

# **TURF TRACER.<sup>®</sup>**

## **S-SERIES**

**For Serial Nos.**  
**920,000 & Higher**  
Part No. 4500-696 Rev. B

# **Operator's Manual**

**⚠ WARNING**

**CALIFORNIA  
Proposition 65 Warning**

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

**Important:** The engine in this product is not equipped with a spark arrester muffler. It is a violation of California Public Resource Code (CPRC) Section 4442 to use or operate this engine on any forest-covered, brush-covered, or grass-covered land as defined in CPRC 4126. Other states or federal areas may have similar laws.

To acquire a spark arrester for your unit, see your Engine Service Dealer.

This spark ignition system complies with the Canadian standard ICES-002. Ce système d'allumage par étincelle de véhicule est conforme à la norme NMB-002 du Canada.

The enclosed Engine Owner's Manual is supplied for information regarding The U.S. Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance and warranty.

Keep this engine Owner's Manual with your unit. Should this engine Owner's Manual become damaged or illegible, replace immediately. Replacements may be ordered through the engine manufacturer.

Exmark reserves the right to make changes or add improvements to its products at any time without incurring any obligation to make such changes to products manufactured previously. Exmark, or its distributors and dealers, accept no responsibility for variations which may be evident in the actual specifications of its products and the statements and descriptions contained in this publication.



If your Exmark dealer does not have the Exmark part in stock, Exmark will get the parts to the dealer the next business day or the part will be FREE Guaranteed!! (Some restrictions apply. See your participating Exmark Dealer for details.)

# Introduction

**CONGRATULATIONS** on the purchase of your Exmark Mower. This product has been carefully designed and manufactured to give you a maximum amount of dependability and years of trouble-free operation.

This manual contains operating, maintenance, adjustment, and safety instructions for your Exmark mower.

## **BEFORE OPERATING YOUR MOWER, CAREFULLY READ THIS MANUAL IN ITS ENTIRETY.**

By following the operating, maintenance, and safety instructions, you will prolong the life of your mower, maintain its maximum efficiency, and promote safe operation.

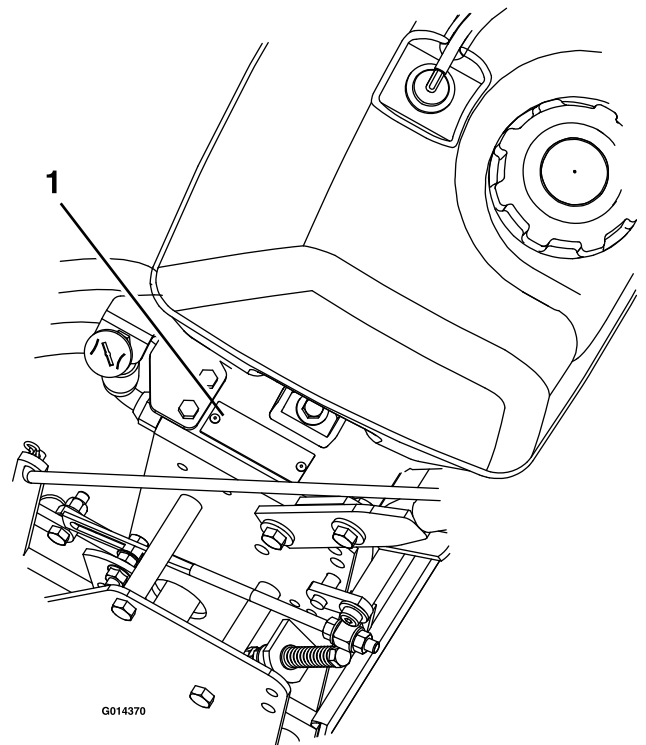
If additional information is needed, or should you require trained mechanic service, contact your authorized Exmark equipment dealer or distributor. Exmark parts manuals are available online at <http://www.exmark.com/manuals.htm>

All Exmark equipment dealers and distributors are kept informed of the latest methods of servicing and are equipped to provide prompt and efficient service in the field or at their service stations. They carry ample stock of service parts or can secure them promptly for you from the factory.

All Exmark parts are thoroughly tested and inspected before leaving the factory, however, attention is required on your part if you are to obtain the fullest measure of satisfaction and performance.

Whenever you need service, genuine Exmark parts, or additional information, contact an Authorized Service Dealer or Exmark Customer Service and have the model and serial numbers of your product ready.

Figure 1 identifies the location of the model and serial numbers on the product. Write the numbers in the space provided.



**Figure 1**

1. Model and serial number location

<b>Model No.</b> _____
<b>Serial No.</b> _____

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# Safety

## Safety Alert Symbol

This lawn mower meets or exceeds the B71.4 specifications of the American National Standards Institute in effect at the time of production.

Exmark designed and tested this lawn mower to offer reasonably safe service; however, failure to comply with the following instructions may result in personal injury.

This Safety Alert Symbol (Figure 2) is used both in this manual and on the machine to identify important safety messages which must be followed to avoid accidents.

This symbol means: **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



Figure 2

1. Safety alert symbol

The safety alert symbol appears above information which alerts you to unsafe actions or situations and will be followed by the word **DANGER**, **WARNING**, or **CAUTION**.

**DANGER:** White lettering / Red background. Indicates an imminently hazardous situation which, if not avoided, **Will** result in death or serious injury.

**WARNING:** Black lettering / Orange background. Indicates a potentially hazardous situation which, if not avoided, **Could** result in death or serious injury.

**CAUTION:** Black lettering / Yellow background. Indicates a potentially hazardous situation which, if not avoided, **May** result in minor or moderate injury.

This manual uses two other words to highlight information. **Important** calls attention to special mechanical information and **Note** emphasizes general information worthy of special attention.

## Safe Operating Practices

### Training

- not read English it is the owner's responsibility to explain this material to them.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner 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.
- Only adults and mature teenagers should operate a mower, and even mature teenagers should have adult supervision. Be sure a teenager:
  1. has read and understands the Operator's Manual and recognizes the risks involved;
  2. is sufficiently mature to use caution; and
  3. is of sufficient size and weight to operate the controls comfortably and to manage the mower without taking risks.
- The owner/user can prevent and is responsible for accidents or injuries occurring to himself or herself, other people or property.

## 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 Exmark.
- Wear appropriate clothing including safety glasses, substantial footwear, long trousers, and hearing protection. Do Not operate when barefoot or when wearing open sandals. Long hair, loose clothing or jewelry may get tangled in moving parts.

### **▲ CAUTION**

**This machine produces sound levels in excess of 85 dBA at the operator's ear and can cause hearing loss through extended periods of exposure.**

**Wear hearing protection when operating this machine.**

- Inspect the area where the equipment is to be used and remove all rocks, toys, sticks, wires, bones, and other foreign objects which can be thrown by the machine and may cause personal injury to the operator or bystanders.

## **⚠ DANGER**

In certain conditions gasoline is extremely flammable and vapors are explosive.

A fire or explosion from gasoline can burn you, others, and cause property damage.

- Fill the fuel tank outdoors on level ground, in an open area, when the engine is cold. Wipe up any gasoline that spills.
- Never refill the fuel tank or drain the machine indoors or inside an enclosed trailer.
- Do Not fill the fuel tank completely full. Fill the fuel tank to the bottom of the filler neck. The empty space in the tank allows gasoline to expand. Overfilling may result in fuel leakage or damage to the engine or emission system.
- Never smoke when handling gasoline, and stay away from an open flame or where gasoline fumes may be ignited by spark.
- Store gasoline in an approved container and keep it out of the reach of children.
- Add fuel before starting the engine. Never remove the cap of the fuel tank or add fuel when engine is running or when the engine is hot.
- If fuel is spilled, Do Not attempt to start the engine. Move away from the area of the spill and avoid creating any source of ignition until fuel vapors have dissipated.
- Do Not operate without entire exhaust system in place and in proper working condition.

## **⚠ DANGER**

In certain conditions during fueling, static electricity can be released causing a spark which can ignite gasoline vapors. A fire or explosion from gasoline can burn you and others and cause property damage.

- Always place gasoline containers on the ground away from your vehicle before filling.
- Do Not fill gasoline containers inside a vehicle or on a truck or trailer bed because interior carpets or plastic truck bed liners may insulate the container and slow the loss of any static charge.
- When practical, remove gas-powered equipment from the truck or trailer and refuel the equipment with its wheels on the ground.
- If this is not possible, then refuel such equipment on a truck or trailer from a portable container, rather than from a gasoline dispenser nozzle.
- If a gasoline dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete.

## **⚠ WARNING**

Gasoline is harmful or fatal if swallowed. Long-term exposure to vapors has caused cancer in laboratory animals. Failure to use caution may cause serious injury or illness.

- Avoid prolonged breathing of vapors.
  - Keep face away from nozzle and gas tank/container opening.
  - Keep away from eyes and skin.
  - Never siphon by mouth.
- 
- Check that the operator's presence controls, safety switches, and shields are attached and functioning properly. Do Not operate unless they are functioning properly.

## Operation

### ⚠ WARNING

Operating engine parts, especially the muffler, become extremely hot. Severe burns can occur on contact and debris, such as leaves, grass, brush, etc. can catch fire.

- Allow engine parts, especially the muffler, to cool before touching.
- Remove accumulated debris from muffler and engine area.
- Install and maintain in working order a spark arrester before using equipment on forest-covered, grass-covered, or brush-covered unimproved land.

### ⚠ WARNING

Engine exhaust contains carbon monoxide, which is an odorless deadly poison that can kill you.

Do Not run engine indoors or in a small confined area where dangerous carbon monoxide fumes can collect.

- Operate only in daylight or good artificial light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine.
- Never raise deck with blades running.
- Never operate the mower with damaged guards, shields, or covers. Always have safety shields, guards, switches and other devices in place and in proper working condition.
- Never mow with the discharge deflector raised, removed or altered unless there is a grass collection system or mulch kit in place and working properly.
- Do Not change the engine governor setting or overspeed the engine.
- Park machine on level ground. Stop engine, wait for all moving parts to stop, remove key and engage parking brake:
  - Before checking, cleaning or working on the mower.
  - After striking a foreign object or abnormal vibration occurs (inspect the mower for

damage and make repairs before restarting and operating the mower).

- Before clearing blockages.
- Whenever you leave the mower.
- Stop engine, wait for all moving parts to stop, and engage parking brake:
  - Before refueling.
  - Before dumping the grass catcher.
  - Before making height adjustments.

### ⚠ WARNING

Hands, feet, hair, clothing, or accessories can become entangled in rotating parts. Contact with the rotating parts can cause traumatic amputation or severe lacerations.

- Do Not operate the machine without guards, shields, and safety devices in place and working properly.
- Keep hands, feet, hair, jewelry, or clothing away from rotating parts.
- **DO NOT** operate the mower when people, especially children, or pets are in the area.
- Be alert, slow down and use caution when making turns. Look behind and to the side before changing directions.
- Stop the blades, slow down, and use caution when crossing surfaces other than grass and when transporting the mower to and from the area to be mowed.
- Be aware of the mower discharge path and direct discharge away from others.
- Do Not operate the mower under the influence of alcohol or drugs.
- Use extreme care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

## Slope Operation

Use **Extreme** caution when mowing and/or turning on slopes as loss of traction and/or tip-over could occur. The operator is responsible for safe operation on slopes.

# Safety

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## **⚠ DANGER**

**Operating on wet grass or steep slopes can cause sliding and loss of control. Loss of control and/or loss of operator's footing could result in a fall with an arm or leg getting under the mower or engine deck which may result in serious injury, death or drowning.**

- **Mow across slopes, never up and down.**
- **Do Not mow slopes when grass is wet.**
- **Do Not mow near drop-offs or near water.**
- **Do Not mow slopes greater than 20 degrees.**
- **Reduce speed and use extreme caution on slopes.**
- **Avoid sudden turns or rapid speed changes.**
- See inside the back cover to determine the approximate slope angle of the area to be mowed.
- Remove or mark obstacles such as rocks, tree limbs, etc. from the mowing area. Tall grass can hide obstacles.
- Watch for ditches, holes, rocks, dips and rises that change the operating angle, as rough terrain could overturn the machine.
- Avoid sudden starts when mowing uphill because the mower may tip backwards.
- Be aware that operating on wet grass, across steep slopes or downhill may cause the mower to lose traction. Loss of traction to the drive wheels may result in sliding and a loss of braking and steering.
- Always avoid sudden starting or stopping on a slope. If tires lose traction, disengage the blades and proceed slowly off the slope.
- Follow the manufacturer's recommendations for wheel weights or counter weights to improve stability.
- Use extreme care with grass catchers or attachments. These can change the stability of the machine and cause loss of control.

## **Maintenance and Storage**

- Disengage drives, lower implement, set parking brake, stop engine and remove key or disconnect spark plug wire. Wait for all movement to stop before adjusting, cleaning or repairing.

- Keep engine and engine area free from accumulation of grass, leaves, excessive grease or oil, and other debris which can accumulate in these areas. These materials can become combustible and may result in a fire.
- Let engine cool before storing and do not store near flame or any enclosed area where open pilot lights or heat appliances are present.
- 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.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect battery or remove spark plug wire before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace damaged blades. Never straighten or weld them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.

## **⚠ DANGER**

**Charging or jump starting the battery may produce explosive gases. Battery gases can explode causing serious injury.**

- **Keep sparks, flames, or cigarettes away from battery.**
- **Ventilate when charging or using battery in an enclosed space.**
- **Make sure venting path of battery is always open once battery is filled with acid.**
- **Always shield eyes and face from battery.**



## **⚠ DANGER**

Battery electrolyte contains sulfuric acid, which is poisonous and can cause severe burns. Swallowing electrolyte can be fatal or if it touches skin can cause severe burns.

- Wear safety glasses to shield eyes, and rubber gloves to protect skin and clothing when handling electrolyte.
- Do Not swallow electrolyte.
- In the event of an accident, flush with water and call a doctor immediately.

## **⚠ CAUTION**

If the ignition is in the “ON” position there is potential for sparks and engagement of components. Sparks could cause an explosion or moving parts could accidentally engage causing personal injury.

**Be sure ignition switch is in the “OFF” position before charging the battery.**

- Keep all guards, shields and all safety devices in place and in safe working condition.
- Check all bolts frequently to maintain proper tightness.
- Frequently check for worn or deteriorating components that could create a hazard.

## **⚠ WARNING**

Removing standard original equipment parts, or using non-Exmark replacement parts and accessories may alter the warranty, traction, and safety of the machine. Failure to use original Exmark parts could cause serious injury or death.

Replace all parts including, but not limited to, tires, belts, and blades with original Exmark parts.

## **⚠ WARNING**

Hydraulic fluid escaping under pressure can penetrate skin and cause injury. Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

- If equipped, make sure all hydraulic fluid hoses and lines are in good condition and all hydraulic connections and fittings are tight before applying pressure to hydraulic system.
- Keep body and hands away from pinhole leaks or nozzles that eject high pressure hydraulic fluid.
- Use cardboard or paper, not your hands, to find hydraulic leaks.
- Safely relieve all pressure in the hydraulic system by placing the motion control levers in neutral and shutting off the engine before performing any work on the hydraulic system.

## Safety and Instructional Decals

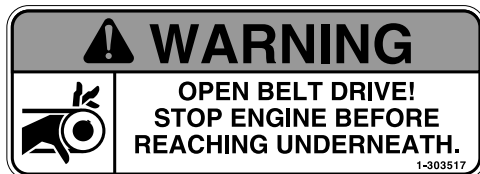
- Keep all safety signs legible. Remove all grease, dirt and debris from safety signs and instructional labels.
- Replace all worn, damaged, or missing safety signs.
- When replacement components are installed, be sure that current safety signs are affixed to the replaced components.
- If an attachment or accessory has been installed, make sure current safety signs are visible.
- New safety signs may be obtained from your authorized Exmark equipment dealer or distributor or from Exmark Mfg. Co. Inc.
- Safety signs may be affixed by peeling off the backing to expose the adhesive surface. Apply only to a clean, dry surface. Smooth to remove any air bubbles.
- Familiarize yourself with the following safety signs and instruction labels. They are critical to the safe operation of your Exmark commercial mower.



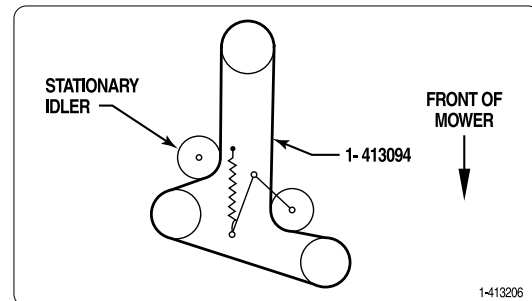
1-303508



1-403143



1-303517



1-413206

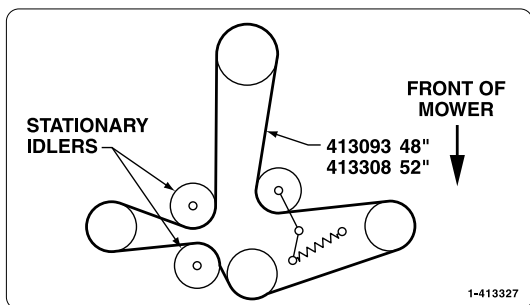
36 inch Decks Only



1-403005

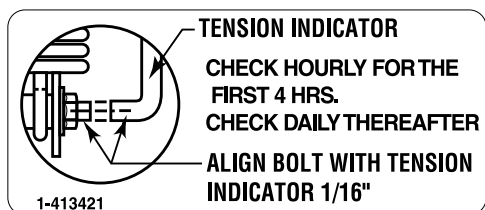


1-413214



1-413327

48 inch and 52 inch Decks Only



1-413421

1-413421

<b>WARNING</b>		<b>ANTI-SCALP ROLLER ADJUSTMENT</b>	
DISENGAGE BLADE CLUTCH, SHUT OFF ENGINE AND REMOVE KEY BEFORE MAKING ADJUSTMENTS, SERVICING OR CLEANING DECK		FOR NORMAL OPERATING CONDITIONS, PLACE ROLLERS IN POSITIONS SHOWN FOR 3/4" (19 mm) GROUND CLEARANCE.	
<b>CUTTING HEIGHT ADJUSTMENT</b>		<b>CUTTING HEIGHT INCHES(mm)</b>	
DECK SUPPORT PIN	CUTTING HEIGHT INCHES (mm)		
○ 1.5(38)	○ 2.0(51)	○ 2.0(51)	○ 2.5(64)
○ 2.5(64)	○ 3.0(76)	○ 3.0(76)	○ 3.5(90)
○ 3.5(90)	○ 4.0(102)	FOR MAXIMUM FLOTATION, ROLLERS MAY BE POSITIONED LOWER, BUT MUST MAINTAIN A MINIMUM OF 1/4" (6.4 mm) GROUND CLEARANCE. NEVER POSITION THE ROLLERS TO SUPPORT MOWER DECK.	
○ 4.0(102)	○ 4.5(114)	1-553049	

1-553049

**! DANGER**

COVER IS MISSING. DO NOT OPERATE THIS UNIT WHEN COVER IS NOT IN PLACE. 98-5954

98-5954



103-1798

↑ ROTATE PTO

↓ STOP

OFF

ON

START

103-1976

6

5

4

3

2

1

N

**! WARNING**

- Read operator's manual before operating.
- Do NOT operate unless trained to safely operate this machine.
- Do NOT operate without shields, guards, and safety devices in place and working.
- Do NOT carry passengers.
- Clear area of debris before mowing.
- Before leaving operator's position:
  - Lock drive levers in neutral lock position.
  - Disengage PTO.
  - Shift speed control lever to neutral.
  - Engage park brake.
- Shut off engine and remove key before adjusting, servicing, or cleaning.
- Use extreme caution when operating on slopes.
  - Do NOT operate on slopes greater than 20°.
  - Mow across slope - NOT up and down.
  - Do NOT mow wet slopes.

**! DANGER**

- Thrown objects or blade contact can cause serious injury or death.
- Keep all people and pets out of area when mowing.
- Avoid blades unless blades and engine are stopped.

**! CAUTION**

- Hearing protection recommended.

103-1976

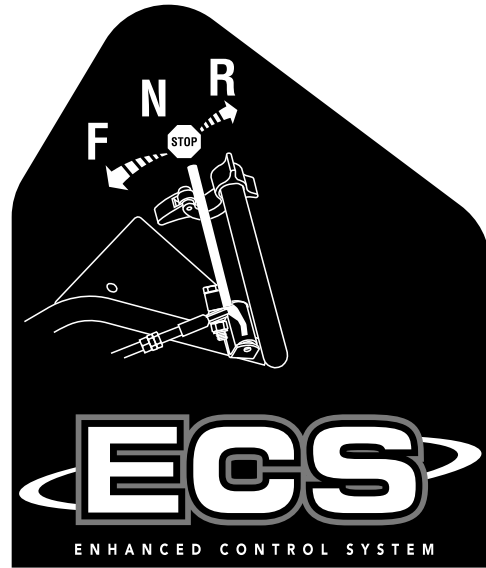
20 HP Kawasaki Electric Start

# Safety



103-1977

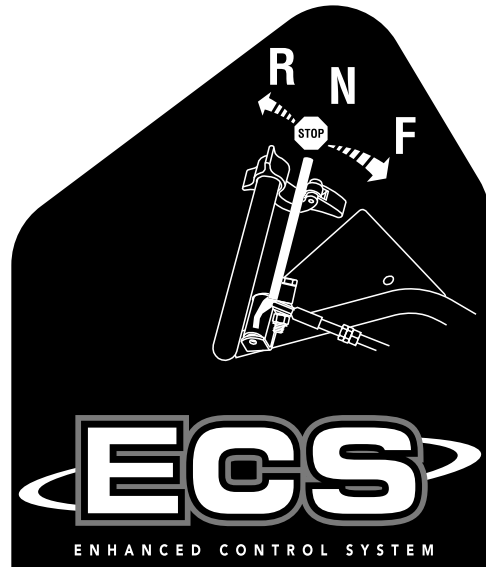
16 HP and 18 HP Kawasaki Manual Start



103-2242



103-2076



103-2243



103-2103



103-4935

**Lubricate Blade Bolt  
threads with copper based  
antiseize or grease  
and torque to  
55-60 ft-lbs (75-81 N·m)**  
109-3148

109-3148

ONLY USE  
**EXMARK HYDRO OIL**  
FILL TO TOP OF BAFFLE

 **CAUTION**

 **HOT  
SURFACE**

116-0404

116-0404

**CALIFORNIA SPARK ARRESTER WARNING**  
Operation of this equipment may create sparks that can start  
fires around dry vegetation. A spark arrester may be required.  
The operator should contact local fire agencies for laws or  
regulations relating to fire prevention requirements. 117-2718

117-2718

# Specifications

## Model Numbers

Serial Nos: 920,000 and Higher

Manual Start Models: TTS16KA363; TTS16KA363CA; TTS16KA483; TTS16KA483CA; TTS18KA523

Electric Start Models: TTS20KAE483; TTS20KAE483CA; TTS20KAE523

## Systems

### Engine

- Engine Specifications: See your Engine Owner's Manual
- Engine Oil Type: Exmark 4-Cycle Premium Engine Oil
- RPM: Full Speed: 3600 (No Load)  
Idle: 1550 RPM

### Fuel System

- Capacity: 5.0 gal. (18.9 L)
- Type of Fuel: Regular unleaded gasoline, 87 octane or higher; containing no more than 10% methanol or ethanol.
- Fuel Filter: Replaceable In-line
- Fuel Shut-Off Valve: 1/4 turn increments

### Electrical System (Electric Start)

- Charging System: Flywheel Alternator
- Charging Capacity: 15 amps
- Battery Type: BCI Group U1
- Battery Voltage: 12 Volt
- Polarity: Negative Ground
- Fuses: Two 20 amp blade type

### Safety Interlock System:

- Operator must have OPC (Operator Presence Control) levers held in contact with handle grips, speed control lever in neutral, and PTO disengaged to start engine. Release of OPC levers will cause the engine to stop if speed control lever is not in neutral and/or PTO is engaged.
- Park brake must be disengaged to move speed control out of neutral or engine will kill.

### Operator Controls

Steering Control: Fingertip drive control levers provide independent speed control, braking and neutral to each drive wheel for moving forward or reverse, stopping, and power turning.

### Transmission

Twin Hydrostatic Drive

- Two Hydro Gear variable displacement high efficiency pumps independently coupled to two high efficiency Parker/Ross wheel drive motors.
- Hydraulic Oil: Use Exmark Premium Hydro Oil.
- Hydraulic Oil Capacity: 2.4 qt. (2.2 L)
- Hydraulic Filter is replaceable cartridge type.

P/N 109-4180: 25 microns, 10 psi bypass (Summer use above 32°F (0°C))

P/N 1-523541: 40 microns, 18 psi bypass (Winter use below 32°F (0°C))

- Speeds:
  - 0-6.2 mph (10.0 km/hr) forward.
  - 0-2.2 mph (3.5 km/hr) reverse.
- Drive wheels release valves allow machine to be moved when engine is not running.

### Wheel Drive System

Drive wheels are direct coupled to Parker wheel drive motors with 1 inch (25.4 mm) tapered shaft.

## Tires & Wheels

	Drive	Front Caster
	Pneumatic (Air-Filled)	Semi-Pneumatic
Quantity	2	2
Tread	Turf Master	Smooth
Size	16 x 6.50-8	9 x 3.50-4
Ply Rating	4	
Pressure	14 psi (97 kPa)	

## Cutting Deck

- Cutting Width:
  - 36 inch Deck: 35.25 inches (89.5 cm)
  - 48 inch Deck: 47.25 inches (120.0 cm)
  - 52 inch Deck: 52.00 inches (132.1 cm)
- Discharge: Side
- Blade Size:
  - 36 inch Deck: 18.00 inches (45.7 cm)—Quantity: 2
  - 48 inch Deck: 16.25 inches (41.3 cm)—Quantity: 3
  - 52 inch Deck: 18.00 inches (45.7 cm)—Quantity: 3
- Deck Drive: Manual engagement of belt with over-center lock. Blade belt tension is adjustable via turnbuckle.
- Deck Mounting: Full floating deck is attached to out-front support frame, removable for service.
- Deck Depth:
  - 36 inch Deck: 5.0 inches (12.7 cm)
  - 48 inch Deck: 5.0 inches (12.7 cm)
  - 52 inch Deck: 5.0 inches (12.7 cm)
- Cutting Height Adjustment:
 

Adjusts from 1 1/2 inches (3.8 cm) to 4 1/2 inches (11.4 cm) in 1/2 inch (1.3 cm) increments
- Mulching Kit: Optional
- Bagger: Optional

## Dimensions

### Overall Width:

	36 inch Deck	48 inch Deck	52 inch Deck
Deflector Up	36.1 inches (91.7 cm)	48.1 inches (122.2 cm)	53.0 inches (134.6 cm)
Deflector Down	45.9 inches (116.6 cm)	57.9 inches (147.1 cm)	62.8 inches (159.5 cm)

### Overall Length:

36 inch Deck	48 inch Deck	52 inch Deck
77.7 inches (197.4 cm)	73.7 inches (187.2 cm)	75.9 inches (192.8 cm)

### Overall Height:

36 inch Deck	48 inch Deck	52 inch Deck
42 inches (106.7 cm)	42 inches (106.7 cm)	42 inches (106.7 cm)

### Tread Width: (Outside to Outside of Tires, Widthwise)

36 inch Deck	48 inch Deck	52 inch Deck
35.0 inches (88.9 cm)	39.4 inches (100.1 cm)	39.4 inches (100.1 cm)

### Curb Weight:

36 inch Deck	48 inch Deck	52 inch Deck
634 lb (285 kg)	775 lb (349 kg)	774 lb (348 kg)

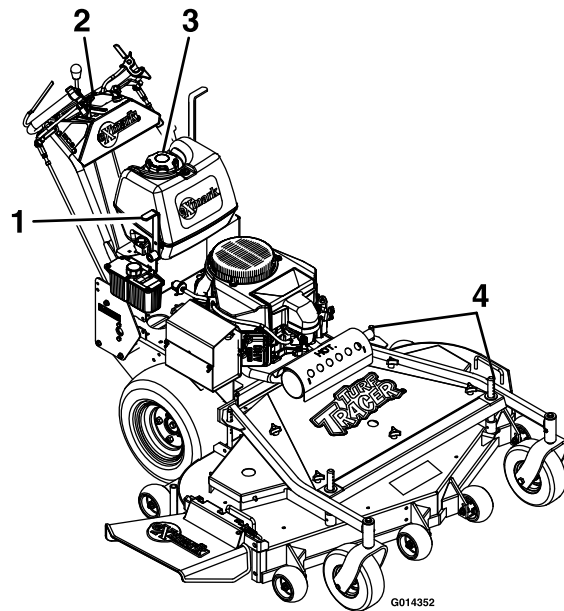
**Note:** Weights will vary slightly depending on engine and electric start options.

# Product Overview

## Torque Requirements

Bolt Location	Torque
Cutter Housing Spindle Nut	140-145 ft-lb (190-197 N-m)
Blade Mounting Bolt (lubricate with anti-seize)	55-60 ft-lb (75-81 N-m)
Engine Deck/Mower Deck Support Mount Bolts	30-35 ft-lb (41-47 N-m)
Anti-Scalp Roller Nyloc Nut See Figure 9	30-35 ft-lb (41-47 N-m)
Anti-Scalp Roller Whizlock Nut See Figure 9	30-35 ft-lb (41-47 N-m)
Engine Mounting Bolts	17-23 ft-lb (23-31 N-m)
Wheel Lug Nuts	90-95 ft-lb (122-129 N-m)
Wheel Hub Slotted Nut (Style A)	140-155 ft-lb (190-210 N-m)
Wheel Hub Slotted Nut (Style B)	minimum 100 ft-lb (136 N-m)
Wheel Motor Mounting Bolts	30-35 ft-lb (41-47 N-m)

## Product Overview



**Figure 3**

- 1. Park Brake Lever
- 2. Controls
- 3. Fuel Cap
- 4. Height-of-Cut Pins



## Operation

**Note:** Determine the left and right sides of the machine from the normal operating position.

## Controls

### Operator Presence Control (OPC) Levers

Located on the upper handle assembly directly above the handle grips.

When these levers are depressed, the OPC system senses that the operator is in the normal operator's position. When the levers are released, the OPC system senses that the operator has moved from the normal operating position and will kill the engine if either the speed control lever is not in the neutral position or the PTO is engaged (see Figure 4).

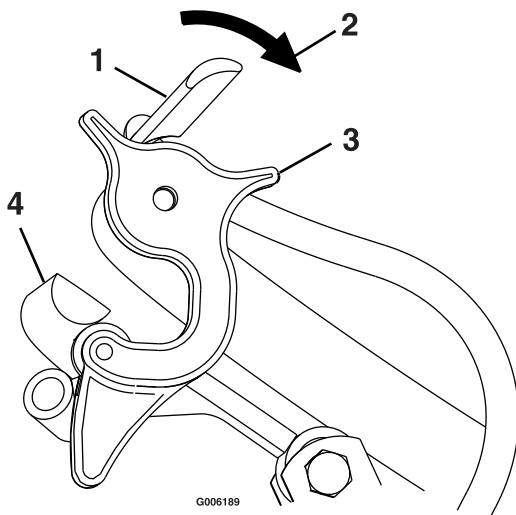


Figure 4

- |   |   |
|---|---|
| 1. OPC Lever  | 3. Neutral Lock Latch                   |
| 2. Rotate neutral lock latch downward for neutral lock position | 4. Drive Lever in neutral lock position |

### Drive Levers

Located on each side of the upper handle assembly ahead of and below the handle grips.

These levers individually control the speed and direction of each drive wheel. When the speed control lever is moved out of the neutral position and the neutral lock latches are moved into the drive position,

as shown in Figure 4, and the drive levers are released, the drive wheels are engaged in the forward direction.

Squeezing the left hand and/or right hand lever causes the left hand and/or right hand drive wheel respectively to slow down, stop, or reverse, depending on how far each drive lever is “squeezed”. Squeezing the drive levers beyond the neutral position causes the drive wheels to engage in the reverse direction regardless of the position of the neutral lock latches and the speed control lever.

### Neutral Lock Latches

Located on the upper handle assembly on the ends of the handle grips.

These latches allow the operator to lock the drive levers in a “neutral” position where the drive wheels are not engaged in either a forward or reverse direction.

### Choke Control

Located on the front left corner of the fuel tank support.

Choke is used to aid in starting a cold engine. The choke control is pulled out to be in the “ON” position and pushed in to be in the “OFF” position. Do Not run a warm engine with choke in the “ON” position.

### Throttle Control

Located on the control console's right side.

The throttle is used to control engine speed. Moving the throttle control forward will increase engine speed and moving it to the rear will decrease engine speed. Moving the throttle forward into the detent is full position.

### Speed Control Lever

Located in middle of control console.

The speed control lever controls the maximum forward speed and is infinitely variable from neutral 0–6.2 mph (10.0 km/hr).

Park brake must be disengaged to move speed control out of neutral or engine will kill.

# Operation

---

## Park Brake Lever

Located on the left side of the unit above the hydraulic tank.

The brake lever engages the park brake on the drive wheels.

Pull the lever up and rearward to engage the brake.

Push the lever forward and down to disengage the brake.

When parking on a steep slope, the wheels must be chocked or blocked in addition to the brake being engaged. The unit must be tied down and brake engaged when transporting.

The park brake must be disengaged to move speed control out of neutral or engine will kill.

For manual start engines: The park brake must be disengaged before the PTO is engaged or the engine will kill.

## “Off-Run” Switch (Manual Start Only)

Located on the console.

Turn key to the “Run” position to allow the engine to be started. Turn key to the “Off” position to shut engine off.

Operator must have speed control lever in neutral and the PTO disengaged to start engine.

## Ignition Switch (Electric Start Only)

Located on the control console.

The ignition switch is used to start and stop the engine. The ignition switch has three positions, “Off”, “On” and “Start”. Insert key into switch and rotate clockwise to the “On” position. Rotate clockwise to the next position to engage the starter (key must be held against spring pressure in this position). Operator must have speed control lever in neutral, OPC levers depressed and PTO disengaged to start engine. When engine starts, release key.

## Fuel Shut-Off Valve

Located in the fuel line midway between the tank and engine.

The fuel shut-off valve is used to shut off the flow of fuel when parking inside a building, during

transportation to and from the job sites, and when the machine will not be used for a few days.

Rotate valve 1/4 turn clockwise to shut fuel off.  
Rotate valve 1/4 turn counterclockwise to turn fuel on.

## Drive Wheel Release Valves

Located on the left rear corner of the hydrostatic pumps.

Drive wheel release valves are used to release the hydrostatic drive system to allow the machine to be moved by hand without the engine running.

With a 5/8 wrench, turn both valves one turn counterclockwise to release the drive system.

Turn clockwise to reset the drive system. **Do Not overtighten.**

## Tracking Adjustment Knob

Located on the right-hand side of the rear of the fuel tank support.

The knob can be adjusted so that machine will “track” straight ahead with the drive levers released.

## PTO Engagement

Located on the left side of the upper handle.

To engage the blades, push the lever forward, or away from the operator, until the linkage locks over-center. To disengage the blades, pull the lever to the rear, or towards the operator.

For manual start engines: The park brake must be disengaged before the PTO is engaged or the engine will kill.

## Cold Start Kit (Manual Start Only)

Located below the hydro control shield.

The cold start kit is used to ease the starting of the unit in cold weather or when the unit has not been operated for a period of time. The cold start kit moves the idler pulley away from the pump belt, releasing the tension on the belt which allows the engine to turn over with less resistance (see **Starting the Engine (Manual Start)** section in Operation).

## Pre-Start

Fill fuel tank on level ground. For best results use only clean, fresh regular grade unleaded gasoline with an octane rating of 87 or higher.

**Important:** Never use methanol, gasoline containing methanol, gasohol containing more than 10% ethanol, premium gasoline, or white gas because the fuel system could be damaged.

**Do Not** add oil to gasoline.

**Do Not** overfill fuel tank. Fill the fuel tank to the bottom of the filler neck. The empty space in the tank allows gasoline to expand. Overfilling may result in fuel leakage or damage to the engine or emission system (if equipped).

Make sure you understand the controls, their locations, their functions, and their safety requirements.

Refer to the Maintenance section and perform all the necessary inspection and maintenance steps.

**Note:** After starting the engine and engaging the hydro drive, if either of the drive wheels acts sluggish or will not rotate at all, stop engine and refer to the **Hydraulic System Air Purge Procedure** in Maintenance.

## Operating Instructions

### Open the Fuel Shut-Off Valve

Rotate the valve 1/4 turn counterclockwise to turn fuel on.

### Starting the Engine (Manual Start)

**Note:** Operator must have PTO disengaged and speed control lever in neutral position when starting the engine.

1. Lock drive levers in neutral and engage park brake.

**Note:** A cold weather starting kit has been added for ease of starting in either cold weather or when the unit has not been run for a period of time.

- To use cold start kit:
  - A. Pull split ring straight out the side of the unit, and hook the ring over the lower rear hydro control shield bolt.

- B. Start engine. Refer to the following guidelines for further starting suggestions.
- To engage pump drive (disengage cold start kit):
  - A. Pull chain straight out from the side of the unit until the split ring can be removed from the bolt.
  - B. Slowly release tension on chain.
2. Pull out the choke control. Place the throttle control midway between the “Slow” and “Fast” positions.
3. Turn the key switch to the “Run” position.
4. Pull recoil rope to start engine.
5. After engine warms up, gradually push in the choke control. Do Not run warm engine with the choke in the “ON” position.

**Note:** Kawasaki engines generally need to be “choked” even when warm.

### Starting the Engine (Electric Start)

**Note:** Operator must have PTO disengaged, speed control lever in neutral position, and OPC levers depressed when starting the engine.

1. Lock drive levers in neutral and engage park brake.
2. Pull out the choke control. Place the throttle control midway between the “Slow” and “Fast” positions.
3. Turn the ignition switch to the “Start” position. Release the switch as soon as the engine starts.

**Important:** Do Not crank the engine continuously for more than ten seconds at a time. If the engine does not start, allow a 60 second starter cool-down period between starting attempts. Failure to follow these guidelines can burn out the starter motor.

4. After engine warms up, gradually push in the choke control. Do Not run warm engine with the choke in the “ON” position.

**Note:** Kawasaki engines generally need to be “choked” even when warm.

# Operation

---

## PTO Engagement

### **⚠ DANGER**

The rotating blades under the mower deck are dangerous. Blade contact can cause serious injury or kill you.

**Do Not put hands or feet under the mower or mower deck when the blades are engaged.**

### **⚠ DANGER**

An uncovered discharge opening will allow objects to be thrown in an operator's or bystander's direction. Also, contact with the blade could occur. Thrown objects or blade contact can cause serious injury or death.

**Never operate the mower with the discharge deflector raised, removed, or altered unless there is a grass collection system or mulch kit in place and working properly.**

The PTO switch engages the cutting blades. Be sure that all persons are clear of mower deck and discharge area before engaging the PTO.

1. Set throttle to "MIDWAY" position.
2. Push the PTO engagement arm forward and down to engage blades.
3. Place the throttle in the "FAST" position to begin mowing.

For manual start engines: The park brake must be disengaged before the PTO is engaged or the engine will kill.

## Disengaging the PTO

1. Set throttle to "MIDWAY" position.
2. Pull upward and back completely on the PTO engagement arm to disengage the blades.

## Stopping the Engine

1. Bring the unit to a full stop.
2. Lock drive levers in neutral.
3. Disengage the PTO.
4. Move speed control lever to neutral.
5. Engage the parking brake.

6. Place the throttle midway between the "SLOW" and "FAST" positions.
7. Allow the engine to run for a minimum of 15 seconds, then turn the ignition switch to the "OFF" position to stop the engine.
8. Remove the key to prevent children or other unauthorized persons from starting engine.
9. Close the fuel shut-off valve when the machine will not be in use for a few days, when transporting, or when the unit is parked inside a building.

## Driving the Machine

### Drive Lever/Neutral Lock Latch Operation

To lock the drive levers in "neutral lock", squeeze the drive levers to the "neutral" position (Do Not squeeze the drive levers all the way back as this will cause the drive wheels to go into full reverse direction). See Figure 5 position 1. Place thumbs on the inner lobe of the neutral lock latches and rotate them under the drive levers into the "neutral lock" position. See Figure 5 position 2. Release the drive levers.

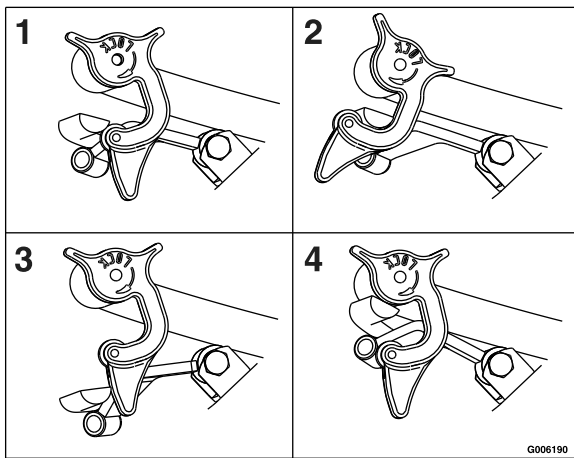
### **⚠ CAUTION**

**If the neutral lock latches are not completely engaged the drive levers could unexpectedly slip into the forward drive position. If the drive levers slip into the drive position the unit could lurch forward and cause injury or property damage.**

**Be sure the drive levers are past the roller and securely seated at the bottom of the neutral lock latches.**

To place the drive levers in the "forward" position, slightly squeeze the drive levers while placing thumbs on the outer thumb lobe of the neutral lock latches (or the index finger on the front lobe) and rotate them from under the drive levers. Slowly and carefully release the drive levers. See Figure 5 position 3.

To place the drive levers in the "reverse" position, squeeze the drive levers past the neutral position. See Figure 5 position 4.



**Figure 5**

- |   |                                    |
|---|------------------------------------|
| 1. Drive Lever in neutral position        | 3. Drive Lever in forward position |
| 2. Drive Lever locked in neutral position | 4. Drive Lever in reverse position |

## Driving Forward

1. Release the parking brake.
2. With drive levers locked in “neutral”, shift speed control lever to desired forward speed.
3. Slowly squeeze and hold both drive levers in the neutral position and rotate both neutral lock latches from the neutral lock position to the forward position.

**Note: Do Not** squeeze both drive levers all the way back. This will cause the drive wheels to engage in the reverse direction.

4. To move forward in a straight line, smoothly release both drive levers to engage drive wheels.

To turn left or right, squeeze the right hand drive lever to turn right and the left hand drive lever to turn left.

To make a “zero turn”, squeeze either the left hand or the right hand drive lever back into the reverse position while the opposite drive lever is in a forward position at an equal but opposite speed.

**Note:** For smooth operation of this machine, avoid quick, jerky movements of the drive levers. Move the drive levers smoothly and deliberately.

To stop, squeeze drive levers back to the “neutral” position. Move the neutral lock latches into the “neutral lock” position and release drive levers. Move the speed control lever to the neutral position.

## Driving in Reverse

To move rearward in a straight line, squeeze drive levers into the reverse position.

To turn left or right, squeeze the right hand drive lever to turn left and the left hand drive lever to turn right.

To make a “zero turn”, squeeze either the left hand or the right hand drive lever back into the reverse position while the opposite drive lever is in a forward position at an equal but opposite speed.

**Note:** For smooth operation of this machine, avoid quick, jerky movements of the drive levers. Move the drive levers smoothly and deliberately.

To stop, squeeze drive levers back to the “neutral” position. Move the neutral lock latches into the “neutral lock” position and release drive levers. Move the speed control lever to the neutral position.

## Adjusting the Cutting Height

### ⚠ WARNING

**When the two front support rod hairpins are removed from the mower deck, the weight of the tractor section may cause the front frame of the unit to rise suddenly. If the unit rises suddenly, injury may occur.**

**Securely hold down the front of the unit when the front support rod hairpins are removed.**

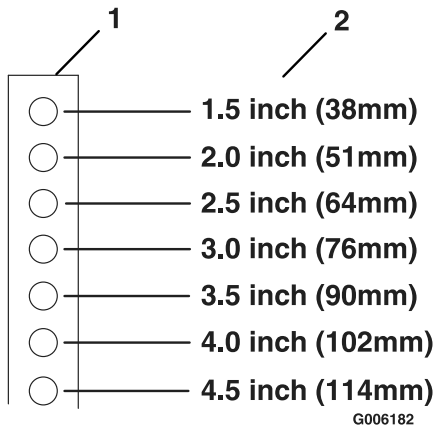
The cutting height of the mower deck is adjusted from 1 1/2 to 4 1/2 inches (3.81 cm to 11.4 cm) in 1/2 inch increments.

1. Stop the machine and move the drive levers to the neutral locked position.
2. Disengage the PTO.
3. Engage the park brake.
4. Stop the engine, remove the key and wait for all moving parts to stop.
5. Install hairpin clips in the holes for the desired cutting height. See Figure 6.

**Important:** To maintain correct cutting height and rake, check the following for proper adjustment.

- A. The front and rear hairpins are in the same holes with the proper spacers under the hair pins. See Figure 6.

# Operation

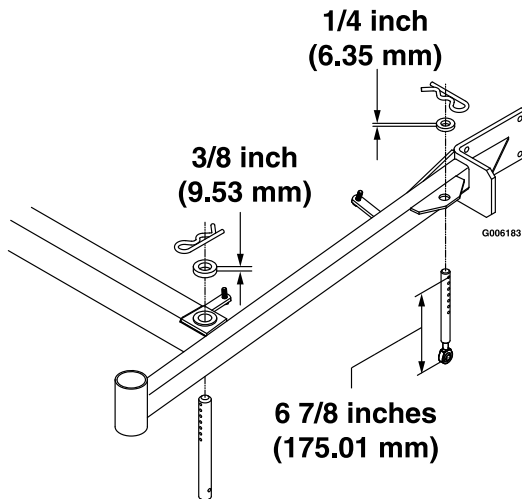


**Figure 6**

1. Deck support pin      2. Cutting Height

- B. The tire pressures are set as directed in **Check Tire Pressures** in the Maintenance section.
- C. The length of the rear deck support link assemblies average 6.89 inches (approximately 6 7/8 inches) (175.01 mm) from the center of the balljoint to the center of the farthest hole. See Figure 7.

**Note:** All four pins must equally support the weight of the deck. Adjustment in the length of the rear deck support assemblies may be necessary. If one side is longer than 6.89 inches (approximately 6 7/8 inches) (175.01 mm), than the opposite side must be shorter by the same amount.



**Figure 7**

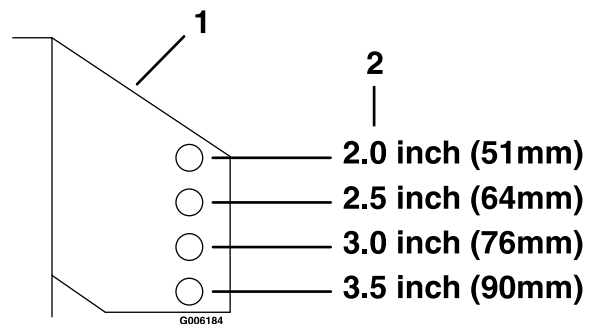
Left Hand Side Shown

## Adjusting the Anti-Scalp Rollers

It is recommended to change the anti-scalp roller position when the height of cut has changed.

1. Stop the machine and move the drive levers to the neutral lock position.
2. Disengage the PTO.
3. Engage the park brake.
4. Stop the engine, remove the key and wait for all moving parts to stop.
5. After adjusting the height of cut, adjust the anti-scalp rollers by removing the whizlock nut and spring disc washer.
6. Adjust anti-scalp rollers for Normal Operating Conditions. Place rollers in one of the positions shown in Figure 8. Rollers will maintain 3/4 inches (19 mm) clearance to the ground to minimize gouging and roller wear or damage.

**Note:** For Maximum Deck Flotation, place rollers one hole position lower. Rollers should maintain 1/4 inch (6.35 mm) clearance to ground. Do Not adjust rollers to support the deck. Be sure roller bolts are installed with the spring disc washer between head of the nut and mounting bracket.

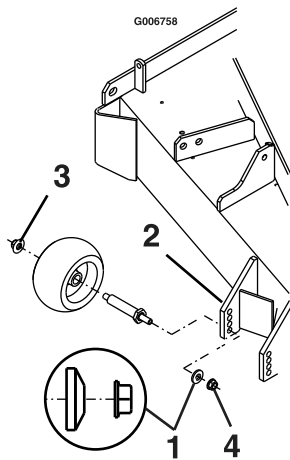


**Figure 8**

For cutting heights above 3.5 inches (38 mm) use the bottom hole. The rollers will still be effective against scalping.

1. Anti-scalp roller mounting bracket      2. Cutting height

7. Torque the 3/8–16 whizlock nut to 30–35 ft-lb (41–47 N-m) (Figure 9).
8. If the 3/8 nyloc nut has been removed, reinstall and torque to 30–35 ft-lb (41–47 N-m) (Figure 9).



**Figure 9**

- |   |  |
|---|--|
| 1. Spring disc washer<br>(cone towards nut) | 3. 3/8 nyloc-torque to 30-35<br>ft-lb (41-47 N-m)              |
| 2. Front right anti-scalp<br>bracket shown  | 4. 3/8-16 whizlock nut<br>torque to 30-35 ft-lb<br>(41-47 N-m) |

## Transporting

### Transporting a Unit

#### **⚠ WARNING**

Loading the mower onto a trailer without strong enough or properly supported ramps could be dangerous. The ramps could collapse causing the unit to fall, which could cause injury.

- Use proper ramps that are secured to the truck or trailer.
- Keep feet and legs out from under the unit when loading and unloading.
- If necessary, use assistance when loading.

Be sure the fuel shut-off valve is closed.

Use a heavy duty trailer to transport the machine. Engage neutral lock latches and park brake, then block wheels.

Securely fasten the machine to the trailer with straps, chains, cables, or ropes.

Do Not rely solely on the parking brake to hold the machine on the trailer.

Be sure that the trailer has all necessary lighting and marking as required by law and use a safety chain.

## Maintenance

**Note:** Determine the left and right sides of the machine from the normal operating position.

### ⚠ WARNING

While maintenance or adjustments are being made, someone could start the engine. Accidental starting of the engine could seriously injure you or other bystanders.

Remove the key from the ignition switch, engage parking brake, and pull the wire(s) off the spark plug(s) before you do any maintenance. Also push the wire(s) aside so it does not accidentally contact the spark plug(s).

### ⚠ WARNING

The engine can become very hot. Touching a hot engine can cause severe burns.

Allow the engine to cool completely before service or making repairs around the engine area.

## Recommended Maintenance Schedule(s)

Maintenance Service Interval	Maintenance Procedure
After the first 2 hours	<ul style="list-style-type: none"> <li>Inspect PTO clutching belt tension. Check every 2 hours for the first 8 hours of operation.</li> </ul>
After the first 5 hours	<ul style="list-style-type: none"> <li>Change the engine oil.</li> </ul>
After the first 100 hours	<ul style="list-style-type: none"> <li>Check wheel hub-slotted torque specification.</li> </ul>
After the first 250 hours	<ul style="list-style-type: none"> <li>Change the hydraulic filter.</li> </ul>
Before each use or daily	<ul style="list-style-type: none"> <li>Check the engine oil level.</li> <li>Check the mower blades.</li> <li>Check the safety interlock system.</li> <li>Check for loose hardware.</li> <li>Grease the caster wheel bearings.</li> <li>Grease caster pivots.</li> <li>Clean the engine and exhaust system area.</li> <li>Clean the grass and debris build-up from the machine and cutting deck.</li> <li>Clean the grass build-up from under the deck.</li> </ul>
Every 25 hours	<ul style="list-style-type: none"> <li>Service the foam element. (May need more often under severe conditions. See the Engine Owner's manual for additional information.)</li> </ul>
Every 40 hours	<ul style="list-style-type: none"> <li>Check the hydraulic oil level.</li> <li>Check the tire pressures.</li> <li>Check the condition of the belts.</li> <li>Grease the pump drive idler pivot.</li> <li>Grease the clutch arm pivot.</li> <li>Grease the pump control bearings.</li> <li>Grease the mower deck idler pivot.</li> <li>Inspect PTO clutching belt tension.</li> </ul>
Every 100 hours	<ul style="list-style-type: none"> <li>Service the paper element. (May need more often under severe conditions. See the Engine Owner's manual for additional information.)</li> <li>Change the engine oil. (May need more often under severe conditions.)</li> <li>Remove engine shrouds and clean cooling fins.</li> </ul>
Every 160 hours	<ul style="list-style-type: none"> <li>Check the spark plugs.</li> </ul>
Every 200 hours	<ul style="list-style-type: none"> <li>Replace the paper element.</li> </ul>



Maintenance Service Interval	Maintenance Procedure
Every 500 hours	<ul style="list-style-type: none"> <li>Change the hydraulic filter (Every 250 hours/yearly if using Mobil 1 15W50)</li> <li>Replace the emissions air intake filter.</li> <li>Check wheel hub-slotted torque specification.</li> </ul>
Monthly	<ul style="list-style-type: none"> <li>Check the battery charge.</li> <li>Grease the PTO engagement bellcrank.</li> </ul>

## Periodic Maintenance

### Check Engine Oil Level

**Service Interval: Before each use or daily**

1. Stop engine and wait for all moving parts to stop. Make sure unit is on a level surface.
2. Check with engine cold.
3. Clean area around dipstick. Remove dipstick and wipe oil off. Reinsert the dipstick and push it all the way down into the tube. **Do Not** screw into place. Remove the dipstick and read the oil level.
4. If the oil level is low, wipe off the area around the oil fill cap, remove cap and fill to the “FULL” mark on the dipstick. Exmark 4-Cycle Premium Engine Oil is recommended; refer to the Engine Owner’s manual for an acceptable alternative. **Do Not** overfill.

**Important:** Do Not operate the engine with the oil level below the “LOW” (or “ADD”) mark on the dipstick, or over the “FULL” mark.

### Check Battery Charge (Electric Start Units Only)

**Service Interval: Monthly**

<b>⚠ WARNING</b>
<p><b>CALIFORNIA</b>  <b>Proposition 65 Warning</b></p> <p><b>Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.</b></p>

performance and service life. To preserve optimum battery performance and life, recharge batteries in storage when the open circuit voltage drops to 12.4 volts.

**Note:** To prevent damage due to freezing, battery should be fully charged before putting away for winter storage.

Check the voltage of the battery with a digital voltmeter. Locate the voltage reading of the battery in the table and charge the battery for the recommended time interval to bring the charge up to a full charge of 12.6 volts or greater.

**Important:** Make sure the negative battery cables are disconnected and the battery charger used for charging the battery has an output of 16 volts and 7 amps or less to avoid damaging the battery (see chart for recommended charger settings).

Voltage Reading	Percent Charge	Maximum Charger Settings	Charging Interval
12.6 or greater	100%	16 volts/7 amps	No Charging Required
12.4 – 12.6	75–100%	16 volts/7 amps	30 Minutes
12.2 – 12.4	50–75%	16 volts/7 amps	1 Hour
12.0–12.2	25–50%	14.4 volts/4 amps	2 Hours
11.7–12.0	0–25%	14.4 volts/4 amps	3 Hours
11.7 or less	0%	14.4 volts/2 amps	6 Hours or More

Allowing batteries to stand for an extended period of time without recharging them will result in reduced

## Recommended Jump Starting Procedure (Electric Start Units Only)

**Service Interval: As required**

1. Check the weak battery for terminal corrosion (white, green, or blue “snow”), it must be cleaned off prior to jump starting. Clean and tighten connections as necessary.

### ⚠ CAUTION

Corrosion or loose connections can cause unwanted electrical voltage spikes at anytime during the jump starting procedure.

Do Not attempt to jump start with loose or corroded battery terminals or damage to the engine may occur.

### ⚠ DANGER

Jump starting a weak battery that is cracked, frozen, has low electrolyte level, or an open/shorted battery cell, can cause an explosion resulting in serious personal injury.

Do Not jump start a weak battery if these conditions exist.

2. Make sure the booster is a good and fully charged lead acid battery at 12.6 volts or greater. Use properly sized jumper cables (4 to 6 AWG) with short lengths to reduce voltage drop between systems. Make sure the cables are color coded or labeled for the correct polarity.

### ⚠ CAUTION

Connecting the jumper cables incorrectly (wrong polarity) can immediately damage the electrical system.

Be certain of battery terminal polarity and jumper cable polarity when hooking up batteries.

**Note:** The following instructions are adapted from the SAE J1494 Rev. Dec. 2001 – Battery Booster Cables – Surface Vehicle Recommended Practice (SAE – Society of Automotive Engineers).

### ⚠ WARNING

Batteries contain acid and produce explosive gases.

- Shield the eyes and face from the batteries at all times.
- Do Not lean over the batteries.

**Note:** Be sure the vent caps are tight and level. Place a damp cloth, if available, over any vent caps on both batteries. Be sure the vehicles do not touch and that both electrical systems are off and at the same rated system voltage. These instructions are for negative ground systems only.

3. Connect the positive (+) cable to the positive (+) terminal of the discharged battery that is wired to the starter or solenoid as shown in Figure 10.

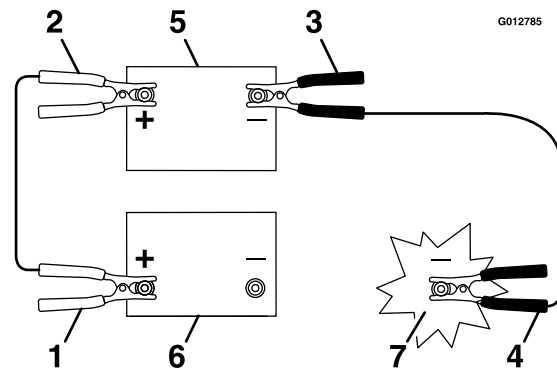


Figure 10

1. Positive (+) cable on discharged battery
  2. Positive (+) cable on booster battery
  3. Negative (-) cable on the booster battery
  4. Negative (-) cable on the engine block
  5. Booster battery
  6. Discharged battery
  7. Engine block
- 
4. Connect the other end of the positive cable to the positive terminal of the booster battery.
  5. Connect the black negative (-) cable to the other terminal (negative) of the booster battery.
  6. MAKE THE FINAL CONNECTION ON THE ENGINE BLOCK OF THE STALLED VEHICLE (NOT TO THE NEGATIVE POST) AWAY FROM THE BATTERY. STAND BACK.
  7. Start the vehicle and remove the cables in the reverse order of connection (the engine block (black) connection is the first to disconnect).

## Check Mower Blades

### Service Interval: Before each use or daily

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Lift deck and secure in raised position as stated in the **Clean Grass Build-Up Under Deck** section.
3. Inspect blades and sharpen or replace as required.
4. Reinstall the blades (if they were removed) in the following order:
  - A. Install bushing through blade with bushing flange on bottom (grass) side of blade.

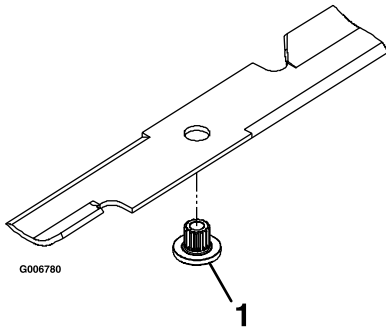


Figure 11

1. Install bushing in blade prior to installing bushing in spindle.

- B. Install bushing/blade assembly into spindle.

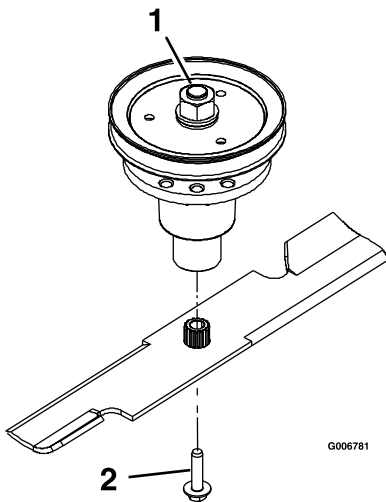


Figure 12

1. Use wrench here for blade installation. This nut has been torqued to 140–145 ft-lb (190–197 N-m)
2. Torque to 55-60 ft-lb (75-81 N-m) Apply lubricant to threads as needed to prevent seizing. Copper-based anti-seize preferable. Grease acceptable substitute.

- C. Apply lubricant to threads of blade bolt as needed to prevent seizing. Copper-based anti-seize preferable. Grease acceptable substitute. Install blade bolt finger tight. Place wrench on the top spindle nut then torque the blade bolts to 55-60 ft-lb (75-81 N-m).

### ⚠ WARNING

**Incorrect installation of the blade or components used to retain the blade can be dangerous. Failure to use all original components and assembled as shown could allow a blade or blade component to be thrown out from under the deck resulting in serious personal injury or death.**

Always install the original Exmark blades, blade bushings, and blade bolts as shown.

## Replacing the Discharge Deflector

### Service Interval: As required

### ⚠ DANGER

**An uncovered discharge opening could allow the lawn mower to throw objects in the operator's or bystander's direction and result in serious injury. Also, contact with the blade could occur.**

**Never operate the lawn mower unless you install a mulch plate, discharge deflector, or grass collection system.**

1. To remove a damaged or worn discharge deflector, lift the leg of the spring with the loop out of the notch in the discharge deflector and slide the rod out of the discharge deflector brackets, and discharge deflector.
2. To install new discharge deflector, orient the spring on the rod as shown in Figure 13. Slide the rod through the front discharge deflector bracket, discharge deflector, and rear deflector bracket.

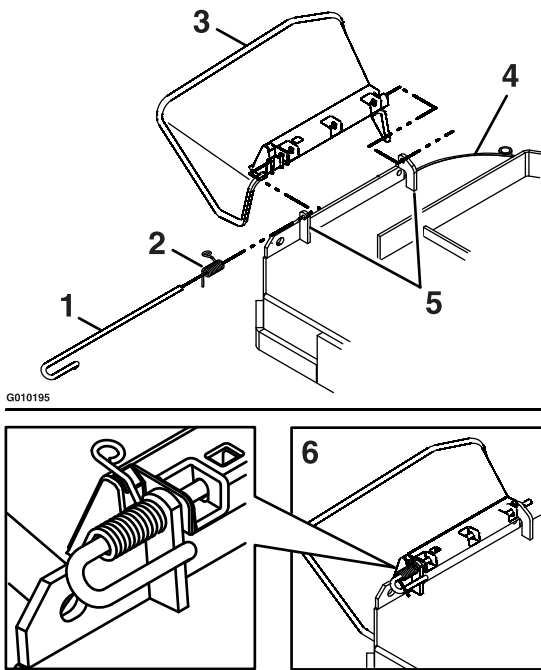


Figure 13

- |                        |                                |
|------------------------|--------------------------------|
| 1. Rod                 | 4. Mower deck                  |
| 2. Spring              | 5. Discharge deflector bracket |
| 3. Discharge deflector | 6. Assembled view              |

- Hook the bent end of the rod around the front discharge deflector bracket to retain it from sliding out. Place the leg of the spring with the loop in the notch in the discharge deflector to hold the discharge deflector in the down position (see Figure 13).

**Important:** The discharge deflector must be spring loaded in the down position. Lift the deflector up to test that it snaps to the full down position.

## Check Safety Interlock System

**Service Interval:** Before each use or daily

- For Electric Start Units Only: Check starting circuit. Starter should crank with: Operator Presence Control levers **depressed**, speed control lever in **neutral**, and PTO **disengaged**.

Try to start the engine with OPC levers **disengaged**, speed control lever in **neutral** and PTO **disengaged**—starter must not crank.

Try to start with, OPC levers **depressed**, speed control lever in any speed but **neutral** and PTO **disengaged**—starter must not crank.

Try to start with OPC levers **depressed**, speed control lever in **neutral** and PTO **engaged**—starter must not crank. .

- For All Units: Check OPC circuits. Clear the area. Disengage the park brake. Run engine at one-third throttle, then, with drive levers and neutral lock latches in **neutral lock position**, move the speed control lever out of neutral and release OPC levers—**engine must stop**. Again, run engine at one-third throttle, move the speed control lever to **neutral**, engage PTO and release OPC levers—**engine must stop**.

**Note:** Park brake must be disengaged before the speed control lever is moved out of neutral or engine will kill.

For Manual Start Engines: The park brake must be disengaged before the PTO is engaged or the engine will kill.

**Note:** If machine does not pass any of these tests, do not operate. Contact your authorized **EXMARK SERVICE DEALER**.

**Important:** It is essential that operator safety mechanisms be connected and in proper operating condition prior to use for mowing.

## Check for Loose Hardware

**Service Interval:** Before each use or daily

- Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
- Visually inspect machine for any loose hardware or any other possible problem. Tighten hardware or correct the problem before operating.

## Service Air Cleaner

**Service Interval:** Every 25 hours—Service the foam element. (May need more often under severe conditions. See the Engine Owner's manual for additional information.)

Every 100 hours—Service the paper element. (May

**need more often under severe conditions. See the Engine Owner's manual for additional information.)**

**Every 200 hours/Yearly (whichever comes first)—Replace the paper element.**

1. Stop engine, wait for all moving parts to stop, and remove key or spark plug wire(s). Engage parking brake.
2. See the Engine Owner's Manual for maintenance instructions.

## Change Engine Oil

**Service Interval: After the first 5 hours**

**Every 100 hours (May need more often under severe conditions.)**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Drain oil while engine is warm from operation.
3. The oil drain hose assembly is located on the left side of the engine.

Place pan under machine to catch oil. Remove oil drain plug. Allow oil to drain and replace oil drain plug. Torque plug to 20-24 ft-lb (27-33 N-m).

4. Replace the oil filter per the Engine Owner's Manual. Clean around oil filter and unscrew filter to remove. Before the new filter is installed, apply a thin coating of Exmark 4-Cycle Premium Engine Oil on the surface of the rubber seal. Turn filter clockwise until rubber seal contacts the filter adapter, then tighten filter an additional  $\frac{2}{3}$  to  $\frac{3}{4}$  turn.
5. Clean around oil fill cap and remove cap. Fill to specified capacity and replace cap.
6. Use oil recommended in the **Check Engine Oil Level** section. **Do Not** overfill. Start the engine and check for leaks. Stop engine and recheck oil level.

## Check Hydraulic Oil Level

**Service Interval: Every 40 hours**

1. Stop engine and wait for all moving parts to stop, and remove key. Engage parking brake.
2. Clean area around hydraulic reservoir cap and remove cap. Oil level should be to the top of the baffle inside the tank. If not, add oil. Use Exmark Premium Hydro Oil. Replace hydraulic reservoir cap and tighten until snug. Do Not overtighten.

**Note:** The baffle is labeled "HOT" and "COLD". The oil level varies with the temperature of the oil. The "HOT" level shows the level of oil when it is at 225°F (107°C). The "COLD" level shows the level of the oil when it is at 75°F (24°C). Fill to the appropriate level depending upon the temperature of the oil. For example: If the oil is about 150°F (65°C), fill to halfway between the "HOT" and "COLD" levels. If the oil is at room temperature (about 75°F (24°C)), fill only to the "COLD" level.

## Check Tire Pressures

**Service Interval: Every 40 hours**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Check tire pressure in drive tires.
3. Inflate drive tires to 12–16 psi (83–110 kPa).
4. Inflate tires to pressures stated above. Measure the circumference of each drive tire. Adjust tire pressures within the above range to try to make tire circumferences match as closely as possible.
5. Semi-pneumatic caster tires do not need to be inflated.

## Check Condition Of Belts

**Service Interval: Every 40 hours**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Remove the mower deck belt shield to check mower blade drive belt condition.
3. Look under engine deck to check the pump drive belt condition.
4. Check all idler arms to be sure they pivot freely. Disassemble, clean and grease pivot bushings if necessary.

## Lubricate Grease Fittings

**Note:** See chart for service intervals.

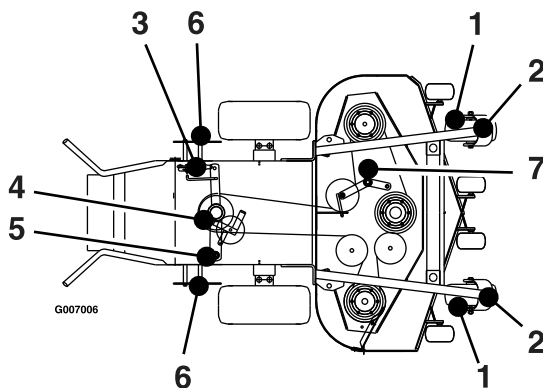
# Maintenance

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Lubricate fittings with NGLI grade #2 multi-purpose gun grease.

Refer to the following chart for fitting locations and lubrication schedule.

## Lubrication Chart

Fitting Locations	Initial Pumps	Number of Places			Service Interval
		36 inch Deck	48 inch Deck	52 inch Deck	
1. Caster Wheel Bearings	12	2	2	2	Daily
2. Caster Pivots	2	2	2	2	Daily
3. PTO Engagement Bellcrank	1	1	1	1	40 hours
4. Pump Drive Idler Pivot	2	1	1	1	Yearly
5. Clutch Arm Pivot	1	1	1	1	40 hours
6. Pump Control Bearings	2	2	2	2	40 hours
7. Mower Deck Idler Pivots	2	1	1	1	Yearly



Number 4 Idler Pivot (Pump Drive) Located under engine deck.

Number 5 (Clutch Arm Pivot) Located under engine deck.

3. Lubricate pivot points with a spray penetrating lubricant as shown in the **Spray Lubricant Chart**.

## Spray Lubricant Chart

## Spray Lubricant Chart (cont'd.)

Pivot Point	Number of Places	Service Interval
1. PTO Lever	1	40 hours

## Check Spark Plugs

### Service Interval: Every 160 hours

Remove spark plugs, check condition and reset gaps, or replace with new plugs. See Engine Owner's Manual.

## Change Fuel Filter

### Service Interval: As required

A fuel filter is installed in the fuel line between the fuel tank and the engine. Replace when necessary.

## Change Hydraulic System Filter

### Service Interval: After the first 250 hours

**Every 500 hours/Yearly (whichever comes first) thereafter**

**(Every 250 hours/Yearly if using Mobil 1 15W50)**

**Note:** Use only Exmark Part No. 109-4180 for Summer use above 32°F (0°C) or P/N 1-523541 for Winter use below 32°F (0°C) (Refer to **Transmission** section in Specifications for filter specifications).

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Carefully clean area around filter. It is important that no dirt or contamination enter hydraulic system.
3. Unscrew filter to remove and allow oil to drain from reservoir.

**Important: Before reinstalling new filter, fill it with Exmark Premium Hydro Oil and apply a thin coat of oil on the surface of the rubber seal.**

Turn filter clockwise until rubber seal contacts the filter adapter, then tighten the filter an additional 2/3 to 3/4 turn.

4. Fill reservoir as stated in **Check Hydraulic Oil Level**.

Exmark Premium Hydro Oil is recommended. Refer to the chart for an acceptable alternative:

Hydro Oil	Change Interval
Exmark Premium Hydro Oil (Preferred)	500 Hours
Mobil 1 15W50	250 Hours

- Loosen filter 1/2 turn and allow a small amount of oil to leak from the oil filter (this allows air to be purged from the oil filter and supply hose from the hydraulic reservoir). Turn filter clockwise until rubber seal contacts the filter adapter. Then tighten the filter an additional 2/3 to 3/4 turn.
- Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.

## ⚠ CAUTION

Raising the mower for service or maintenance relying solely on mechanical or hydraulic jacks could be dangerous. The mechanical or hydraulic jacks may not be enough support or may malfunction allowing the unit to fall, which could cause injury.

**Do Not** rely solely on mechanical or hydraulic jacks for support. Use adequate jack stands or equivalent support.

- If either drive wheel does not rotate, one or both of the charge pumps (located on the top of the main pump as shown in Figure 14) may have lost their “prime”. Refer to **Hydraulic System Air Purge** section.

**Note:** Do Not change hydraulic system oil (except for what can be drained when changing filter), unless it is felt the oil has been contaminated or been extremely hot.

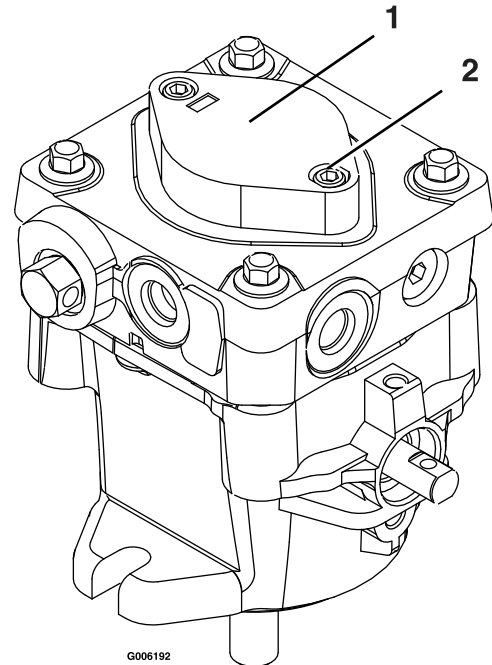
Changing oil unnecessarily could damage hydraulic system by introducing contaminants into the system.

## Hydraulic System Air Purge

### Service Interval: As required

Air must be purged from the hydraulic system when any hydraulic components, including oil filter, are removed or any of the hydraulic lines are disconnected.

The critical area for purging air from the hydraulic system is between the oil reservoir and each charge pump located on the top of each variable displacement pump (Figure 14). Air in other parts of the hydraulic system will be purged through normal operation once the charge pump is “primed”.



**Figure 14**

- Charge pump cap
- Loosen 1 1/2 turns only

- Stop engine and wait for all moving parts to stop. Raise the rear of the machine up onto jack stands high enough to raise the drive wheels off the ground.
- Check oil level as stated in **Check Hydraulic Oil Level** section.
- Start engine and move throttle control ahead to full throttle position. Move the speed control lever to the middle speed position and place the drive levers in the “drive” position.

If either drive wheel does not rotate, it is possible to assist the purging of the charge pump by carefully rotating the tire in the forward position.

**Note:** It is necessary to lightly touch the charge pump cap with your hand to check the pump temperature. If the cap is too hot to touch, turn off engine. The pumps may be damaged if the pump becomes too hot.

If either drive wheel still does not rotate continue with step 4.

# Maintenance

4. Thoroughly clean the area around each of the charge pump housings.
5. To “prime” charge pump, loosen two hex socket head capscrews (shown in Figure 14) **1 1/2 turns only. Make sure engine is not running.** Lift the charge pump housing upward and wait for a steady flow of oil to flow out from under the housing. Retighten the capscrews. Do this for both pumps.

**Note:** Hydraulic reservoir can be pressurized up to 5 psi to speed this process.

6. If either drive wheel still does not rotate, stop and repeat steps 4 and 5 above for the respective pump. If wheels rotate slowly, the system may prime after additional running. Check oil level as stated in **Check the Hydraulic Oil Level** section.
7. Allow unit to run several minutes after the charge pumps are “primed” with drive system in the full speed position. Check oil level as stated in **Check the Hydraulic Oil Level** section.
8. Check hydro drive linkage adjustment as stated in **Hydro Drive Linkage Adjustment** section in Adjustments.

## Replace Emissions Air Intake Filter

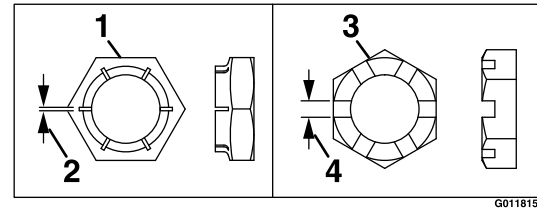
**Service Interval: Every 500 hours**

1. Stop engine, wait for all moving parts to stop, and remove key or spark plug wire(s). Engage parking brake.
2. Remove the filter from the vent hose.
3. Insert a new filter into the end of the vent hose.

## Wheel Hub-Slotted Nut Torque Specification

**Service Interval: After the first 100 hours  
Every 500 hours thereafter**

See Figure 15 to determine which slotted nut has been installed on the unit.



**Figure 15**

1. Style A (black finish)
2. .03 inch (.76 mm)
3. Style B (yellow zinc)
4. .24 inch (6 mm)

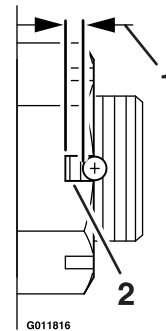
- **Style A (black finish):**

Torque the slotted nut to 140-155 ft-lb (190-210 N-m).

**Note:** Do Not use anti-seize on wheel hub.

- **Style B (yellow zinc):**

1. Remove and discard the cotter pin.
2. Torque the slotted nut to 100 ft-lb (136 N-m).
3. Check distance from bottom of slot in nut to inside edge of hole. Two threads (0.1 inch) or less should be showing.



**Figure 16**

1. 0.1 inch max
2. No more than two threads (0.1 inch max) should be showing here.

4. If more than two threads (0.1 inch) are showing remove nut and install washer (P/N 1-523157) between hub and nut.
5. Torque the slotted nut to 100 ft-lb (136 N-m).
6. Then tighten nut until the next set of slots line up with the cross hole in shaft. Do Not loosen nut to align the slot. If required, tighten to the next set of slots.
7. Install new cotter pin (P/N 1-806800).

**Note:** Do Not use anti-seize on wheel hub.

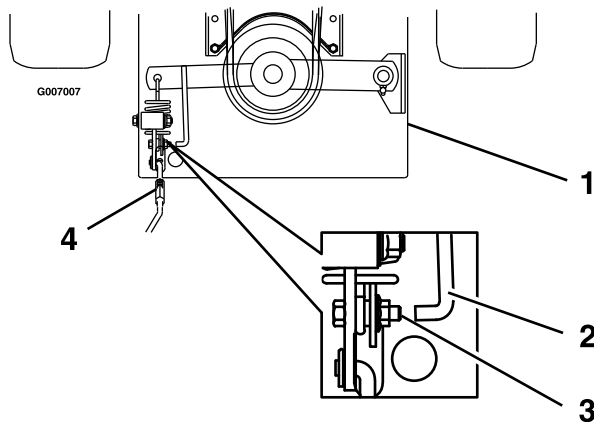


## Inspect PTO Clutching Belt Tension

**Service Interval: After the first 2 hours  
Check every 2 hours  
for the first 8 hours of  
operation.**

**Every 40 hours thereafter.**

1. Stop engine and wait for all moving parts to stop.
2. Engage PTO lever.
3. Look through the round hole in the left rear corner of the engine deck to inspect blade clutching belt tension. Bolt on blade engagement linkage bellcrank and indicator arm should align within 1/16 inch (1.6 mm) (see Figure 17). Refer to **PTO Engagement Linkage** for adjustment.



**Figure 17**

- |                |  |
|----------------|--|
| 1. Engine deck | 3. Align bolt to indicator within 1/16 inch (1.6 mm) |
| 2. Indicator   | 4. Turnbuckle  |

## Thread Locking Adhesives

Thread locking adhesives such as “Loctite 242” or “Fel-Pro, Pro-Lock Nut Type” are used on the following fasteners:

- Pump sheave setscrews.
- Square head setscrews on hydro pump control arms.
- OPC lever setscrews.
- Lower sheave retaining bolt on clutch arm.
- Shoulder bolts in ends of speed control crank.

- Sheave retaining bolt in end of engine crankshaft.
- Fuel tank bulkhead fitting threads

Adhesives such as “Loctite RC/609 or RC/680” or “Fel-Pro Pro-Lock Retaining I or Retaining II” are used on the following:

- OPC lever hubs and cross-shaft.
- Note:** Care must be used not to bond the bearing, next to each OPC hub, to the cross-shaft which could cause binding of the OPC levers and erratic operation.
- Fuel tank studs, where studs are inserted into tank.

## Mobil HTS Grease (Or Food-Grade Anti-seize)

Mobil HTS grease (or food-grade anti-seize) is used in the following locations:

- Between the cutter housing spindle and bearings.
- Between the cutter housing spindle and sheave.
- Under top cutter housing bearing guard.

## Copper-Based Anti-seize

Copper-based anti-seize is used in the following locations:

- On threads of Blade Bolts. See **Check Mower Blades** section.
- Between engine crankshaft and pump and blade drive sheaves.
- On clutch arm assembly between bearings and shaft and between lower sheave and shaft.
- Between pump shafts and sheaves.

## Dielectric Grease

Dielectric grease is used on all blade type electrical connections to prevent corrosion and loss of contact.

## Adjustments

**Note:** Disengage PTO, shut off engine, wait for all moving parts to stop, engage parking brake, and remove key before servicing, cleaning, or making any adjustments to the unit.

## Deck Leveling

See **Adjusting the Cutting Height** section in Operation.

## Pump Drive Belt Tension

Self-tensioning - No adjustment necessary.

## PTO Clutching Belt Tension

See **Inspect PTO Clutching Belt Tension** section.

## Deck Belt Tension

Self-tensioning - No adjustment necessary.

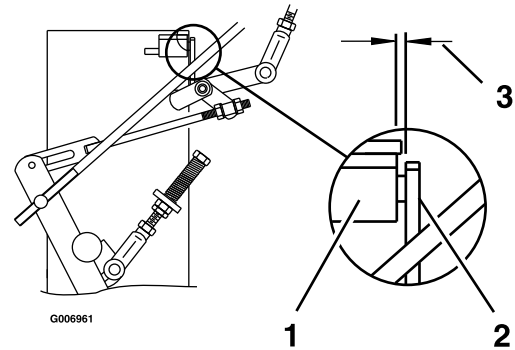
## Park Brake Adjustment

1. Shut off engine and wait for all moving parts to stop.
2. Disengage the park brake.
3. Remove the hairpin in the park brake linkage. Turn the linkage in the yoke until there is 3/16 inch (4.8 mm) to 1/4 inch (6.4 mm) clearance between the park brake tire bars and the tires with the park brake disengaged. Re-install the hairpin.

## Hydro Drive Linkage Adjustment

- **Adjust Speed Control Linkage and Neutral Safety Switch:**
  1. Stop engine and wait for all moving parts to stop. Engage parking brake. Remove key or spark plug wire(s).
  2. Move the speed control lever (located on the console) to the full forward position and check the orientation of the tabs on the ends of the speed control crank (see Figure 18). These tabs should be pointing straight down at the 6 o'clock position or slightly forward.

Adjust the threaded yoke at the bottom of the speed control linkage (see Figure 18) until the tabs are positioned correctly.



**Figure 18**

Viewed from Left Side of Unit

1. Neutral Safety Switch
2. Actuating Tab in neutral position
3. 5/16 inch (7.9 mm)

3. Pull the speed control lever back to neutral. Check that the neutral safety switch actuating tab has depressed the plunger of the switch so that there is about 5/16 inch (7.9 mm) between the tab and the switch (see Figure 18). If necessary, move the switch fore and aft.

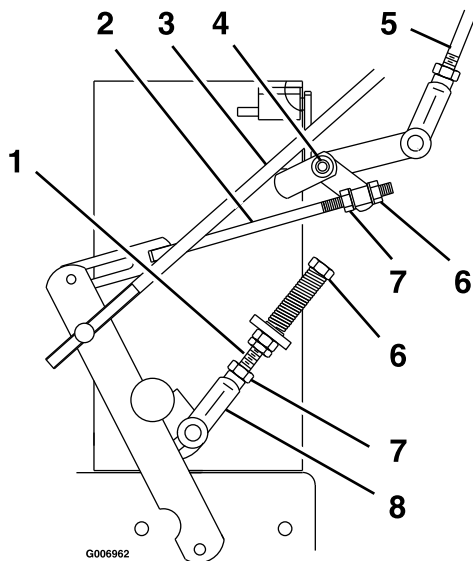
- **Adjust Neutral Control Linkages:**

1. Raise the rear of the machine up onto jack stands high enough to raise the drive wheels off of the ground.
2. Start the engine and move the throttle ahead to the full throttle position. Place the neutral lock latches in the “forward” position as shown in Figure 4. Release the park brake and move the speed control lever to the “mid-speed” position.

**Note:** The OPC levers must be held down and the park brake must be disengaged whenever the speed control lever is moved out of neutral or the engine will kill.

3. Squeeze the respective drive lever until an increased resistance is felt, this is where neutral should be.

If the wheel turns while holding the drive lever in neutral, the neutral control linkages need to be adjusted. If the wheel stops then go to step 7.



**Figure 19**

Viewed from Left Side of Unit

- |                            |  |
|----------------------------|--|
| 1. Neutral Control Linkage | 5. Speed Control Linkage   |
| 2. Hydro Control Linkage   | 6. Adjust here-rotate at approximately 1/4 turn increments and re-check. |
| 3. Drive Lever Linkage     | 7. Loosen nut  |
| 4. Speed Control Crank     | 8. Yoke  |

4. Loosen the nut against the neutral control linkage yoke as shown in Figure 19.
5. Adjust the neutral control linkage until the respective drive wheel stops when the lever is pulled against the neutral spring (neutral position). Turn the adjusting bolt approximately 1/4 turn clockwise if the wheel is turning in reverse or turn the bolt approximately 1/4 turn counterclockwise if the wheel is turning forward. Release the drive lever to the forward drive position and squeeze back into the neutral position. Check to see if the wheel stops. If not, repeat the above adjustment procedure.
6. Make this adjustment on both sides.
7. After adjustments are made and the wheels stop when the drive levers are in the neutral position, tighten the nuts against the yokes.

• **Adjust Hydro Control Linkages:**

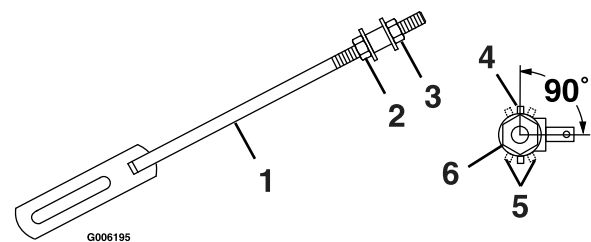
1. Place the speed control lever in the “neutral” position. This adjustment is again made with rear of machine on jack stands and engine running at full throttle. OPC levers will have to be held down and the park brake must be

disengaged whenever speed control levers are moved out of the neutral position.

**Note:** The neutral lock latches should be “unlocked” and in the forward position.

2. Loosen the front nut on left hydro control linkage as shown in Figure 19. Turn the rear control linkage adjusting nut counterclockwise until wheel rotates forward. Turn the rear nut of left control linkage clockwise 1/4 of a turn at a time, stopping to move the speed control forward and back to neutral, until left wheel stops rotating forward.

Turn the rear nut an additional 1/2 turn and tighten the front nut making sure not to put a bind on the linkage. Make sure flat part of linkage is perpendicular to pin part of swivel (see Figure 20).



**Figure 20**

- |  |   |
|--|---|
| 1. Left Hydro Control Link (left side shown) | 4. Linkage is perpendicular to pin (correct position) |
| 2. Front nut                                 | 5. Linkage in incorrect position                      |
| 3. Rear nut                                  | 6. End view of swivel                                 |

After adjusting the left hydro control linkage, move the speed control lever to the mid-speed position and then back to the neutral position. Recheck the left drive wheel rotation to see if further adjustment is necessary - be sure the speed control lever is in the neutral position.

**Important: If inconsistent neutral occurs, check to be sure both springs are properly tightened on the speed control lever under the console—especially the rear pivot spring.**

Repeat above adjustments if necessary.

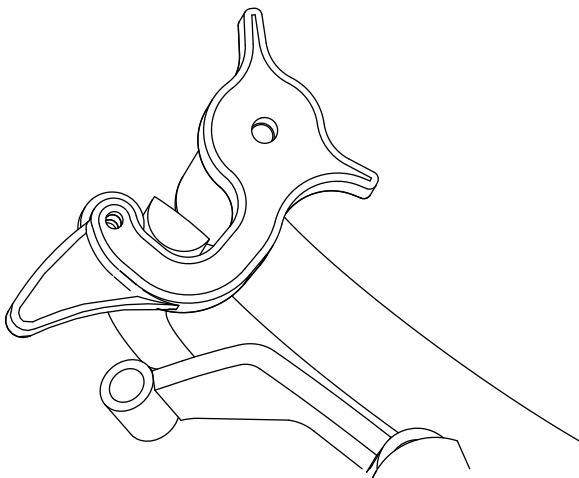
3. Place the speed control lever in neutral. Adjust the right side linkage by turning the quick track knob counterclockwise until the tire begins to rotate forward. Begin to retighten the knob clockwise about 1/4 turn at a time, stopping to move the speed control forward and back

to neutral. Recheck the drive wheel rotation to see if further adjustment is necessary.

- The spring that keeps tension on the knob should normally not need adjustment. However, if adjustment is needed, adjust to where length of spring is about 1 inch (2.5 cm) between the washers. Adjust spring length by turning nut at front of spring.

- **Drive Lever Linkage Adjustment:**

- With rear of machine still on jack stands and engine running at full throttle, disengage the park brake and move the speed control lever to the midway position. Move the respective drive lever upward until it reaches the neutral position and engage neutral lock latches (Figure 21). If the tire rotates in either direction, the length of the drive lever link will need to be adjusted.



**Figure 21**

- Adjust the linkage length by loosening the jam nuts at both ends of the linkage and rotating the linkage in the ball joints. Lengthen the linkage if the tire is turning in reverse and shorten the linkage if the tire is creeping forward. Tighten the jam nuts at both ends. Release and re-engage the neutral lock latch checking that the tire stops. Continue this process until the tire is at a dead stop.
- Make this adjustment for both sides.
- Stop engine and wait for all moving parts to stop. Raise rear of machine, remove jack stands, and carefully lower machine to the ground.

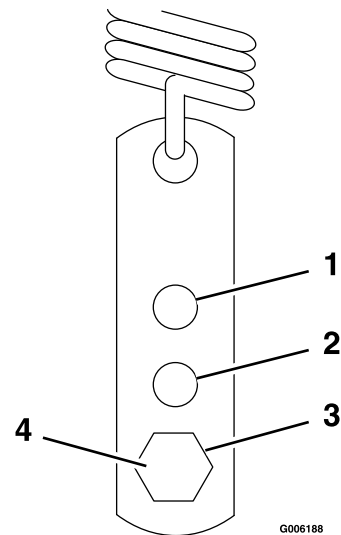
## Tracking Adjustment

- Stop engine and wait for all moving parts to stop.
- Check the drive tire pressures and tire circumferences as stated in **Check the Tire Pressures** section in Maintenance.
- Run the unit and observe the tracking on a level, smooth, hard surface such as concrete or asphalt.
- If the unit tracks to one side or the other, turn the quick track knob. Turn the knob right to “steer” right, turn the knob left to “steer” left.

## Hydro Pump Spring Tension Setting

- For medium or heavy duty drive conditions such as operation with a sulky on steep slopes, a higher spring force may be required on the hydro pump control arms to prevent the drive system from stalling.
- For a heavier drive setting, relocate the spring anchor link as shown in Figure 13. The spring anchor links are located under the engine deck on the left and right hand sides.

**Note:** In “medium” or “heavy duty” positions, the drive lever forces at the upper handle will also be increased.



**Figure 22**

- |                |                   |
|----------------|-------------------|
| 1. Heavy duty  | 3. Standard       |
| 2. Medium duty | 4. Retaining bolt |

## PTO Safety Switch

Mounted to a tab on the inside left side of the fuel tank support.

1. Stop engine and wait for all moving parts to stop. Engage parking brake. Remove ignition key or spark plug wire(s).
2. With PTO disengaged and the bellcrank touching the rear of the slot in the engine deck, adjust the PTO safety switch (if needed) until the bellcrank arm is 5/16 inch (7.9 mm) from the switch body.
3. Be sure the bellcrank Does Not touch the switch body or damage to the switch could occur.
4. Retighten PTO switch mounting hardware.

## Cleaning

### Clean Engine and Exhaust System Area

**Service Interval: Before each use or daily (May be required more often in dry or dirty conditions.)**

#### **⚠ CAUTION**

**Excessive debris around engine cooling air intake and exhaust system area can cause engine, exhaust area, and hydraulic system to overheat which can create a fire hazard.**

**Clean all debris from engine and exhaust system area.**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Clean all debris from rotating engine air intake screen, around engine shrouding, and exhaust system area.
3. Wipe up any excessive grease or oil around the engine and exhaust system area

### Remove Engine Shrouds and Clean Cooling Fins

**Service Interval: Every 100 hours**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Remove cooling shrouds from engine and clean cooling fins. Also clean dust, dirt, and oil from external surfaces of engine which can cause improper cooling.
3. Make sure cooling shrouds are properly reinstalled. Operating the engine without cooling shrouds will cause engine damage due to overheating.

## Maintenance

---

### Clean Debris From Machine

#### Service Interval: Before each use or daily

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Clean off any oil, debris, or grass build-up on the machine and cutting deck, especially under deck belt shields, around the fuel tank, around engine and exhaust area.

If a battery is being replaced or if the unit containing the battery is no longer operating and is being scrapped, take the battery to a local certified recycling center. If no local recycling is available return the battery to any certified battery reseller.

### Clean Grass Build-Up Under Deck

#### Service Interval: Before each use or daily

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Raise deck to the transport (maximum cutting height) position. Lift the front of unit and support unit using jack stands or equivalent support.
3. Clean out any grass build-up from underside of deck and in discharge chute.

## Waste Disposal

### Motor Oil Disposal

Engine oil and hydraulic oil are both pollutants to the environment. Dispose of used oil at a certified recycling center or according to your state and local regulations.

### Battery Disposal

#### **⚠ DANGER**

Battery electrolyte contains sulfuric acid, which is poisonous and can cause severe burns.

Swallowing electrolyte can be fatal or if it touches skin can cause severe burns.

- **Wear safety glasses to shield eyes, and rubber gloves to protect skin and clothing when handling electrolyte.**
- **Do Not swallow electrolyte.**
- **In the event of an accident, flush with water and call a doctor immediately.**

Federal law states that batteries should not be placed in the garbage. Management and disposal practices must be within relevant federal, state, or local laws.

## Troubleshooting

**Important:** It is essential that all operator safety mechanisms be connected and in proper operating condition prior to mower use.

When a problem occurs, do not overlook the simple causes. For example: starting problems could be caused by an empty fuel tank.

The following table lists some of the common causes of trouble. Do Not attempt to service or replace major items or any items that call for special timing of adjustments procedures (such as valves, governor, etc.). Have this work done by your **Engine Service Dealer**.

**Note:** When disconnecting electrical connectors Do Not pull on the wires to separate the connectors.

Problem	Possible Cause	Corrective Action
Starter does not crank (Electric Start Units).	<ol style="list-style-type: none"> <li>1. PTO is engaged.</li> <li>2. Speed control lever is are not in neutral lock position.</li> <li>3. OPC levers are released.</li> <li>4. Battery does not have a full charge.</li> <li>5. Electrical connections are corroded, loose or faulty.</li> <li>6. Fuse is blown.</li> <li>7. Relay or switch is defective.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disengage the PTO.</li> <li>2. Ensure the speed control lever is in the neutral lock position.</li> <li>3. Depress OPC levers.</li> <li>4. Charge the battery. See <b>Check Battery Charge and Recommended Jump Starting Procedure</b> sections in Maintenance.</li> <li>5. Check the electrical connections for good contact. Clean connector terminals thoroughly with electrical contact cleaner, apply dielectric grease and reconnect.</li> <li>6. Replace the blown fuse.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>
Engine will not start, starts hard, or fails to keep running	<ol style="list-style-type: none"> <li>1. Fuel tank is empty.</li> <li>2. Fuel shutoff valve is closed.</li> <li>3. The throttle and choke are not in the correct position.</li> <li>4. Dirt in fuel filter.</li> <li>5. Dirt, water, or stale fuel is in the fuel system.</li> <li>6. Air cleaner is dirty.</li> <li>7. Electrical connections are corroded, loose or faulty.</li> <li>8. Relay or switch is defective.</li> <li>9. Faulty spark plug.</li> <li>10. Spark plug wire is not connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill the fuel tank.</li> <li>2. Open the fuel shutoff valve.</li> <li>3. Be sure the throttle control is midway between the "SLOW" and "FAST" positions, and the choke is in the "ON" position for a cold engine or the "OFF" position for a warm engine.</li> <li>4. Replace the fuel filter.</li> <li>5. Contact an Authorized Service Dealer.</li> <li>6. Clean or replace the air cleaner element.</li> <li>7. Check the electrical connections for good contact. Clean connector terminals thoroughly with electrical contact cleaner, apply dielectric grease and reconnect.</li> <li>8. Contact an Authorized Service Dealer.</li> <li>9. Clean, adjust or replace spark plug.</li> <li>10. Check the spark plug wire connection.</li> </ol>
Engine loses power	<ol style="list-style-type: none"> <li>1. Engine load is excessive</li> <li>2. Air cleaner is dirty.</li> <li>3. Oil level in the crankcase is low.</li> <li>4. Cooling fins and air passages for the engine are plugged.</li> <li>5. Vent hole in the fuel cap is plugged.</li> <li>6. Dirt in fuel filter.</li> <li>7. Dirt, water, or stale fuel is in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Clean or replace the air cleaner element.</li> <li>3. Add oil to the crankcase.</li> <li>4. Remove the obstructions from the cooling fins and air passages.</li> <li>5. Clean or replace the fuel cap.</li> <li>6. Replace the fuel filter.</li> <li>7. Contact an Authorized Service Dealer.</li> </ol>

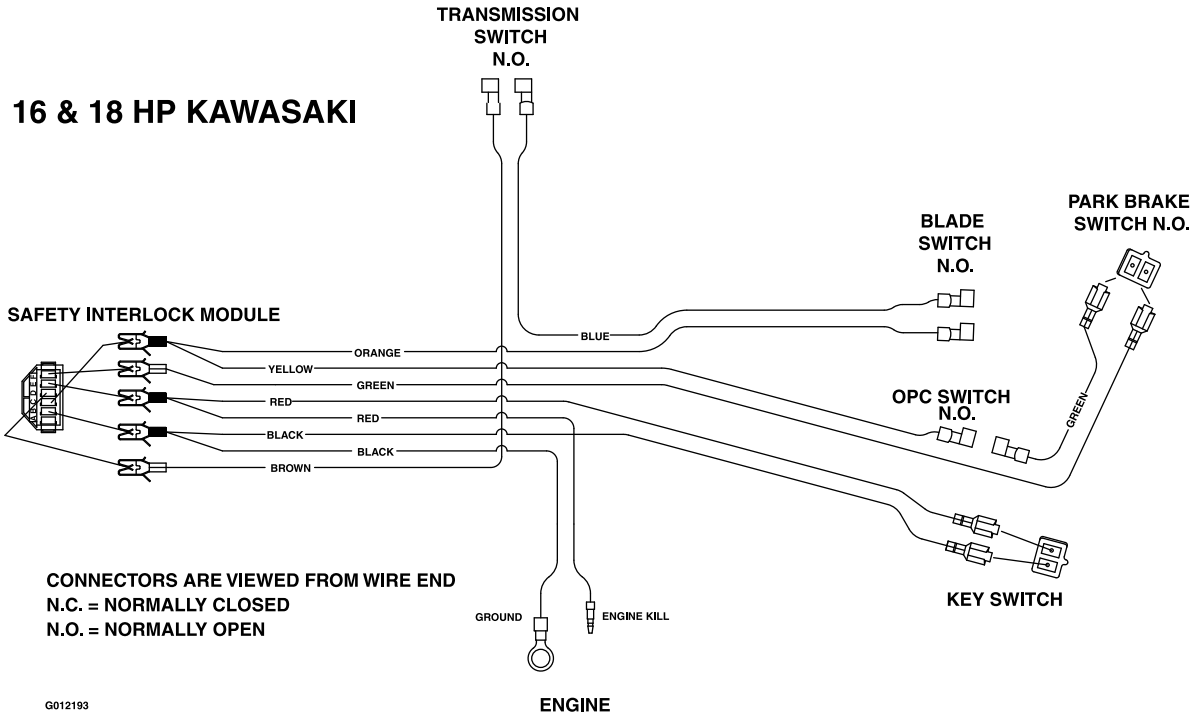
# Troubleshooting

Problem	Possible Cause	Corrective Action
Engine overheats	<ol style="list-style-type: none"> <li>1. Engine load is excessive</li> <li>2. Oil level in the crankcase is low.</li> <li>3. Cooling fins and air passages for the engine are plugged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the ground speed.</li> <li>2. Add oil to the crankcase.</li> <li>3. Remove the obstructions from the cooling fins and air passages.</li> </ol>
Mower pulls left or right (with levers fully forward).	<ol style="list-style-type: none"> <li>1. Tracking needs adjustment.</li> <li>2. Tire pressure in drive tires not correct.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the tracking by turning knob on the right hydro control linkage in the direction that the mower needs to be adjusted to. Turn the knob in 1/4 turn increments until the mower tracks correctly.</li> <li>2. Adjust tire pressure in the drive tires.</li> </ol>
Machine does not drive.	<ol style="list-style-type: none"> <li>1. Bypass valve is not closed tight.</li> <li>2. Drive or pump belt is worn, loose or broken.</li> <li>3. Drive or pump belt is off a pulley.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten the bypass valve.</li> <li>2. Change the belt.</li> <li>3. Change the belt.</li> </ol>
Uneven cutting height.	<ol style="list-style-type: none"> <li>1. Blade(s) not sharp.</li> <li>2. Cutting blade(s) is/are bent.</li> <li>3. Mower deck is not level.</li> <li>4. Underside of mower is dirty.</li> <li>5. Tire pressure in drive tires not correct.</li> <li>6. Blade spindle bent.</li> <li>7. Tips of adjacent blades are at an uneven cutting height. Blades tips should be even within 3/16 inch which is approximately one blade thickness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen the blade(s).</li> <li>2. Install new cutting blade(s).</li> <li>3. Level mower deck from side-to-side and front-to-rear.</li> <li>4. Clean the underside of the mower.</li> <li>5. Adjust tire pressure in the drive tires.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Replace blades, spindles and (or) check for damage to mower deck.</li> </ol>
Abnormal vibration	<ol style="list-style-type: none"> <li>1. Cutting blade(s) is/are bent or unbalanced.</li> <li>2. Blade mounting bolt is loose.</li> <li>3. Engine mounting bolts are loose.</li> <li>4. Loose engine pulley, idler pulley, or blade pulley.</li> <li>5. Engine pulley is damaged.</li> <li>6. Blade spindle is bent.</li> <li>7. Belt is damaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install new cutting blade(s).</li> <li>2. Tighten the blade mounting bolt.</li> <li>3. Tighten the engine mounting bolts.</li> <li>4. Tighten the appropriate pulley.</li> <li>5. Contact an Authorized Service Dealer.</li> <li>6. Contact an Authorized Service Dealer.</li> <li>7. Install new belt.</li> </ol>
Blades do not rotate.	<ol style="list-style-type: none"> <li>1. Drive belt is worn, loose or broken.</li> <li>2. Drive belt is off pulley.</li> <li>3. Deck belt is worn, loose or broken.</li> <li>4. Deck belt is off pulley.</li> <li>5. Broken or missing idler spring.</li> <li>6. PTO clutch does not engage.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the belt tension.</li> <li>2. Check belt for damage; replace if necessary. Install drive belt and check adjusting shafts and belt guides for correct position.</li> <li>3. Install new deck belt.</li> <li>4. Install deck pulley and check the idler pulley, idler arm and spring for correct position and function.</li> <li>5. Replace the spring.</li> <li>6. Contact an Authorized Service Dealer.</li> </ol>



# Schematics

## Electrical Diagram

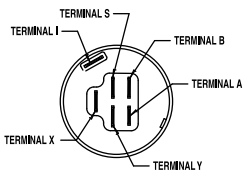


## Electrical Diagram

### 20 HP KAWASAKI ELECTRIC START

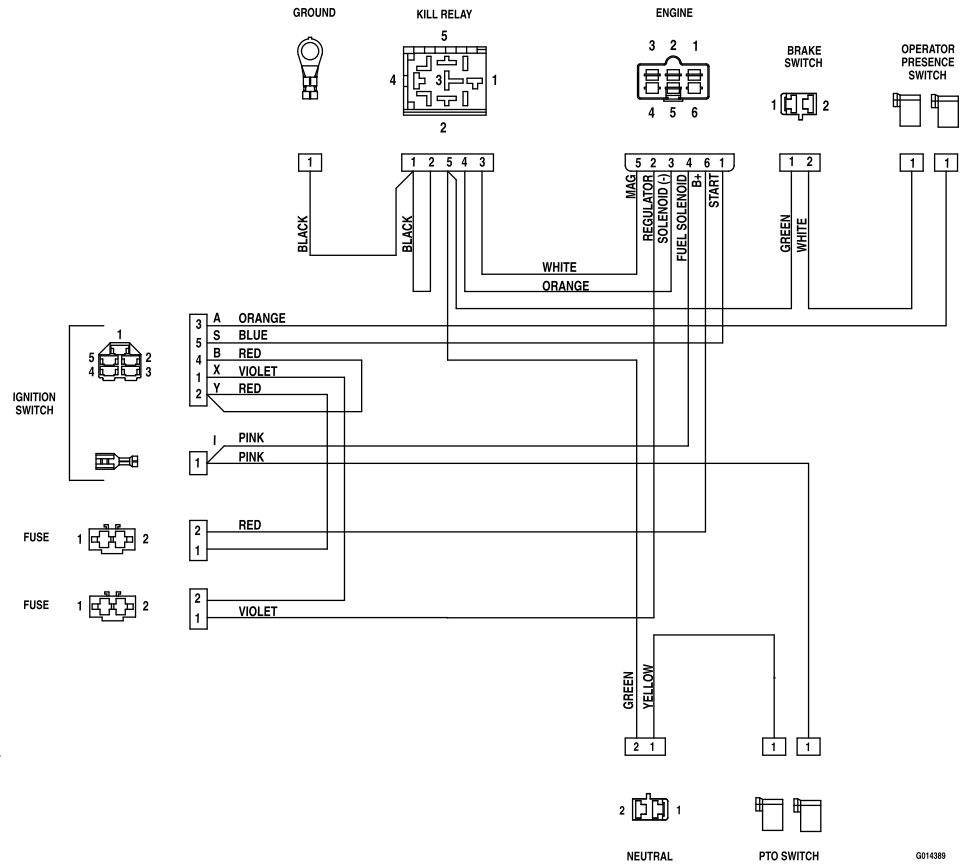
#### IGNITION SWITCH

TERMINAL	CONNECTIONS
TERMINAL A	ENGINE KILL
TERMINAL B	BATTERY
TERMINAL I	PTO/NEUTRAL SAFETY CIRCUIT
TERMINAL S	START
TERMINAL X	REGULATOR
TERMINAL Y	BATTERY



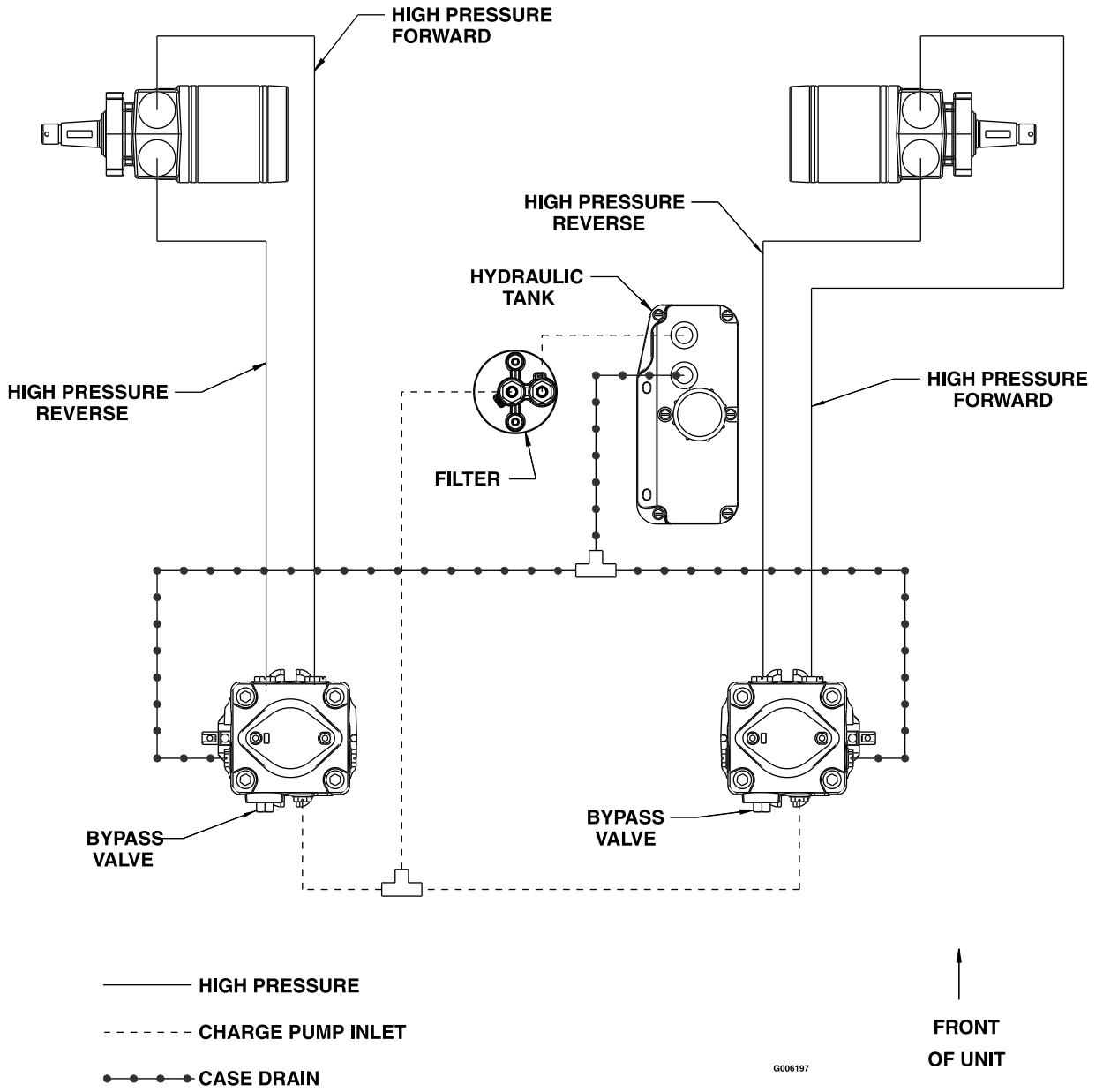
POSITION	CIRCUIT "MAKE"
1. OFF	NONE
2. RUN	B + I + A X + Y
3. START	B + I + S

NOTE:  
CONNECTORS VIEWED FROM MATING COMPONENT



G014389

### Hydraulic Diagram



# Exmark Commercial Turf Equipment 2 Year Limited Warranty

## Conditions and Products Covered

Exmark Mfg. Co. Inc. and its affiliate, Exmark Warranty Company, pursuant to an agreement between them, jointly warrant on the terms and conditions herein, that we will repair, replace or adjust any part on these products and found by us (in the exercise of our reasonable discretion) to be defective in factory materials or workmanship for a period of two years.

This warranty applies to Exmark commercial turf equipment sold in the U.S. or Canada. This warranty may only be assigned or transferred to a second (or third) owner by an authorized Exmark dealer. The warranty period commences upon the date of the original retail purchase.

### Warranty Exceptions

- Bags, Belts and Tires
- Battery
- Engine

### Warranty Period

90 days  
1 Year Prorated \*

\* The Engine warranty is covered by the engine manufacturer. Please refer to the engine manufacturer's warranty statement that is included in the literature packet.

This warranty only includes the cost of parts and labor.

## Items and Conditions Not Covered

This warranty does not cover the following:

- Pickup and delivery charges to and from any authorized Exmark Service Dealer.
- Any damage or deterioration due to normal use, wear and tear, or exposure.
- Cost of regular maintenance service or parts, such as filters, fuel, lubricants, tune-up parts, and adjustments.
- Any product or part which has been altered or misused or required replacement or repair due to normal wear, accidents, or lack of proper maintenance.
- Any repairs necessary due to use of parts, accessories or supplies, including gasoline, oil or lubricants, incompatible with the turf equipment or other than as recommended in the operator's manual or other operational instructions provided by Exmark.

There are no other express warranties except for engine and special emission system coverage.

All warranty work must be performed by an authorized Exmark Service Dealer using Exmark approved replacement parts.

## Instructions for Obtaining Warranty Service

The product must be registered with original proof of purchase by an Exmark Service Dealer before obtaining any warranty service.

Contact any Exmark Service Dealer to arrange service at their dealership. To locate a dealer convenient to you, access our website at [www.exmark.com](http://www.exmark.com). U.S. or Canada customers may also call 402-223-6375.

If for any reason you are dissatisfied with the Service Dealer's analysis or with the assistance provided, contact us at:

Exmark Customer Service Department  
The Exmark Warranty Company  
2101 Ashland Avenue  
Beatrice, NE 68310  
402-223-6375 or  
[service@exmark.com](mailto:service@exmark.com)

## Owner's Responsibilities

If your product requires warranty service it must be returned to an authorized Exmark service dealer within the warranty period. This warranty extends only to turf equipment operated under normal conditions. You must read the operator's manual. You must also properly service and maintain your Exmark product as described in the operator's manual. Such routine maintenance, whether performed by a dealer or by you, is at your expense.

## General Conditions

The sole liability of Exmark and Exmark Warranty Company with respect to this warranty shall be repair or replacement of defective components as set forth herein. **Neither Exmark nor Exmark Warranty Company shall be liable for any incidental or consequential loss or damage.**

Such damages include but are not limited to:

- Expenses related to gasoline, oil or lubricants.
- Travel time, overtime, after hours time or other extraordinary repair charges or charges relating to repairs or replacements outside of normal business hours at the place of business of the authorized Exmark Service Dealer.
- Rental of like or similar replacement equipment during the period of any warranty, repair or replacement work.
- Any telephone or telegram charges or travel charges.
- Loss or damage to person or property other than that covered by the terms of this warranty.
- Any claims for lost revenue, lost profit or additional cost as a result of a claim of breach of warranty.
- Attorney's fees.

No Claim of breach of warranty shall be cause for cancellation or rescission of the contract of sale of any Exmark mower.

**All implied warranties of merchantability (that the product is fit for ordinary use) and fitness for use (that the product is fit for a particular purpose) are limited to the duration of the express warranty.**

**Some states do not allow exclusions of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.**

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

# Service Record

Date:	Description of Work Done:	Service Done By:

# EXMARK® MAINTENANCE

## MAXIMIZE THE PERFORMANCE OF YOUR EXMARK.

### 4-CYCLE PREMIUM ENGINE OIL

Part No. 116-3373

Both SAE 30 and SAE 10W-30 in one bottle.

Contains increased levels of zinc and phosphorus for better lubricity.

No Viscosity Index Improvers that tend to shear down in high heat.

Synthetic formulation.

Gas & Diesel compatible.

Anti-corrosion additives.

API 'SL' and JASO rated with wet clutch compatibility for other machines.

### PREMIUM HYDRO OIL

Part No. 109-9828

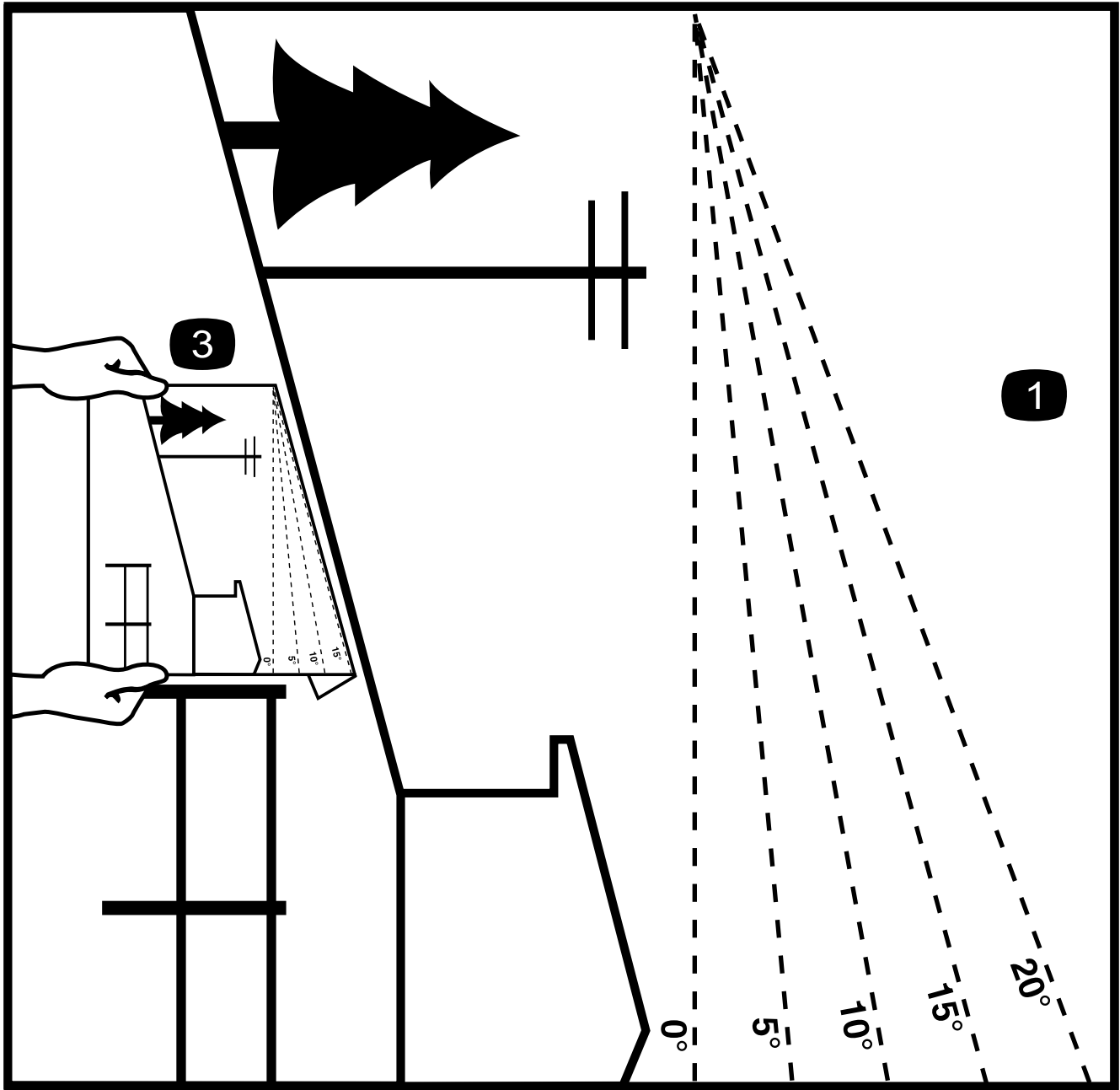
Commercial quality for tough, high-heat conditions.

Designed specifically for zero-turn mower hydraulic systems.

Superior shear resistance under heavy loads.



Available from your local Exmark dealer. Find your closest dealer at [exmark.com](http://exmark.com)



G011841

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Figure 23

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1. The maximum slope you can safely operate the machine on is **20 degrees**. Use the slope indicator to determine the degree of slope of hills before operating. **Do Not operate this machine on a slope greater than 20 degrees.** Fold along the appropriate line to match the recommended slope.
2. Align this edge with a vertical surface, a tree, building, fence pole, etc.
3. Example of how to compare slope with folded edge.

## SEE EXMARK'S COMPLETE LINE OF ACCESSORIES AND OPTIONS

### MID-MOUNT RIDING ACCESSORIES AND OPTIONS

CUSTOM RIDE SEAT SUSPENSION SYSTEM	OPERATOR CONTROLLED DISCHARGE
FULL SUSPENSION SEAT	ROLL OVER PROTECTION SYSTEM (ROPS)
DECK LIFT ASSIST KIT	SUN SHADE
HITCH KIT	TRASH CONTAINER
LIGHT KIT	TURF STRIPER
12V POWER PORT	ULTRA VAC COLLECTION SYSTEM
MICRO-MULCH SYSTEM	ULTRA VAC QUICK DISPOSAL SYSTEM

### OUT-FRONT RIDING ACCESSORIES AND OPTIONS

CUSTOM RIDE SEAT SUSPENSION SYSTEM	SNOW BLADE
DUAL-TAIL WHEEL	SNOWBLOWER
FLOOR PAN EXTENDER	SUN SHADE
HITCH KIT	TRASH CONTAINER
LIGHT KIT	ULTRA VAC COLLECTION SYSTEM
MICRO-MULCH SYSTEM	ULTRA VAC QUICK DISPOSAL SYSTEM
ROLL OVER PROTECTION SYSTEM (ROPS)	WEATHER CAB

### WALK-BEHIND ACCESSORIES AND OPTIONS

GRASS CATCHER	TURF STRIPER
MICRO-MULCH SYSTEM	STANDON

Place Model No. and Serial No.  
Label Here (Included in the Literature  
Pack) or Fill in Below

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date Purchased \_\_\_\_\_

Engine Model No. and Spec. No. \_\_\_\_\_

Engine Serial No. (E/No) \_\_\_\_\_

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