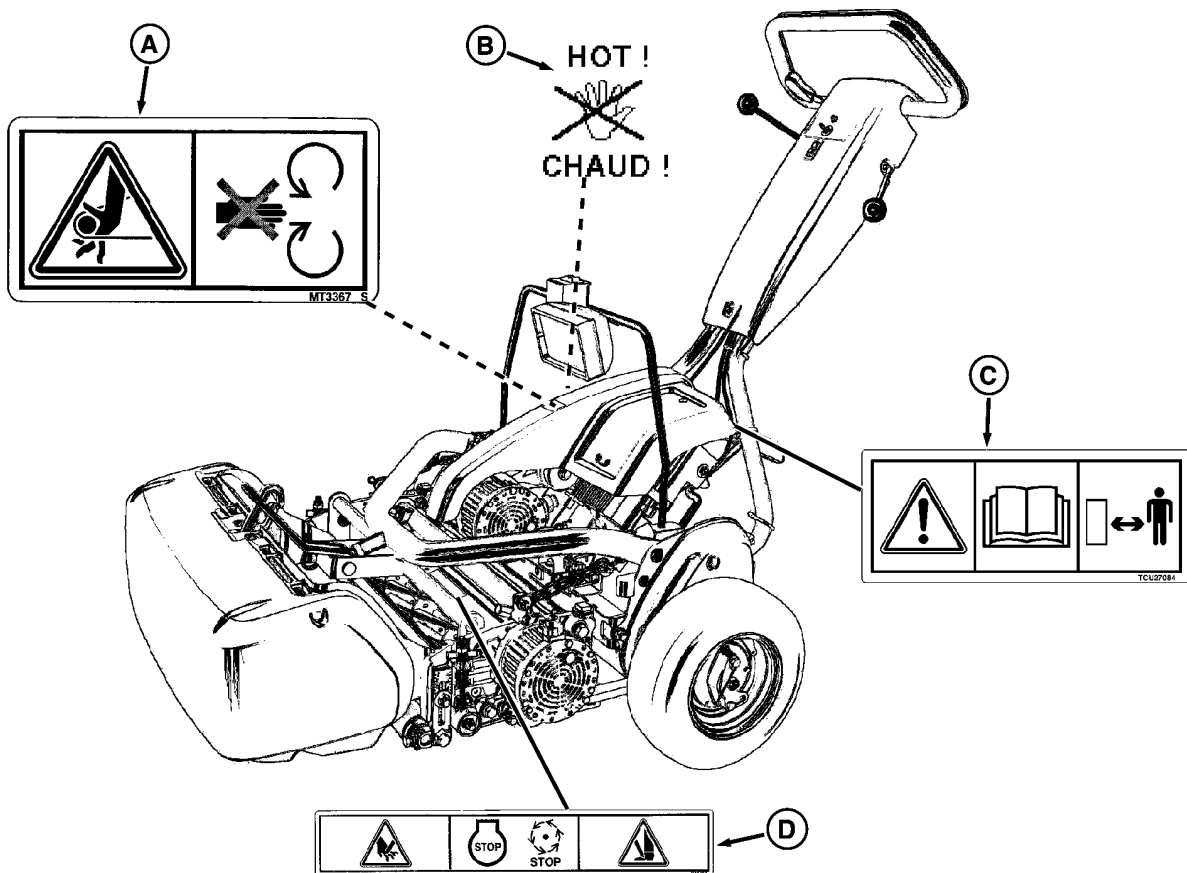
PRODUCT IDENTIFICATION NUMBER, MOWER (A):

PRODUCT IDENTIFICATION NUMBER, REEL (B):

ENGINE SERIAL NUMBER (C):

Safety Labels No-Text

Safety Label Location



TCT008686—UN—12SEP13

A —Keep All Shields in Place MT3367

B —Hot Surface (embedded into muffler shield)

C —Help Avoid Injury TCU27084

D —Avoid Injury from Rotating Blades MT6732

Understanding The No-Text Machine Safety Labels



TCT005498—UN—11SEP12

At several important places on this machine safety signs are affixed intended to signify potential danger. The hazard is identified by a pictorial in a warning triangle. An adjacent pictorial provides information how to avoid personal injury. These safety signs, their placement on the machine and a brief explanatory text are shown in this Safety section.

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

Keep All Shields in Place



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- Do not operate machine without shield in place.

Safety Labels No-Text

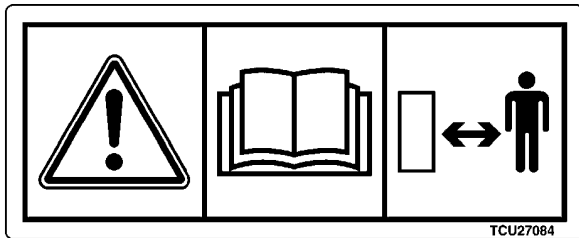
Hot Surface



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- Hot surface

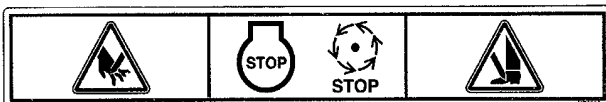
Help Avoid Injury



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- Read operator's manual for operating and training instructions.
- Keep shields in place.
- Keep people a safe distance away.
- Maintain all safety devices.
- Stop engine whenever you leave the mower.

Avoid Injury From Rotating Blades



TCAL41591—UN—22JAN13

- Keep hands and feet away from rotating blades.
- Shut off engine before servicing, lubricating or removing cutting units.

Safety

Operator Training Required

- Read the operator's manual, attachment manuals, and other training material carefully. If the operator or mechanic cannot read English, it is the owner's 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 owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people, or property.
- Operate the machine in an open, unobstructed area under the direction of an experienced operator.
- Test drive area with attachment lowered, if equipped, but not running. Slow down when you travel over rough ground.

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's presence controls, 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 parking brake is engaged before starting engine. Only start engine from the operator's position.
- Be sure of your footing while using pedestrian-controlled equipment, especially when backing up. Walk, don't run. Never operate on wet grass. Reduced footing could cause slipping.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. For this machine, mow across hillsides, not up and down. Turf conditions can affect the machine's stability. Use caution while operating near drop-offs.
- Slow down and use caution when making turns and when changing directions on slopes. Stop blades if not mowing.
- Stop the blades if the mower has to be tilted for transportation when crossing surfaces other than grass, and when transporting the mower to and from the area to be mowed.
- Never operate with guards not securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not change the engine governor settings or overspeed the engine. Operating an engine at excessive speed can increase the hazard of personal injury.
- Stop on level ground, disengage drives, engage parking brake, and shut off engine before leaving the operator's position for any reason including emptying the grasscatchers or clearing blockages.
- Stop equipment and inspect reels 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.
- 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.
- Never pick up or carry a mower while the engine is running.
- Stop machine if anyone enters the area.
- Use only accessories and attachments approved by the manufacturer of the machine.
- Do not wear radio or music headphones. Safe service and operation requires your full attention.

Safety

Using a Spark Arrestor

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

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

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

Checking Mowing Area



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

Parking Safely

1. Stop machine on a level surface, not on a slope.
2. Disengage cutting unit(s).
3. Lock the park brake.

4. Stop the engine.
5. Wait for engine and all moving parts to stop before you leave the operator's station.
6. Close fuel shut-off valve, if your machine is equipped.
7. Remove the spark plug wire (for gasoline engines) before servicing the machine.

Rotating Blades Are Dangerous



TCT012793—UN—06JUL15

- Rotating cutting units 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 rotating cutting units when engine is running.
- Be alert at all times, drive forward and in reverse carefully. People, especially children can move quickly into the mowing area before you know it.
- Before backing up, stop cutting units and look down and behind the machine carefully, especially for children.
- Do not mow in reverse.
- Shut off cutting units when you are not mowing.
- Park machine safely before leaving the operator's station for any reason including emptying the grass catchers or unplugging the chute, if equipped.
- Keep all parts of the body away from the cutting edges. Residual hydraulic pressure or other stored energy source in the system can cause cutting unit rotation when the blockage is released.
- If applicable, use a long-handled brush when applying reel sharpening compound.
- Keep bystanders away from cutting units when adjusting or servicing.
- Always wear gloves when manually rotating cutting units.
- Manually rotating one cutting unit can cause another to rotate if operated hydraulically.
- The cutting unit should stop in approximately five seconds when disengaged. If you believe that your cutting units may not be stopping in that period of time, take your machine to your authorized dealer where they can safely check and service your machine.

Safety

Protect Children

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

Wear Appropriate Clothing



TCAL25962—UN—24MAY12

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

Maintenance and Storage



TCAL41691—UN—08MAR13

- Never operate machine in a closed area where dangerous carbon monoxide fumes can collect.
- Disengage drives, lock parking brake, stop engine and remove key or disconnect spark plug (for gas engines). Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean grass and debris from cutting units, drives, mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.
- Let engine cool before storing and do not store near flame.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Park machine on level ground. Never allow untrained personnel to service machine. Understand service procedure before doing work.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Use care when checking cutting units. Wear gloves, and use caution when servicing cutting units.
- Only replace blades. Never straighten or weld them.
- Keep hands, feet, clothing, jewelry and long hair away from moving parts. If possible, do not make adjustments with the engine running.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- Be careful during adjustment of the machine to prevent entrapment of the fingers between moving blades and fixed parts of the machine.

Prevent Fires

- Please review these recommendations with all operators. See your John Deere dealer with questions.
- Always follow all safety procedures posted on the machine and in this operator manual. Before carrying out any inspection or cleaning always shut off engine, set parking brake and remove ignition key.
- Besides routine maintenance, one of the best ways to keep your John Deere equipment running efficiently and to reduce fire risk is to regularly remove debris buildup from the machine.

Safety

- After operating, allow machine to cool in an open area before cleaning or storing. Do not park machine near flammable materials such as wood, cloth or chemicals, or near an open flame or other sources of ignition, such as a water heater or furnace.
- Completely remove any combustible materials from equipment before storing, by emptying any grass catcher bags, containers and cargo boxes.
- Debris can accumulate anywhere on the machine, especially on horizontal surfaces. Remove grass and debris completely from engine compartment, muffler area, and from on top of the mower deck both before and after operating machine. Additional cleaning may be necessary when mowing or mulching in dry conditions.
- In addition to cleaning machine before using and storing, keeping engine area clean provides the greatest impact on fire prevention. Other areas requiring regular inspection and cleaning include behind wheel rims, wire harness, hose or line routing, mowing attachments, etc. Compressed air, leaf blowers, or high pressured water assists in keeping these areas clean.
- Frequency of these inspections and cleaning will vary depending on a number of factors including operating conditions, machine configuration, operating speeds and weather conditions particularly dry, hot and windy conditions. When you are operating in these conditions, inspect and clean these areas frequently throughout the day.
- Excess lubrication or fuel/oil leaks or spills on the machine can also serve as collection sites for debris. Prompt machine repair and oil and fuel clean-up reduces the potential for debris collection.
- Bearing failures or overheating can result in a fire. To reduce this risk, always follow the instructions in the machine operator's manual regarding lubrication intervals and locations. Contact your local dealer if you have any questions about the lubrication intervals or location and if any unusual noises are coming from areas where bearings might be located. Washing the machine while warm may also reduce bearing life and increase potential for premature bearing failure.
- Always shut off fuel when storing or transporting machine, if the machine has a fuel shutoff.
- Check fuel lines, tank, cap, and fittings frequently for cracks or leaks. Replace if necessary.

Handling Fuel Safely



TCAL25966—UN—24MAY12

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

- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container. Use only non-metal, portable fuel containers approved by the Underwriter's Laboratory (U.L.) or the American Society for Testing & Materials (ASTM). If using a funnel, make sure it is plastic and has no screen or filter.
- Never remove the fuel tank cap or add fuel with the engine running. Allow engine to cool before refueling.
- Never add fuel to or drain fuel from the machine indoors. Move machine outdoors and provide adequate ventilation.
- Clean up spilled fuel immediately. If fuel is spilled on clothing, change clothing immediately. If fuel is spilled near machine, do not attempt to start the engine but move the machine away from the area of spillage. Avoid creating any source of ignition until fuel vapors have dissipated.
- Never store the machine or fuel container where there is an open flame, spark, or pilot light such as on a water heater or other appliance.
- Prevent fire and explosion caused by static electric discharge. Static electric discharge can ignite fuel vapors in an ungrounded fuel container.
- Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before fueling.
- Remove fuel-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment with a portable container, rather than from a fuel dispenser nozzle.
- Keep the nozzle in contact with the rim of the fuel tank or container opening at all times until the fueling is complete. Do not use a nozzle lock-open device.
- Never overfill fuel tank. Replace fuel tank cap and tighten securely.
- Replace all fuel container caps securely after use.

Safety

- For gasoline engines, do not use gas with methanol. Methanol is harmful to your health and to the environment.

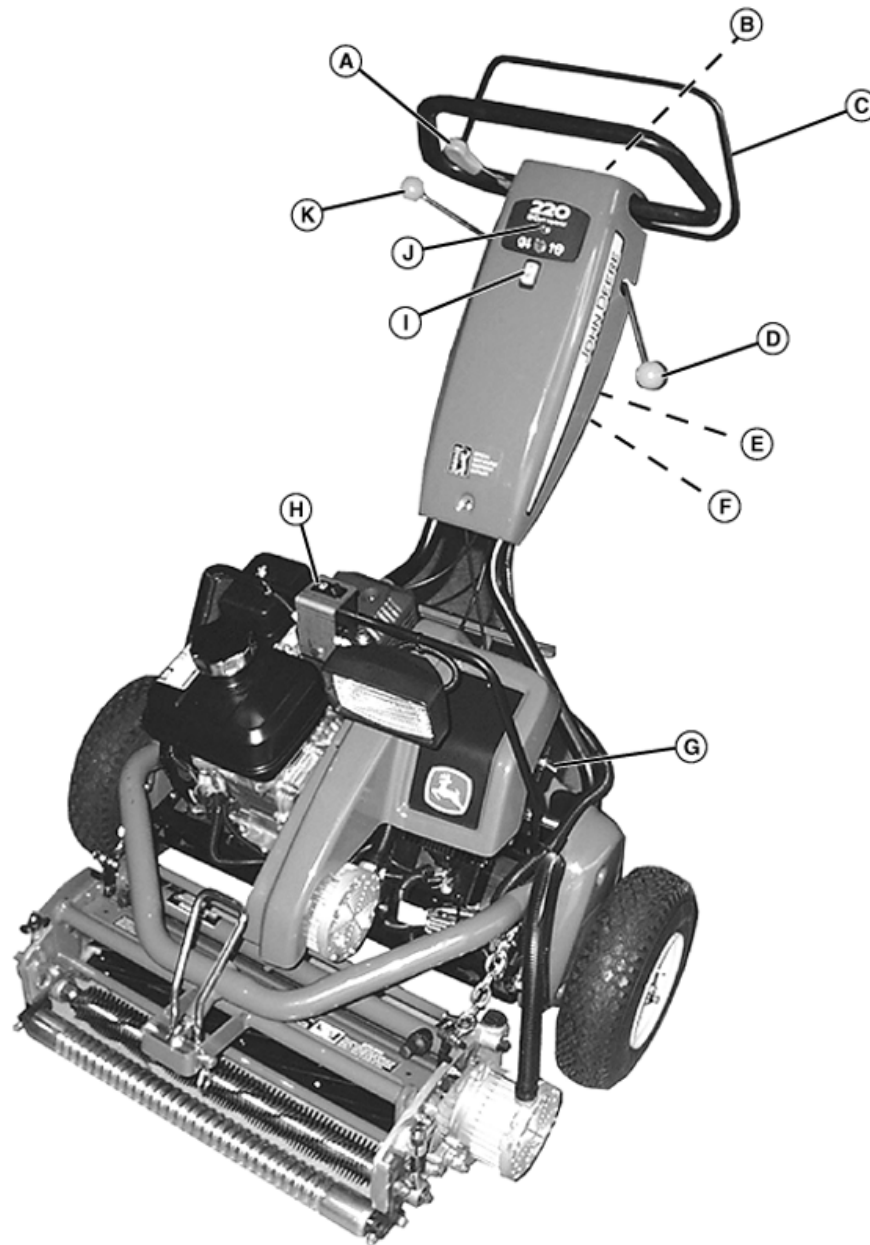
Handling Waste Product and Chemicals

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 and how to put your machine out of service at the end of its life.

Operating Controls

Operating Controls



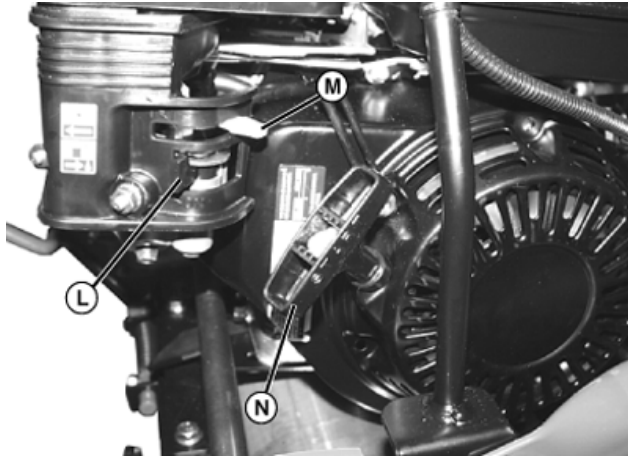
Operating Controls

- A — Throttle Lever
- B — Diagnostic Indicator Light
- C — Operator Presence Bail
- D — Park Brake Lever
- E — Frequency Of Clip (FOC) Control
- F — Hour Meter

- G — Mow/Backlap Switch
- H — Light Switch (Optional)
- I — PTO Switch
- J — Run/Stop Switch
- K — Clutch Lever

TCAL41476—UN—22JAN13

Operating Controls



TCAL41477—UN—22JAN13

Engine Controls

- L —Fuel Shut-Off Valve**
- M —Choke Lever**
- N —Starter Handle**

Operating

Daily Operating Checklist

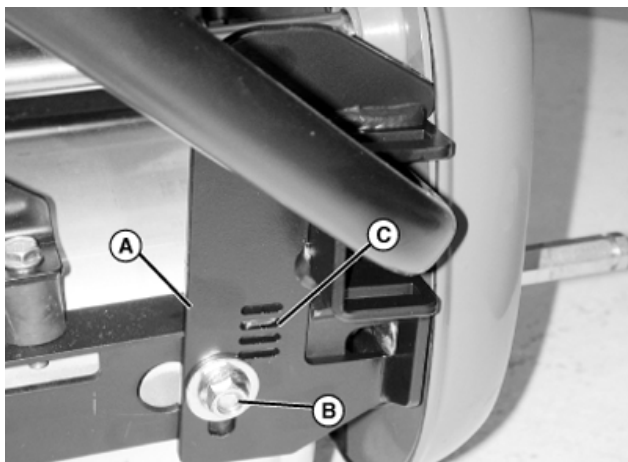
- ☐ Check engine oil.
- ☐ Check safety interlock system.

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.

Adjusting Handlebar Height

NOTE: Make sure bracket (A) is straight up and down, and not at an angle.



TCAL41478—UN—22JAN13

1. Loosen nut (B) on each side of machine.
2. Move handlebar to desired position with tab (C) in one of four available slots and tighten nut (A).

Using Operator Controls

Using Run Switch

- Push run/stop toggle switch forward to run engine.
- Pull run/stop toggle switch back (toward operator) to stop engine.

Using Operator Presence Bail

⚠ CAUTION: Avoid injury! This machine is equipped with an operator presence system to protect the operator and bystanders. Do not attempt to alter the function of the operator presence system.

IMPORTANT: Avoid damage! Do not attempt to move machine using operator presence bail. Bail is not designed to support machine weight.

The operator presence bail stops the machine forward travel and cutting unit when released.

The operator presence bail when squeezed with handlebar permits engagement of the travel lever and cutting unit.

Using Travel Lever (Forward Travel)

1. Hold operator presence bail to handlebar.
2. Push travel lever forward to engage drive.
3. Release bail to stop travel.

Using Park Brake Lever

Release operator presence bail and pull brake lever back to stop mower movement.

Using Throttle Lever

Use throttle lever to adjust engine speed and rate of travel.

Pull lever back (toward operator) to reduce engine speed.

Adjust throttle lever depending on rate of travel, cutting height, and ground contour.

Using Choke Lever

Move choke lever left toward the decal for the choke position.

Using Fuel Shut-Off Valve

This unit is equipped with a 2-position fuel shutoff valve. Slide lever to the right to open or to the left to close the fuel shutoff valve.

Closed (OFF) position:

- When performing any type of service.
- When transporting.
- During storage.
- Open (ON) position:
- Fuel shutoff valve must be in the full open (ON) position for proper fuel delivery when operating the engine.

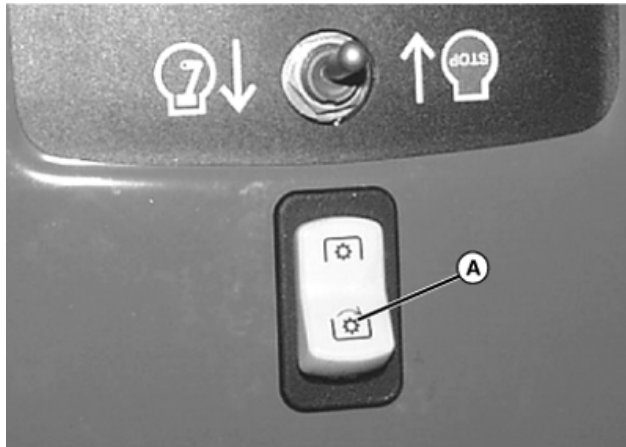
Using Mow/Backlap Switch

The Mow/Backlap switch must be in the MOW position for all mowing and transport operation. The BACKLAP

Operating

position is only used during machine service. (See Backlapping Cutting Units in SERVICE section.)

Using PTO Switch



TCAL41479—UN—22JAN13

Pushing the PTO switch to the engaged (A) position starts the cutting unit for mowing operation only if all the following conditions are met:

- The operator presence bail is pushed forward and held with the handlebar.
- The parking brake is released.
- The travel lever is pushed forward into the engaged position.
- The backlap/mow switch is in MOW position.
- Pushing the PTO switch to the engaged position starts the cutting unit for backlapping service only if all the following conditions are met:
 - The backlap/mow switch is in BACKLAP position.
 - The parking brake is engaged.
 - The travel lever is released.

Pushing the PTO switch to the disengaged position stops mowing and backlapping reel rotation.

Machine Hourmeter



TCAL41480—UN—22JAN13

The machine hourmeter (A) records actual run time of the engine and is graduated in 1/10 hour intervals. It can be used to schedule service for the machine and document when service was performed.

To check the hourmeter, park machine safely (See Parking Safely in SAFETY section), engage park brake and turn PTO switch to the disengaged position. Look under handlebar to read display.

Removing Transport Wheels



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1. Place machine on stand (A).
2. Release latch (B) and slide wheel from shaft. Repeat procedure for other side.

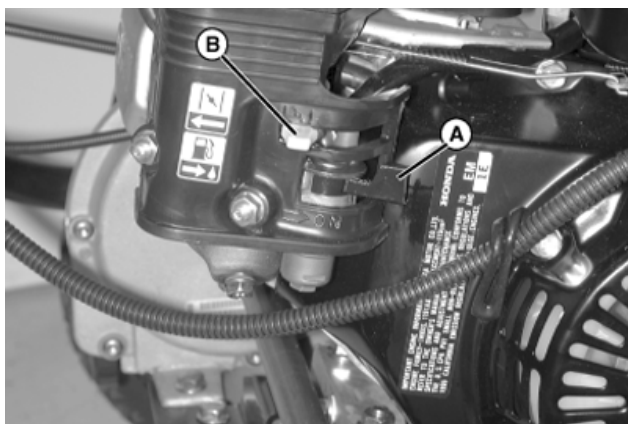
Starting the Engine

⚠ CAUTION: Avoid injury!

- Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.
- Move the machine to an outside area before running the engine.
- Do not run an engine in an enclosed area without adequate ventilation.
- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear out the exhaust fumes.

1. Lock park brake lever.
2. Disengage drive clutches.
3. Push run/stop switch forward to the run position.
4. Move throttle lever to half open position.

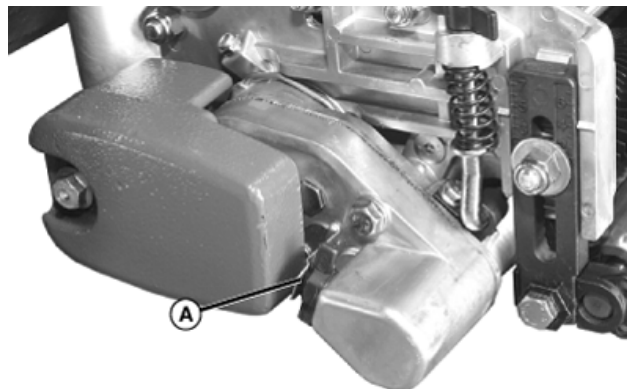
Operating



TCAL41482—UN—22JAN13

4. Turn fuel shut-off valve (A) to the OFF position.

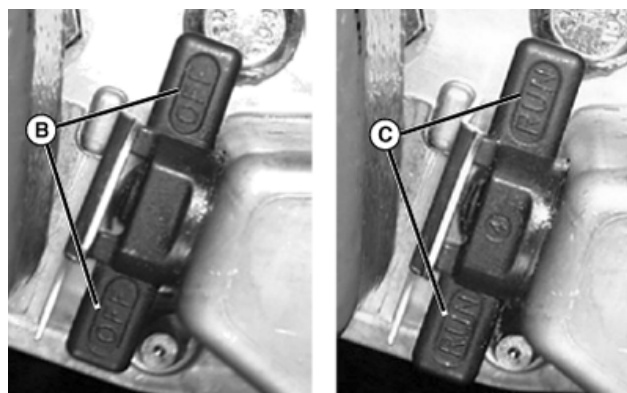
Operating Turf Conditioner or Rotary Turf Brush (Optional)



TCAL41484—UN—22JAN13

The rotary brush is controlled by a knob (A) on the cutting unit gearcase.

NOTE: Before operating, always release the operator presence bail, engage the park brake, and place the PTO switch into the disengaged position. Verify the reel has completely stopped spinning.



TCAL41485—UN—22JAN13

5. Turn fuel shutoff valve (A) to the ON position.
6. Set choke (B) at closed position.
7. Pull starter handle.

NOTE: If engine fails to start after three attempts, return choke to open.

8. Move choke to the open position after engine has started.
9. Allow engine to warm up before applying load.

Stopping the Engine

1. Release operator presence bail.
2. Pull throttle lever all the way back (toward operator). Let engine idle 2-4 minutes to allow engine to cool down.

NOTE: If mower will not be used for a long period, close fuel shut-off valve (A) and allow engine to run until remaining fuel in carburetor is exhausted and engine stops running (The engine will continue to run for a few minutes).

3. Pull run/stop switch back (toward operator) to STOP position.

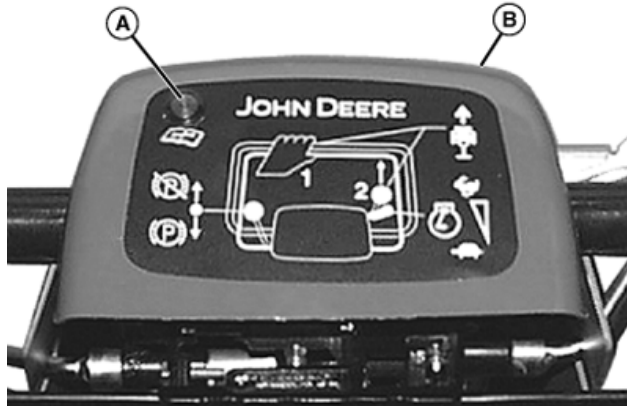


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- The turf conditioner or rotary turf brush is not engaged (neutral) when the control knob is placed in a vertical position and the word OFF (B) is visible on both ends.
- To engage the turf condition or rotary turf brush, rotate the knob 180° until the word RUN (C) is visible on both ends.

Operating

E-Cut Hybrid System Operation



TCAL41486—UN—22JAN13

After starting engine, the diagnostic indicator light (A) on the handlebar cover (B) will illuminate momentarily (one quick flash, followed by a 2-3 second flash). This indicates the E-Cut Hybrid 48-Volt System controller has been activated.

If the E-Cut Hybrid System controller detects an abnormal condition or malfunction during operation of the machine, it will flash a diagnostic code number on the indicator light (A) while the engine is running. The code number will appear as one or a series of pulses, followed by a short pause and another single or series of pulses. The code or codes will continue to repeat until the engine is stopped.

NOTE: If an E-Cut Diagnostic code is displayed while the engine is running at less than full throttle, increase the throttle fully and continue machine use. If the displayed code continues, record the code (or codes) and stop the machine. See the Service Electrical and Troubleshooting sections of this manual for additional information.

The controller may automatically shut down and stop reel rotation depending on the type of code detected. The diagnostic indicator light will display a quick flash, followed by a 2-3 second flash. The controller may be reset with the following method:

1. Turn the PTO switch to the disengaged position and then engaged position. If no codes are displayed and reel rotation is restored, continue machine operation. If the indicator light displays a quick flash, followed by a 2-3 second flash, proceed to the next step.
2. Pull the run/stop switch to STOP position to stop the engine. Push the run/stop switch to the run position, start the engine and engage the cutting unit. If no codes are displayed and reel rotation is restored, continue machine operation.
3. If any code is displayed or reel rotation cannot be restored, stop the machine. See the Service

Electrical and Troubleshooting sections of this manual for additional information.

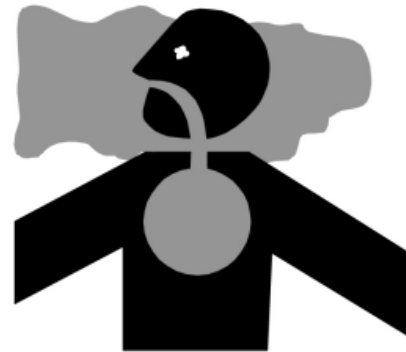
Frequency of Clip (FOC) Adjustment



TCAL41487—UN—22JAN13

Reel speed can be adjusted depending on the type of application for your greensmower, the type of cutting unit used and grass and height conditions. Adjust the FOC control (A) as required for your specific application. (See Adjusting Frequency of Clip in the SERVICE section.)

Testing Safety Systems



TCT005796—UN—08NOV12

Operating

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

- Move the machine to an outside area before running the engine.
- Do not run an engine in an enclosed area without adequate ventilation.
- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear the exhaust fumes out.

The safety systems installed on your machine should be checked before each machine use. Be sure you have read the machine operator 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 Park Brake

1. Lock park brake.
2. Run engine at low idle.
3. Engage operator presence bail.
4. Slowly engage travel clutch lever.

Result: Engine should stall with no movement of the mower.

Testing Run Switch

1. Flip run switch rearward (toward operator) to STOP position.
2. Pull start handle.

Result: Engine should not start.

Testing Operator Presence Bail

1. Operate machine in clear open area.
2. Release operator presence bail.

Result: Cutting reel should stop rotating and machine should stop moving forward. Engine should continue to run.

Operating

Emergency Stopping

⚠ CAUTION: Avoid injury! The machine can be unstable if stopped suddenly. Do not stop suddenly unless it is an emergency.

1. Release operator presence bail.
2. Engage parking brake lever.
3. Turn run/off switch to off position.

Transporting Machine on Trailer

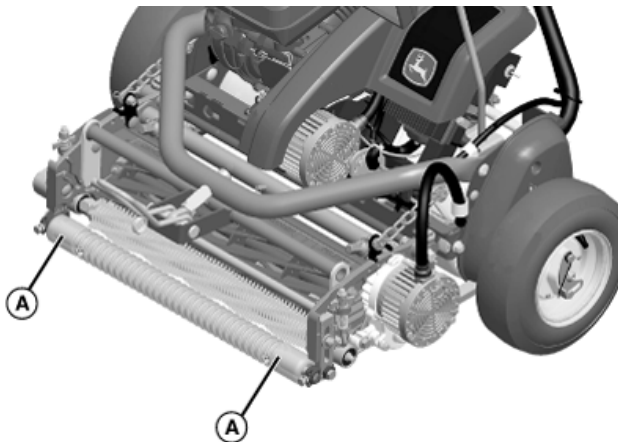
Be sure trailer has all the necessary lights and signs required by law.

⚠ CAUTION: Avoid injury! Use extra care when loading or unloading the machine into a trailer or truck.

Close fuel shutoff valve, if your machine is equipped.

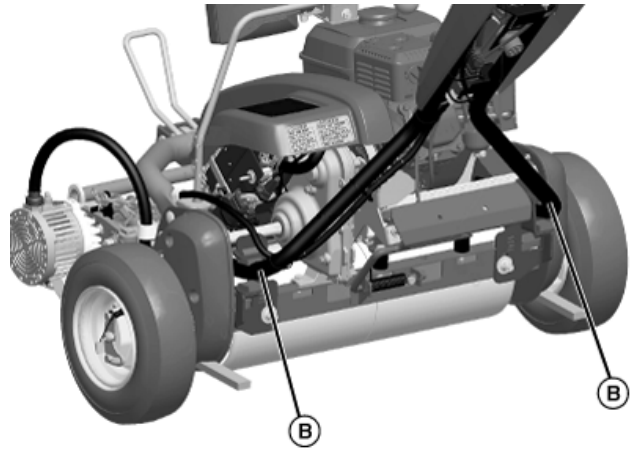
NOTE: Trailer capacity must exceed combined machine weight and attachment weight. (See Specifications section in operators manual.)

1. Park trailer on a level surface.
2. Move forward onto heavy-duty trailer.
3. Lock park brake.
4. Turn off machine.
5. Machines with fuel shutoff: Turn fuel shutoff to off position.



TCAL41489—UN—22JAN13

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



TCAL41490—UN—22JAN13

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

Operating—Cutting Units

Engaging Cutting Unit

⚠ CAUTION: Avoid injury!

- Blades are sharp and rotate quickly:
- Keep hands and feet away from cutting reels while machine is running.
- Check and clear area of bystanders and children before engaging cutting reels.

NOTE: During machine transport, the PTO switch must be in the disengaged position.

1. Engage the Greens Tender Conditioner (if equipped).
2. With the engine running, push the operator presence bail against the handlebar and move throttle lever forward to the fast position.
3. Release the park brake and press the PTO switch to the engaged position.
4. Push the travel lever forward to engage the cutting unit and begin forward travel.

NOTE: Do not reduce throttle more than 50%. If a low voltage trouble code appears, increase throttle position.

5. In areas where engine noise is restricted or of other concern, the engine speed can be reduced to lower the noise. As engine speed is reduced, ground speed is reduced.

The frequency of clip (FOC) control on this machine maintains synchronization of ground and reel speeds at any engine speed selected.

Emergency Stopping - Cutting Unit

NOTE: While mowing, there are three methods of stopping reel rotation in case of an emergency:

- Release the operator presence bail. Reel rotation and forward travel will stop.
- Push the PTO switch into the disengaged position. Reel rotation will stop and machine will continue forward travel.
- Push Run/Stop switch into the STOP position. Engine will stop. Reel rotation and forward travel will stop.

NOTE: When backlapping the cutting unit, there are four methods of stopping reel rotation in case of an emergency:

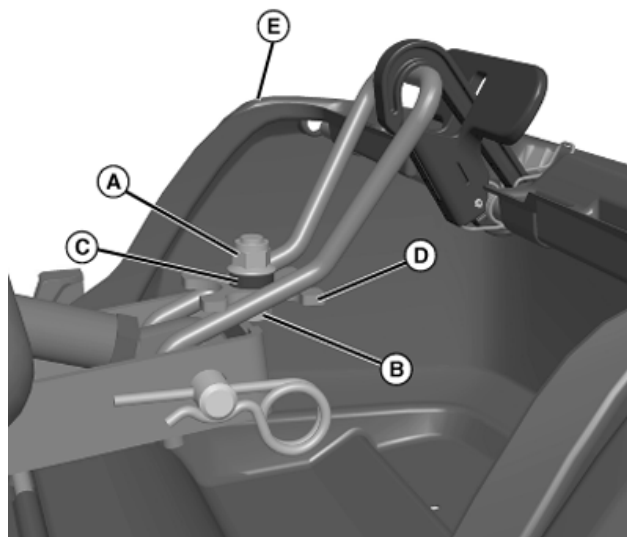
- Press the mow/backlap switch into the MOW position. Reel rotation will stop.
- Release the park brake. Reel rotation will stop.
- Push the PTO switch into the disengaged position. Reel rotation will stop.

- Push Run/Stop switch into the STOP position. Engine and reel rotation will stop.

Adjusting Grass Catcher Basket Height (Latch Style)

IMPORTANT: Avoid damage! Adjustment ensures that basket does not drag on turf/ground.

NOTE: Secure bolt (B) with wrench while loosening or tightening locknut (A).



TCAL41491—UN—22JAN13

1. Loosen and remove locknut (A) from bolt (B).
2. Reposition washers (C) above or below hanger plate (D) to adjust catcher basket (E) to desired height.
3. Install and tighten locknut.

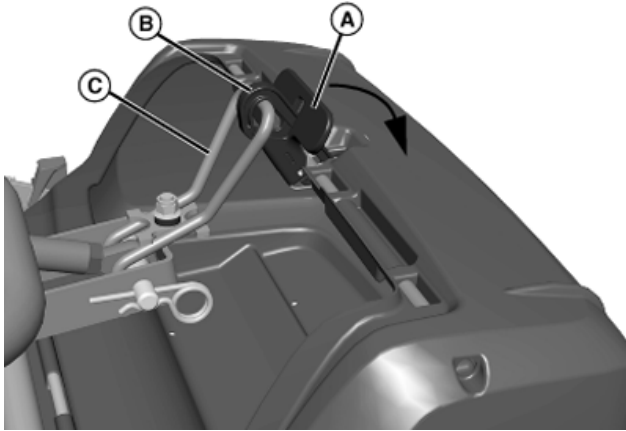
Removing and Installing Grass Catcher Basket (Latch Style)

Removing

IMPORTANT: Avoid injury! Proper orientation of the basket hanger is shown below. If the hanger is installed in the opposite orientation, the basket drags on the turf/ground.

1. Release operator presence bail to release travel clutch lever and stop reel rotation.
2. Lock park brake.
3. Push PTO switch into the disengaged position, and verify that reel has come to a complete stop.

Operating—Cutting Units



TCAL41492—UN—22JAN13

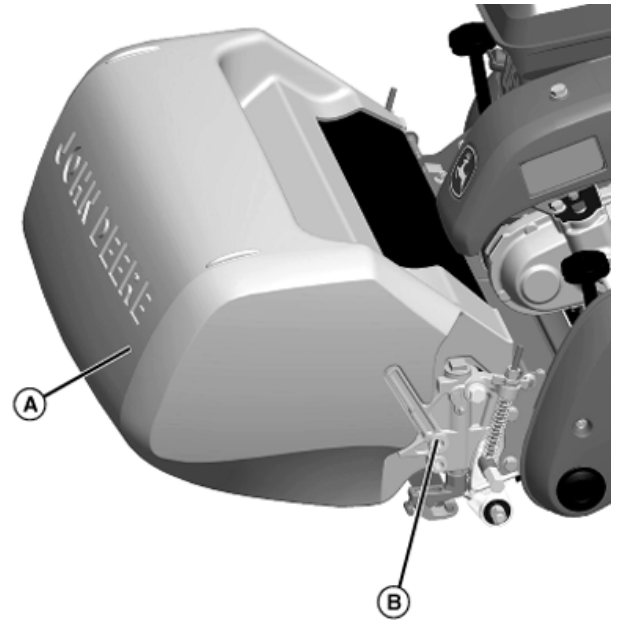
4. Compress arm (A) on retaining bracket (B) to release grass catcher basket from hanger (C).
5. Raise and remove retaining bracket from hanger.
6. Pivot basket upward from cutting unit frame and empty.

Installing

1. Guide alignment rods in basket into slots in cutting unit side panels.
2. Secure retaining bracket (B) onto hanger (C).

Removing and Installing Grass Catcher (Direct-Mount Style)

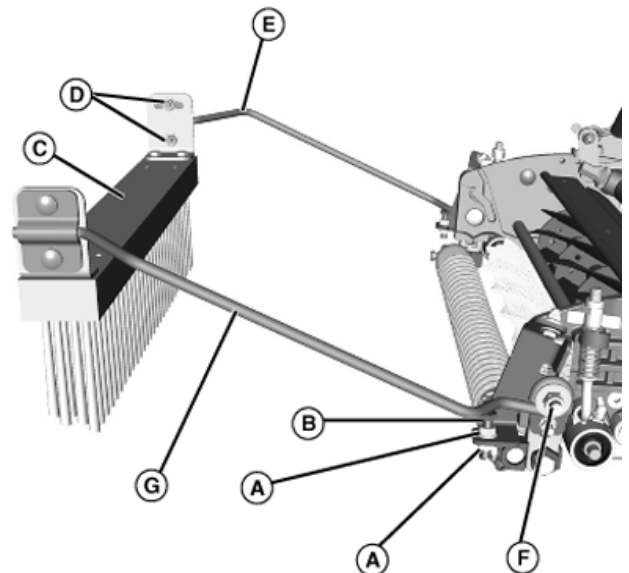
NOTE: Check position of basket after installation. Lower lip of basket must rest on top of crossbar in cutting unit.



TCAL41625—UN—22JAN13

1. Install grass catcher basket (A) onto brackets (B) on cutting unit
2. To remove basket, pull basket upwards and off brackets.

Operating Turf Broom



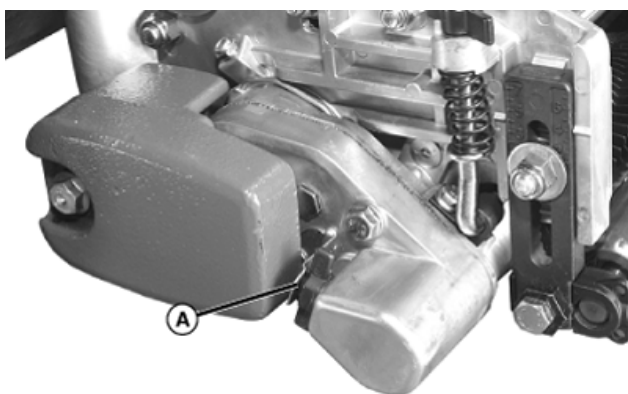
TCAL41626—UN—22JAN13

1. Adjust broom:
 - To adjust broom height, loosen two jam nuts (A) and rotate bolt (B) until desired broom height is achieved. Repeat on opposite side. Tighten jam nuts to secure broom position.

Operating—Cutting Units

- To adjust broom (C) angle, loosen two nuts (D) on each side, and rotate broom on brackets (E). Tighten two nuts to secure position.
- 2. To remove broom, remove locknut (F), spacer, and carriage bolt, and remove broom with brackets (G) from reel.

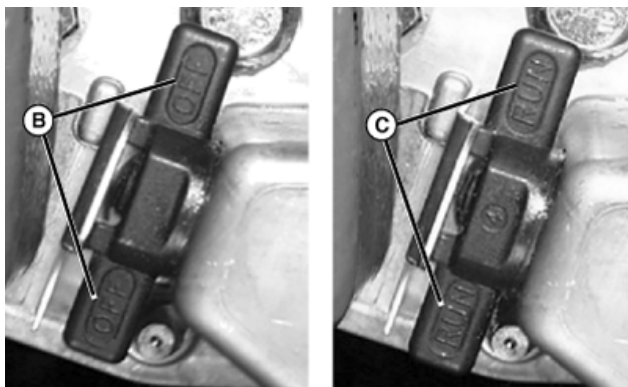
Operating Rotary Brush (Optional)



TCAL41493—UN—22JAN13

The rotary brush is controlled by a knob (A) on the cutting unit gearcase.

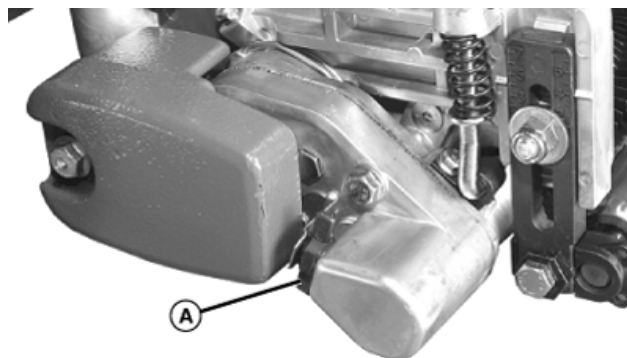
NOTE: Before operating, always release the operator presense bail, engage the park brake and turn the PTO switch to the disengaged position, and verify that the reel has come to a complete stop.



TCAL41494—UN—22JAN13

- The rotary brush is in neutral (not engaged) with the control knob in the vertical position and the word OFF (B) is visible on both sides of the knob.
- To engage the rotary brush, rotate the knob 180° until the word RUN (C) is visible on both sides of the knob.

Operating Greens Tender Conditioner (GTC) (Optional)



TCAL41495—UN—22JAN13

- The GTC is disengaged with the control knob (A) in the vertical position.
- To engage the GTC, turn the control knob 90° to the horizontal position.

IMPORTANT: Avoid damage! The blades can be dulled if the Greens Tender or Fairway Tender Conditioner (GTC or FTC) is used immediately after applying top dressing. Wait for at least three days following top dressing before using GTC or FTC.

- The conditioner process involves shallow vertical cutting. The blades are adjusted to cut runners and lift horizontal leaf material. It is important that frequent and thorough observations be performed or stress to the plants can occur. Adjust as necessary.

NOTE: The initial setting must be the same as Height Of Cut to prevent damage to the turf.

For a deeper cut, set approximately 0.79 mm (.032 in.) below Height Of Cut.

1. Set the GTC blades the same height as the Height of Cut when conditioning greens for the first time.
2. While cutting with GTC, closely examine each green for any inconsistencies or appearance of over-aggressiveness. Decrease GTC penetration if necessary.
3. Check each green 1–2 operating hours after cutting. Look for any tendency toward a yellow or brown tint, which indicates over-stress.
4. If visible stress is observed, decrease GTC penetration to 0.39 mm (0.016 in.) for next cutting.
5. Continue cutting/conditioning at this setting for 3 to 5 days. Check frequently for stress.
6. If no stress is observed, increase GTC penetration by 0.25 mm (0.010 in.). Check for obvious over-aggressiveness. Observe for 2 to 3 days, watching for signs of stress.

Operating—Cutting Units

7. Mow with GTC at this setting until stress becomes visible. Back off the GTC adjusted penetration by 0.25 mm (0.010 in.).

NOTE: Stress is a cumulative result of many factors such as irrigation, temperature, humidity, chemical application, disease, and thatch.

Conditioning aggressiveness requires adjustment and monitoring as these factors vary.

Conditioning frequency may also need to be reduced in some cases.

Cleaning Cutting Unit

IMPORTANT: Avoid damage! Grease after washing to purge fittings and bearings of water.

Do not use high-pressure water to clean grass from cutting units.

- When cleaning do not direct high-pressure water at the cutting unit motor seals. Water can be drawn into bearings as they cool.
- Use high volume, low-pressure water to clean exterior of machine and the reels.
- Do not use water to wash where electrical components are located. If water penetrates electrical connections it can create problems.
- Use compressed air not water to clean air filters. Reduce compressed air to less than 210 kPa (2.10 bar) (30 psi) when using for cleaning purposes.
- Clean grease fittings before lubricating. Replace lost or broken fittings immediately.

Replacement Parts

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.

Service Intervals

Servicing Your Machine

IMPORTANT: Avoid damage! High-pressure washing can cause damage to machine components.

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.

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

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

Before Each Use

- Check engine oil.
- Check safety interlock system.

After Each Use

- Check and fill fuel.
- Clean debris from machine.
- Clean debris from cutting units and attachments.
- Lubricate machine after washing.

Break-In (After First 5 Hours)

- Check traction drive belt.

Break-In (After First 20 Hours)

- Change engine oil.
- Clean fuel sediment bowl.

Break-In (After First 50 Hours)

- Check chain tension.
- Change gear case oil.

Every 50 Hours

- Lubricate traction and brake linkage components.
- Lubricate operator presence bail components.
- Lubricate drive roller bearings.
- Change engine oil.

Every 100 Hours

- Check gear case oil.
- Check spark arrestor.
- Clean fuel sediment bowl.
- Clean fuel filter in fuel tank fitting.
- Check drive belt tension.

Every 200 Hours

- Tighten collet nut on conditioner or brush shaft (if equipped).

Every 300 Hours

- Change paper air cleaner element.
- Check chain tension.
- Replace spark plug.
- Check alternator belt.
- Check engine idle speed.

Every 500 Hours or Yearly

- Check valve clearance.
- Inspect valves.
- Remove combustion chamber deposits.

Service Lubrication

Grease

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

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

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

The following greases are preferred:

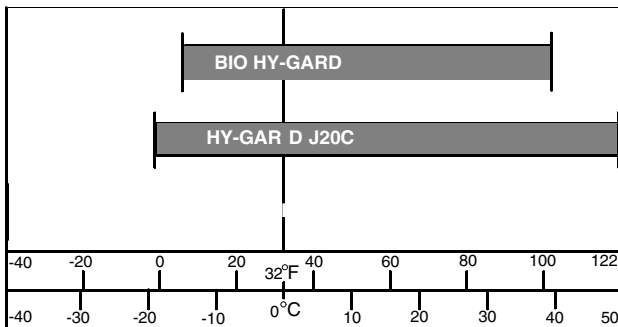
- John Deere Special Purpose Golf and Turf Cutting Unit Grease
- John Deere Multi-Purpose SD Polyurea Grease

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 can require use of a special-use grease. Contact your Servicing dealer for information.

Transmission and Hydraulic Oil

IMPORTANT: Avoid damage! Machine is filled with John Deere HY-GARD™ (J20C) Transmission/Hydraulic Oil at the factory. DO NOT mix oils. DO NOT use type “F” automatic transmission fluid.



TCAL41496—UN—22JAN13

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

John Deere J20C Hy-Gard™ Transmission/Hydraulic Oil is recommended.

Use John Deere BIO Hy-Gard™ oil when a biodegradable fluid is required.

Biodegradable Oil

Application

IMPORTANT: Avoid damage! Biodegradable oils, other than Bio Hy-Gard™, are not recommended.

When use of a biodegradable lubricant is desired or required, Bio Hy-Gard™ is recommended. Bio Hy-Gard™ can be used under normal mowing conditions.

DO NOT USE biodegradable lubricants in machines for the following operations:

- Any machine used for scalping procedure.
- Any verticut operation in temperatures exceeding 32° C (90°F).
- Mixing of biodegradable oil and mineral oil reduces the degradability of the lubricant in the machine. Mixing of Hy-Gard™ and Bio Hy-Gard™ does not result in performance deterioration.

Cold-Weather Operation

Precautions must be taken if Bio Hy-Gard™ containers or equipment are stored for long periods of time in cold temperatures. Freezing should be expected if Bio Hy-Gard™ is subjected to the following temperatures:

- Stored for six months at -18° to -23°C (-1° to -10°F)
- Stored for seven days at -23° to -26°C (-10° to -15°F)
- Stored for three days at -26° to -29°C (-15° to -20°F)
- Stored for two days at -29° to -34°C (-20° to -30°F)
- Stored for one day at -34°C (-30°F) and below.

IMPORTANT: Avoid damage! Equipment must not be started or any operation attempted until Bio Hy-Gard™ has reached a safe operating viscosity.

- If freezing of Bio Hy-Gard™ is suspected, the container or equipment MUST be warmed to at least 0°C (32°F). Maintain for 24—48 hours to ensure that the fluid has reached a safe operating viscosity.

Converting From HY-GARD to BIO HY-GARD

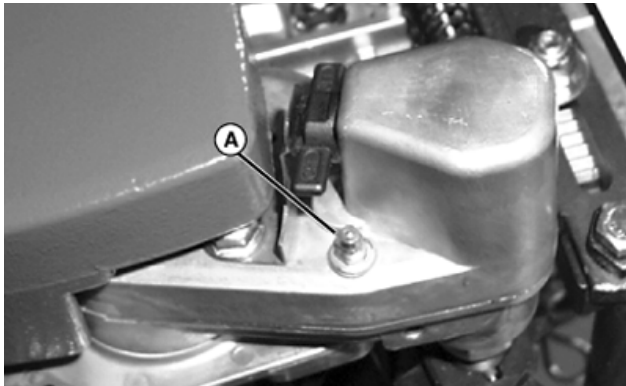
Systems being converted from HY-GARD to BIO HY-GARD should follow the procedure listed below to obtain maximum lubricant biodegradability.

1. Park machine on a level surface.
2. Stop engine and set park brake.
3. Drain gearcase.
4. Fill gearcase with BIO HY-GARD to appropriate level.
5. Start engine and bring to medium idle.

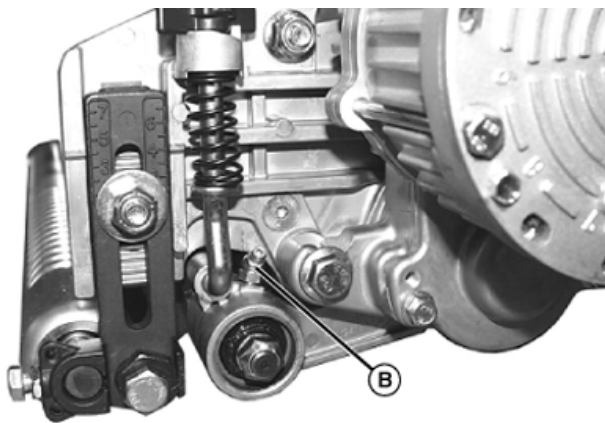
Service Lubrication

6. Cycle traction drive clutch several times with PTO off.
7. Stop engine and check gearcase level. Add BIO HY-GARD to appropriate level.
8. Operate machine under normal operating conditions for a minimum of two hours.
9. Repeat steps 1-7.
10. Follow recommended maintenance schedules.

Lubricating Turf Conditioner or Rotary Turf Brush Drive



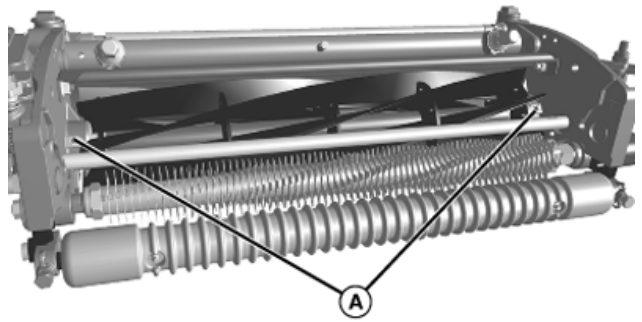
TCAL41497—UN—22JAN13



TCAL41498—UN—22JAN13

Lubricate GTC or rotary brush gearcase (A) and support arm bearing (B) with John Deere Golf and Turf Cutting Unit Grease.

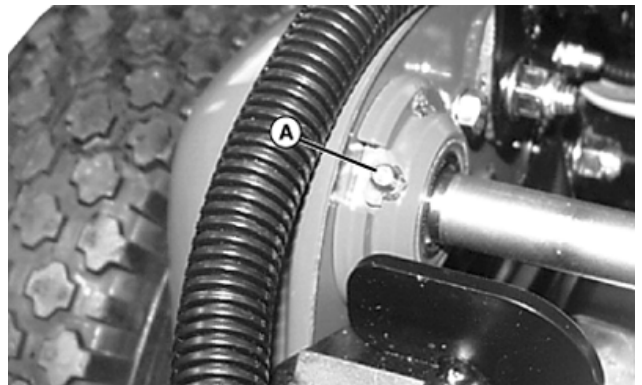
Lubricating Reel



TCAL41499—UN—22JAN13

Lubricate reel bearing grease fittings (A) on both ends with John Deere Golf and Turf Cutting Unit Grease.

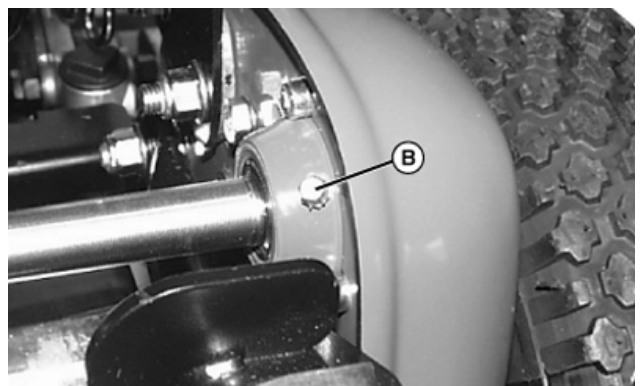
Lubricating Input Drives



TCAL41500—UN—22JAN13

Left side shown from rear.

1. Lubricate input drive to left side drive chain at point (A) with John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.



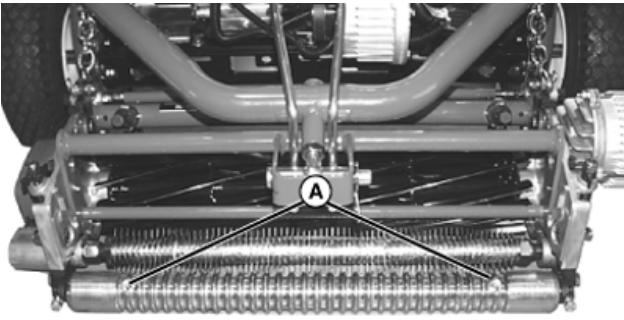
TCAL41501—UN—22JAN13

Right side shown from rear.

2. Lubricate input drive to right side drive chain at point (B) with John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.

Service Lubrication

Lubricating Front Roller

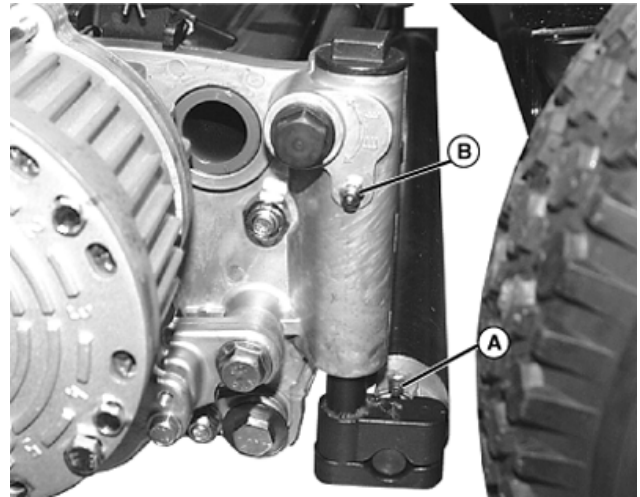


TCAL41502—UN—22JAN13

Grooved Roller Shown

Lubricate roller at points (A) with John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.

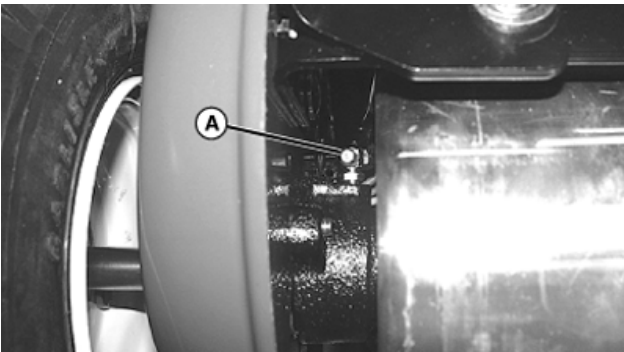
Lubricating Rear Roller and Height of Cut Adjusters



TCAL41505—UN—22JAN13

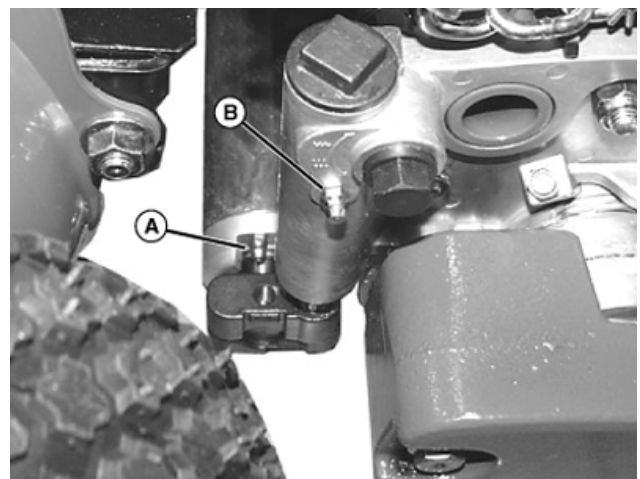
Left side shown.

Lubricating Drive Roller



TCAL41503—UN—22JAN13

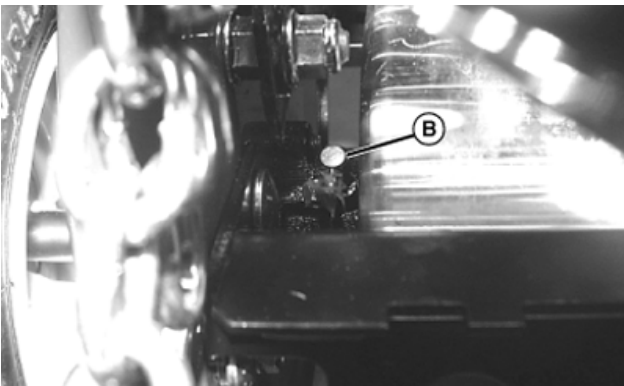
Left side shown from rear.



TCAL41506—UN—22JAN13

Right side shown.

Lubricate rear roller at two points (A) and height of cut adjusters at two points (B) with John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.

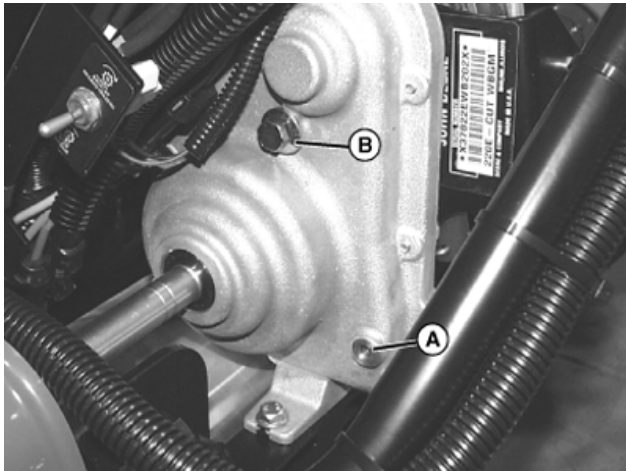


TCAL41504—UN—22JAN13

Right side shown from front.

Lubricate drive roller at points (A and B) with John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.

Checking and Filling Gear Case



TCAL41507—UN—22JAN13

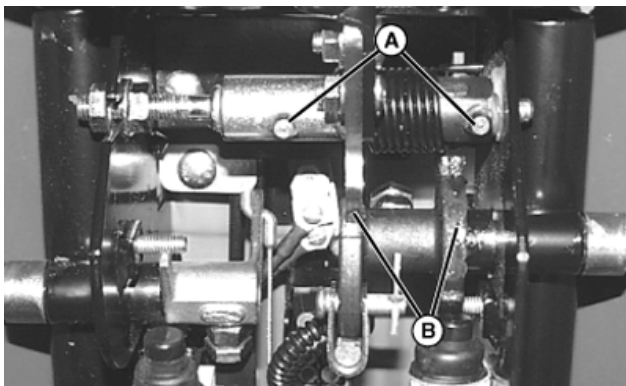
1. Remove transport wheels and position machine so traction drum and front and rear rollers are on a level surface.
2. Remove drain plug (A).
3. Check level of lubricant. Oil should be at the bottom of drain hole.
4. Add oil if required through the upper hole (B) using John Deere Hy-Gard Oil.

Specification

Gear Case — Capacity 0.14 L (0.3 pt) or 140 mL (4.8 oz.)

5. Install drain plug with gasket in hole (A) and tighten securely.
6. Remove block used to level unit.

Lubricating Drive Control Linkage



TCAL41508—UN—22JAN13

1. Lubricate drive control linkage at points (A and B) with John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.

Service Engine

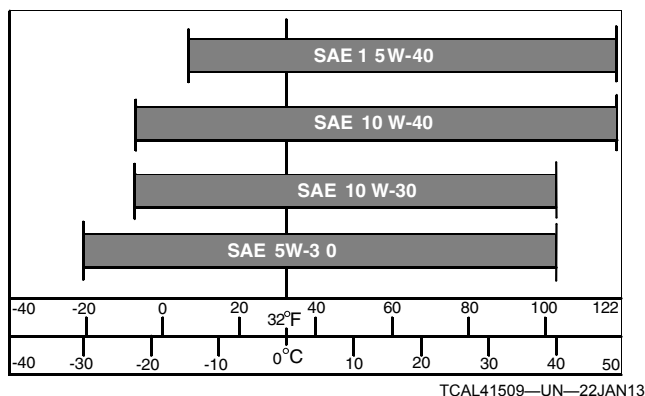
Avoid Fumes

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

- Move the machine to an outside area before running the engine.
- Do not run an engine in an enclosed area without adequate ventilation.
- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear out the exhaust fumes.

Engine Oil

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



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

Using Proper Fuel

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, or add fuel stabilizer.

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 components which can affect engine performance.

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

Condensation may collect in the fuel tank because of a variety of operating or environmental conditions and, over time, may affect your machine's operation. Fill fuel tank at the end of daily use and store fuel in plastic containers to reduce condensation.

For best year-round performance and fuel-handling, add stabilizer to fuel immediately after fuel purchase. Such practice helps prevent engine performance problems and allows fuel storage in the machine all year without draining.

Service Engine

Filling Fuel Tank

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

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

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

- Clean dirt and debris from the fuel tank opening.
- Use clean, fresh, stabilized fuel.
- Fill the fuel tank at the end of each 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.

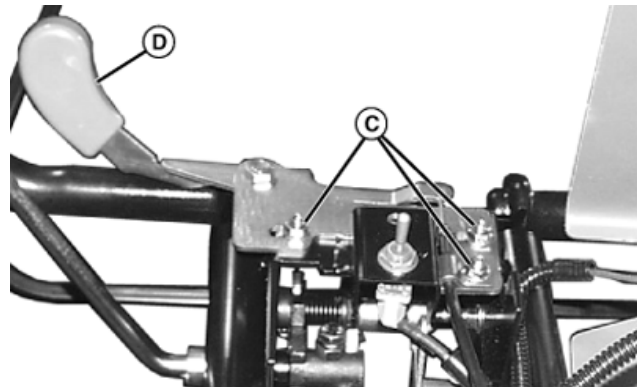
1. Park machine safely. (See Parking Safely in the Safety section.)
2. Allow engine to cool.
3. Remove any trash from area around fuel tank cap.
4. Remove fuel tank cap slowly to allow any pressure built up in tank to escape.
5. Fill fuel tank only to bottom of filler neck. Do not overfill.
6. Install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

Adjusting Throttle Lever Location



TCAL41510—UN—22JAN13

1. Remove two hex head bolts (A).
2. Remove handlebar cover (B).



TCAL41511—UN—22JAN13

3. Loosen three nuts (C).
4. Move throttle lever plate (D) to where the throttle lever location is most comfortable for the operator.
5. Tighten nuts.
6. Install handlebar cover with two hex head bolts and tighten.

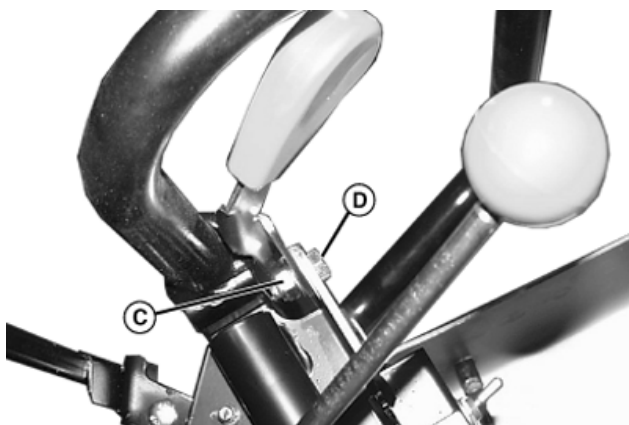
Service Engine

Adjusting Throttle Lever Tension



TCAL41512—UN—22JAN13

1. Remove two hex head bolts (A).
2. Remove handlebar cover (B).



TCAL41513—UN—22JAN13

3. Using two wrenches, tighten or loosen the lock nut (C) on the throttle pivot hex bolt (D). At the proper tension, the throttle lever is easy to move, yet maintains the desired throttle setting during operation.
4. Install handlebar cover with two hex head bolts and tighten.

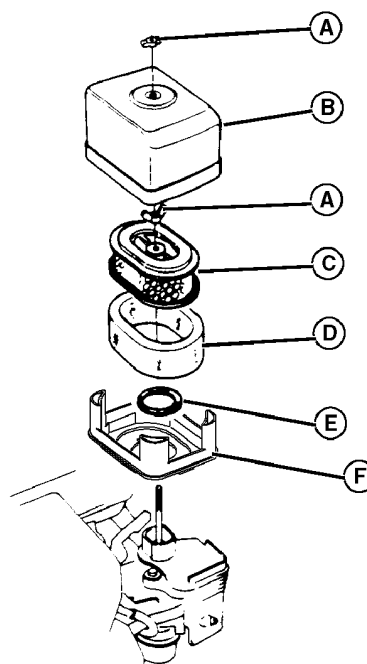
Cleaning Air Cleaner

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

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

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

1. Remove wing nut (A) to remove air cleaner cover (B).



TCAL41514—UN—22JAN13

2. Remove second wing nut (A) to remove air cleaner element (C) and pre-cleaner (D).
3. Check housing, pre-cleaner, element, and rubber gasket (E) for damage. Housing must seat well and permit only filtered air to reach carburetor. Replace if necessary.

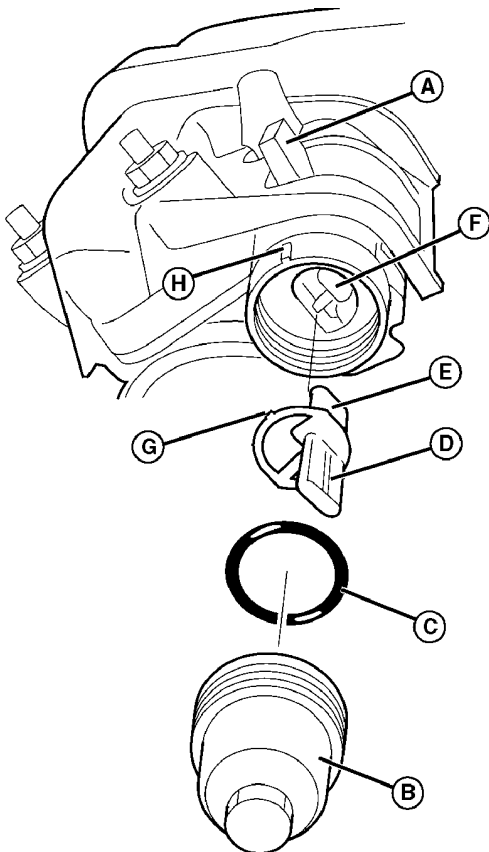
IMPORTANT: Avoid damage! Do not clean pre-cleaner with solvent or compressed air.

4. Be sure that nothing is obstructing the air passage.
5. Pre-cleaner (D) - Clean every 25 operating hours:
 - Wash in detergent and water, rinse in clean water.
 - Dry thoroughly.

Service Engine

- Air cleaner element (C) - Clean or replace every 100 operating hours:
- If element is dirty or damaged, install new element.
- Assemble air cleaner assembly and install two wing nuts. Ensure base (F) is properly installed before assembly.

Cleaning Fuel Sediment Bowl and Fuel Filter



TCAL41515—UN—22JAN13

1. Turn fuel shut-off valve (A) to the OFF position.
2. Unscrew and remove sediment bowl (B) and O-ring (C).
3. Remove fuel filter screen (D).
4. Thoroughly clean sediment bowl (B) and fuel filter screen (D) with John Deere degreasing solvent or equivalent.
5. Install fuel filter screen (D) with tab (E) aligned with slot (F), and tab (G) aligned with notch (H) on carburetor.
6. Install O-ring (C) and sediment bowl (B). Securely tighten sediment bowl.
7. Turn fuel shut-off valve to the full open (ON) position and check for leaks.

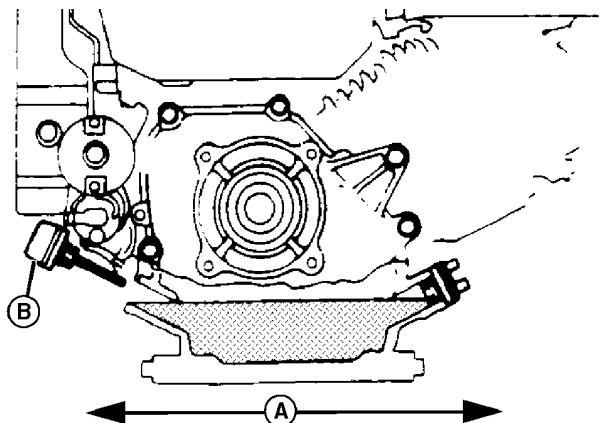
Checking Engine Oil Level

IMPORTANT: Avoid damage! Failure to check the oil level regularly could lead to serious engine problems if oil level is out of the operating range:

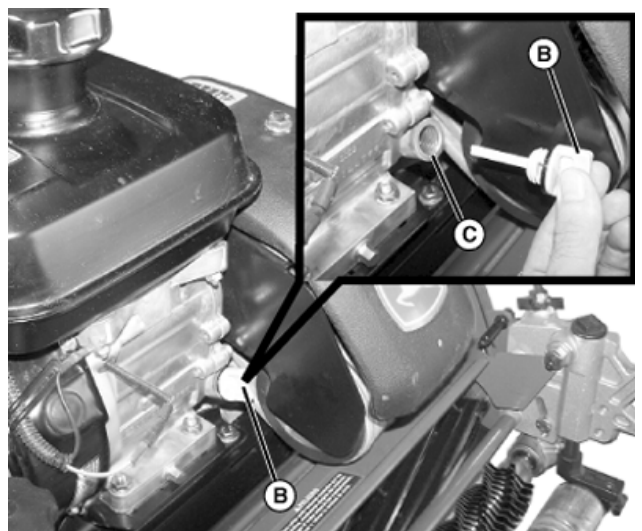
- Engine must be level before checking oil level.
- Check oil level before operating.
- Check oil level when the engine is cold and not running.
- Keep oil level between the dipstick marks.
- Shut off engine before adding oil.

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

Make sure that engine is cold when checking engine oil level.



TCAL41516—UN—22JAN13



TCAL41517—UN—22JAN13

Service Engine

1. Be sure that engine is in a level (horizontal) position (A). If necessary, put a block under front roller to level engine.

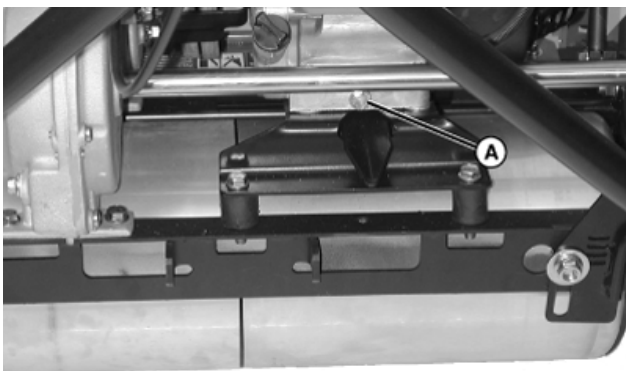
NOTE: Do not screw dipstick into engine to check oil level.

2. Remove dipstick (B), wipe clean, and install dipstick loosely into filler port.
3. Remove dipstick and inspect oil level. If no oil or only a slight amount is seen on dipstick, add to full level (C). Do not overfill.
4. Wipe any spilled oil off mower.

Changing Engine Oil

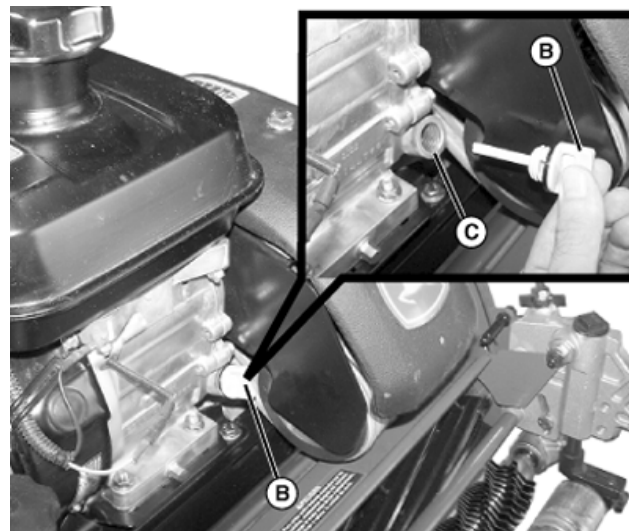
NOTE: Change engine oil after first 20 operating hours, then every 50 operating hours. Check and fill plugs are located in front and rear of machine.

1. Run engine a few minutes to warm oil.
2. Be sure that engine is in a level (horizontal) position, if necessary, put a block under front roller to level engine.
3. Stop engine.



TCAL41518—UN—22JAN13

4. Remove drain plug (A) and drain oil into container.
5. Install drain plug.



TCAL41519—UN—22JAN13

6. Remove dipstick (B), and wipe clean.
7. Add specified amount of oil to full level (C). Do not overfill. (See Checking Oil Level.)

Specification

Engine Oil — Capacity 0.6 L (0.63 qt.)

8. Wipe any spilled oil off mower.

Cleaning Spark Plug And Adjusting Electrode Gap

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



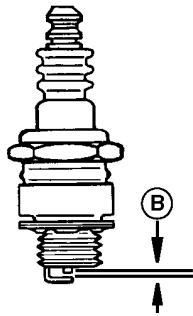
TCAL41520—UN—22JAN13

1. Disconnect plug wire (A) and remove plug.
2. Thoroughly clean plug using high flash-point solvent and wire brush.
3. Inspect plug for cracked porcelain, pitted or damaged electrodes, or other damage.

Service Engine

NOTE: In Canada, replace plug with a resistor plug.

4. Replace plug if necessary.



TCAL41521—UN—22JAN13

5. Check plug gap (B) with a round wire-type feeler gauge.

6. Gap must be within specification.

Specification

Spark Plug — Gap 0.7—0.8 mm (0.028—0.031 in.)

7. Change gap by moving only the outer electrode toward center electrode.

8. Install and tighten plug to specification.

Specification

Spark Plug — Torque. 18 N·m (13 lb.-ft.)

9. Connect spark plug wire.

Service—Cutting Units

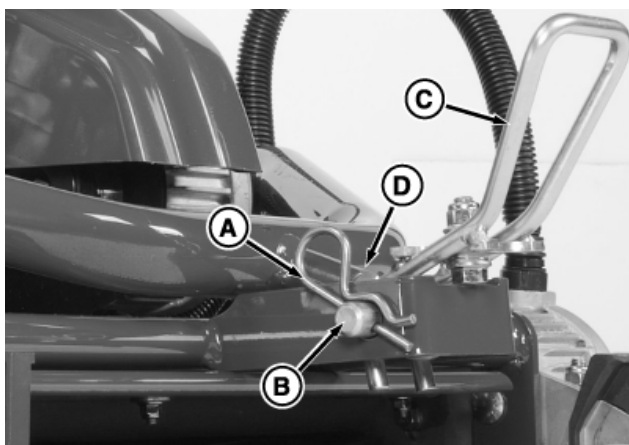
Removing and Installing Cutting Units

Removing Cutting Unit

IMPORTANT: Avoid damage! Support the machine handlebar before removal of the cutting unit to prevent uncontrolled tipping of the machine.

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

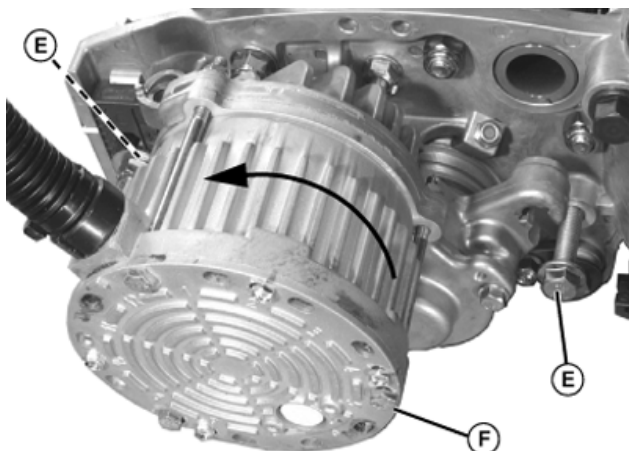
NOTE: When a Direct-Mount style basket is used, remove hanger (C). Install the hanger in the opposite orientation with the bent portion of the hanger pointing downward.



TCT011727—UN—22SEP14

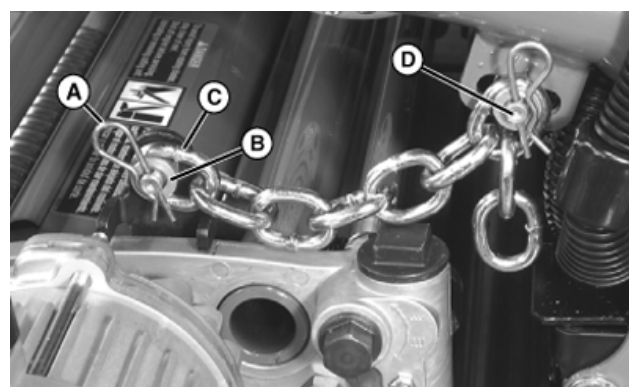
2. Remove spring locking pin (A) and clevis pin (B) securing cutting unit and basket hanger (C) to support arm (D). Roll cutting unit away from machine.

IMPORTANT: Avoid damage! NEVER lift or carry motor by wires.



TCAL41523—UN—22JAN13

3. Loosen two hex flange head bolts (E), and rotate and remove drive motor assembly (F) from cutting unit.

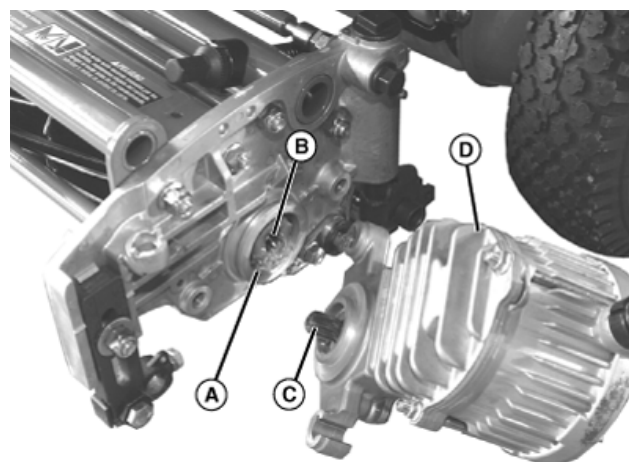


TCAL41524—UN—22JAN13

4. Remove spring locking pin (A) flat washer (B) and limit chain (C) from anchor pin on each side of cutting unit.

NOTE: If chains are removed from the support arm pin (D), mark the link so lift chains can be installed correctly.

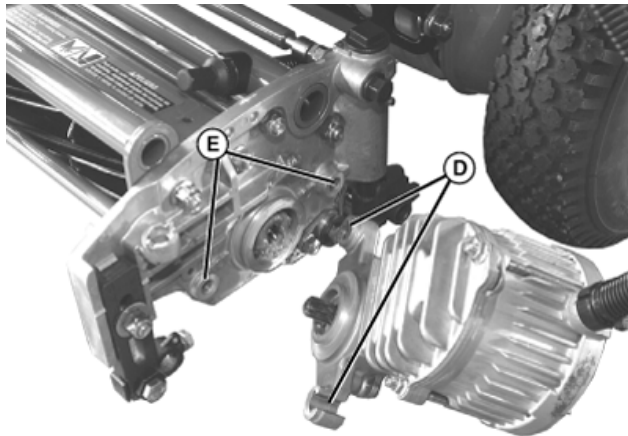
Installing Cutting Units



TCAL41525—UN—22JAN13

1. Inspect inside cutting unit bearing housing (A) for grease. Add John Deere Golf and Turf Cutting Unit Grease to housing (A) and internal reel splines (B) if more lubrication is needed.
2. Align splines (C) on drive motor shaft with internal reel splines (B). Install drive motor assembly (D) onto the cutting unit.

Service—Cutting Units



TCAL41526—UN—22JAN13

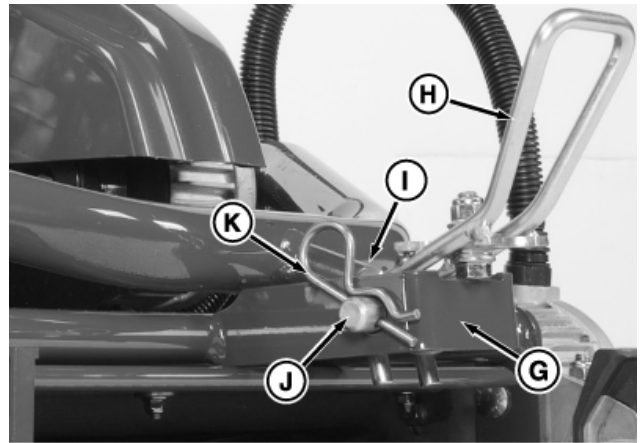
3. Rotate drive motor as required to align slotted holes (D) in housing with threaded holes (E) in cutting unit.



TCAL41527—UN—22JAN13

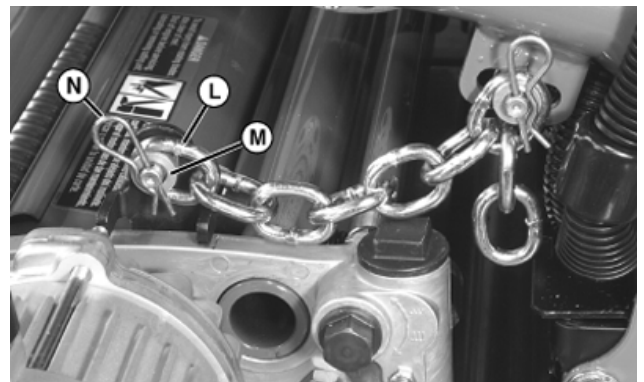
4. Install and tighten hex flange head bolts (F).
5. Roll cutting unit under machine.

NOTE: When a Direct-Mount style basket is used, remove hanger (H). Install the hanger in the opposite orientation with the bent portion of the hanger pointing downward.



TCT011728—UN—22SEP14

6. Align holes in front yoke (G), basket hanger (H), and cutting unit support arm (I).
7. Ensure proper orientation of basket hanger (H). Fully insert clevis pin (J) and secure with spring locking pin (K).



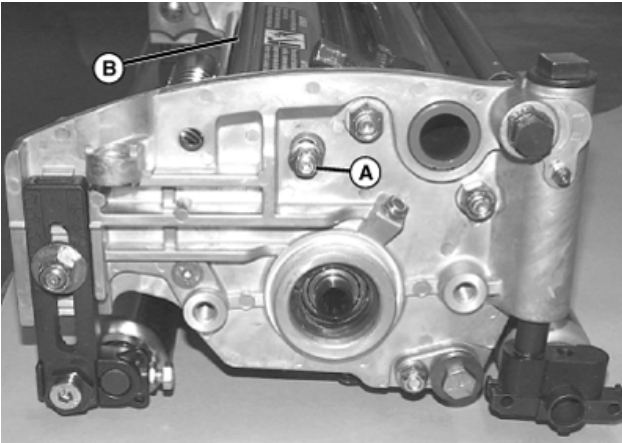
TCAL41529—UN—22JAN13

8. Install lift chains (L) on cutting unit housing pins. Ensure that chains are not kinked.
9. Install flat washers (M) and spring locking pins (N) on each cutting unit housing pin. (See Adjusting Cutting Unit Limit Chains in this section.)

Adjusting Cutting Unit Shield

NOTE: Keeping the shield close to the cutting blades improves the performance of the grass catcher in most conditions.

Service—Cutting Units



TCAL41530—UN—22JAN13

1. Loosen two bolts (A) and locknuts on each side of cutting unit.



TCAL41531—UN—22JAN13

2. Raise or lower shield (B) to adjust clearance (C) between bottom of shield and the top of cutting blade per specification.

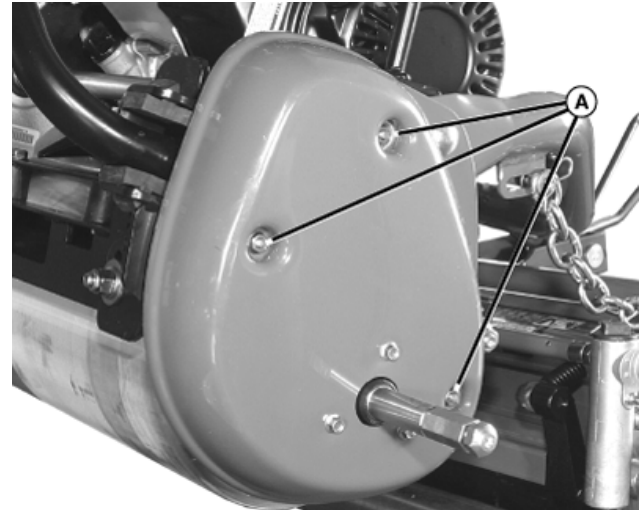
Specification

Shield to Cutting Blade — Clearance 1.5 mm (0.06 in.)

3. Tighten bolts.

Adjusting Roller Drive Chains

1. Raise machine on kick stand and remove transport wheel.



TCAL41532—UN—22JAN13

2. Remove three nuts on drive cover (A) and remove cover from machine.



TCAL41533—UN—22JAN13

3. Loosen nut (B) on idler wheel.
4. Slide idler (C) per specification for maximum deflection at mid point (D) of drive chain.
Specification
 Idler — Maximum Deflection. 6.35 mm (1/4 in.)
5. Tighten nut (B).
6. Lubricate drive chain using John Deere Multi-Purpose SD Polyurea Grease or equivalent SAE multipurpose grease.
7. Install cover and secure with original hardware.
8. Install transport wheel.
9. Repeat steps on opposite side.
10. Lower machine from kick stand.

Service—Cutting Units

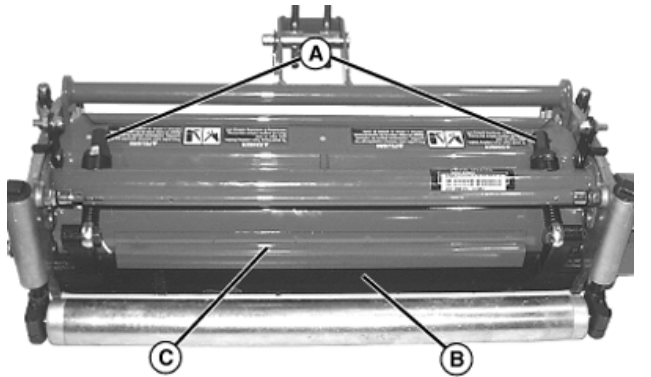
Adjusting Bedknife to Reel (QA5)

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

IMPORTANT: Avoid damage! Adjust bedknife to reel by lowering and raising the bedknife evenly.

Do not adjust more than one flat on the adjuster nut at a time, alternating side to side.

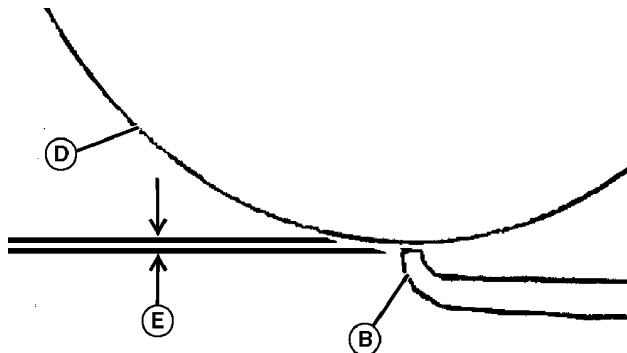
NOTE: Stand cutting unit upright on workbench.



TCAL41534—UN—22JAN13

1. Turn bedknife tower adjuster (A) on both sides of cutting unit counterclockwise until bedknife (B) is tight against cutting unit (C).
2. Slowly tighten tower adjuster (A) clockwise, alternating from side to side until bedknife begins to pull away from the cutting reel. Cutting reel should rotate freely.

NOTE: Make sure that the final adjustment to the bedknife is pulling the bedknife away from the cutting reel.



TCAL41535—UN—22JAN13

3. Alternately turn adjusters (A) no more than one flat at a time until bedknife (B) to reel (D) clearance (E) measures the specified clearance.

Specification

Bedknife to Reel

— Clearance 0.025—0.050 mm (0.001—0.002 in.)

4. Check the bedknife to reel clearance (E). Adjust again if necessary.

Adjusting Front Roller Parallel with Bedknife (QA5)

CAUTION: Avoid injury! Blades are sharp and rotate quickly:

Keeps hands and feet away from cutting units when machine is running.

Always wear gloves when working on cutting units.

Watch for rotation of cutting reel. Rotating one cutting reel can cause another blade or cutting reel to rotate.

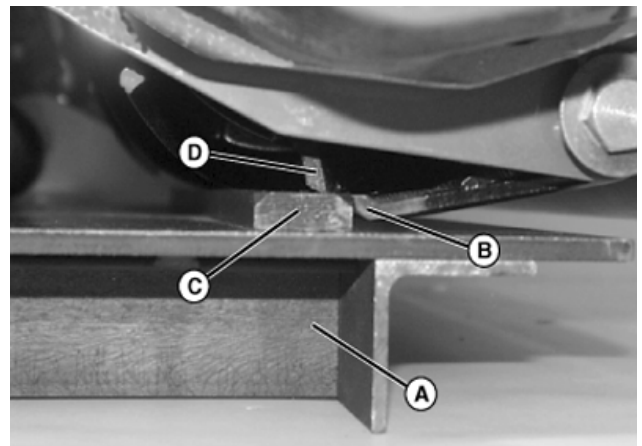
NOTE: Use of a bench plate or a 2 or 3 bolt height of cut gauge bar is recommended when adjusting front roller parallel with the bedknife.

Always adjust bedknife-to-reel before adjusting front roller for parallelism.

Always make parallelism adjustment after adjusting front roller height of cut range.

Parallelism Adjustment with Bench Plate

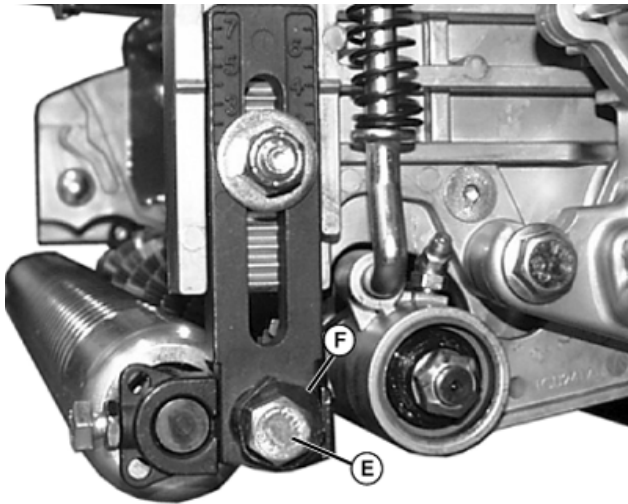
1. Position cutting unit upright on flat surface or workbench.



TCAL41536—UN—22JAN13

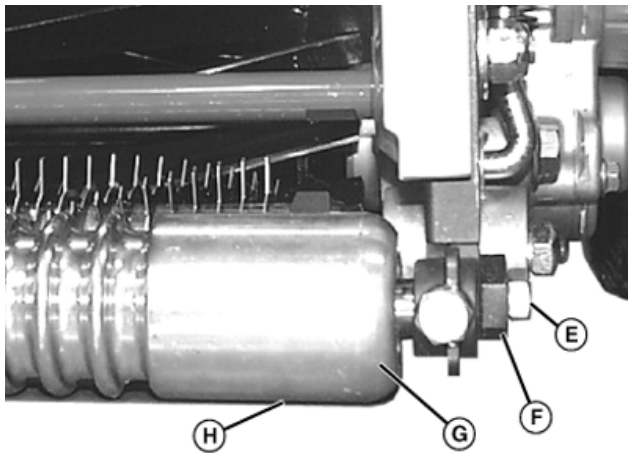
2. Set bench plate on a level surface. Set cutting unit on top of bench plate (A). Bedknife (B) must rest firmly against plate stop (C) with cutting reel blade (D) on top of plate stop.

Service—Cutting Units



TCAL41537—UN—22JAN13

3. Loosen hex head bolt (E) on one of the roller brackets.



TCAL41538—UN—22JAN13

4. Rotate eccentric adjuster (F) until the front roller (G) sits flat and parallel with the bench plate. Gap (H) must not exceed maximum specification.

Specification

Front Roller — Gap 0.050 mm (0.002 in) Maximum

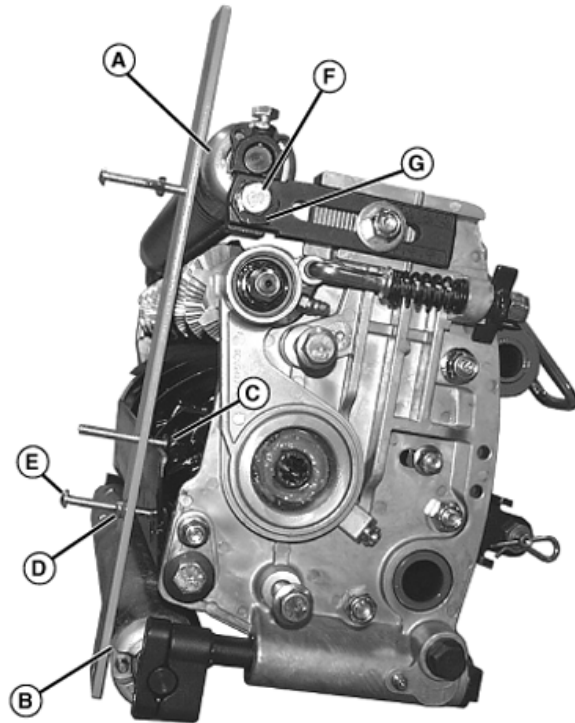
5. Hold roller eccentric adjuster (F) and tighten hex head bolt (E) to specification.

Specification

Eccentric Adjuster Hex Head Bolt

— Torque 81.3 N·m (60 lb·ft)

Parallelism Adjustment with Height of Cut Gauge Bar



TCAL41539—UN—22JAN13

1. Position cutting unit upright on flat surface or workbench.
2. Rest height of cut gauge bar against front (A) and rear rollers (B) to specification from the outside end of the bedknife.

Specification

Cut Gauge Bar — Height 51 mm (2 in)

3. Set the inside of the screw head (C) against the front edge of the bedknife to hold the gauge bar in position.
4. Loosen wing nut (D). Turn lower gauge screw (E) clockwise until top of screw contacts flat edge of bedknife.

5. Tighten wing nut (D).

6. Adjust position of front roller:

- a. Loosen bolt (F) and rotate eccentric adjuster (G) until top of lower gauge screw (E) contacts the bedknife.

- b. Hold roller eccentric adjuster (G) and tighten hex head bolt (F) to specification.

Specification

Eccentric Adjuster Hex Head Bolt

— Torque 81.3 N·m (60 lb·ft)

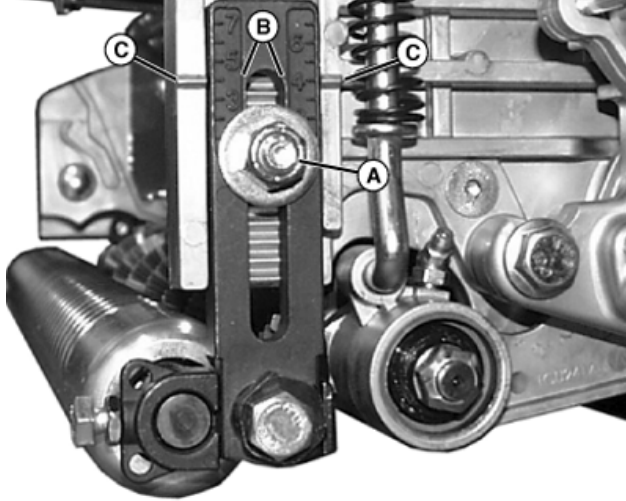
7. Repeat procedure for opposite side.

Service—Cutting Units

Adjusting Height of Cut Range (QA5)

Adjust front roller brackets for the height of cut range desired.

1. Select height of cut adjustment range by adjusting the position of both front roller brackets.



TCAL41540—UN—22JAN13

2. Loosen nut (A) on each roller bracket.
3. Alignment of roller bracket (B) and cutting unit frame (C) adjustment marks determine height of cut adjustment range.

NOTE: Height of cut range for the 180 E-Cut™ Hybrid and 220 E-Cut™ Hybrid mowers is 0-19 mm (0.00-0.75 in.).

4. Refer to chart for desired setting.

Height of Cut Range (2 in. Front Roller With Out GTC)		Front Roller Setting
mm	in.	
Not Recommended	Not Recommended	1
0.0—4	0.00—0.160	2
1—9.5	0.04—0.37	3
6—15	0.24—0.60	4
11—21	0.43—0.83	5
16—27	0.63—1.06	6
21—33	0.83—1.30	7

Height of Cut Range (2 in. Front Roller With GTC)		Front Roller Setting
mm	in.	
Not Recommended	Not Recommended	1
0.0—5	0.00—0.20	2
0—11	0.00—0.43	3
5—17	0.20—0.67	4
10—24	0.40—0.94	5
15—30	0.60—1.18	6
20—36	0.80—1.42	7

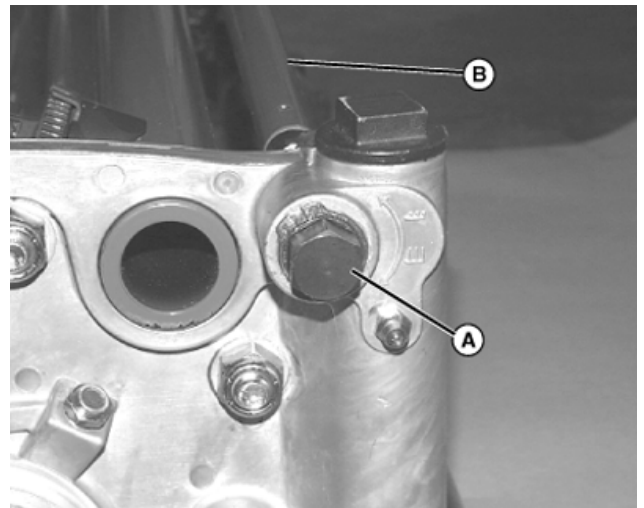
Adjusting Height of Cut (QA5)

CAUTION: Avoid injury! Blades are sharp and rotate quickly:

- Keeps hands and feet away from cutting units when machine is running.
- Always wear gloves when working on cutting units.
- Watch for rotation of cutting reel. Rotating one cutting reel can cause another blade or cutting reel to rotate.

NOTE: Do not use any type of pneumatic drill or impact wrench to make height of cut adjustments.

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

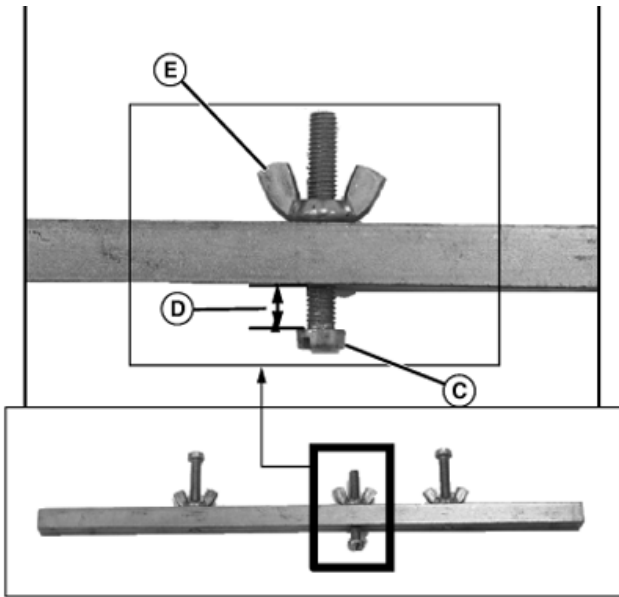


TCAL41541—UN—22JAN13

2. Locate the height of cut adjuster (A) on top rear of reel side casting (either side).
3. Turn the height of cut adjustment (A) to decrease or increase height of cut.

NOTE: Adjusters are connected with cross shaft (B) so turning one side simultaneously turns the other.

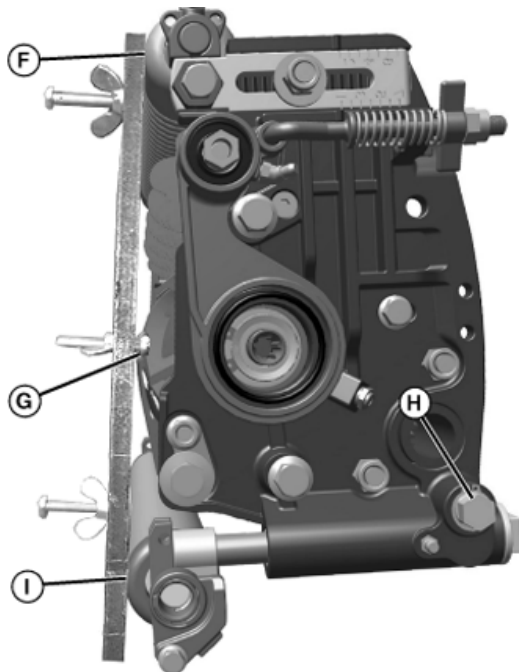
Service—Cutting Units



TCAL41542—UN—22JAN13

4. On the height of cut gauge bar, set center adjustment bolt head (C) at the desired height of cut (D). Lock wing nut (E).

NOTE: Effective height of cut could be less than bench setting, based on turf and soil conditions and front roller option.

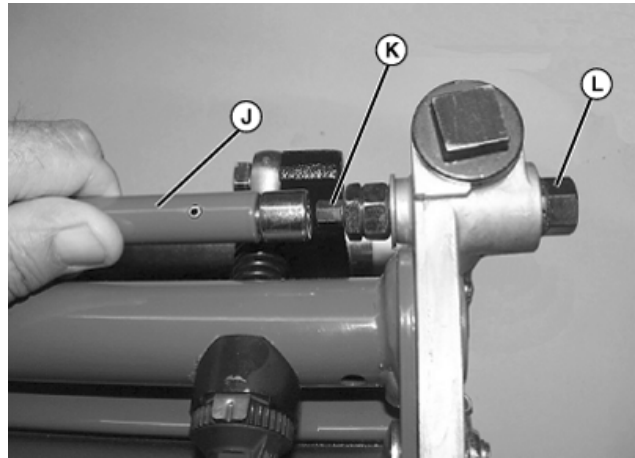


TCAL41543—UN—22JAN13

5. Rest height of cut gauge bar against front roller (F) approximately 51 mm (2 in) from either end of the bedknife. Set the inside of the bolt head (G) against the edge of the bedknife.

NOTE: Bottom of screw head on gauge bar must be engaged with cutting edge of bedknife.

6. Turn adjuster (H) to move the rear roller (I) away from gauge bar slightly. Turn adjuster in the opposite direction until the rear roller contacts the height of cut gauge bar. Repeat for the other side of the cutting reel.
7. Check height of cut adjustment setting from side to side.



TCAL41544—UN—22JAN13

8. If side to side height of cut adjustment is necessary, pull against spring tension on cross shaft (J) to disconnect it from hex coupling (K). Remove the cross shaft.
9. Turn the adjuster (L) on the side requiring adjustment to move the rear roller away from the gauge bar slightly. Turn the adjuster in the opposite direction until the side to side height of cut is equal for both. Reinstall the cross shaft.

Removing and Installing Bedknife Shoe

⚠ CAUTION: Avoid injury! Blades are sharp and rotate quickly:

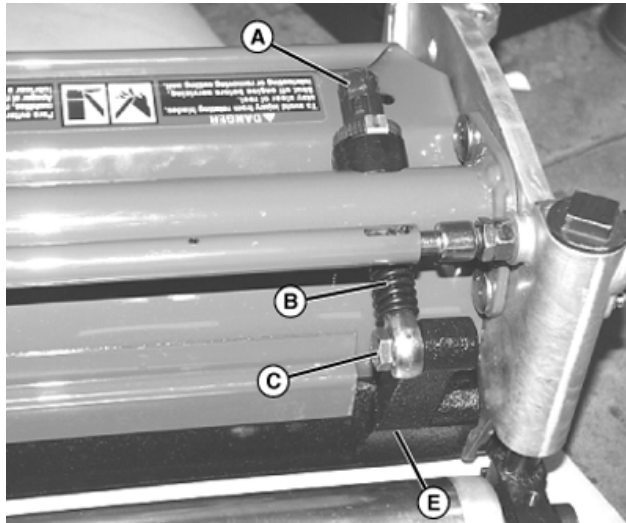
- Keeps hands and feet away from cutting units when machine is running.
- Always wear gloves when working on cutting units.
- Watch for rotation of cutting reel. Rotating one cutting reel can cause another blade or cutting reel to rotate.

Removing Bedknife Shoe

1. Remove the cutting unit from machine.
2. Position cutting unit with the bottom side down on a flat surface or workbench.

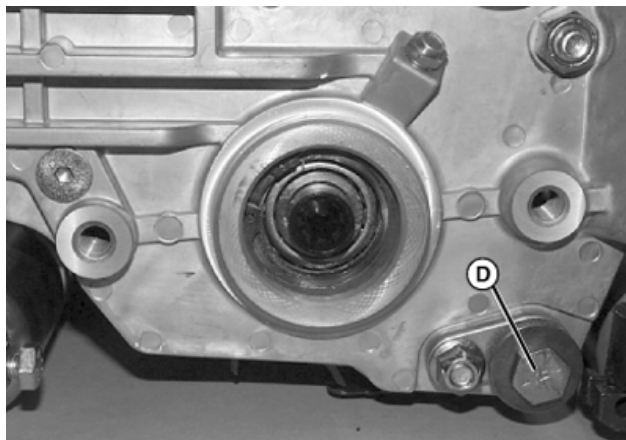
Service—Cutting Units

3. Increase clearance between bedknife and reel on both sides of cutting unit.



TCAL41545—UN—22JAN13

- Turn hex head bolts (A) on both sides of cutting unit clockwise to pull bedknife away from reel.
 - Turn hex head bolts until springs (B) on both sides of cutting unit are fully compressed.
4. Remove bolt (C) on each side.

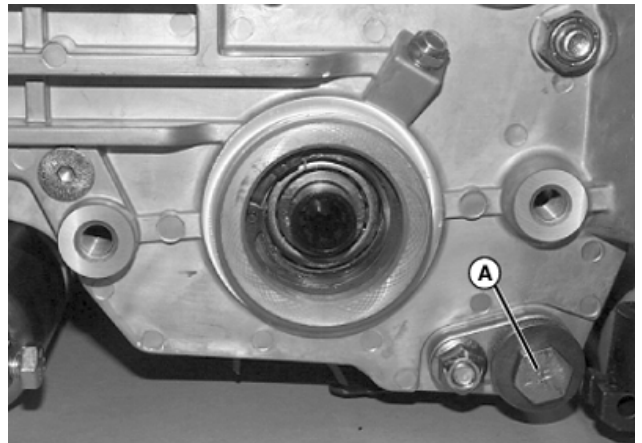


TCAL41546—UN—22JAN13

5. Remove hex head bolt (D) from each end of cutting unit, and remove bedknife shoe (E).
6. Inspect bedknife for wear or damage. Replace bedknife, if necessary. (See Replacing Bedknife in this section.)
7. If original bedknife is used again, grind the bedknife. (See Grinding Reel and Bedknife in this section.)

Installing Bedknife Shoe

NOTE: Debris can accumulate inside channel in cutting unit shield. Clean all debris from channel before installing bedknife shoe.



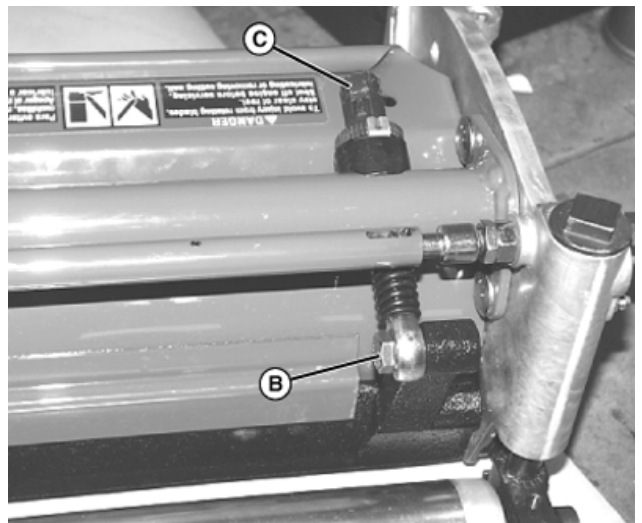
TCAL41547—UN—22JAN13

1. Slide bedknife shoe into position within cutting unit and secure with hex head bolt (A) on each side. Tighten hardware to specification.

Specification

Bedknife Shoe Bolt — Torque.55 N·m (40 lb·ft)

2. Position cutting unit with bottom side down on flat surface or workbench.



TCAL41548—UN—22JAN13

3. Install hex head bolt (B) through eyebolt into bedknife shoe.
4. Adjust bedknife-to-reel.
5. Adjust front roller parallel to bedknife.
6. Set height of cut.
7. Backlap reel.
8. Check height of cut and adjust as necessary.

Service—Cutting Units

Replacing Bedknife (QA5)

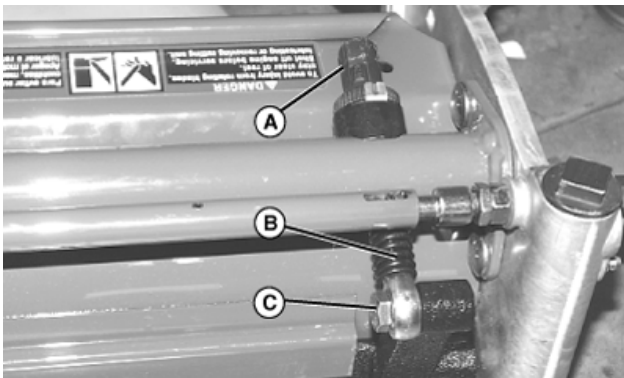
⚠ CAUTION: Avoid injury! Blades are sharp and rotate quickly:

- Keeps hands and feet away from cutting units while machine is running.
- Always wear gloves while working on cutting units.
- Watch for rotation of cutting reel. Rotating one cutting reel can cause another blade or cutting reel to rotate.

NOTE: If the original bedknife is ground and used again, do not remove it from the bedknife shoe. The bedknife and bedknife shoe are machined as an assembly. (See *Removing and Installing Bedknife Shoe and Grinding the Bedknife* in this section.)

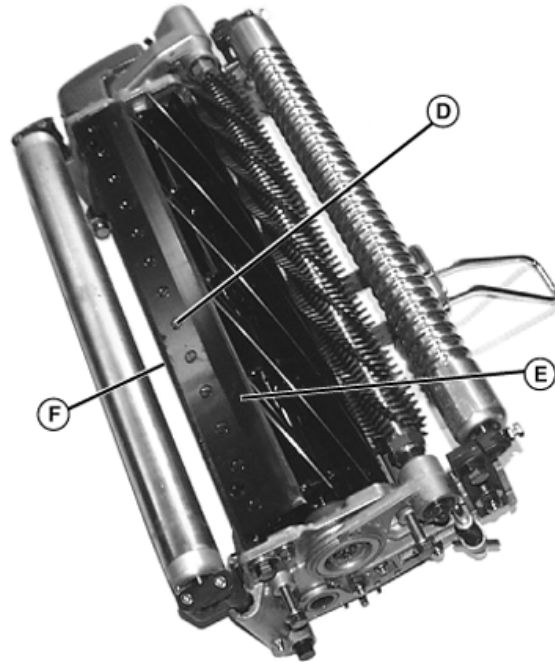
Removing Bedknife

1. Position cutting unit with the bottom side down on a flat surface or workbench.
2. Remove the cutting unit from machine.
3. Increase clearance of bedknife and reel on both sides of cutting unit.



TCAL41549—UN—22JAN13

4. Turn hex head bolt (A) clockwise until spring (B) is completely compressed. Repeat on opposite side.



TCAL41550—UN—22JAN13

5. Rotate cutting unit and position with bottom side up on flat surface or workbench as shown.
6. Remove and discard thirteen screws (D) attaching bedknife (E) to bedknife shoe (F). Discard bedknife.

Installing Bedknife

NOTE: Remove debris, corrosion, and rust from bottom surface of bedknife support.

1. Install bedknife using new screws. Alternate tightening by starting with center screws and working out to the ends. Tighten screws to specification.

Specification

Bedknife Screws — Torque 7 N·m (62 lb.-in.)

2. If installing a used bedknife, grind the bedknife. (See *Grinding the Bedknife* in this section.)
3. Adjust front roller parallel to bedknife.
4. Adjust bedknife-to-reel.
5. Set height of cut.
6. Backlap reel.
7. Check height of cut and adjust as necessary.

Service—Cutting Units

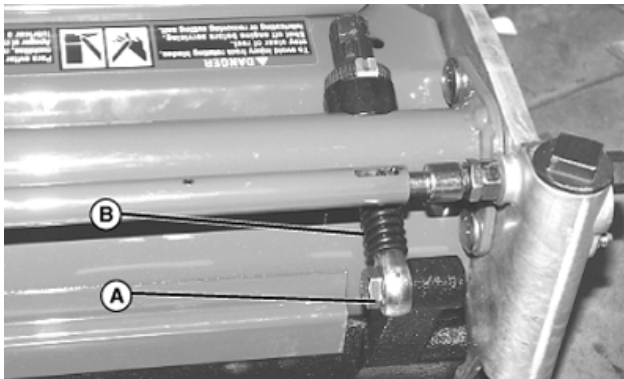
Adjusting Bedknife and Bedknife Shoe Position for Worn Reel (QA5)

IMPORTANT: Avoid damage! Reduce front roller setting by 1 if bedbar eccentrics have been flipped. (See “Adjusting Height of Cut Range (QA5 Cutting Units)” in the SERVICE Section.)

If a reel has been replaced due to excessive wear, eccentrics must be flipped to nominal (new reel) position.

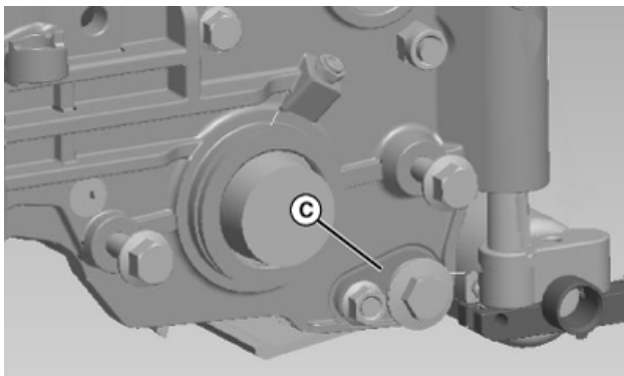
NOTE: When the reel diameter is reduced to about 122 mm (4.8 in.) flipping the eccentric increases the useful life of the reel.

1. Remove the cutting unit from machine.
2. Position cutting unit with the bottom side down on a flat surface or workbench.
3. Increase clearance of bedknife and reel on both sides of cutting unit.



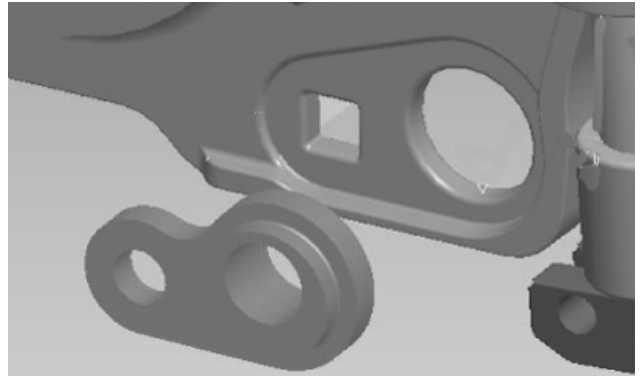
TCAL41551—UN—22JAN13

4. Turn hex head bolt (A) clockwise until spring (B) is compressed. Repeat on opposite side



TCAL41552—UN—22JAN13

5. Remove hardware on eccentric (C).
6. Remove eccentric.



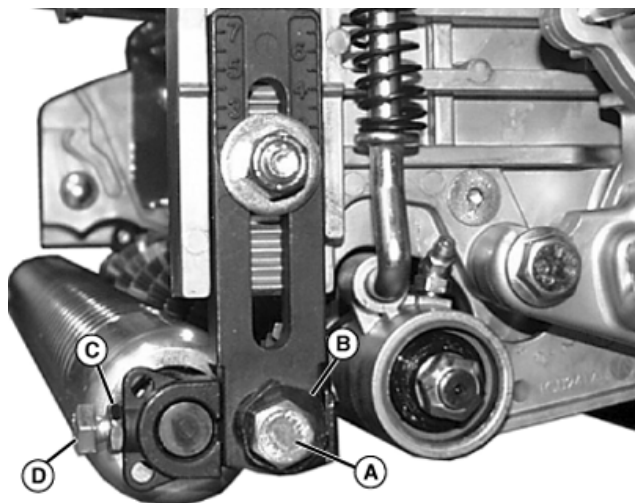
TCAL41553—UN—22JAN13

7. Flip eccentric 180 degrees as shown.
8. Insert eccentric back into cutting unit.
9. Reinstall and tighten hardware.
10. Repeat procedure for opposite side eccentric.
11. Adjust bedknife-to-reel.
12. Adjust front roller parallel to bedknife.
13. Set height of cut.
14. Backlap reel.
15. Check height of cut and adjust as necessary.

Removing and Installing Front Roller (QA5)

Removing Front Roller

1. Remove cutting unit from machine.
2. Position cutting unit upright on a flat surface or workbench.



TCAL41554—UN—22JAN13

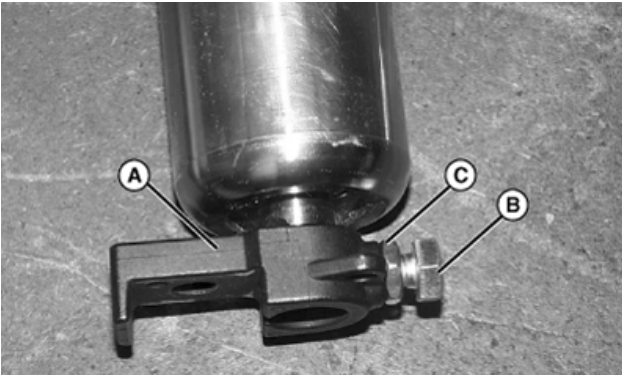
3. Remove hex head bolt (A), and eccentric adjuster (B) on both sides of roller.

Service—Cutting Units

- Loosen locknut (C) and loosen hex head bolt (D) to remove roller bracket from shaft.
- Replace roller.

Installing Front Roller

NOTE: Roller brackets are offset. For standard use, the bracket must be installed to the roller with the offset to the rear of the base cutting unit to allow close proximity of front roller to rear roller. If GTC or Rotary Brush is being installed, offset must be to the front to allow the GTC or Rotary Brush to be installed behind the front roller.



TCAL41555—UN—22JAN13

- Install roller brackets (A) onto each bearing spindle shaft end.
- Install set screws (B) and locknuts (C) loosely. Do not tighten.

NOTE: Make sure the roller bracket set screw locations are not aligned with the holes in each bearing spindle shaft end. Set screws must engage the bearing spindle shaft at each end.

- Install roller with eccentric adjuster and hex head bolt on each side. Center front roller. Tighten set screws (B) and lock nuts (C) on both roller brackets.
- Tighten roller bracket attaching hardware.
- Adjust front roller for parallelism.
- Adjust height of cut.
- Tighten eccentric to specification.

Specification

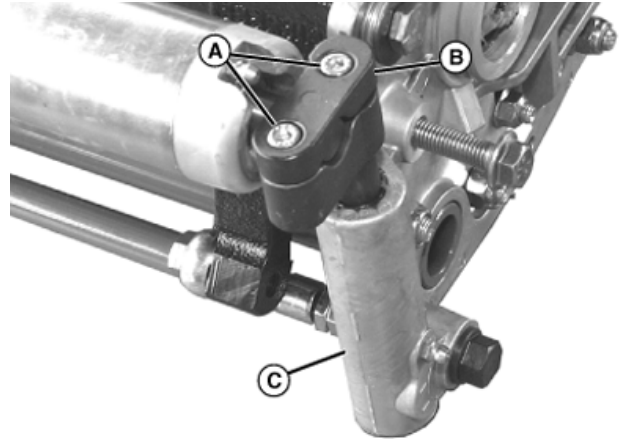
Eccentric Hardware — Torque 81 N·m (60 lb.-ft.)

Removing and Installing Rear Roller (QA5)

NOTE: The 180 E-Cut Hybrid and 220 E-Cut Hybrid mowers use a unique rear roller retaining clamp (item B in pictures that follow). This type of clamp must be used on any QA5 cutting unit attached to these mowers.

Removing Rear Roller

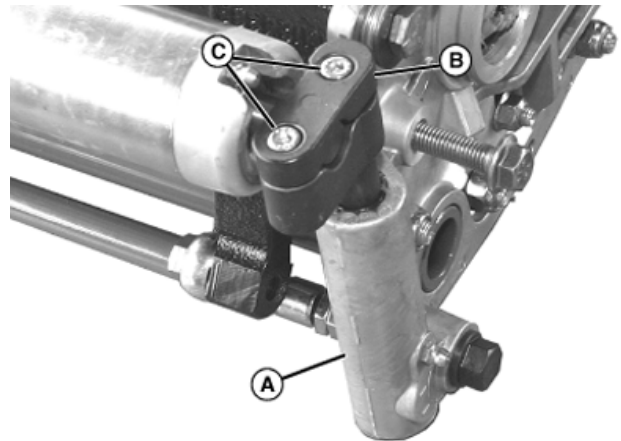
- Remove cutting unit from machine.
- Position cutting unit with bottom side up on a flat surface or workbench.



TCAL41556—UN—22JAN13

- Remove hex socket head bolts (A) and clamp (B) on each side of roller assembly. Remove roller from each height of cut bracket (C).

Installing Rear Roller



TCAL41557—UN—22JAN13

- Install roller shaft into each height of cut bracket (A).
- Install clamp (B) and M6 hex socket head bolts (A) on each side.
- Center roller between clamps.
- Torque four M6 bolts to specification.
- Adjust height of cut.

Specification

Hex Socket Bolts — Torque 19 N·m (14 lb-ft)

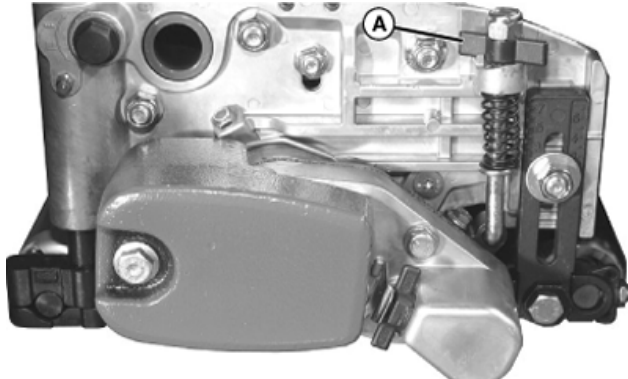
Service—Cutting Units

Adjusting Rotary Turf Brush

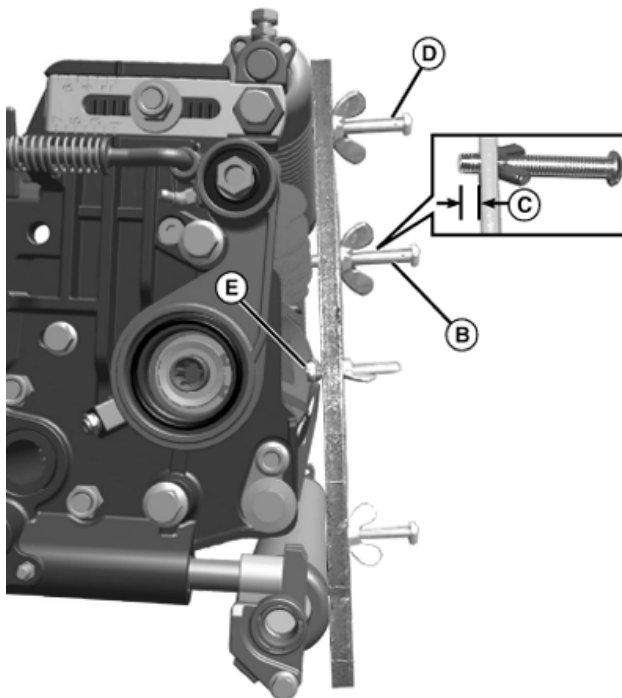
Refer to “Adjusting Greens Tender Conditioner (GTC) (QA5)” below and use identical adjustment procedure to adjust rotary turf brush.

Adjusting Greens Tender Conditioner (GTC) (QA5)

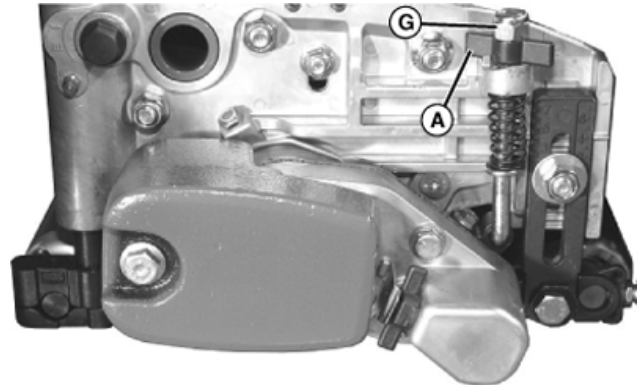
NOTE: Height of Cut must be adjusted prior to adjusting the Greens Tender Conditioner.



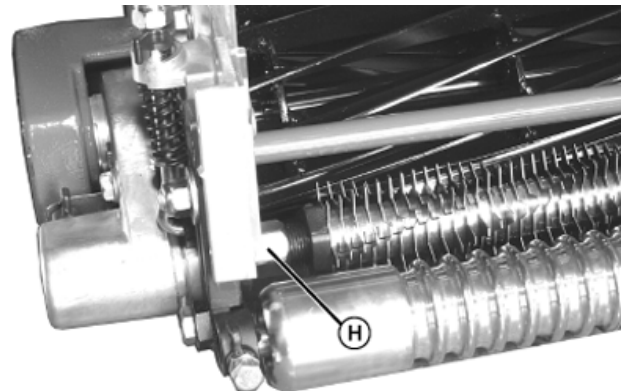
1. Rotate GTC adjuster wing nut (A) to lower GTC shaft. Repeat on opposite side.
2. Position cutting unit to make height of cut adjustment.



3. Set GTC adjustment screw (B) on the gauge bar to the desired operating height (C).
 - a. Adjustment screw (D) may need to be loosened so that the gauge bar can rest on both the front and rear rollers.
4. Place preset gauge bar on cutting unit. Hook height of cut screw (E) on bedknife. The ends of the bar should rest firmly on the front and rear rollers.



5. Adjust locknut (G) to raise or lower GTC shaft (Tightening locknut will raise GTC shaft). Alternate from end to end until the teeth touch the screw on the gauge bar.
6. Remove gauge bar.
7. Rotate GTC adjuster wing nut (A) on both sides to raise GTC shaft.

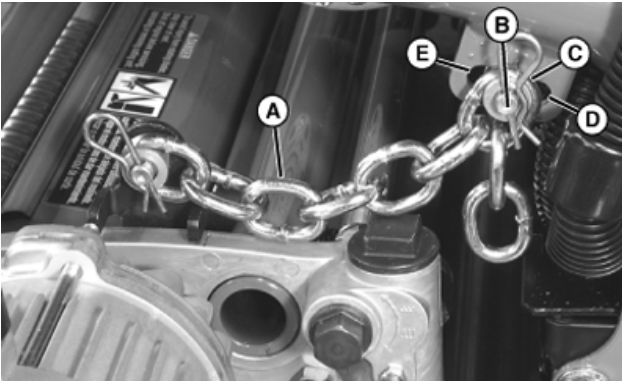


8. Check and tighten GTC collet (H) whenever the GTC is adjusted or every 200 hours.

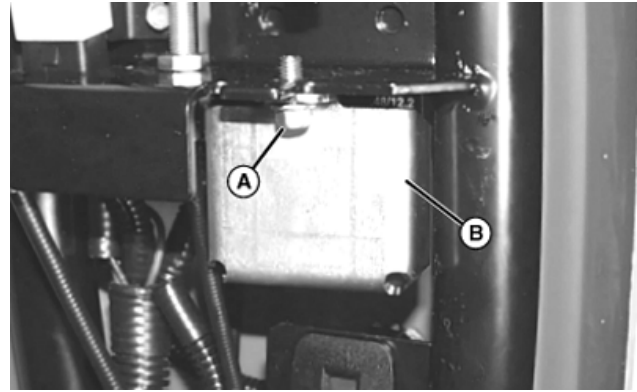
Adjusting Cutting Unit Limit Chains

Limit chains on each side of the cutting unit controls the amount of cutting unit steering while mowing and the amount of rear roller drop when the unit is lifted for turns.

Service—Cutting Units



TCAL41562—UN—22JAN13



TCAL41563—UN—22JAN13

- Initial setting should be each chain (A) shortened to 7 links, with the upper chain anchor studs (B) in center of slots (C). This will provide maximum float and maximum rear roller drop when lifted. The majority of greens will not require maximum float. Turning and maneuvering will be easiest if float is limited to the requirements of the greens surface.

NOTE: Use care not to exceed maximum float setting. If excessive chain slack is permitted, rear roller adjustment towers may contact front frame cross bar causing damage. Minimum clearance on flat ground, with cutting unit rotated to limit is 6.5 mm (1/4 in.) between rear roller tower and frame.

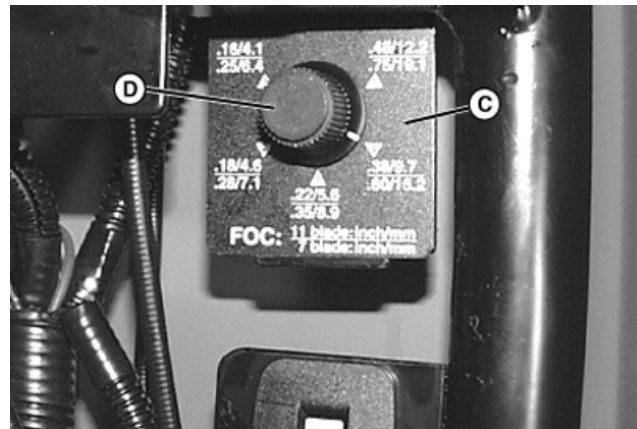
- To limit float for relatively flat or non-undulating greens, adjust upper chain anchor studs (B) rearward in slots (D). This will also reduce rear roller drop.
- Further tightening can be achieved after reaching rear of slot, by shortening chain to 6 links and re-positioning upper chain anchor studs (B) to front of slots (E).

Adjusting Frequency of Clip (FOC)

IMPORTANT: Avoid damage! Operating the reels at a high speed can cause excessive bedknife and reel wear. Operate the reels at the appropriate frequency of clip.

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

- Remove 6 mm screw (A) and cover (B) from rear of handle bar.



TCAL41564—UN—22JAN13

- Locate reel speed Frequency of Clip (FOC) control box (C).

NOTE: FOC can be adjusted depending on the type of application for the greens mower, which types of cutting units are used, and grass height and conditions.

FOC is infinitely variable between positions 1 and 5 on the control label (C). FOC specifications for each control position are listed on the control label and in the table that follows.

Control Position	11 Blade Reel FOC	7 Blade Reel FOC
1	4.1 mm (0.16 in.)	6.4 mm (0.25 in.)
2	4.6 mm (0.18 in.)	7.1 mm (0.28 in.)
3	5.6 mm (0.22 in.)	8.9 mm (0.35 in.)
4	9.7 mm (0.38 in.)	15.2 mm (0.60 in.)
5	12.2 mm (0.48 in.)	19.1 mm (0.75 in.)

Adjust FOC control dial (D) to desired setting for reel type, greens, and conditions. (Turning the control counterclockwise from position 1 reduces the reel speed. Turning the control clockwise from position 5 increases the reel speed.)

Service—Cutting Units

4.
 - a. For mowing greens, set the control (D) to the desired FOC (Greens typically use 4.1—4.6 mm (0.16—0.18 in.) with an 11 blade reel).
 - b. For mowing approaches and teeboxes, reel speed can be reduced by turning the speed control knob counterclockwise.

NOTE: FOC is automatically maintained at selected setting regardless of throttle position and ground speed.

5. Install FOC cover (B) and secure with 6 mm screw (A).
FOC has no control over backlap reel speed.
Controller override keeps backlap to 156 rpm.

Grinding Reel and Bedknife

Reel and Bedknife Relationship

Reel mowers are precision machines requiring daily maintenance to maintain the well-groomed appearance of turfgrass. The scissor-like shearing action, that only a reel mower is capable of achieving, is only possible if the reel and bedknife are sharp and the reel-to-bedknife clearance is maintained.

Close examination of the reel-to-bedknife relationship reveals two square edges passing one another with approximately 0.025 - 0.051 mm (0.001 - 0.002 in.) clearance. There are several reasons why this clearance is necessary.

- When the reel is allowed to contact the bedknife, the square (sharp) edges of the reel and bedknife will roll over, becoming dull.
- Contact between the reel and bedknife generates heat. Heat generated through this contact will distort the shape of the bedknife. Distortion causes the bedknife to draw closer to the reel, resulting in more rollover of the cutting surfaces and more heat generated in the bedknife.
- Drag produced by an improperly adjusted cutting unit may result in an unacceptable clip ratio, undue strain on drive mechanisms and premature wear of the cutting unit.

Reasons for Grinding

- To restore the cylindrical shape of a reel that has become cone-shaped due to improper adjustment of the reel-to-bedknife clearance or worn reel bearings.
- To restore the edge when the grass is not being cut across the entire length of the bedknife, evidenced by streaks of grass left after the mower has passed. Usually the result of nicked blades caused by hitting foreign objects in the grass.
- To restore the edge when the lack of frequent backlapping allowed the edge to be rounded beyond

the capability of the backlapping procedure to restore the edge.

- To restore the edge when the reel-to-bedknife clearance has been improperly adjusted (reel contacting bedknife).

Cutting action begins as the bedknife positions the grass to be cut at the cutting edge. The reel then pulls the grass toward the bedknife where it is sheared by the cutting edges as they pass one another.

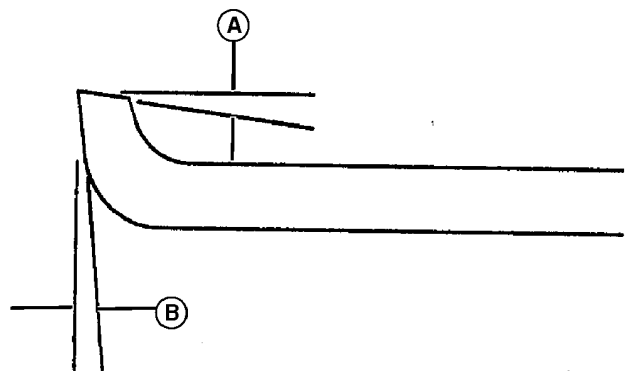
In order for the grass to be cut at the proper height, it must contact the bedknife at the cutting edge. This is accomplished by grinding a 15° relief angle on the front face of the bedknife. Without a relief angle, the blade of grass will contact the lower edge of the bedknife and be bent over at too much of an angle prior to being cut. In the case of mowing greens, where very small cuts are being taken, the reel may not capture the grass at all, and no grass will be cut.

Although some spin grinding machine manufacturers say backlapping is not necessary, John Deere recommends backlapping after spin grinding to remove burrs and rough edges left from the spin grinding procedure. Backlapping produces a honed edge that will cut the grass evenly and leave the tops of the grass with clean, straight edges.

It is important to note, dull cutting edges will tear rather than shear the grass drawn into the bedknife. This will shock the grass plant and retard its growth.

Grinding the Bedknife

NOTE: Bedknife and support assembly must be ground as a complete unit.



TCAL41565—UN—22JAN13

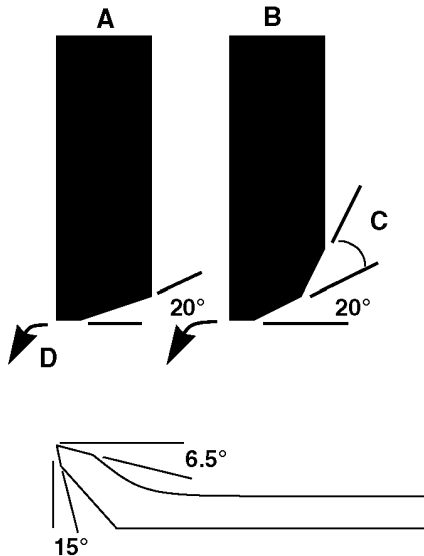
1. When grinding the bedknife, it is important to have a 6.5° relief angle on the top surface (A) and on the front surface (B):
 - a. 56 cm (22 in.) QA5 except ET17767 - a 15° relief angle on the front surface (B).
 - b. 56 cm (22 in.) ET17767 high cut - a 5° relief angle on the front surface (B).

Service—Cutting Units

- Put entire bedknife support and bedknife in a suitable grinder and grind until material is consistently removed from the entire length of the top and front surfaces of the bedknife.

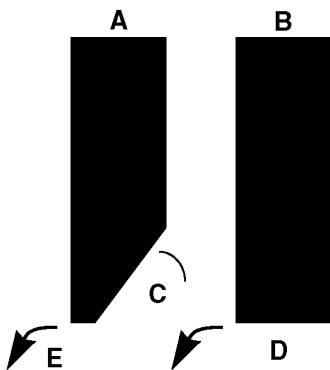
Grinding the Reel

CORRECT way to grind the reel:



- A — Relief Grind
- B — Double Relief Grind
- C — Secondary Relief
- D — Cutting Edge

INCORRECT way to grind the reel:



- A — Relief Grind
- B — Flat Grind
- C — Excessive Relief
- D — No Relief
- E — Cutting Edge

John Deere recommends relief grinding the reels after spin grinding for these reasons:

- Reduced blade contact area results in less friction, requiring less horsepower to drive the reel and increases fuel efficiency.
- Ensures longer wear life.
- Less time is required to backlap.
- Reduces pulling and tearing of the grass as the unit gets dull by use.
- Provides an area for backlapping compound to be trapped to more effectively backlap reels.
- Relief grinding removes metal from the trailing edge of the blade, forming an angle (relief angle) to reduce the contact area of the cutting edges.
- Because of the relief grind it is possible, with backlapping, to true a reel (make it round) if a blade is 0.025-0.051 mm (0.001-0.002 in.) too high.

Backlapping Cutting Unit

CAUTION: Avoid injury! Rotating blades are dangerous and can cut fingers and toes. Keep hands and feet away when greensmower is running.

Disengage greens tender conditioner (GTC) before backlapping.

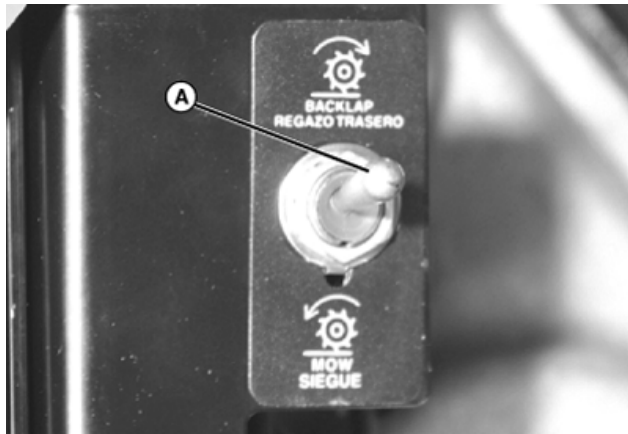
IMPORTANT: Avoid damage! Backlapping cutting units must be done by trained personnel as needed. Backlap intervals vary depending on conditions. Backlapping is done to prolong reel life, prevent downtime and provide a consistently sharp cutting action.

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

NOTE: To help maintain sharp edges required on cutting reels, bedknife to reel clearance must be checked before the backlapping function begins. The bedknife must be adjusted properly to ensure light, even contact over the length of the cutting blades.

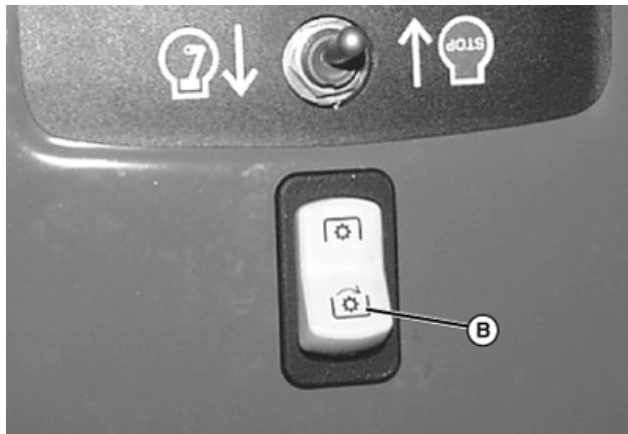
- Check bedknife to reel clearance on cutting reel. Adjust if necessary.
- Start engine and adjust throttle to a low or middle position.
- Lock park brake.

Service—Cutting Units



TCAL41568—UN—22JAN13

5. Place mow/backlap switch in the raised BACKLAP (A) position



TCAL41569—UN—22JAN13

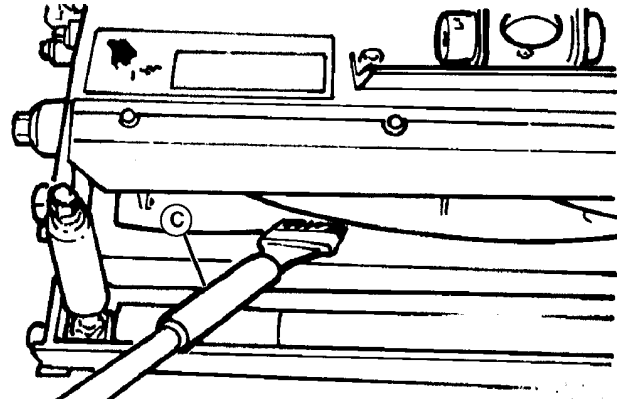
6. Press PTO switch to engaged (B) position to start reel rotation.

CAUTION: Avoid injury! Rotating blades are dangerous. Keep hands and feet away while greensmower is operating.

Use a brush with a long handle when performing backlapping procedure to keep fingers and hands from rotating blades.

NOTE: To stop reel rotation at any time during the backlap operation, place engine run/stop switch in STOP position, place PTO switch in disengaged position, place mow/backlap switch in MOW position, or lock the park brake.

If reel rotation is stopped by any action other than the PTO switch, it can be necessary to turn the PTO switch off, then on to resume reel rotation.



TCAL41570—UN—22JAN13

7. Using a long-handled brush (C), carefully apply an initial coarse grit reel sharpening compound, uniformly from one end of the cutting reel to the other. Repeat application in opposite direction. Allow cutting reel to continue running backwards until reel is quiet.

CAUTION: Avoid injury! Rotating blades are dangerous and can cut fingers and toes. Keep hands and feet away when greensmower is operating.

Do not attempt to disengage the cutting units using the reel speed control knob. If engine is running, reels can continue to rotate.

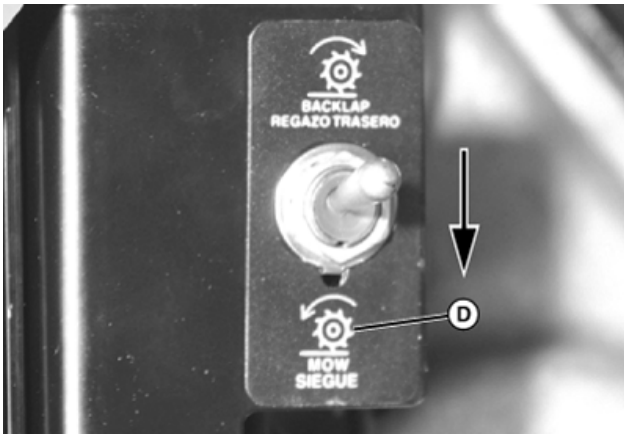
NOTE: Course compounds are used initially, followed by a fine "tournament grade" abrasive for final honing. Recommended grits for greens and tees are 120, 180, and 220.

8. Periodically disengage cutting units by pressing the PTO switch to the disengaged position. Turn the Run/Stop switch to the STOP position to shut down the machine. Visually check the blade appearance.
9. Check for uniform clearance across entire bedknife. If clearance is not uniform, repeat backlapping procedure until clearance is uniform across entire bedknife.
10. Repeat lapping process using progressively finer lapping compounds as required until the bedknife and reel are returned to a sharp condition.

IMPORTANT: Avoid damage! Do not operate cutting reels in the forward direction until reel sharpening compound is washed from the unit. Unless properly washed, the compound can dull the reels.

11. Use water to wash off all reel sharpening compound when cutting reels are turning in reverse.
12. Stop reel and shut down engine. Adjust reel to bedknife clearance.

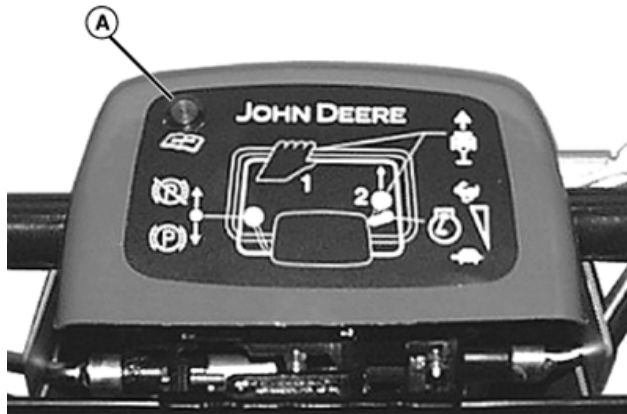
Service—Cutting Units



TCAL41571—UN—22JAN13

13. Place mow/backlap switch in the lowered MOW (D) position.

E-Cut™ Hybrid System Service



TCAL41572—UN—22JAN13

The E-Cut™ Hybrid System control unit is mounted to the machine frame under the belt cover. It monitors the status and control of the machine electrical system (including the cutting unit reel motor) whenever the engine is running. If certain conditions exist, the control unit can stop reel rotation. It does not control the machine engine. The control unit communicates diagnostic information to the operator through the diagnostic indicator light (A) on the handlebar cover.

The indicator light can flash a code number that appears as one or a series of pulses, followed by a short pause and another single or series of pulses.

IMPORTANT: Avoid damage! A displayed diagnostic code indicates that an abnormal condition or malfunction exists on the machine. Record the displayed code (or codes) before stopping the machine. Codes will not appear again after engine has been shut off. Diagnose and correct the condition before attempting further operation.

Multiple diagnostic codes can be identified and displayed on the indicator light. The code or codes repeat until the PTO switch is cycled (disengaged; then engaged) or the engine is shut off and started again. If a continuing condition exists, the diagnostic code or codes are displayed again when the engine is started until the original condition is corrected.

The control unit is configured to store any diagnostic code it has identified. Stored diagnostic codes can be accessed by your John Deere Service Technician using specialized service equipment.

Numerous operating conditions can occur that increase the load on the engine. The control unit can detect these increased loads, and displays a diagnostic code to notify the operator and protect the machine.

Operating conditions easily corrected by the operator include:

- Improper reel or frequency of clip (FOC) adjustments.

- Plugged reels.
- Lack of scheduled maintenance.
- Dirt or debris on control unit, alternator, or motor cooling fins.
- Loose alternator belt.

NOTE: Refer to E-Cut™ Hybrid System Diagnostic Codes in TROUBLESHOOTING section for complete Diagnostic Code information.

For more E-Cut™ Hybrid System Service information, see the Technical Manual for this machine or contact your John Deere Dealer.

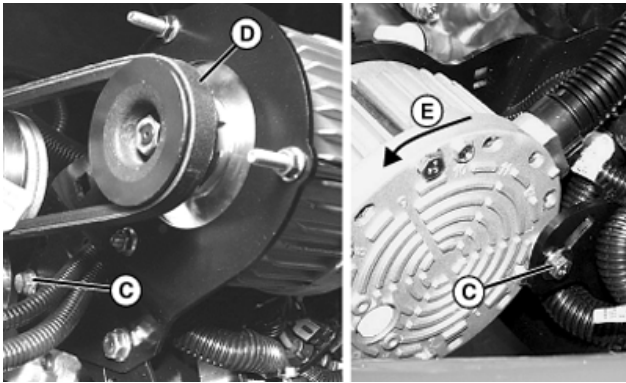
Service - Belts

Removing Belts



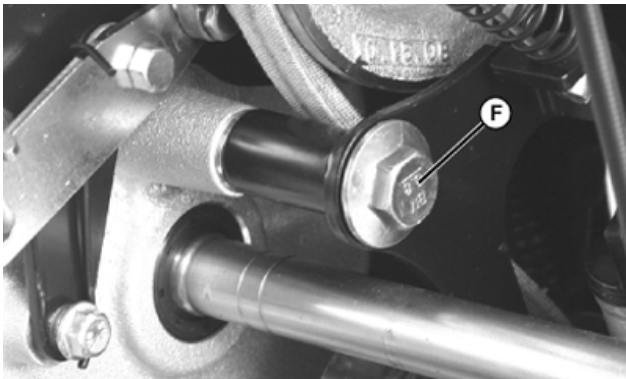
TCAL41573—UN—22JAN13

1. Loosen and remove three screws (A) and cover (B).



TCAL41574—UN—22JAN13

2. Loosen two hex bolts (C) on alternator brackets, relieve tension on alternator belt (D) and remove belt from alternator pulley.
3. Tilt alternator fully forward (E) in adjustment slots to provide clearance for drive belt removal.

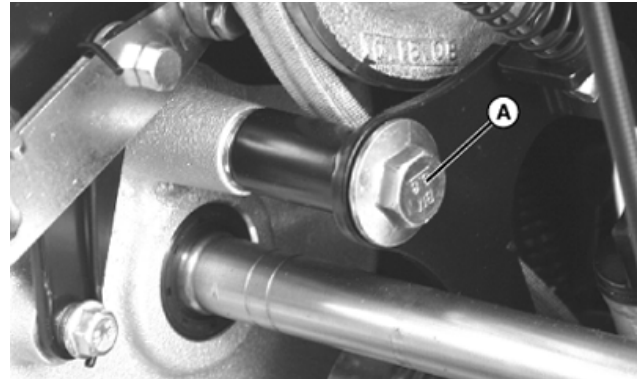


TCAL41575—UN—22JAN13

4. Loosen the travel clutch arm hex bolt (F).
5. Remove drive and alternator belts from machine.

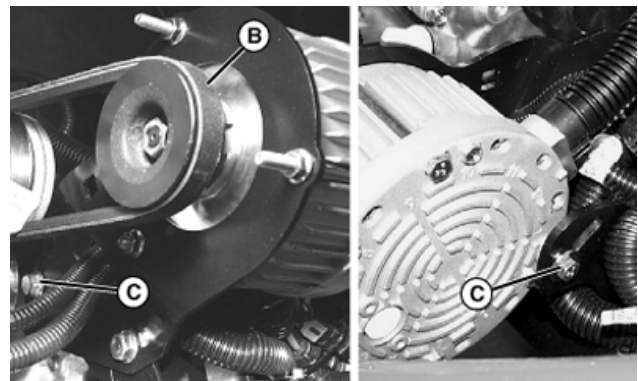
Installing Belts

1. Place alternator belt on engine pulley only.



TCAL41576—UN—22JAN13

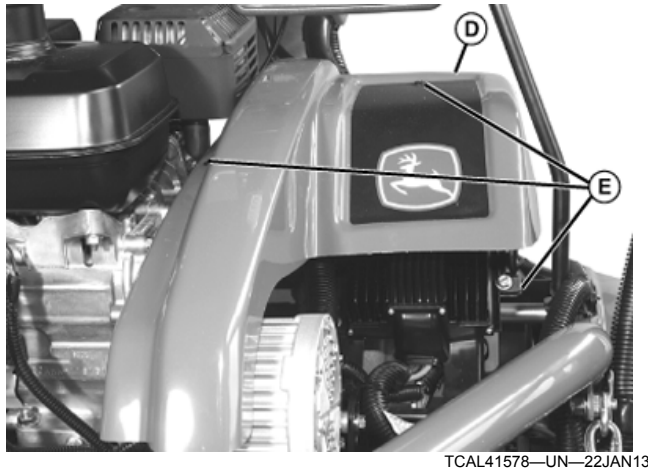
2. Loosen the travel clutch arm hex bolt (A) if not already done.
3. Install drive belt on transmission and engine pulleys.



TCAL41577—UN—22JAN13

4. Install alternator belt (B) on alternator pulley.
5. Adjust alternator belt tension and tighten two hex bolts (C).
6. Tighten travel clutch arm hex bolt (A).

Service - Belts



7. Install cover (D) and secure with three screws (E).

Drive Belt Tension Check and Adjustment

NOTE: Press PTO switch in the disengaged position for all checks and adjustments in this section.

When controls are properly adjusted, the machine will respond as follows:

- With engine stopped and clutch disengaged, machine should move freely.
- With engine stopped and travel clutch applied, traction roller should not move.
- With engine running and set at slow idle, brake released and travel clutch released, machine should not move.
- With engine running and set at slow idle, brake released, travel clutch lever engaged and holding machine by handlebars, transport wheels should spin on gravel or concrete surface.
- With engine running, brake released, and travel clutch applied, unit should propel itself up an incline.

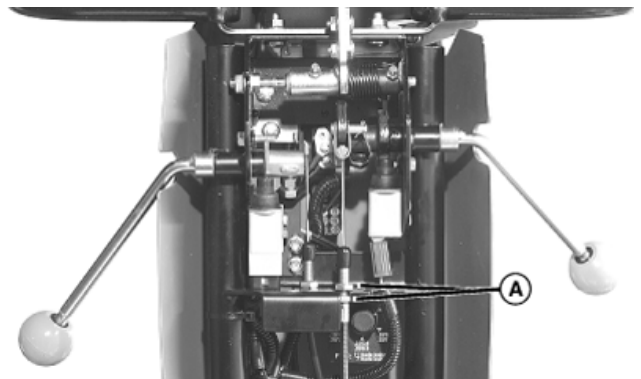
Check Procedure

1. Park machine on a level surface.
2. Move run/stop switch to STOP position.
3. Release travel clutch lever and park brake.
4. Pull the machine backward: transport wheels and roller should turn freely.
 - a. If roller and transport wheels turn freely, proceed to next step.
 - b. If roller and transport wheels do not turn, adjust belt tension and repeat step.
5. Move travel clutch lever to engaged position and pull the machine backward: transport wheels and roller should not turn.

- a. If transport wheels or roller turn, or if excessive force is required to engage clutch, adjust drive belt tension.
 - b. If transport wheels and roller do not turn, proceed to next step.
6. Release travel clutch lever. Start engine and run at slow idle. The machine should not move forward. If it does, adjust drive belt tension.
 - a. If machine moves forward, adjust drive belt tension.
 - b. If the machine does not move forward, proceed to the next step.
7. With engine running at slow idle, hold machine by the handlebars to prevent it from moving. Engage the travel clutch lever.
 - a. If transport wheels will not spin on gravel or concrete, belt adjustment is required.
 - b. If transport wheels spin on gravel or concrete, proceed to next step.
8. With engine running at slow idle, engage the travel clutch lever to begin forward travel. Release the operator presence bail.
 - a. If forward travel stops, belt is properly adjusted.
 - b. If forward travel does not stop, see Adjusting Operator Presence Bail in this section or your John Deere Dealer.

Adjustment Procedure

1. Park machine on a level surface.
2. Move run/stop switch to stop position.
3. Release travel clutch lever.



4. Loosen upper cable jam nuts (A) and lengthen (decrease belt tension) or shorten (increase belt tension) ferrule length to change belt tension.
 5. Tighten jam nuts to specification.

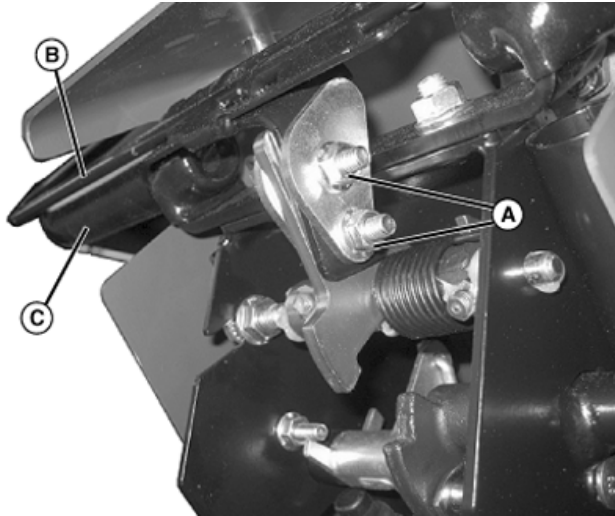
Specification

Jam Nuts — Torque. 11 N·m (96 lb.-in.)

Service - Belts

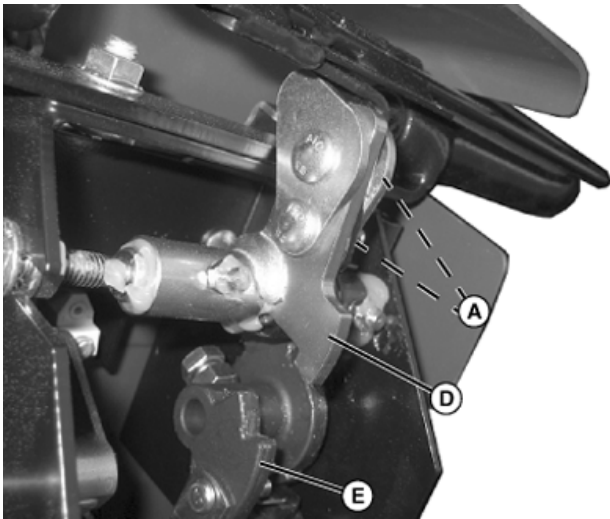
6. Repeat check procedure. (See Check Procedure.) If additional adjustment is required, repeat previous steps. If proper adjustment cannot be obtained, reference the Technical Manual for additional service information.

Adjusting Operator Presence Bail



TCAL41580—UN—22JAN13

1. Loosen two nuts (A).
2. Press and hold the bail (B) against the loop handlebar (C).



TCAL41581—UN—22JAN13

3. Rotate the engagement arm (D) upward as far as possible.
4. Tighten two nuts (A).
5. Check bail for proper operation:
 - a. When bail is released, the engagement arm (D) must return and fully engage travel clutch lever

linkage (E) and the travel clutch lever must return to the released position.

- b. With the engine running, PTO on and travel clutch lever engaged, the machine forward travel and reel rotation must stop when the bail is released.

If release of the bail does not result in the operations listed above, do not operate the machine until further diagnosis and corrective actions are taken. (See Drive Belt Tension Check and Adjustment in this section, Lubricating Drive Control Linkage in the SERVICE LUBRICATION section or your John Deere Dealer.)

Troubleshooting

Using Troubleshooting Chart

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

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

Engine

IF	CHECK
Engine Will Not Start Or Is Hard To Start.	Run/Off Switch in off position. Fuel shutoff valve closed (OFF). Improper fuel / fuel level. Stale fuel. Plugged fuel filter or fuel filter screen. Plugged air intake filter. Spark plug wire is loose or disconnected. Spark plug not gapped correctly. Choke not functioning - See your John Deere Dealer.
Engine Will Not Slow Idle.	Carburetor problems - See your John Deere Dealer.
Engine Runs Rough.	Fuel shutoff valve partially closed. Plugged fuel filter or fuel filter screen. Plugged air intake filter. Fuel cap vent dirty. Stale or improper fuel / fuel level. Spark plug not gapped correctly. Replace spark plug. Choke not functioning - See your John Deere Dealer. Carburetor problems - See your John Deere Dealer.
Engine Overheats.	Clean cooling fins. Low oil level. Plugged air intake filter.
Engine Knocks.	Reduce load. Fuel is bad. Fill tank with fresh fuel, correct octane. Operate engine at FAST idle. Low oil level.
Engine Lacks Power.	Reduce load. Plugged air intake filter. Plugged fuel filter or fuel filter screen. Drain and fill tank with correct fuel. Clean cooling fins to help prevent overheating. Spark plug. Clean spark arrestor. Throttle lever travel.
Engine Uses Too Much Oil.	Find and correct oil leaks. Incorrect engine oil. Plugged air intake filter. Worn rings.
Engine Backfires Through Muffler.	Carburetor problems - See your John Deere Dealer.

Mower

IF	CHECK
Poor Cutting.	FOC not set correctly for cutting height and turf conditions. Bedknife to reel out of adjustment. Bedknife and/or reel dull. Bedknife and/or reel grooved, ribbed, or rifled due to contact between bedknife and reel. Limit chains adjusted too tight preventing cutting unit float and contour following. Grass too tall.
Mows Unevenly.	Grass too tall. Check grass type and grass grain. Height of cut not properly set. Front roller and/or drive roller not parallel to bedknife.

Troubleshooting

IF	CHECK
Mower Does Not Move.	Drive belt out of adjustment or broken. Roller chain broken.
Reel Motor Does Not Engage.	PTO switch off or Mow/Backlap switch set to BACKLAP position. Adjust cables. Switch on clutch lever out of adjustment. See your John Deere Dealer. Insufficient engine low idle speed. Broken or shorted wiring. Record fault code and perform troubleshooting.
Reel Will Not Rotate.	Bedknife adjusted tight against reel. Reel plugged with debris or object preventing rotation. Broken belt in reel drive housing.
Reel Squeals During Mowing.	Bedknife adjusted tight against reel.
Grass Clippings Remain On Green.	Grass catcher basket or support bracket incorrectly installed. Reel shield clips not secured to bedknife support. Adjust reel shield. Install shield extension in dry turf conditions.
Marking Grass on Turns.	Excess play in limit chains. Incorrect rear roller clamps.

E-Cut Hybrid System Diagnostic Codes

If	Check
Code 1-5 (One pulse followed by a short pause followed by five pulses.) Indicates motor failed to start.	Jammed reels. Tight reel to bedknife clearance. Failed bearings.
Code 1-6 (One pulse followed by a short pause followed by six pulses.) Indicates motor stalled while running.	Jammed reels. Bedknife to reel adjusted too tight. Failed bearings.
Code 1-7 or 1-8 (One pulse followed by a short pause followed by seven or eight pulses.) Indicates low alternator voltage.	Engine RPM too low. Low or no voltage output from alternator. Poor connections on alternator or alternator harness. Alternator belt slippage. Alternator malfunction. Excessive reel load from items mentioned in Code 1-6.
Code 1-10 (One pulse followed by a short pause followed by ten pulses.) Indicates reel direction reversed for 1/4 turn of motor.	Jammed reel. Jammed or Failed Greens Tender Conditioner or Rotary Brush. Damaged bedknife or reel.
Code 2-5 or 2-8 (Two pulses followed by a short pause followed by five, six or eight pulses.) Indicates motor current over the limit, due to excessive load or jammed reel.	Jammed Reel. Bedknife to reel adjusted too tight. Failed bearings.
Code 2-9 (Two pulses followed by a short pause followed by nine pulses.) Indicates Internal controller temperature resulted in controller shutting down motor.	Tight reel to bedknife clearance. Bedknife to reel adjusted too tight. Overheated controller. Controller cooling fins plugged with debris. Heavy load on motor.
Code 2-10 (Two pulses followed by a short pause followed by ten pulses.) Indicates Internal motor temperature resulted in controller shutting down motor.	Disconnected connectors. Reel motor wires are damaged. Cutting unit not turning freely. Dull reel and bedknife. Heavy load on reel motor.
Code 6-4 (Six pulses followed by a short pause followed by four pulses.) Indicates motor position sensor error at start.	Disconnected connectors. Damaged or broken wires.
Code 6-6 (Six pulses followed by a short pause followed by Six pulses.) Indicates motor position sensor error while running.	Overheated reel motor. Cutting reel jammed by debris. Reel drive system not turning freely. Tight reel to bedknife clearance. Disconnected connectors. Dull reel and bedknife. Jammed or failed attachment. Broken or damaged wires between motor and controller.
Code 7-2 (Seven pulses followed by a short pause followed by two pulses.) Indicates phase short to ground.	Debris in connectors. Wires from controller to motor shorted. Internal short in motor. Internal short in controller.

Troubleshooting

If	Check
Code 7-3 (Seven pulses followed by a short pause followed by three pulses.) Indicates high current to motor.	Broken or damaged wires between motor and controller. Contaminated connections between motor and controller.
Code 7-4 (Seven pulses followed by a short pause followed by four pulses.) Indicates open high-amperage wire between motor and controller.	Broken or damaged wires between motor and controller. Open connector between motor and controller.
Code 7-5 (Seven pulses followed by a short pause followed by five pulses.) Indicates frequency of cut potentiometer speed control voltage is low.	Poor connection between the controller and speed control potentiometer. Damaged wires between controller and speed controller potentiometer. Potentiometer malfunction.
Code 8-1 (Eight pulses followed by a short pause followed by one pulse.) Indicates internal alternator temperature resulting in shutting down motor.	Disconnected wiring connectors. Broken or damaged wires between alternator and controller. Poor connection on 48-volt power or ground connections. Cutting unit not turning freely. Dull reel and bedknife. Excessive load on reel motor.
Code 8-2 (Eight pulses followed by a short pause followed by two pulses.) Indicates failure to hold frequency of clip due to excessive load or jammed reel.	Cutting unit jammed with debris. Cutting unit not turning freely. Tight reel to bedknife clearance. Dull reel and bedknife. Jammed or failed attachment.
Code 8-3 (Eight pulses followed by a short pause followed by three pulses.) Indicates alternator speed sensor error resulting in shutting down motor.	Disconnected wiring connectors. Broken or damaged wires between alternator and controller.
Code 8-4 (Eight pulses followed by a short pause followed by four pulses.) Indicates Incorrect controller for this machine.	Wrong controller on machine. Need to replace with proper controller for model of machine.
Code 9-2 (Nine pulses followed by a short pause followed by two pulses.) Indicates alternator output too high.	Alternator internal regulator. Alternator over speed.
Code 9-3 (Nine pulses followed by a short pause followed by three pulses.) Internal controller failure.	Call John Deere Dealer.
Code 9-5 (Nine pulses followed by a short pause followed by five pulses.) Indicates signal wires shorted to external power line or ground.	Broken or damage wires between motor and controller. Signal wires shorted to ground. Contaminated connector.
Code 9-7 (Nine pulses followed by a short pause followed by seven pulses.) Indicates supply voltage from controller to frequency of clip (FOC) speed control potentiometer voltage is low.	Poor connection between the controller and speed control potentiometer. Damaged wires between controller and speed controller potentiometer. Shorted ground on speed controller potentiometer. Potentiometer malfunction.

Storage

Storing Safety

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

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

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

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. Wash the machine with low pressure water and apply wax to metal and plastic surfaces.
5. Run machine for five minutes to dry belts and pulleys.
6. Apply light coat of engine oil to pivot and wear points to prevent rust.
7. Lubricate grease points.
8. Check tire pressure.

Preparing Fuel and Engine For Storage

Fuel Usage with Stabilizers or Conditioners.

1. Park machine safely in a well-ventilated area. (See Parking Safely in the SAFETY section.)

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

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

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

2. Mix fresh fuel and fuel stabilizer in separate container. Follow stabilizer label instructions for mixing.
3. Fill fuel tank with stabilized fuel.
4. Run engine for a few minutes to allow fuel mixture to circulate through carburetor.
5. Turn run/stop switch to STOP position.

Fuel Usage without Stabilizers or Conditioners.

IMPORTANT: Avoid damage! Stale fuel can produce varnish and plug carburetor components affecting engine components.

- The use of a fuel stabilizer or conditioner is recommended for this machine.

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

1. Park machine safely in a well-ventilated area. (See Parking Safely in the SAFETY section.)
2. Turn on engine and allow to run until it runs out of fuel.
3. Turn run/stop switch to STOP position.

Engine:

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

1. Change engine oil while engine is warm.
2. Service air filter if necessary.
3. On gas engines:
 - a. Remove spark plugs. Put 30 mL (1 oz.) of clean engine oil in cylinders.
 - b. Install spark plugs, but do not connect spark plug wires.
 - c. Crank the engine 5 or 6 times to allow oil to be distributed.
4. Clean the engine and engine compartment.
5. Close fuel shutoff valve, if your machine is equipped.

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

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

Removing Machine From Storage

1. Check tire pressure.
2. Check engine oil level.

Storage

3. Check spark plug gap . Install and tighten plug to specified torque.

Specification

Spark Plug — Gap 0.7-0.8 mm (0.028-0.031 in.)

Specification

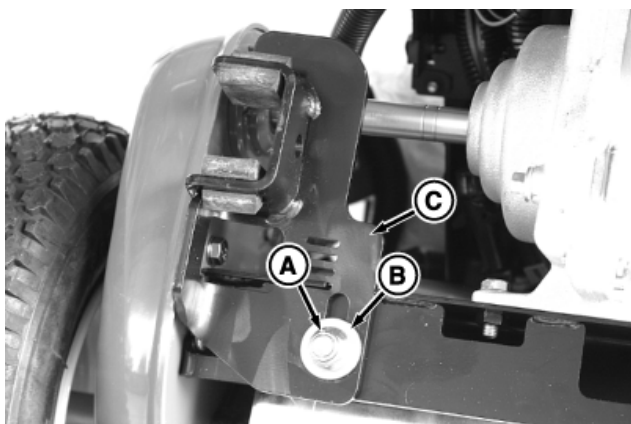
Spark Plug — Torque. 18 N·m (13 lb-ft)

4. Lubricate all grease points.
5. Open fuel shut-off valve, if your machine is equipped.
6. Be sure all shields and guards or deflectors are in place.

Assembly

Attach Handlebar

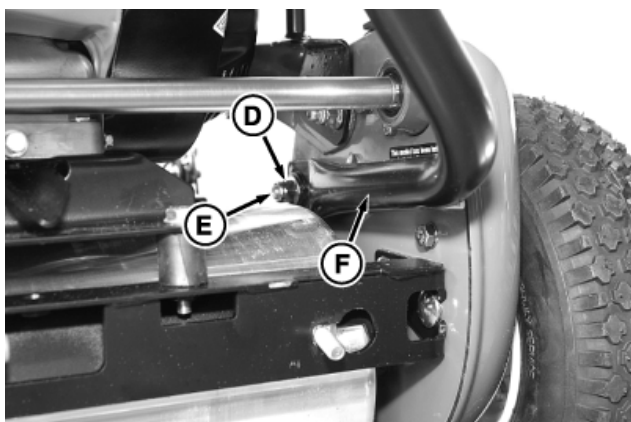
NOTE: If Lighting Kit (optional equipment) is to be added to machine, installation prior to handlebar attachment will ease assembly.



TCT008687—UN—14SEP13

1. Remove locking hex nuts (A) and washers (B) securing left and right handlebar height adjustment brackets (C) to machine frame.
2. Remove left and right handlebar brackets.

NOTE: Loosening the right side handlebar pivot bolt in the machine frame will ease handlebar installation.

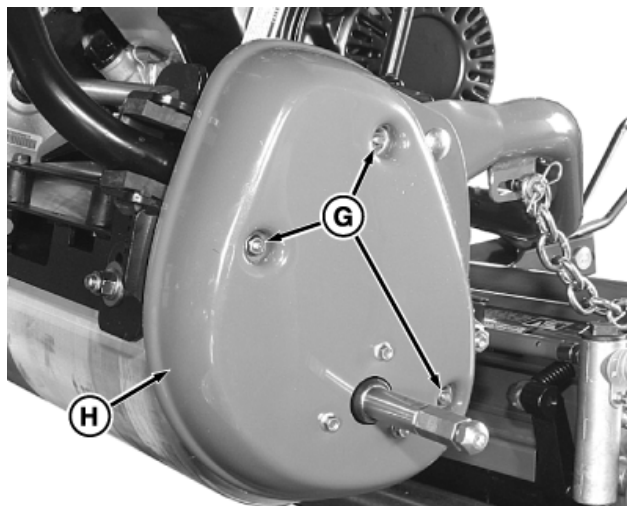


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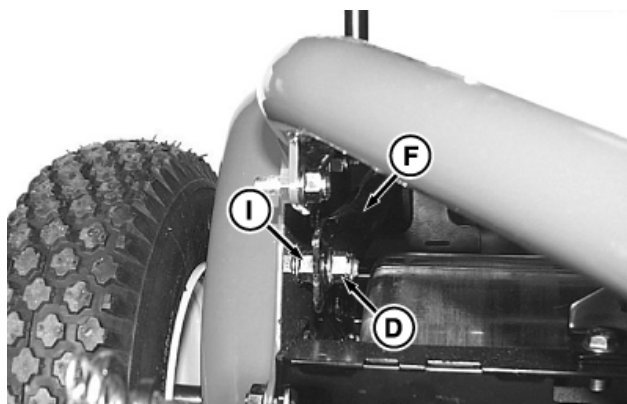
View from rear of machine.

3. Remove locknuts (D) if installed to handlebar pivot bolts (E).
4. Assemble handlebar (F) onto left and then right side pivot bolts (E). If necessary, loosen pivot bolt in right

side frame to install handlebar to bolt.



TCT008689—UN—14SEP13



TCT008690—UN—14SEP13

View from front of machine.

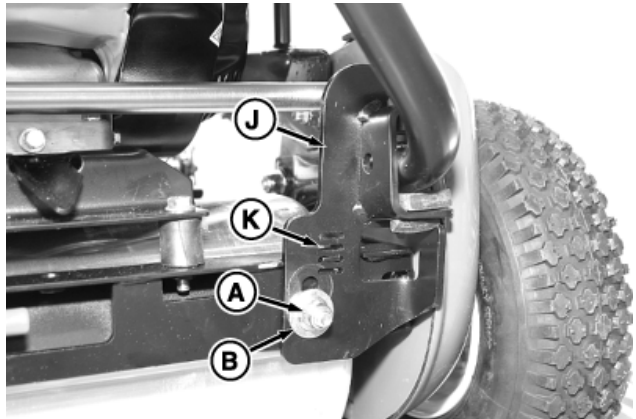
- a. Remove right transport wheel. Remove three flanged hex nuts (G) securing side cover (H) to right side frame.
- b. Remove side cover for access to handlebar pivot bolt.
- c. Loosen locknut (I) on pivot bolt. Install handlebar (F) over bolt and tighten locknut (I) against side plate securely.
- d. Install side cover (H) and secure with three flange hex nuts (G).
- e. Install right transport wheel.

NOTE: Do not over tighten locknuts into handlebar. The handlebar needs to move freely.

5. Install locknuts (D) to pivot bolts on left and right sides to secure handlebar to machine. Tighten locknuts as required to eliminate play, but ensure that handlebar pivots freely on bolts.

Assembly

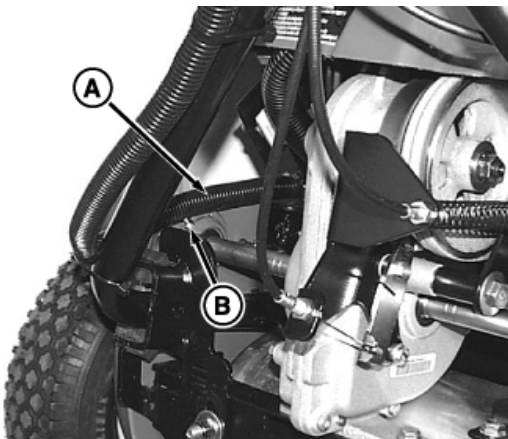
NOTE: Before tightening fasteners in the following step, ensure that the height adjustment brackets (J) are positioned straight up and down (not at an angle) and that the frame tabs (K) engage the same height adjustment slot on each side of the machine.



TCT008691—UN—14SEP13

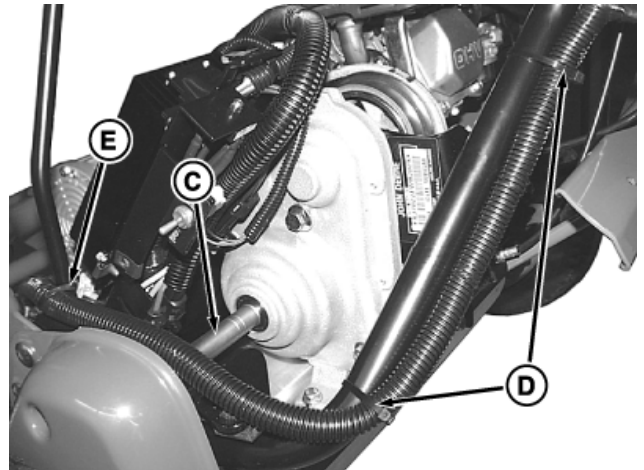
6. Install left and right handlebar height adjustment brackets to machine rear frame at desired height. Ensure that the height adjustment brackets (J) are straight up and down and that the frame tabs (K) are engaged in same slot in left and right brackets. Secure brackets to frame with locknuts (A) and washers (B). Tighten fasteners securely.

Connect Wiring Harness



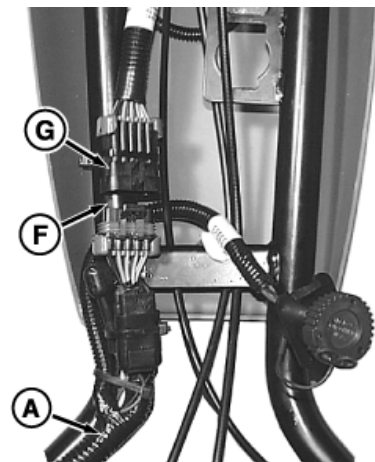
TCT008692—UN—14SEP13

1. After installing handlebar assembly to machine, route main harness (A) above drive shaft and over grease fitting (B) on left side of machine.



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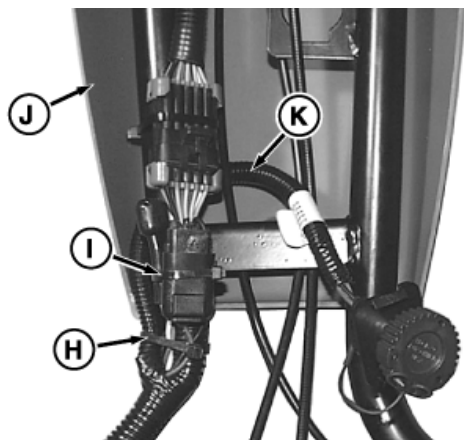
2. Route main harness up left handlebar tube. Ensure that it does not contact the left drive shaft (C) and secure with two tie straps (D). If a light kit has been added, ensure that a tie strap (E) has been added to the harness at the light bar.



TCT008694—UN—14SEP13

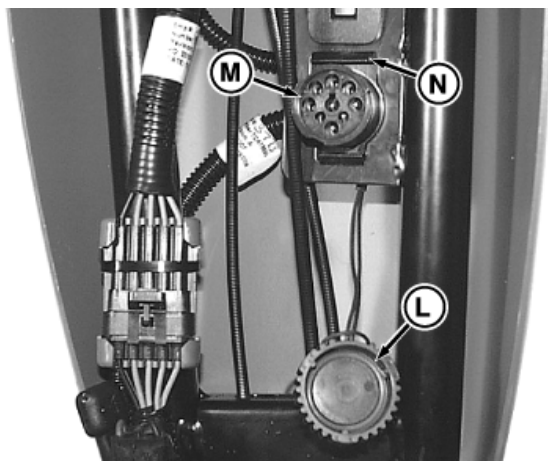
3. Extend machine wiring harness (A) up handlebar to connection points under handlebar cover. Apply dielectric grease to terminals (F) in main harness connector and plug into mating connector (G). Ensure that connector lock tab is fully seated.

Assembly



TCT008695—UN—14SEP13

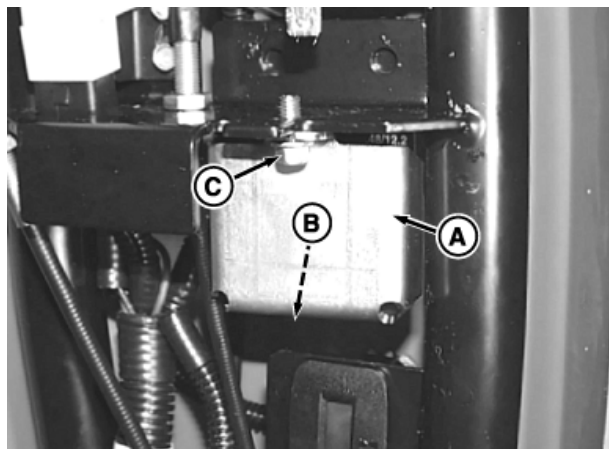
4. Install tie strap to harness (H) and connector bundle (I).
5. Loosen two screws on front of handlebar cover (J). Route diagnostic connector harness (K) between handlebar and cover as shown. Tighten two handlebar cover screws.



TCT008696—UN—14SEP13

6. Remove dust cap (L) from diagnostic connector (M). Install diagnostic connector (M) in handlebar frame bracket. Ensure that larger locking tab (N) on connector is indexed to the top and both tabs are firmly seated in bracket. Install dust cap (L) on connector, turning firmly clockwise to lock in position.

Install Frequency of Clip (FOC) Control Cover



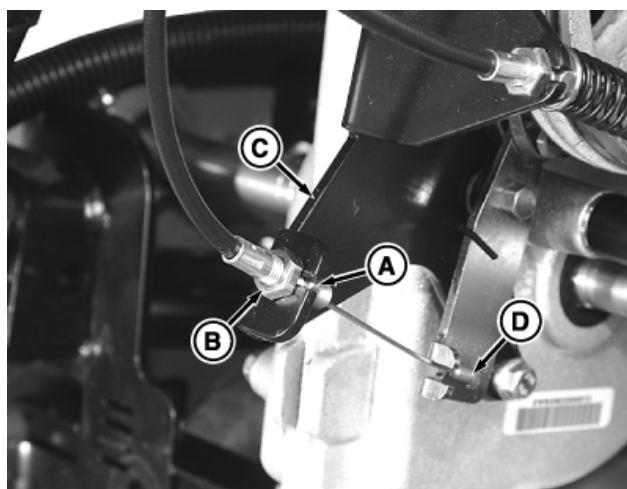
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Install cover (A) over FOC control on rear of handlebar. Engage tab on bracket below control knob with slot (B) in bottom of cover and secure with 6 mm screw (C).

Install Control Cables

Install Park Brake Cable

1. The park brake cable is assembled to the handlebar.



TCT008698—UN—14SEP13

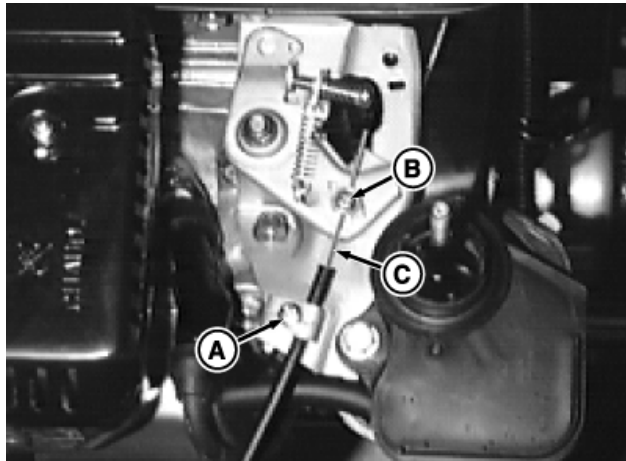
2. Loosen the outer nut completely (A) from the threaded end of the cable ferrule.
3. Rotate jam nut (B) until it bottoms against the threads on the ferrule body.
4. Insert the cable through the anchor bracket (C) and attach the cable end to the brake arm (D).
5. Hold the cable end jam nut (B) against the bracket (C) and tighten outer nut (A).
6. Check operation of park brake (see Testing Park Brake, in Operating section).

Assembly

7. Adjust park brake cable tension (if required) on the upper cable ferrule (see Adjusting Brake in this section).

Install Throttle Cable

1. The throttle cable is assembled to the handlebar.
2. On handlebar console, move throttle lever to the slow position.
3. Remove the air cleaner assembly.

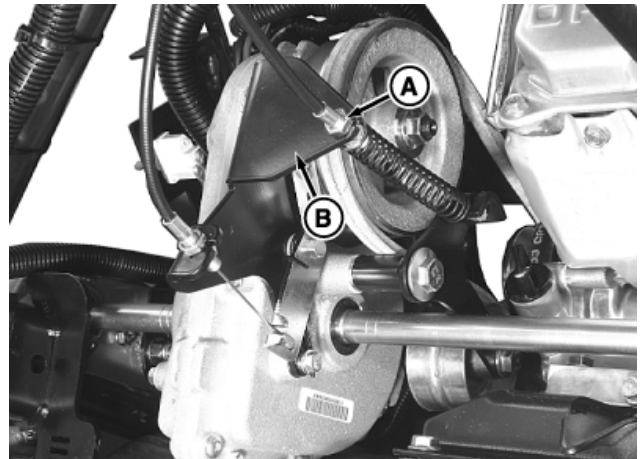


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4. Loosen screws (A and B) on carburetor.
5. Route throttle cable (C) under bracket and screw (A) and through swivel and screw (B).
6. Tighten screws (A and B).
7. Move the throttle lever on the handlebar to ensure full movement at the carburetor.
8. Install the air cleaner assembly.

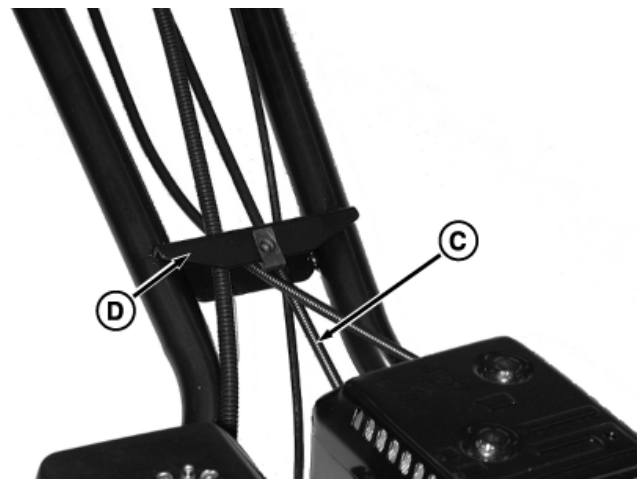
Install Travel Clutch Cable

1. Assemble the travel clutch cable to the machine base.



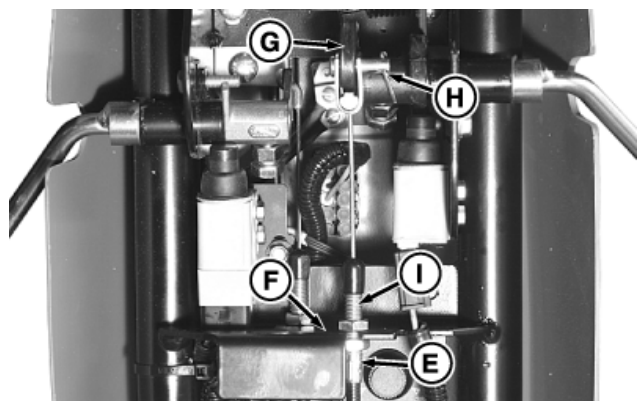
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2. Ensure that the rear nut (A) on the bottom cable ferrule is threaded against the base of the ferrule.



TCT008701—UN—14SEP13

3. Run the cable (C) through the slotted hole in the lower handlebar bracket (D).



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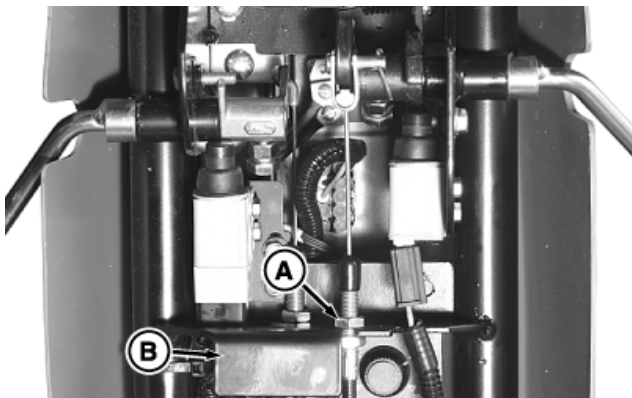
4. Insert the cable (E) through the anchor bracket (F) and attach the cable end to the throttle lever assembly (G) with a pin and cotter pin (H).

Assembly

5. Adjust the cable upper ferrule position (I) to a point just short of deflection in lower cable bracket (B) with the travel lever fully engaged.
6. Check operation of travel clutch lever (see Drive Belt Tension Check and Adjustment in this section).

Adjusting Brake

1. Check operation of park brake (see Testing Park Brake, in Operating section).



TCT008703—UN—14SEP13

2. If adjustment is needed do the following:
 - a. Loosen jam nut (A) holding brake cable in the handlebar bracket (B).
 - b. Shorten ferrule length on cable side of ferrule.
 - c. Tighten jam nut (A).
 - d. Repeat step 1.
 - e. If proper operation cannot be obtained, additional adjustment can be made at the lower cable ferrule.

Drive Belt Tension Check and Adjustment

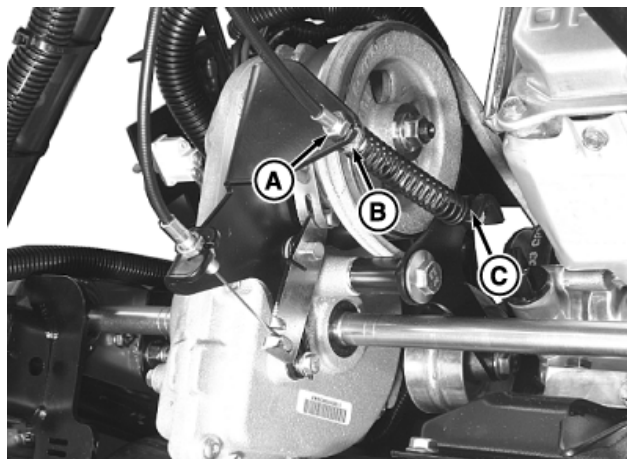
- When properly adjusted, with engine stopped and travel clutch lever disengaged, the machine should move freely. With travel clutch lever applied, the traction roller should not move.
- When properly adjusted, with engine running and set at low idle, park brake released and travel clutch lever disengaged, machine should not move.
- With engine running and set at low idle, park brake released, travel clutch lever applied and holding machine by handlebars, transport wheels should spin on gravel or concrete surface.
- With engine running, park brake released, travel clutch lever applied, unit should propel itself up an incline.

Check Procedure

1. Park machine on a level surface.
2. Move run/stop switch to stop position.
3. Move travel clutch lever to released position.
4. Pull the machine backward: transport wheels and roller should turn freely.
 - If transport wheels and roller turn freely, proceed to next step.
 - If transport wheels or roller do not turn, adjust belt tension.
5. Move travel clutch lever to applied position.
6. Pull the machine backward: transport wheels and roller should not turn.
 - If transport wheels or roller turn, or excessive force is required to engage clutch, adjust belt tension.
 - If transport wheels and roller do not turn, proceed to next step.
7. Move travel clutch lever to released position.
8. Ensure PTO switch is in the disengaged position. Start engine and run at low idle. The machine should not move forward. If it does, adjust belt tension.
9. With engine running at low idle, hold machine by the handlebars to prevent it from moving. Release the brake and engage the clutch.
 - If transport wheels spin on gravel or concrete, belt is properly adjusted.
 - If transport wheels will not spin on gravel or concrete, belt adjustment is required.

Adjustment Procedure

1. Park machine on a level surface.
2. Move run/stop switch to stop position.
3. Move travel clutch lever to released position.



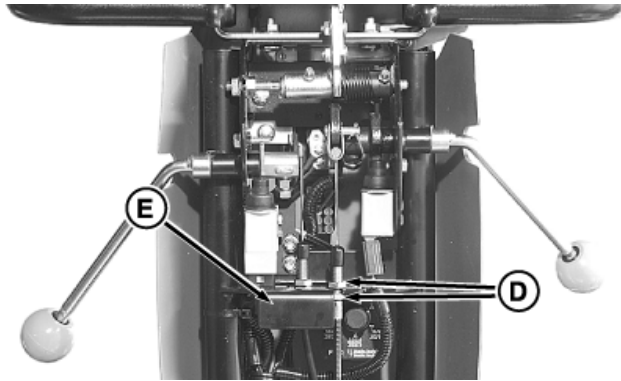
TCT008704—UN—14SEP13

Assembly

- Loosen bottom nut (A) on the travel clutch cable. Insert the cable through the rear of the bracket, install the front nut (B) and tighten to specification. Install the free end of the cable in the clutch pulley bellcrank (C).

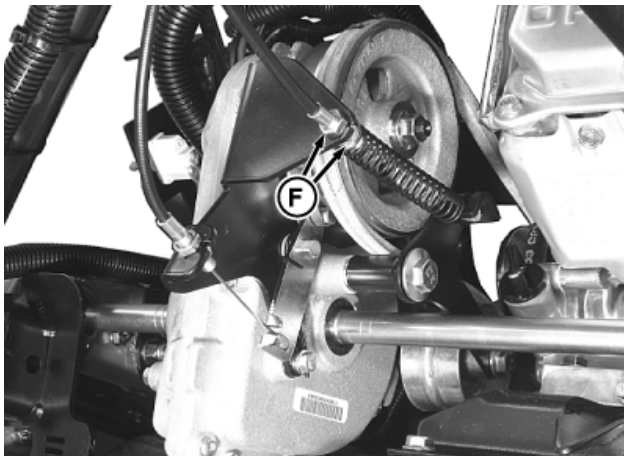
Specification

Travel Clutch Cable Nut — Torque 11 N·m (96 lb.-in.)



TCT008705—UN—14SEP13

- Adjust the upper cable anchor (D) to a point just short of deflection in cable bracket (E) with the travel lever fully engaged.
- If the adjustment is excessively tight, the clutch may randomly disengage while mowing. Release the cable tension by two turns of the cable ferrule and tighten the jam nuts to correct.
- Repeat check procedure.
- If adjusting upper cable is not adequate, proceed to next step.
- If adjusting upper cable is not adequate, center jam nuts (D) on upper cable ferrule.



TCT008706—UN—14SEP13

- Loosen nuts (F) on lower end of cable.
- Lengthen (decrease belt tension) or shorten (increase belt tension) ferrule length to change belt idler tension.

- Tighten nuts to specification.

Specification

Belt Idler Tension Nuts — Torque 11 N·m (96 lb.-in.)

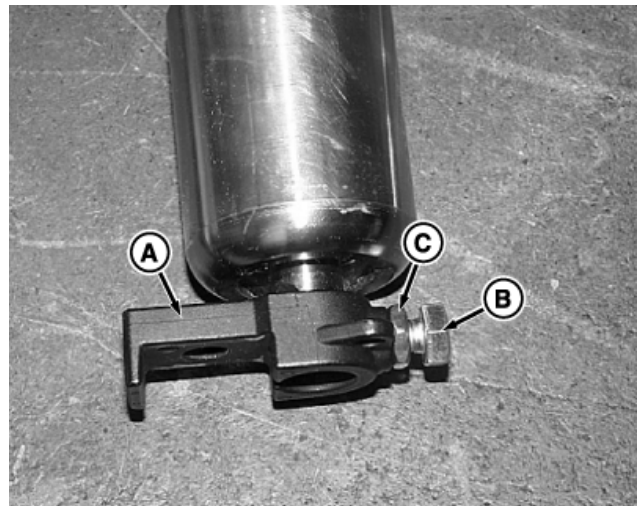
- Repeat check procedure and readjust as necessary.

Prepare Cutting Unit

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

Install Front Roller

NOTE: Front roller brackets are offset. For standard use, the bracket should be installed to the roller with the offset to the rear of the base cutting unit to allow close proximity of front roller to rear roller. If GTC or Rotary Brush will be installed, offset should be to the front to allow the GTC or Rotary Brush to be installed behind the front roller.



TCT008707—UN—14SEP13

- Install roller brackets (A) onto each bearing spindle shaft end.
- Install set screws (B) and locknuts (C) loosely. Do not tighten.

NOTE: Make sure the roller bracket set screw locations are not aligned with the holes in each bearing spindle shaft end. Set screws must engage the bearing spindle shaft at each end.

- Install roller with eccentric adjuster and hex head bolt on each side. Center front roller. Tighten set screws (B) and nuts (C) on both roller brackets.
- Tighten roller bracket attaching hardware.
- Adjust front roller for parallelism.

Assembly

6. Tighten eccentric to specification.

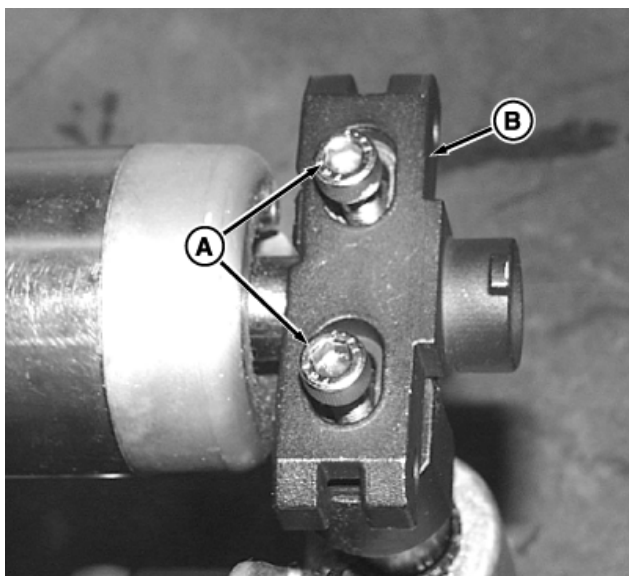
Specification

Roller Eccentric — Torque81 N·m (60 lb.-ft.)

Prepare Rear Roller

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

NOTE: The 180 E-Cut Hybrid and 220 E-Cut Hybrid use unique clamps (item C in the pictures that follow) to retain the rear roller to the cutting unit. This type of clamp must be used on any QA5 cutting unit attached to these machine.



TCT008708—UN—14SEP13

1. Place cutting unit on a flat surface or workbench with bottom surface pointing up. Remove hex socket head bolts (A) and rear roller clamp (B). Repeat on other side. Removed clamps can be discarded.
2. Install rounded clamp (C) (from bag of parts) with two M6 hex socket head bolts (D). Repeat on opposite side.
3. Center roller between clamps and torque four M6 bolts to specification.

Specification

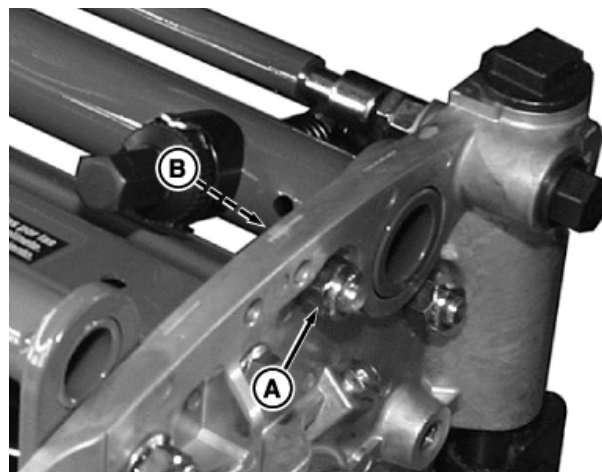
Rear Roller Clamp Bolts — Torque19 N·m (14 lb.-ft.)

NOTE: If an optional Greens Tender Conditioner or Rotary Brush is to be installed on this cutting unit, install it now (see Installation Instructions with GTC or Rotary Brush Kit).

Assemble Cutting Unit Mounting Hardware

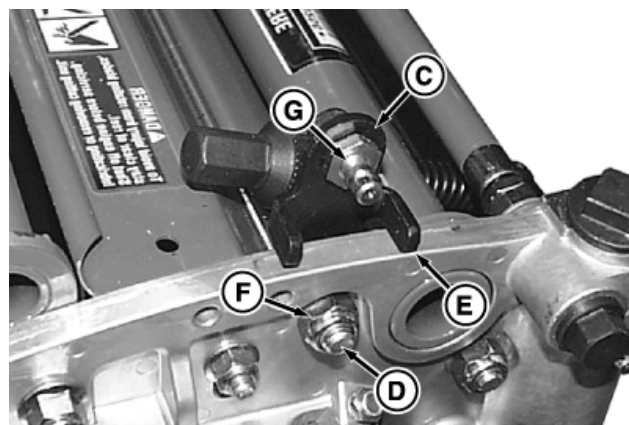
CAUTION: Avoid injury! Blades are sharp. Always wear gloves when handling blades or working near blades.

1. Position cutting unit upright.



TCT008710—UN—14SEP13

2. Remove lock nut (A) and discard carriage bolt (B) from both sides of cutting unit.



TCT008711—UN—14SEP13

3. Install limit chain anchor plate (C) on housing with replacement M10X30 carriage head bolt (D). Rotate anchor so tab facing rear of cutting unit rests against top of housing (E). Secure anchor with original locknut (F). Repeat on opposite side.
4. Install lower chain limit anchor pin (G) in anchor plate (C). Rotate anchor pin to provide 90° angle between chain pull direction and spring clip hole and secure with M8 locknut. Torque locknut to specification. Repeat for opposite side.

Specification

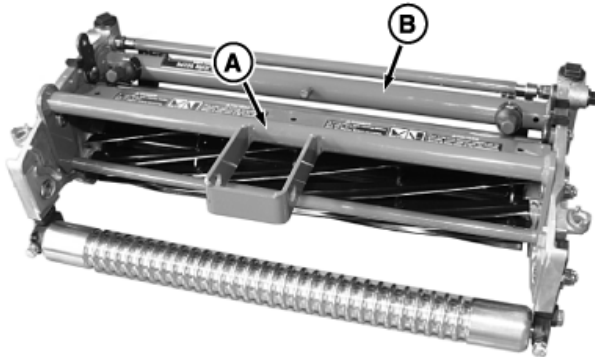
Limit Chain Anchor Plate Locknut

— Torque34 N·m (25 lb.-ft.)

Assembly

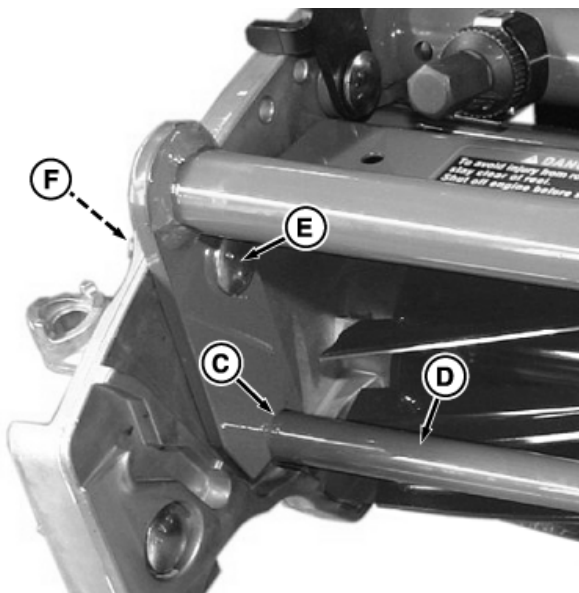
Install Lift Yoke

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



TCT008712—UN—14SEP13

1. Position the lift yoke (A) on the front of the cutting unit (B) as shown.



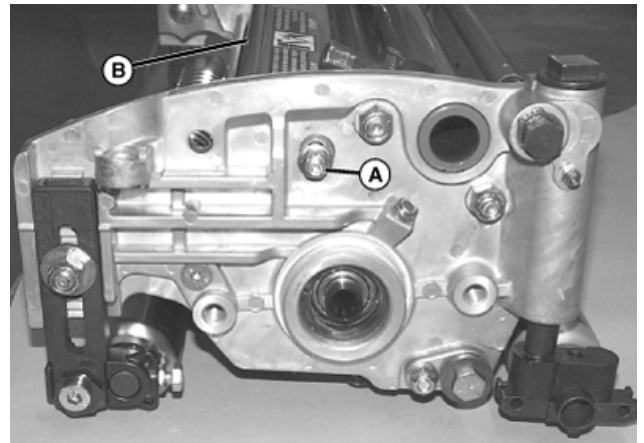
TCT008713—UN—14SEP13

Right side shown for detail.

2. Ensure that notches (C) in the bottom of left and right yoke flanges engage the frame rod (D) and install a M10X35 carriage bolt (E) through each flange and frame end housing. Secure each bolt with a M10 lock nut (F).

Adjusting Cutting Unit Shield

NOTE: Keeping the shield close to the cutting blades improves the performance of the grass catcher in most conditions.



TCAL41530—UN—22JAN13

1. Loosen two bolts (A) and locknuts on each side of cutting unit.



TCAL41531—UN—22JAN13

2. Raise or lower shield (B) to adjust clearance (C) between bottom of shield and the top of cutting blades per specification.

Specification

Shield to Cutting Blade — Clearance 1.5 mm (0.06 in.)

3. Tighten bolts.

Adjusting Bedknife to Reel (QA5)

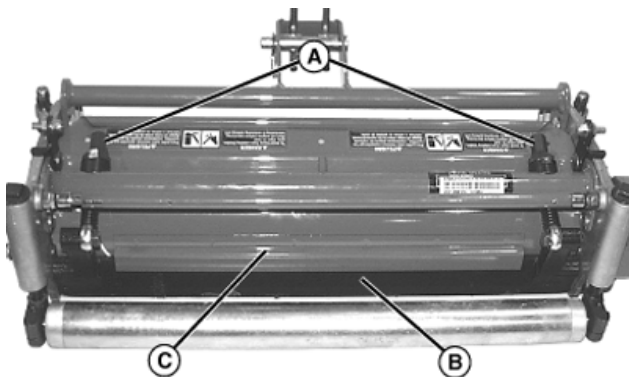
CAUTION: Avoid injury! Blades are sharp. Always wear gloves when handling blades or working near blades.

IMPORTANT: Avoid damage! Adjust bedknife to reel by lowering and raising the bedknife evenly.

Do not adjust more than one flat on the adjuster nut at a time, alternating side to side.

NOTE: Stand cutting unit upright on workbench.

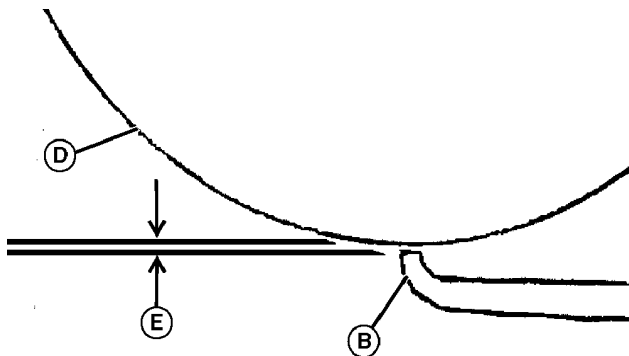
Assembly



TCAL41534—UN—22JAN13

1. Turn bedknife tower adjuster (A) on both sides of cutting unit counterclockwise until bedknife (B) is tight against cutting unit (C).
2. Slowly tighten tower adjuster (A) clockwise, alternating from side to side until bedknife begins to pull away from the cutting reel. Cutting reel should rotate freely.

NOTE: Make sure that the final adjustment to the bedknife is pulling the bedknife away from the cutting reel.



TCAL41535—UN—22JAN13

3. Alternately turn adjusters (A) no more than one flat at a time until bedknife (B) to reel (D) clearance (E) measures the specified clearance.

Specification

Bedknife to Reel

— Clearance 0.025—0.050 mm (0.001—0.002 in.)

4. Check the bedknife to reel clearance (E). Adjust again if necessary.

Adjusting Front Roller Parallel with Bedknife (QA5)

CAUTION: Avoid injury! Blades are sharp and rotate quickly:

Keeps hands and feet away from cutting units when machine is running.

Always wear gloves when working on cutting units.

Watch for rotation of cutting reel. Rotating one cutting reel can cause another blade or cutting reel to rotate.

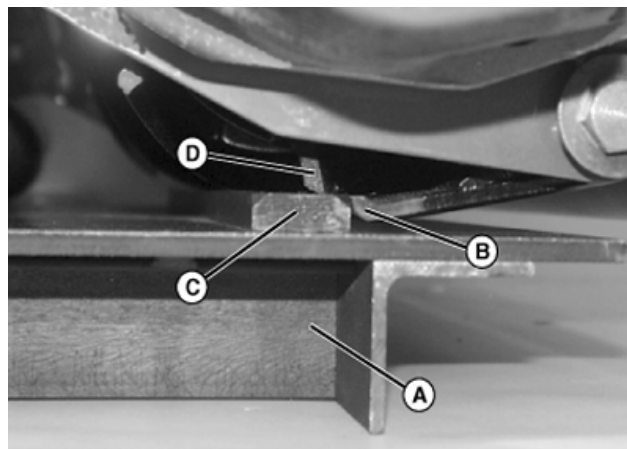
NOTE: Use of a bench plate or a 2 or 3 bolt height of cut gauge bar is recommended when adjusting front roller parallel with the bedknife.

Always adjust bedknife-to-reel before adjusting front roller for parallelism.

Always make parallelism adjustment after adjusting front roller height of cut range.

Parallelism Adjustment with Bench Plate

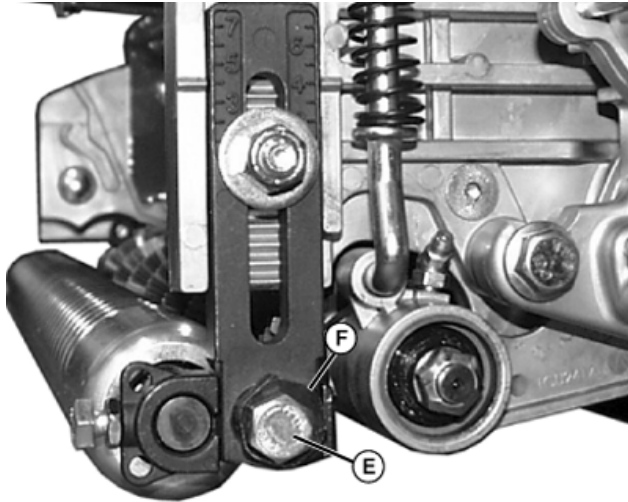
1. Position cutting unit upright on flat surface or workbench.



TCAL41536—UN—22JAN13

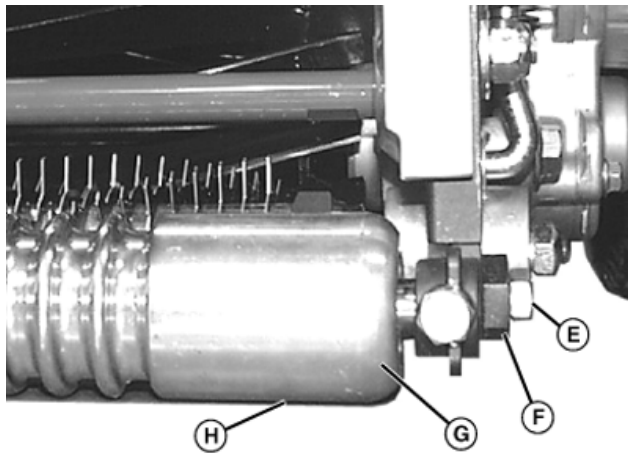
2. Set bench plate on a level surface. Set cutting unit on top of bench plate (A). Bedknife (B) must rest firmly against plate stop (C) with cutting reel blade (D) on top of plate stop.

Assembly



TCAL41537—UN—22JAN13

3. Loosen hex head bolt (E) on one of the roller brackets.



TCAL41538—UN—22JAN13

4. Rotate eccentric adjuster (F) until the front roller (G) sits flat and parallel with the bench plate. Gap (H) must not exceed maximum specification.

Specification

Front Roller — Gap 0.050 mm (0.002 in) Maximum

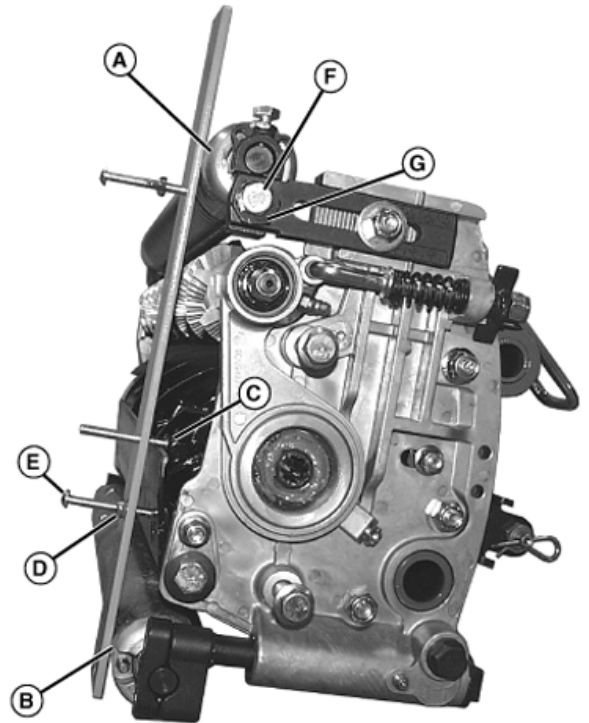
5. Hold roller eccentric adjuster (F) and tighten hex head bolt (E) to specification.

Specification

Eccentric Adjuster Hex Head Bolt

— Torque 81.3 N·m (60 lb·ft)

Parallelism Adjustment with Height of Cut Gauge Bar



TCAL41539—UN—22JAN13

1. Position cutting unit upright on flat surface or workbench.
2. Rest height of cut gauge bar against front (A) and rear rollers (B) to specification from the outside end of the bedknife.

Specification

Cut Gauge Bar — Height 51 mm (2 in)

3. Set the inside of the screw head (C) against the front edge of the bedknife to hold the gauge bar in position.
4. Loosen wing nut (D). Turn lower gauge screw (E) clockwise until top of screw contacts flat edge of bedknife.

5. Tighten wing nut (D).

6. Adjust position of front roller:

- a. Loosen bolt (F) and rotate eccentric adjuster (G) until top of lower gauge screw (E) contacts the bedknife.

- b. Hold roller eccentric adjuster (G) and tighten hex head bolt (F) to specification.

Specification

Eccentric Adjuster Hex Head Bolt

— Torque 81.3 N·m (60 lb·ft)

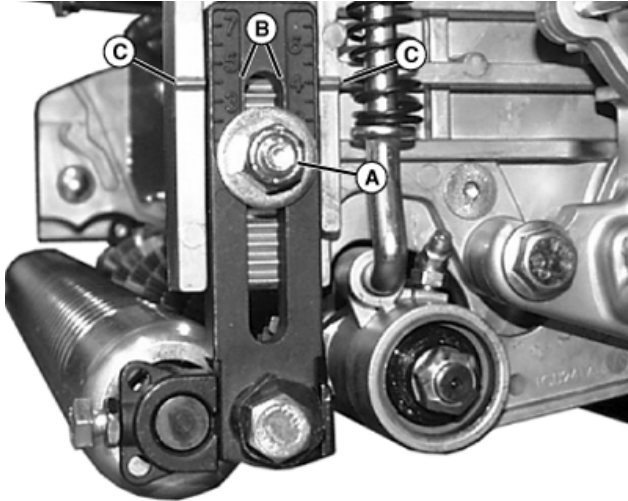
7. Repeat procedure for opposite side.

Assembly

Adjusting Height of Cut Range (QA5)

Adjust front roller brackets for the height of cut range desired.

1. Select height of cut adjustment range by adjusting the position of both front roller brackets.



TCAL41540—UN—22JAN13

2. Loosen nut (A) on each roller bracket.
3. Alignment of roller bracket (B) and cutting unit frame (C) adjustment marks determine height of cut adjustment range.

NOTE: Height of cut range for the 180 E-Cut™ Hybrid and 220 E-Cut™ Hybrid mowers is 0-19 mm (0.00-0.75 in.).

4. Refer to chart for desired setting.

Height of Cut Range (2 in. Front Roller With Out GTC)		Front Roller Setting
mm	in.	
Not Recommended	Not Recommended	1
0.0—4	0.00—0.160	2
1—9.5	0.04—0.37	3
6—15	0.24—0.60	4
11—21	0.43—0.83	5
16—27	0.63—1.06	6
21—33	0.83—1.30	7

Height of Cut Range (2 in. Front Roller With GTC)		Front Roller Setting
mm	in.	
Not Recommended	Not Recommended	1
0.0—5	0.00—0.20	2
0—11	0.00—0.43	3
5—17	0.20—0.67	4
10—24	0.40—0.94	5
15—30	0.60—1.18	6
20—36	0.80—1.42	7

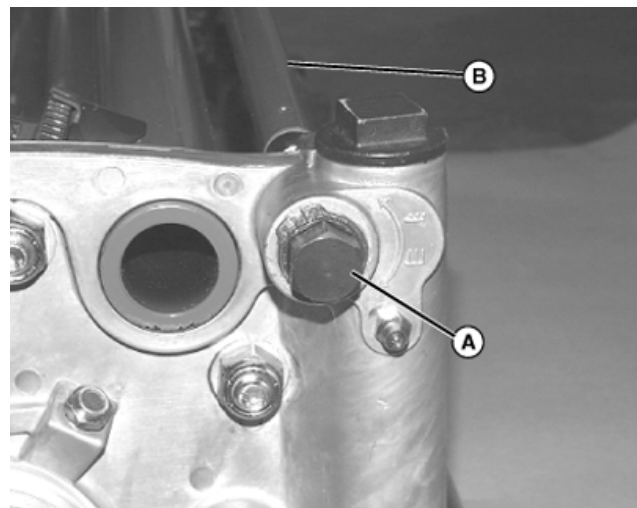
Adjusting Height of Cut (QA5)

⚠ CAUTION: Avoid injury! Blades are sharp and rotate quickly:

- Keeps hands and feet away from cutting units when machine is running.
- Always wear gloves when working on cutting units.
- Watch for rotation of cutting reel. Rotating one cutting reel can cause another blade or cutting reel to rotate.

NOTE: Do not use any type of pneumatic drill or impact wrench to make height of cut adjustments.

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

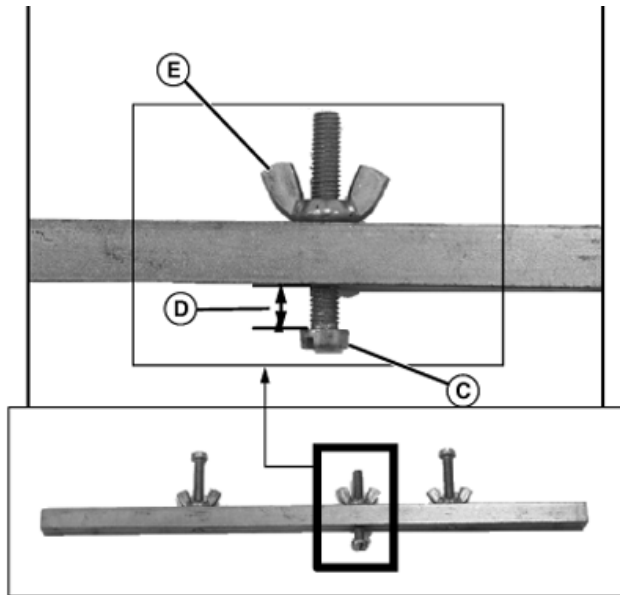


TCAL41541—UN—22JAN13

2. Locate the height of cut adjuster (A) on top rear of reel side casting (either side).
3. Turn the height of cut adjustment (A) to decrease or increase height of cut.

NOTE: Adjusters are connected with cross shaft (B) so turning one side simultaneously turns the other.

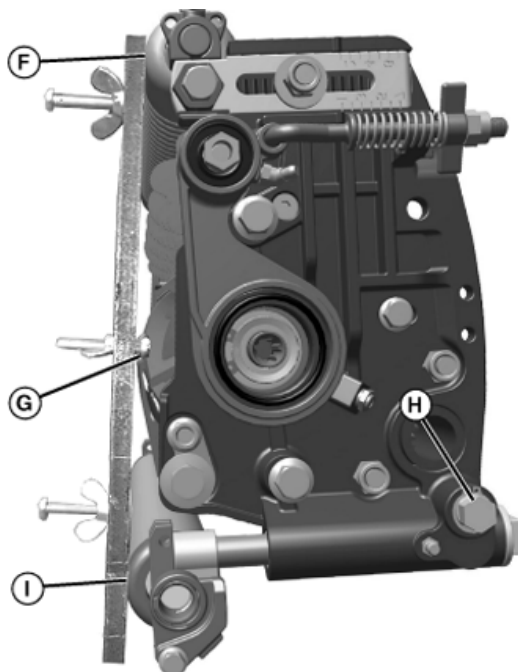
Assembly



TCAL41542—UN—22JAN13

4. On the height of cut gauge bar, set center adjustment bolt head (C) at the desired height of cut (D). Lock wing nut (E).

NOTE: Effective height of cut could be less than bench setting, based on turf and soil conditions and front roller option.

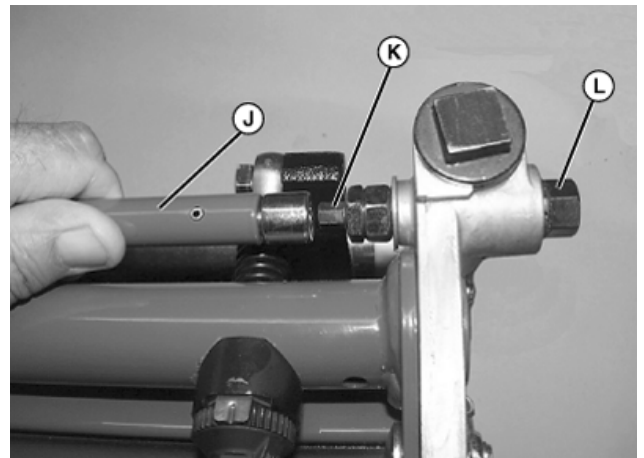


TCAL41543—UN—22JAN13

5. Rest height of cut gauge bar against front roller (F) approximately 51 mm (2 in) from either end of the bedknife. Set the inside of the bolt head (G) against the edge of the bedknife.

NOTE: Bottom of screw head on gauge bar must be engaged with cutting edge of bedknife.

6. Turn adjuster (H) to move the rear roller (I) away from gauge bar slightly. Turn adjuster in the opposite direction until the rear roller contacts the height of cut gauge bar. Repeat for the other side of the cutting reel.
7. Check height of cut adjustment setting from side to side.



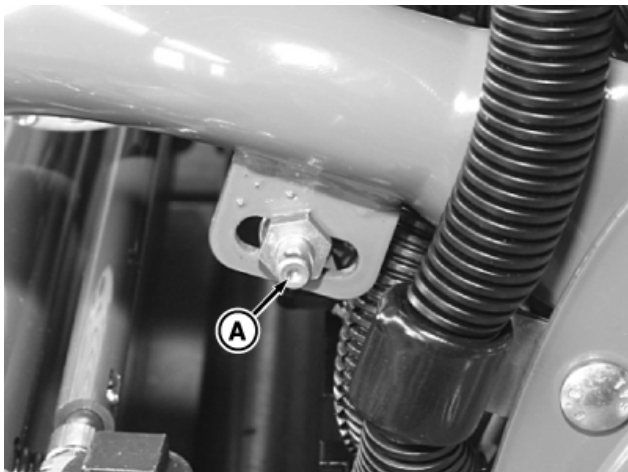
TCAL41544—UN—22JAN13

8. If side to side height of cut adjustment is necessary, pull against spring tension on cross shaft (J) to disconnect it from hex coupling (K). Remove the cross shaft.
9. Turn the adjuster (L) on the side requiring adjustment to move the rear roller away from the gauge bar slightly. Turn the adjuster in the opposite direction until the side to side height of cut is equal for both. Reinstall the cross shaft.

Assembly

Install Cutting Unit

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



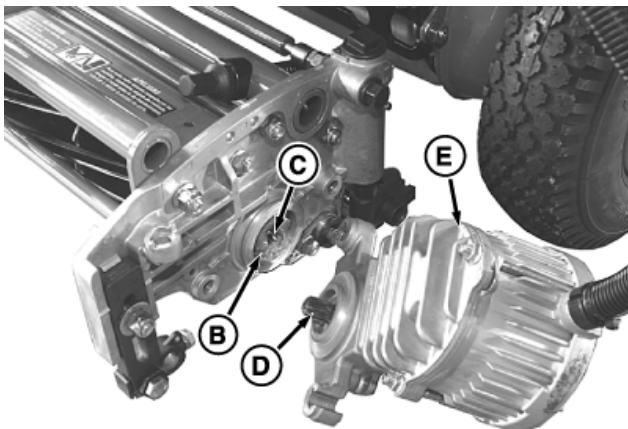
TCT008714—UN—14SEP13

1. Install upper chain limit anchor pin (A) in center of slot in support arm bracket. Rotate anchor pin to provide 90° angle between chain pull direction and spring clip hole and secure with M8 locknut. Torque locknut to specification. Repeat for opposite side.

Specification

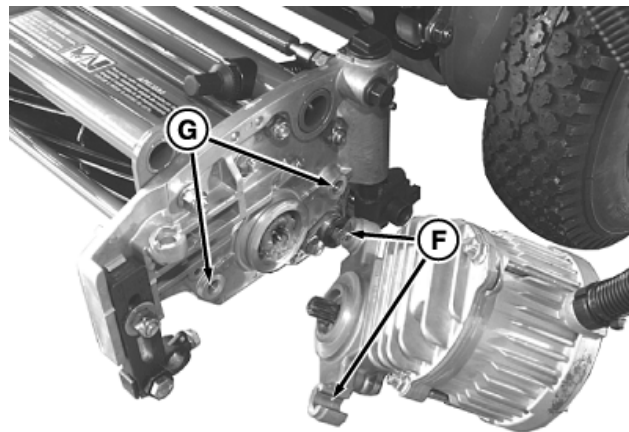
Upper Chain Limit Anchor Pin Locknut

— Torque 34 N·m (25 lb.-ft.)



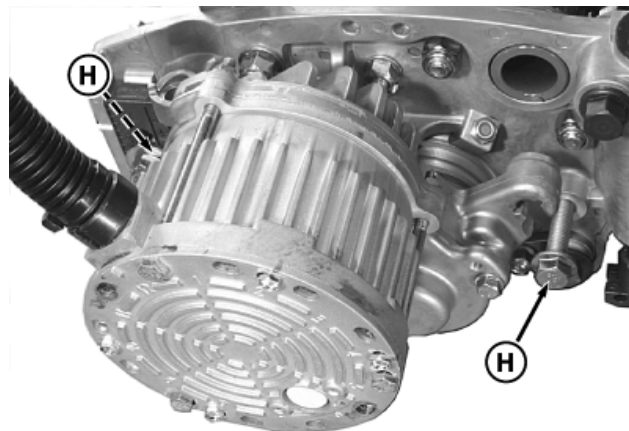
TCT008715—UN—14SEP13

2. Inspect inside of cutting unit bearing housing (B) for grease. Add John Deere Golf and Turf Cutting Unit Grease to housing (B) and internal reel splines (C) if additional lubrication is needed.
3. Align splines on drive motor shaft (D) with internal splines (C) on reel. Install drive motor assembly (E) onto the cutting unit.



TCT008716—UN—14SEP13

4. Rotate drive motor as required to align slotted holes (F) in housing with threaded holes (G) in cutting unit.

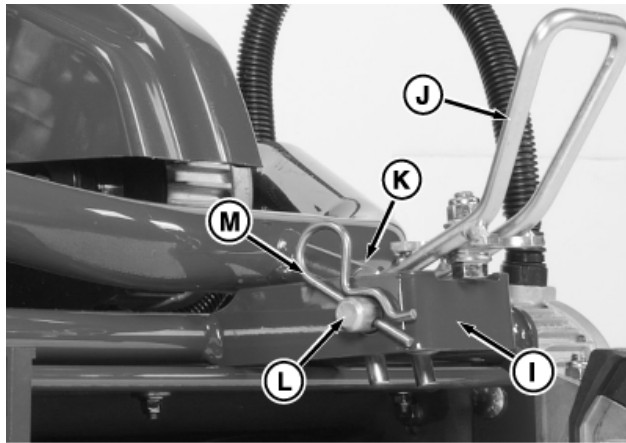


TCT008717—UN—14SEP13

5. Install and tighten hex flange head bolts (H).
6. Roll cutting unit under machine.

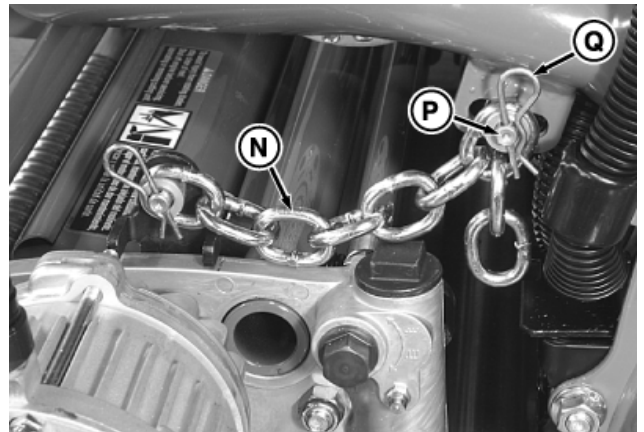
NOTE: When a Direct-Mount style basket is used, remove hanger (J). Install the hanger in the opposite orientation with the bent portion of the hanger pointing downward.

Assembly



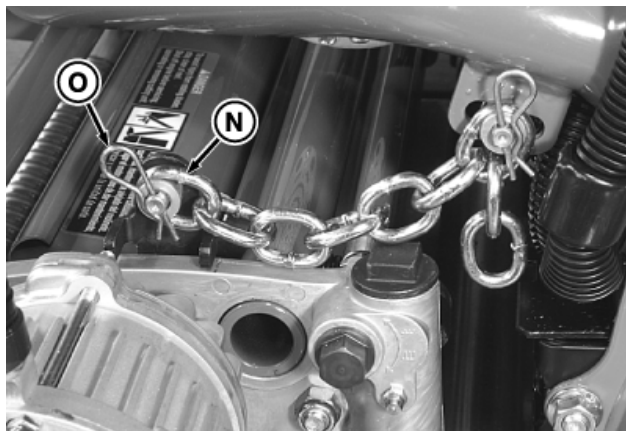
TCT011729—UN—22SEP14

7. Align holes in front yoke (I), basket hanger (J), and cutting unit support arm (K).
8. Ensure proper orientation of basket hanger (J). Fully insert clevis pin (L) and secure with spring locking pin (M).



TCT008720—UN—15SEP13

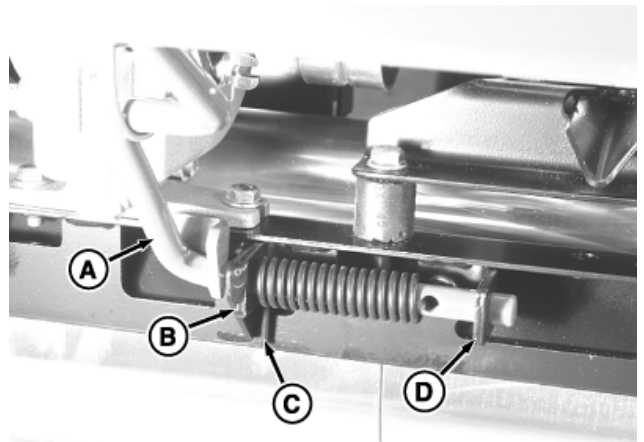
11. Ensuring that chain (N) is not kinked, install seventh link of chain to upper chain anchor pin (P) and secure with flat washer and spring locking pin (Q).
12. Lubricate all grease fittings with appropriate lubricants (see Service Lubrication in the Operator's Manual).



TCT008719—UN—15SEP13

9. Install lift chains (N) on cutting unit housing pins.
10. Install flat washers and spring locking pins (O) on each cutting unit housing pin.

Install Kick Stand (Optional)

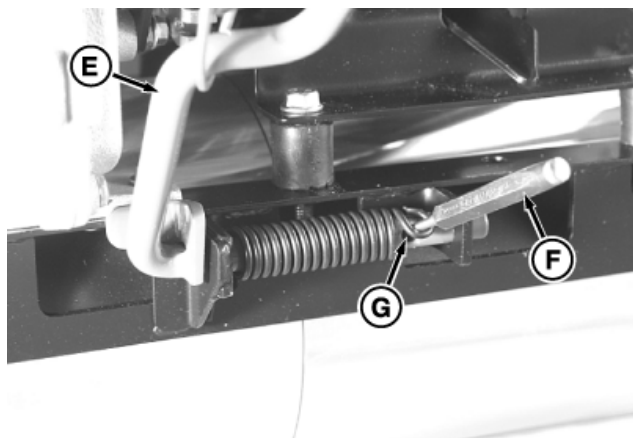


TCT008680—UN—11SEP13

1. Install kick stand (A) through left side tab (B) on the rear cross brace support.
2. Install spring on kick stand, with the straight leg (C) pointing down as shown. Push kickstand (A) through right side tab (D).

Assembly

CAUTION: Avoid injury! Components are installed under spring tension. Wear eye protection and use proper tools when installing and removing components with spring tension.

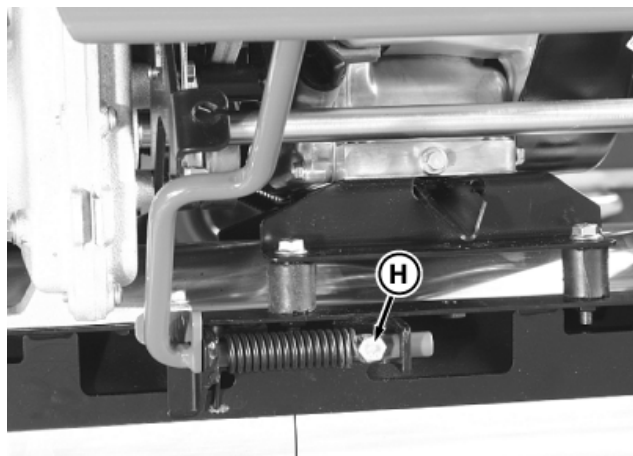


TCT008681—UN—11SEP13

3. Temporarily secure kick stand in raised position (E).

NOTE: Using a pin punch (F) as a guide to rotate and position the spring eyelet over the tapped hole (G) may ease installation of the hex head bolt in the following step.

4. Preload the spring by rotating the eyelet 180° over the top of the kickstand shaft and temporarily secure in this position using a vise-grip pliers or other suitable tool.

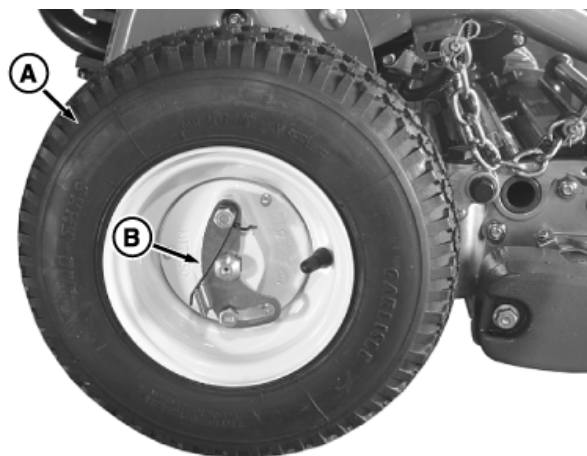


TCT008682—UN—11SEP13

5. Secure the spring to kick stand by installing a M8X16 mm hex head bolt (H) through the spring eyelet into the tapped hole in the kick stand.
6. Release method used to secure kick stand in raised position in earlier step. Kick stand should remain in raised position.

Install Transport Wheels (Optional)

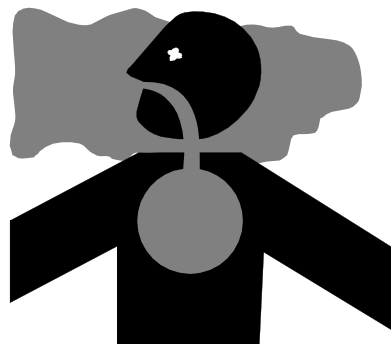
1. Raise machine on kick stand.



TCT008683—UN—11SEP13

2. Slide transport wheel (A) on axle shaft.
3. Engage lock plate (B) in groove on axle shaft.
4. Repeat previous two steps to install second transport wheel.
5. Lower machine.
6. Adjust tire pressure as required, not exceeding recommended pressure. (See Specifications Section for correct tire pressures.)

Testing Safety Systems



TCAL41488—UN—22JAN13

Assembly

CAUTION:

- Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.
- Move the machine to an outside area before running the engine.
- Do not run an engine in an enclosed area without adequate ventilation.
- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear the exhaust fumes out.

The safety systems installed on your machine should be checked before each machine use. Be sure you have read the machine operator 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 Run Switch

1. Flip run switch rearward (toward operator) to STOP position.
2. Pull start handle.

Result: Engine should not start.

Testing Park Brake

1. Lock park brake.
2. Run engine at low idle.
3. Engage operator presence bail.
4. Slowly engage travel clutch lever.

Result: Engine should stall with no movement of the mower.

Testing Operator Presence Bail

1. Operate machine in clear open area.
2. Release operator presence bail.

Result: Cutting reel should stop rotating and machine should stop moving forward. Engine should continue to run.

Engine Break-In

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

- Move the machine to an outside area before running the engine.
- Do not run an engine in an enclosed area without adequate ventilation.
- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear the exhaust fumes out.

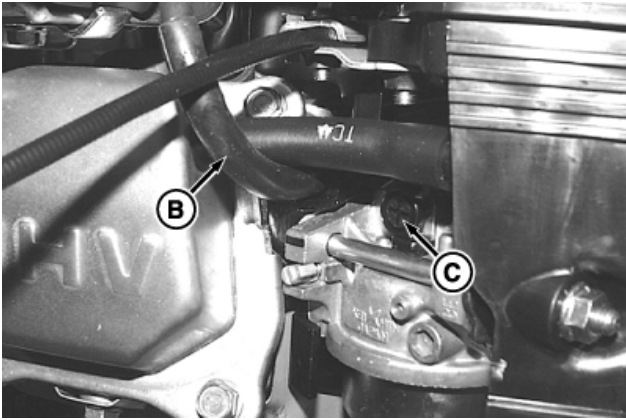
IMPORTANT: Avoid damage! Break-in engine before using machine.



TCT008721—UN—15SEP13

1. Cutting unit PTO switch (A) should be in the disengaged position.
2. Start engine, and allow to run and warm up for 15 minutes at 1/2—3/4 throttle before applying load.
3. Move throttle to slow idle position.

Assembly



TCT008722—UN—15SEP13

4. Hold JT07270 Digital Pulse Tachometer at spark plug lead (B).
5. Adjust slow idle adjustment screw (C) until the engine is running at the specified slow idle speed.

Specification

Engine Slow Idle — Speed. 1700 ± 100 rpm

Cutting Unit Break-In

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

- Move the machine to an outside area before running the engine.
- Do not run an engine in an enclosed area without adequate ventilation.
- Connect a pipe extension to the engine exhaust pipe to direct the exhaust fumes out of the area.
- Allow fresh outside air into the work area to clear the exhaust fumes out.

IMPORTANT: Avoid damage! Break-in cutting unit before using machine.

1. Remove drive belt from engine pulley (see Service—Belts in the Operator's Manual).
2. Start engine and open throttle fully.



TCT008723—UN—15SEP13

3. Release park brake (A) if applied, press operator presence bail (B) against handlebar and place travel clutch lever (C) into engaged position.
4. Place PTO switch (D) in engaged position to run cutting unit.
5. Allow cutting unit to run for 5 minutes, then disengage PTO to stop reel rotation.
6. Reduce throttle, stop engine, release operator presence bail (B) and place travel clutch lever (C) in the disengaged position.
7. Install drive belt on engine pulley.

Pre-Delivery

Check and perform the following on all machines. Complete the Customer Satisfaction Checklist.

1. Lubricate all grease fittings with the appropriate lubricants.
2. Check all fluid levels. Refer to the Operator's Manual as needed for location information.
 - Engine oil.
 - Gear case oil.
 - Fill fuel tank with fresh stabilized fuel to prevent gum and varnish from forming in the fuel system. Use John Deere TY15977 Fuel Stabilizer.
3. Check brake function: at low idle in forward motion, brake engagement must stall engine.
4. Check bedknife to reel adjustment.
5. Check cutting height adjustment.
6. Wash machine to remove dirt and dust. Wax handlebar and pulley covers for scratch protection.
7. Give customer the Operator's Manual and Fuel Stabilizer goodwill packet at delivery. Explain to customer the importance of using the fuel stabilizer. Remind customer to keep fuel stabilizer out of the reach of children.

Specifications

Engine

Manufacturer	Honda
Model	GX 120
Power Rating Information	http://engines.honda.com
Engine Type	4-cycle, 1-cylinder, 25° incline
Piston Displacement	118 cc (7.2 cu in.)
Direction of Rotation of Output Shaft	Counterclockwise viewed from shaft side
Intake Valve Clearance (cold)	0.15 ± 0.02 mm (0.006 ± 0.001 in.)
Exhaust Valve Clearance (cold)	0.20 ± 0.02 mm (0.008 ± 0.001 in.)
Engine Speed, Low Idle	1700 ± 100 rpm
Engine Speed, High Idle	2950 ± 150 rpm

Travel Speeds

Traveling Device (Maximum Forward Speed)

Roller (Rear)	(0—5.5 km/h (0—3.4 mph)
Transport Wheels	0—7.2 km/h (0—4.5 mph)

Electrical System

Spark Plug Gap	0.7—0.8 mm (0.028—0.031 in.)
Ignition Coil Air Gap	0.4 ± 0.2 mm (0.016 ± 0.008 in.)

Fuel System

Fuels Types (Recommended):

	Regular Grade 87 Octane Unleaded Fuel
	Ethanol Blended Fuel (Up to 10%)
Fuel Delivery	Carburetor

Steering and Brakes

Park Brake	Brand type brake, lever action
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Tires

Transport Tires	4.1-6 (2 pr.) (Tubeless)
Pressure (Standard Pneumatic)	125—140 kPa (1.25—1.40 bar) (18—20 psi)

Capacities

Engine Oil	0.6 L (0.63 qt.)
Fuel Tank	2.5 L (.66 gal.)
Differential Drive Capacity	0.14 L (0.3 pt.)

Dimensions

Height (With Tires Installed)	119 cm (47 in.)
Length (With Tires Installed)	94 mm (37 in.)
Width (With Tires Installed)	94.6 cm (37.2 in.)

Specifications

Weights

180 E-Cut™ (Less grass catcher, GTC drive and transport wheels)	113 kg (249 lb.)
180 E-Cut™ (With grass catcher; less GTC drive and transport wheels)	116 kg (256 lb.)
220 E-Cut™ (Less grass catcher, GTC drive and transport wheels)	119 kg (262 lb.)
220 E-Cut™ (With grass catcher; less GTC drive and transport wheels)	122.5 kg (270 lb.)

Cutting Unit

Options

Greens Tender Conditioner (Optional)	Gear driven from reel shaft; Drives Turf Conditioner or Rotary Turf Brush in opposite spin direction of reel
Greens Tender Conditioner (180 E-Cut™)	60 mm (2-3/8 in.) diameter, 57 blades
Greens Tender Conditioner (220 E-Cut™)	60 mm (2-3/8 in.) diameter, 75 blades
Material of GTC Cutter Blades	Special hardened carbon steel star shaped 0.6 mm (1/32 in.)
Rotary Brush (Optional)	60 mm (2-3/8 in.) diameter
Adjustable Conditioner or Brush Height	0.8 mm (1/32 in.) below HOC max. depth to 5.5 mm (7/32 in.) above cut

Frequency of Clip

11 Blade	4.1—12.2 mm (0.16—0.48 in.)
7 Blade	6.4—0.25 mm (0.25—0.75 in.)

Cutting Height (Minimum)

Standard Bedknife	3.2 mm (0.125 in.)
Optional Tournament Bedknife	2.8 mm (0.109 in.)
Optional Low-Cut Bedknife	2.0 mm (0.078 in.)

Cutting Width

180 E-Cut™	457 mm (18 in.)
220 E-Cut™	559 mm (22 in.)
Traction Drum	Dual aluminum traction

Clutches

Transport	Belt tension
Cutter	Jaw-type clutch "on/off"
Brush/GTC	Jaw-type clutch "on/off"

Reel

Diameter	127 mm (5 in.)
Standard Number of Blades	11 blades
Optional Number of Blades	7 blades

Recommended Lubricants

Engine Oil	John Deere Plus-4™
Gear Case Oil	John Deere Hy-Gard™
Grease	See Service Lubrication Section

Sound Measurements

Averaged Sound Level at Work Station According to EN ISO 5395-1:

180 E-Cut™ Hybrid Walk Greens Mower	79 ± 1 dB(A) at 2740 r/min engine speed
220 E-Cut™ Hybrid Walk Greens Mower	79 ± 1 dB(A) at 2740 r/min engine speed

Vibration Measurements

Hand/Arm Measured Per EN ISO 5395-1:

180 E-Cut™ Hybrid Walk Greens Mower	4.2 ± 0.1 m/s ² at 3000 rpm engine speed
220 E-Cut™ Hybrid Walk Greens Mower	4.2 ± 0.1 m/s ² at 3000 rpm engine speed

Declaration of Conformity

EC Declaration of Conformity

Deere & Company
Moline, Illinois U.S.A.

The person named below declares that

Machine Type: E-Cut™ Hybrid Walk Greens Mower (WBGM)

Models: 180E

Serial Numbers: See Product Identification Page

fulfills all relevant provisions and essential requirements of the following directives:

DIRECTIVE	NUMBER	CERTIFICATION METHOD
Machinery Directive	98/37/EC (Until Dec. 28, 2009)	Self-Certification
Machinery Directive	2006/42/EC	Self-Certification
Electromagnetic Compatibility Directive	2014/30/EU	Self-Certification
Noise Directive	2000/14/EC (Annex VI, Procedure 2)	Third-Party Certification
		NOTIFIED BODY
Measured Sound Power Level		AV Technology Unit 2 Easter Court Europa Boulevard Warrington, Cheshire WA5 7ZB, United Kingdom
180 E-Cut™ Hybrid 91.0 dB(A)		
Guaranteed Sound Power Level		
180 E-Cut™ Hybrid 98 dB(A)		

Name and address of the person in the European Community authorized to compile the technical construction file:

Brigitte Birk
John Deere GmbH & Co. KG
Mannheim Regional Center
John Deere Strasse 70
D-68163 Mannheim

Place of Declaration: Fuquay-Varina, NC USA

Date of Declaration: 22 October 2015

Manufacturing Unit: John Deere Horicon Works



DXCE01—UN—28APR09

TCT002177—UN—07DEC12

Sr. Product Safety & Compliance Engineer

Name: Elizabeth M. Harris

Title: Sr. Product Safety & Compliance Engineer

Declaration of Conformity

EC Declaration of Conformity

Deere & Company
Moline, Illinois U.S.A.

The person named below declares that

Machine Type: E-Cut™ Hybrid Walk Greens Mower(WBGM)

Models: 220E

Serial Numbers: See Product Identification Page

fulfills all relevant provisions and essential requirements of the following directives:

DIRECTIVE	NUMBER	CERTIFICATION METHOD
Machinery Directive	98/37/EC (Until Dec. 28, 2009)	Self-Certification
Machinery Directive	2006/42/EC	Self-Certification
Electromagnetic Compatibility Directive	2014/30/EU	Self-Certification
Noise Directive	2000/14/EC (Annex VI, Procedure 2)	Third-Party Certification
		NOTIFIED BODY
Measured Sound Power Level		AV Technology Unit 2 Easter Court Europa Boulevard Warrington, Cheshire WA5 7ZB, United Kingdom
220 E-Cut™ Hybrid 91.0 dB(A)		
Guaranteed Sound Power Level		
220 E-Cut™ Hybrid 98 dB(A)		

Name and address of the person in the European Community authorized to compile the technical construction file:

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DXCE01—UN—28APR09

TCT002177—UN—07DEC12

Sr. Product Safety & Compliance Engineer

Name: Elizabeth M. Harris

Title: Sr. Product Safety & Compliance Engineer

John Deere Quality Statement

John Deere Quality

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

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

Step 1

Refer to your operator's manual

- A. It has many illustrations and detailed information on the safe and proper operation of your equipment.
- B. It gives troubleshooting procedures, and specification information.
- C. It gives ordering information for parts catalogs, service and technical manuals.
- D. If your questions are not answered in the operator's manual, then go to Step 2.

Step 2

Contact your dealer

- A. Your John Deere dealer has the responsibility, authority, and ability to answer questions, resolve problems, and fulfill your parts and service needs.
- B. First, discuss your questions or problems with your dealer's trained parts and service staff.
- C. If the parts and service people are unable to resolve your problem, see the dealership manager or owner.
- D. If your questions or problems are not resolved by the dealer, then go to Step 3.

Step 3

Contact John Deere

- A. Your John Deere dealer is the most efficient source in addressing any concern, but if you are not able to resolve your problem after checking your operator's manual and contacting your dealer, contact John Deere for assistance.
- B. For prompt, effective service, please have the following ready before you call:
 - The name of the dealer with whom you've been working.
 - Your equipment model number.
 - Number of hours on machine (if applicable).
 - Your serial number which you recorded on the inside front cover of this manual.
 - If the problem is with an attachment, your attachment identification number.

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

http://www.deere.com/globalhome/deerecom/global_home.page?CC=true

Select your country and then click on the Contact Us link.

Service Record

Record Service Dates

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