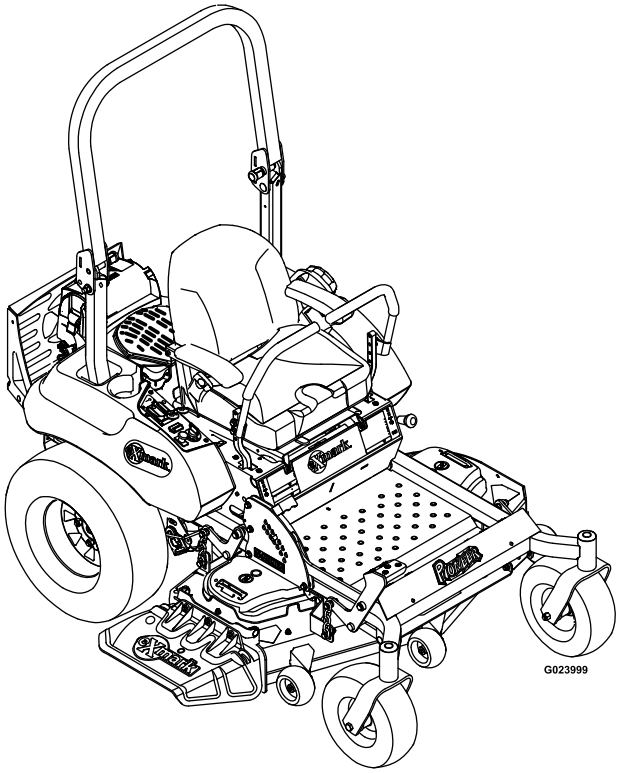
eXmark®




# PIONEER® S-SERIES

**For Serial Nos.**
**314,000,000 & Higher**
Part No. 4502-000 Rev. A

# Operator's Manual

## ⚠ WARNING

**CALIFORNIA**
**Proposition 65 Warning**

**This product contains a chemical or chemicals known to the State of California to cause cancer, birth defects, or reproductive harm.**

**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 ètincelle de vèhicule 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.**

EXMARK PARTS PLUS
PARTS OVERNIGHT OR FREE*

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.)

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Industrial Park Box 808
Beatrice, NE 68310



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# 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.

**Important: To maximize safety, performance, and proper operation of this machine, it is essential that all operators carefully read and fully understand the contents of the Operator's manual provided with the product. Safe operation of Exmark equipment is essential. Failure to comply with the operating instructions or receive proper training may result in injury.**

**Go to http://www.Exmark.com for additional safe operation information, such as safety tips, training materials, and Operator's manuals.**

If additional information is needed, or should you require trained mechanic service, contact your authorized Exmark equipment dealer or distributor.

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.

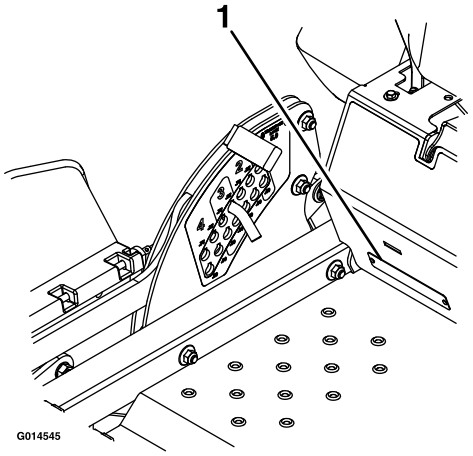



**Figure 1**

1. Model and serial number location

**Model No.** _____

**Serial No.** _____

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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**
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

- Read the Operator's Manual and other training material. If the operator(s) or mechanic(s) can not read English it is the owner's responsibility to explain this material to them; other languages may be available on our website.
- 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, 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. Do Not use a nozzle lock open device.**

**⚠ 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 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.**

**⚠ 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.
- Lightning can cause severe injury or death. If lightning is seen or thunder is heard in the area, Do Not operate the machine; seek shelter.
- Be sure all drives are in neutral and parking brake is engaged before starting engine. Use seat belts with the roll bar in the raised and locked position.
- 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.

**⚠ 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.**

- **NEVER** carry passengers. **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.

**⚠ DANGER**

**Operating on wet grass or steep slopes can cause sliding and loss of control. Wheels dropping over edges, ditches, steep banks, or water can cause rollovers, which may result in serious injury, death or drowning.**

- **Do Not mow slopes when grass is wet.**
- **Do Not mow near drop-offs or near water.**
- **Do Not mow slopes greater than 15 degrees.**
- **Reduce speed and use extreme caution on slopes.**
- **Avoid sudden turns or rapid speed changes.**
- **Keep the roll bar in the raised and locked position and use seat belt.**
- See inside the back cover to determine the approximate slope angle of the area to be mowed.
- Use a walk behind mower and/or a hand trimmer near drop-offs, ditches, steep banks or water. (Figure 3).

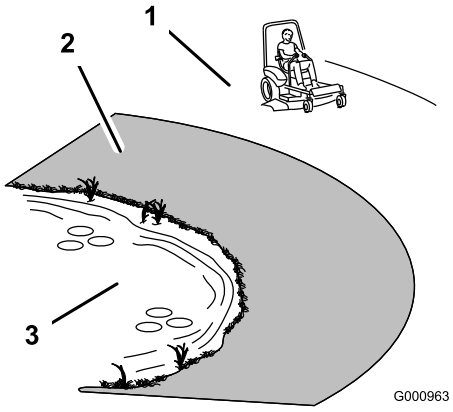



**Figure 3**

1. Safe Zone-Use the mower here on slopes less than 15 degrees
2. Danger Zone-Use a walk behind mower and/or hand trimmer on slopes greater than 15 degrees, near drop-offs and water.
3. Water

- 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.

## Using the Rollover Protection System (ROPS)

A Rollover Protection System (roll bar) is installed on the unit.

**⚠ WARNING**

**There is no rollover protection when the roll bar is down. Wheels dropping over edges, ditches, steep banks, or water can cause rollovers, which may result in serious injury, death or drowning.**

- **Do Not remove the ROPS.**
- **Keep the roll bar in the raised and locked position and use seat belt.**
- **Lower the roll bar only when absolutely necessary.**
- **Do Not wear seat belt when the roll bar is down.**
- **Drive slowly and carefully.**
- **Raise the roll bar as soon as clearance permits.**
- Be certain that the seat belt can be released quickly in the event of an emergency.
- Check carefully for overhead clearances (i.e. branches, doorways, and electrical wires) before driving under any objects and Do Not contact them.
- In the event of a rollover, take the unit to an Authorized Service Dealer to have the ROPS inspected.

- Replace a damaged ROPS. Do Not repair or revise.
- Any accessories, alterations, or attachments added to the ROPS must be approved by Exmark.

## Maintenance and Storage

- Disengage drives, 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**

**Removal or modification of original equipment, parts and/or accessories may alter the warranty, controllability, and safety of the machine. Unauthorized modifications to the original equipment or failure to use original Exmark parts could lead to serious injury or death. Unauthorized changes to the machine, engine, fuel or venting system, may violate applicable safety standards such as: ANSI, OSHA and NFPA and/or government regulations such as EPA and CARB.**

**⚠ 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**




**1-403005**



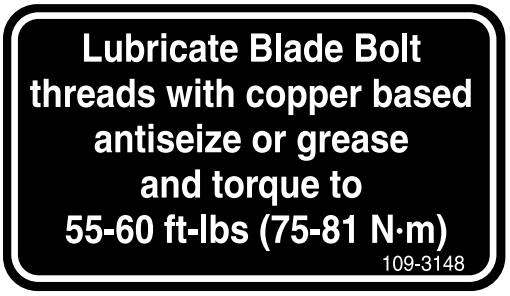

**98-5954**



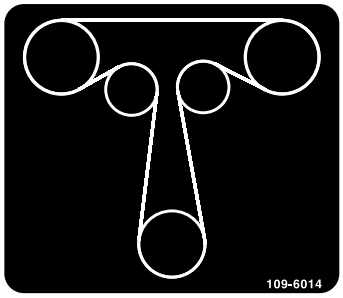

**103-2076**



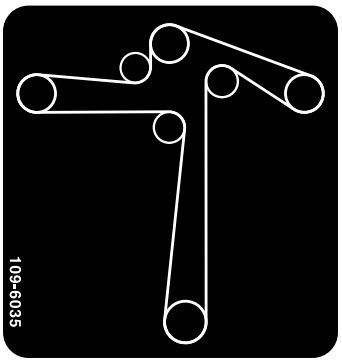

**107-2102**




**109-3148**

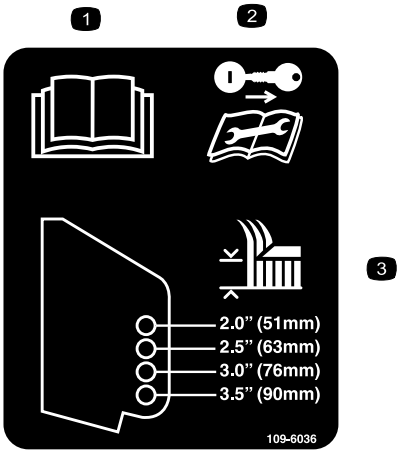



**109-6014**




**109-6035**

48, 52, and 60 Inch Decks

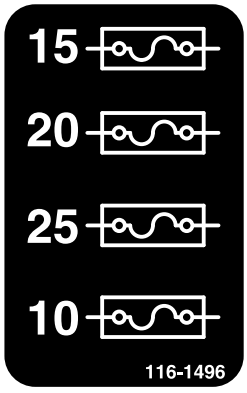



**109-6036**

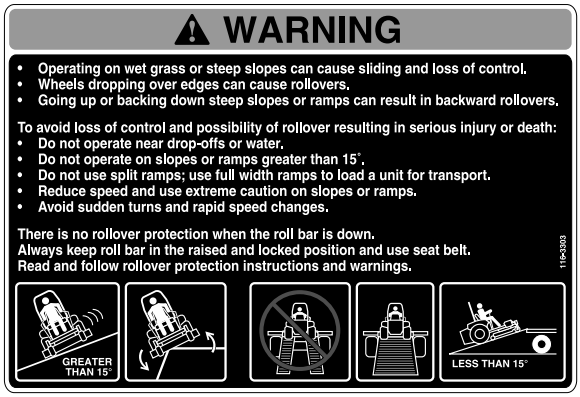
1. Read the Operator's manual
2. Remove the ignition key and read the instructions before servicing or performing maintenance.
3. Height of cut



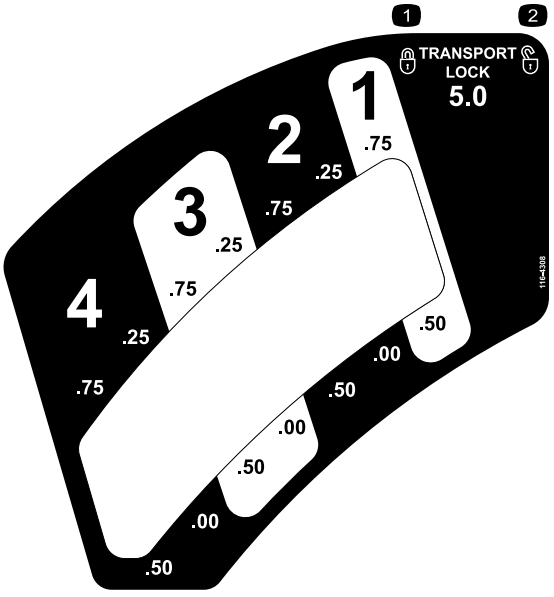

**116-1119**




**116-1496**

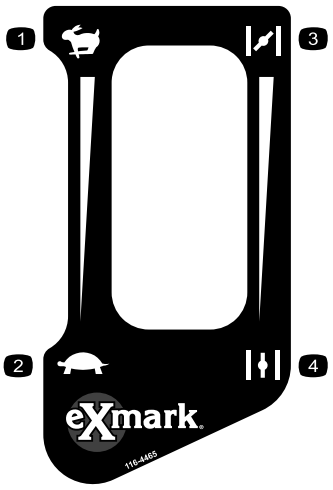



**116-3303**




**116-4308**

1. Latch
2. Unlatch



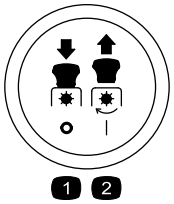

**116-4465**

1. Fast
2. Slow
3. Choke-on
4. Choke-off



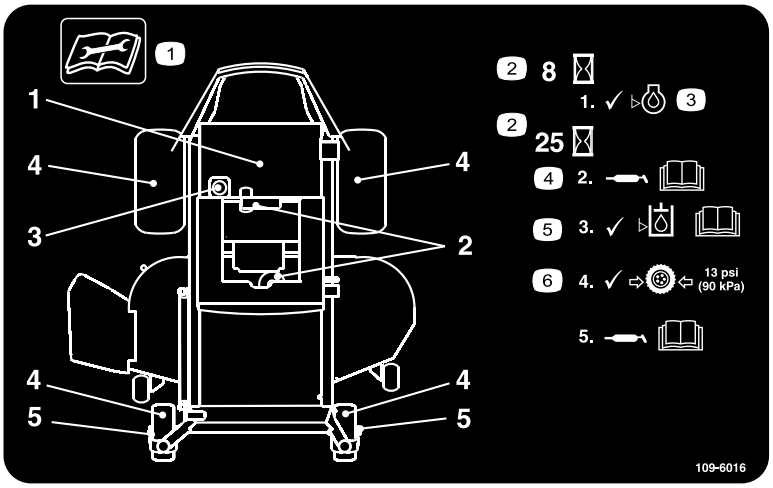

**116-6363**

1. Rotate the drive release knob to loosen, slide the knob, and tighten.
2. Push the machine.



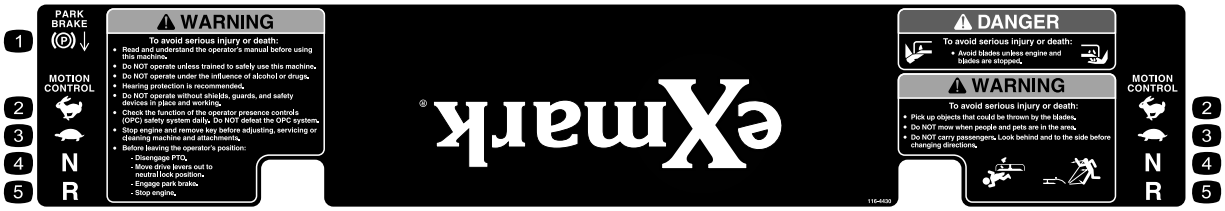

**PTO Switch Symbols**

1. PTO–disengage
2. PTO–engage




**109-6016**

1. Read the instructions before servicing or performing maintenance
2. Time interval
3. Check oil level
4. Refer to the Operator's manual for grease instructions
5. Check hydraulic oil level and refer to the Operator's manual or further instructions
6. Check tire pressure




**116-4430**

1. Park brake — engage
2. Fast
3. Slow
4. Neutral
5. Reverse

# Specifications

## Model Numbers

**Serial Nos: 314,000,000 and Higher**

PNS651KA483; PNS691KA523; PNS710KC443; PNS710KC483; PNS720KC523; PNS720KC523SS; PNS730KA604; PNS730KA604SS; PNS740KC604; PNS740KC604SS

## Systems

### Engine

- Engine Specifications: See your Engine Owner's Manual
- Engine Oil Type: Exmark 4–Cycle Premium Engine Oil
- RPM: Full Speed: 3700 ±50 RPM (PTO not engaged) Idle: 1500 ±100 RPM

### Fuel System

- Capacity: 7.0 gal. (26.5 L)
- Fuel Recommendations:
  - For best results, use only clean, fresh, unleaded gasoline with an octane rating of 87 or higher ((R+M)/2 rating method).
  - Oxygenated fuel with up to 10% ethanol or 15% MTBE by volume is acceptable.
  - **Do Not** use ethanol blends of gasoline (such as E15 or E85) with more than 10% ethanol by volume. Performance problems and/or engine damage may result which may not be covered under warranty.
  - **Do Not** use gasoline containing methanol.
  - **Do Not** store fuel either in the fuel tank or fuel containers over the winter unless a fuel stabilizer is used.
  - **Do Not** add oil to gasoline.
- Fuel Filter:

  Kohler: Kohler P/N 24 050 13

  Kawasaki: Kawasaki P/N 49019-0014
- Fuel Shut-Off Valve:

  All Units: 1/4 turn ("ON", "OFF").

### Electrical System

- Charging System: Flywheel Alternator
- Charging Capacity: 15 amps
- Battery Type: BCI Group U1
- Recommended Minimum Battery CCA: 260 CCA
- Battery Voltage: 12 Volt
- Polarity: Negative Ground
- Fuses:

  All units:
  - 25 amp main fuse
  - 20 amp charging system fuse
  - 10 amp PTO fuse
  - 15 amp accessory fuse

### Safety Interlock System

- LCD indicators appear for the PTO, park brake, drive levers, and operator presence in the message display on the RH control panel.
- PTO must be disengaged, brake engaged, and motion control levers out (neutral lock) to start engine. (It is not necessary for the operator to be in the seat to start the engine.)
- Operator must be in seat when PTO is engaged, brake is disengaged, or motion control levers are moved in or engine will stop.
- Engine will stop if either the left, the right, or both levers are moved from neutral lock position while brake is engaged.

### Operator Controls

- Steering and Motion Control:

  **Note:** Motion control levers are adjustable to three heights.
  - Separate levers, on each side of the console, control speed and direction of travel of the respective drive wheels.

  - Steering is controlled by varying the position of the levers relative to each other.
  - Moving motion control levers outward (in slots) locks the drive system in neutral.
- PTO Engagement Switch: Engages electric clutch (to drive belt) which engages mower blades.
- Parking Brake Lever: Engages parking brake.
- Deck Height Adjustment Lever: Sets cutting height to desired position.
- Deck Lift Pedal: Foot pedal that lifts deck.
- Transport Lock: Latching position: Automatically latches at the transport position.

## Seat

- Seat Type:
  - All models except PNS720KC523SS, PNS730KA604SS, and PNS740KC604SS:

    Standard seat with foam padded seat cushion with armrests and integral safety switch.

    Optional seat accessory for units with standard seats: Suspension seat (adjustable spring suspension), armrests, and integral safety switch. Adds approximately 1/2 inches (12.7 mm) to seat height.
  - PNS720KC523SS, PNS730KA604SS, and PNS740KC604SS:

    Suspension seat (adjustable spring suspension), armrests, and integral safety switch. Adds approximately 1/2 inches (12.7 mm) to seat height.
- Mounting: Hinged seat frame to tilt up seat. Held in tilted position with cable. Adjustable fore and aft on seat tracks.
- Armrests: Molded flip-up armrests.
- Seat Safety Switch:

  Integrated seat switch. Time delay seat switch eliminates rough ground cut-outs.

## Hydrostatic Ground Drive System

- Two unitized hydrostatic transmissions:
  - Units with 44, 48, or 52 inch decks:

    Hydro Gear ZT3100
  - Units with 60 inch deck:

    Hydro Gear ZT3400
- Hydraulic Oil Type: Exmark Premium Hydro Oil.
- Hydraulic Oil Capacity: 77 oz (2.3 L) per side
- Hydraulic Filter: P/N 109-3321
- Speeds:
  - Forward:
    - ◊ Units with 44, 48, or 52 inch decks:

      0-8 mph (12.9 km/hr) forward.
    - ◊ Units with 60 inch deck:

      0-9 mph (14.5 km/hr) forward.
  - Reverse:
    - ◊ Units with 44, 48, or 52 inch decks:

      0-5 mph (8.0 km/hr) reverse.
    - ◊ Units with 60 inch deck:

      0-6 mph (9.7 km/hr) reverse.
- Drive wheel release valves allow machine to be moved when engine is not running.

## Tires & Wheels

| | Drive | |
|---|---|---|
| | Pneumatic (Air filled) | |
| Deck Size | 44, 48, & 52 | 60 |
| Quantity | 2 | 2 |
| Tread | Super Turf | Super Turf |
| Size | 22 x 9.50-12 | 23 x 10.50-12 |
| Ply Rating | 4 | 4 |
| Pressure | 13 psi (90 kPa) | 13 psi (90 kPa) |

| | Front Caster |
|---|---|
| | Pneumatic (Air filled) |
| Deck Size | All Units |
| Quantity | 2 |
| Tread | Smooth |
| Size | 13 x 5.00-6 |
| Ply Rating | 4 |
| Pressure | 13 psi (90 kPa) |

## Cutting Deck

- Cutting Width:
  - 44 inch Deck: (111.8 cm)
  - 48 inch Deck: (121.9 cm)
  - 52 inch Deck: (132.1 cm)
  - 60 inch Deck: (152.4 cm)

- Discharge: Side
- Blade Size:
  - 44 inch Deck: 22.25 inches (56.5 cm) – (2 ea.)
  - 48 inch Deck: 16.25 inches (41.3 cm) – (3 ea.)
  - 52 inch Deck: 18.00 inches (45.7 cm) – (3 ea.)
  - 60 inch Deck: 20.50 inches (52.1 cm) – (3 ea.)
- Blade Spindles: Solid steel spindles with .98 inch (25 mm) I.D. bearings.
- Deck Drive: "B" Section belt with self-tensioning idler.
- Electric clutch:
  - 44, 48, & 52 inch decks: 175 ft-lb Mag Stop
  - 60 inch deck: 200 ft-lb Mag Stop w/spot brake
- Deck: Full floating deck is attached to out-front support frame. Anti-scalp rollers provide maximum turf protection. Deck design allows for bagging, mulching or side discharge.
  - 44 inch Deck: 2 anti-scalp rollers
  - 48 inch Deck: 3 anti-scalp rollers
  - 52 inch Deck: 3 anti-scalp rollers
  - 60 inch Deck: 4 anti-scalp rollers
- Deck Depth:
  - 44 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)
  - 60 inch Deck: 5.5 inches (14.0 cm)
- Cutting Height Adjustment:

  Foot activated lever is used to adjust the cutting height from 1 1/2 inch (3.8 cm) to 5 inches (12.7 cm) in 1/4 inch (6.4 mm) increments.
- Mulching Kit: Optional.

# Dimensions

## Overall Width:

| | 44 inch Deck | 48 inch Deck |
|---|---|---|
| Without Deck | 45.8 inches (116.3 cm) | 45.8 inches (116.3 cm) |
| Deflector Up | 48.2 inches (122.4 cm) | 50.7 inches (128.8 cm) |
| Deflector Down | 56.4 inches (143.3 cm) | 59.5 inches (151.1 cm) |

| | 52 inch Deck | 60 inch Deck |
|---|---|---|
| Without Deck | 45.8 inches (116.3 cm) | 50.4 inches (128.0 cm) |
| Deflector Up | 54.2 inches (137.7 cm) | 61.4 inches (156.0 cm) |
| Deflector Down | 64.3 inches (163.3 cm) | 72.8 inches (185.0 cm) |

## Overall Length:

| | 44 inch Deck | 48 inch Deck |
|---|---|---|
| Roll Bar - Up | 78.8 inches (200.2 cm) | 77.8 inches (197.6 cm) |
| Roll Bar - Down | 79.6 inches (202.2 cm) | 78.6 inches (199.6 cm) |

| | 52 inch Deck | 60 inch Deck |
|---|---|---|
| Roll Bar - Up | 77.8 inches (197.6 cm) | 78.8 inches (200.2 cm) |
| Roll Bar - Down | 78.6 inches (199.6 cm) | 79.9 inches (202.9 cm) |

## Overall Height:

| Roll Bar - Up | Roll Bar - Down |
|---|---|
| 71.3 inches (181.1 cm) | 48 inches (121.9 cm) |

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

| | 44 inch Deck | 48 inch Deck |
|---|---|---|
| Drive Wheels | 36.8 inches (93.5 cm) | 36.8 inches (93.5 cm) |
| Caster Wheels | 26.8 inches (68.1 cm) | 33.5 inches (85.1 cm) |

| | 52 inch Deck | 60 inch Deck |
|---|---|---|
| Drive Wheels | 36.8 inches (93.5 cm) | 39.7 inches (100.8 cm) |
| Caster Wheels | 33.5 inches (85.1 cm) | 38.3 inches (97.3 cm) |

### Wheel Base: (Center of Caster Tire to Center of Drive Tire)

| 44 inch Deck | 48 inch Deck | 52 inch Deck | 60 inch Deck |
|---|---|---|---|
| 49.7 inches (126.2 cm) | 48.7 inches (123.7 cm) | 48.7 inches (123.7 cm) | 49.7 inches (126.2 cm) |

### Curb Weight:

| | |
|---|---|
| PNS651KA483 | 862 lb (391 kg) |
| PNS691KA523 | 868 lb (394 kg) |
| PNS710KC443 | 803 lb (364 kg) |
| PNS710KC483 | 862 lb (391 kg) |
| PNS720KC523 | 868 lb (394 kg) |
| PNS720KC523SS | 878 lb (398 kg) |
| PNS730KA604 | 948 lb (430 kg) |
| PNS730KA604SS | 960 lb (435 kg) |
| PNS740KC604 | 948 lb (430 kg) |
| PNS740KC604SS | 969 lb (440 kg) |

## Torque Requirements

| Bolt Location | Torque |
|---|---|
| Blade Drive Sheave Mounting Nut | 130-160 ft-lb (176-217 N-m) |
| Blade Mounting Bolt (lubricate with anti-seize) | 50-60 ft-lb (68-81 N-m) |
| Anti-Scalp Roller Nyloc Nut (See Figure 18) | 50-55 ft-lb (68-75 N-m) |
| Engine Mounting Bolts | 27-33 ft-lb (37-45 N-m) |
| Wheel Lug Nuts | 90-100 ft-lb (122-136 N-m) |
| Rollover Protection System (Roll Bar) 1/2 inch Mounting Bolts | 90-100 ft-lb (122-136 N-m) |
| Clutch Retaining Bolt (secured with threadlocker) | 49-61 ft-lb (66-83 N-m) |

# Product Overview

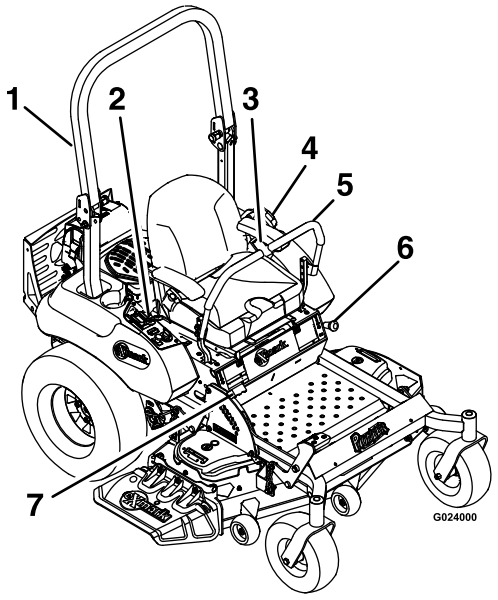



**Figure 4**

1. Rollover Protection System (ROPS)
2. Engine Controls (right console)
3. Seat belt
4. Fuel cap
5. Motion control levers
6. Parking brake
7. Height of cut adjustment

# Operation

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

# Controls

## Motion Control Levers

The motion control levers located on each side of the console control the forward and reverse motion of the machine.

Moving the levers forward or backward turns the wheel on the same side forward or reverse respectively. Wheel speed is proportional to the amount the lever is moved.

Moving the levers outward from the center position into the T-slot locks them in the neutral position (Figure 5).

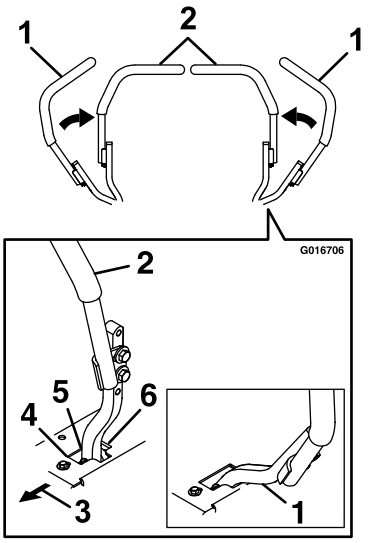



**Figure 5**

1. Neutral lock position (handles out)
2. Neutral operate position (handles in)
3. Front of unit
4. Forward
5. Neutral (operate)
6. Reverse

## Choke Control

Located on right console (black lever) (see Figure 6).

The choke is used to aid in starting a cold engine. Moving the choke lever forward will put the choke in the "ON" position and moving the choke lever to the rear, to the detent, will put the choke in the "OFF" position. Do Not run a warm engine with choke in the "ON" position.

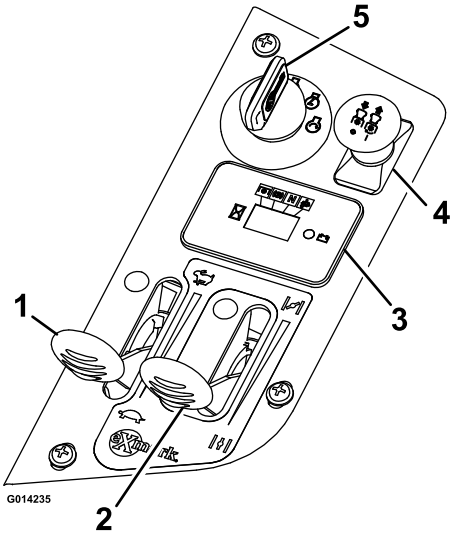



**Figure 6**

1. Throttle lever
2. Choke lever
3. Hour meter
4. Blade control switch (power take-off)
5. Ignition switch

## Throttle Control

Located on right console (red lever) (see Figure 6).

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

## Brake Lever

Located on left side of unit, just to the front of the LH motion control lever.

The brake lever engages a parking 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.

The unit must be tied down and brake engaged when transporting.

## Ignition Switch

Located on right console (see Figure 6).

The ignition switch is used to start and stop the engine. The 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). Allow the key to return to the "on" position immediately after the engine starts.

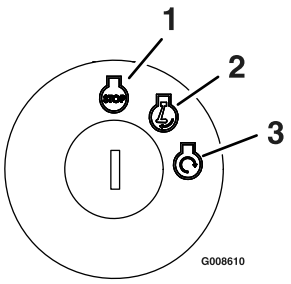



**Figure 7**

1. Off
2. On
3. Start

**Note:** Brake must be engaged, motion control levers out (neutral lock position) and PTO switch disengaged to start engine. (It is not necessary for the operator to be in the seat to start the engine.)

## Hour Meter

Located on the control panel (see Figure 6 and Figure 8).

The hour meter records the number of hours that the engine has run.

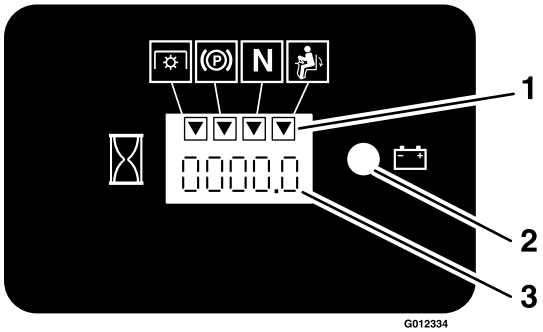



**Figure 8**

1. LCD indicators
2. Low voltage indicator light
3. Hour/Voltage display

## Fuel Shut-Off Valve

Located by the lower LH ROPS tube mounting.

The fuel shut-off valve is used to shut off the fuel when the machine will not be used for a few days, during transport to and from the jobsite, and when parked inside a building.

Align valve handle with the fuel line to open. Rotate 90° to close.

## Drive Wheel Release Valves

**⚠ WARNING**

**Hands may become entangled in the rotating drive components below the engine deck, which could result in serious injury or death.**

**Stop engine, remove key, allow all the moving parts to stop before accessing the drive wheel release valves.**

**⚠ WARNING**

**The engine and hydraulic drive units can become very hot. Touching a hot engine or hydraulic drive units can cause severe burns.**

**Allow the engine and hydraulic drive units to cool completely before accessing the drive wheel release valves.**

Located on the left and right sides underneath the engine deck.

During normal operating conditions, the drive wheel release valves are positioned in front of the slots. If the machine has to be pushed by hand, the valves must be in the "released" position (see Figure 9).

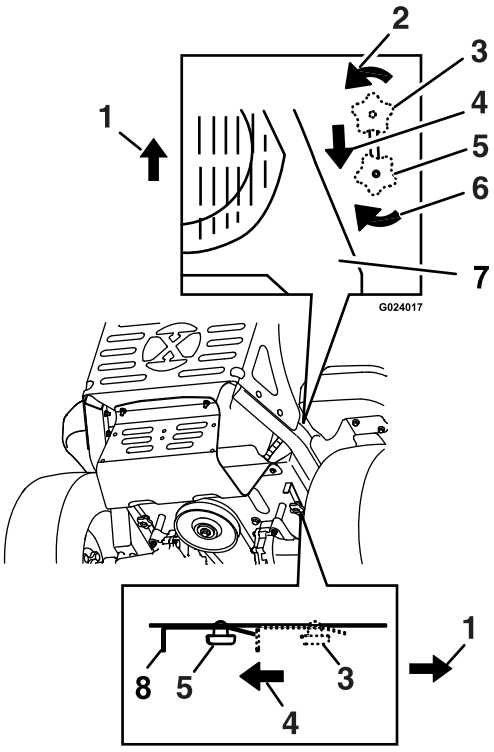



**Figure 9**

1. Front of the machine
2. Rotate bypass release knob counterclockwise to loosen
3. Lever position for operating the machine
4. Pull lever in this direction to push the machine
5. Lever position for pushing the machine
6. Rotate bypass release knob clockwise to tighten
7. Engine
8. Release lever

To release the drive system (see item 1 in Figure 9), loosen the knob by turning counterclockwise. Then pull the release lever on the underside of machine towards the back of the machine and retighten the knob to hold the release lever back in the released state. Repeat this on each side of the machine.

Release the parking brake. The machine is now able to be pushed by hand.

To reset the drive system (see item 2 in Figure 9), loosen the knob by turning counterclockwise. Then push the release lever on the underside of machine towards the front of the machine and retighten the knob to hold the release lever in the operating state. Repeat this on each side of the machine.

**Do Not tow machine.**

## PTO Engagement Switch

Located on right console (see Figure 6).

Switch must be pulled out (up) to engage the blades. Switch is pushed in to disengage the blades.

## Deck Lift Pedal

Located at the right front corner of the floor pan.

Push the pedal forward with your foot to raise the cutting deck. Allow the pedal to move rearward to lower the cutting deck to the cut height that has been set.

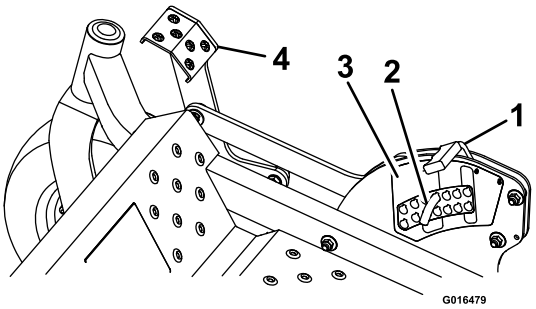



**Figure 10**

1. Transport lock handle
2. Height adjustment pin
3. Height of cut decal
4. Deck foot pedal

## Transport Lock

Located on the height of cut adjustment plate (see Figure 10).

The transport latching mechanism will automatically engage when the deck is raised to the transport position. To release the deck from the transport position: push the foot pedal to remove the load from the transport latching mechanism, pull the transport lock handle rearward, and let the pedal come back to lower the deck down to the desired cut height.

# Pre-Start

Fill fuel tank on level ground. See **Fuel Recommendations** in the Specifications section for additional gasoline information.

**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.

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.

# Operating Instructions

## Raise the Rollover Protection System (ROPS)

**Important: The roll bar is an integral and effective safety device. Keep the roll bar in the raised and locked position when operating the mower. Lower the roll bar temporarily only when absolutely necessary.**

1. The knob must be completely latched with the tabs interlocking as shown in Figure 11 to lock the roll bar in the raised, operate position.
2. Apply forward pressure to the upper hoop of the roll bar.
3. Pull the knob and rotate 90° to hold in the unlatched position to lower the roll bar.
4. To return to the operate position, raise the roll bar, and then rotate knobs 90° so that the tabs interlock partially. Apply forward pressure to the roll bar upper hoop and observe that the knobs return to the completely latched position.

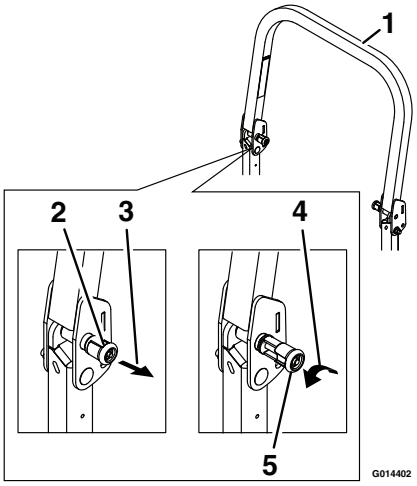



**Figure 11**

1. Roll bar upper hoop
2. Knob in “latched” position
3. Pull knob to unlatch
4. Rotate 90° to hold unlatched
5. Knob in “unlatched” position

5. Make sure the knobs are fully engaged with the roll bar in the raised position. The upper hoop of the roll bar may need to be pushed forward or pulled rearward to get both knobs fully engaged (see Figure 12).

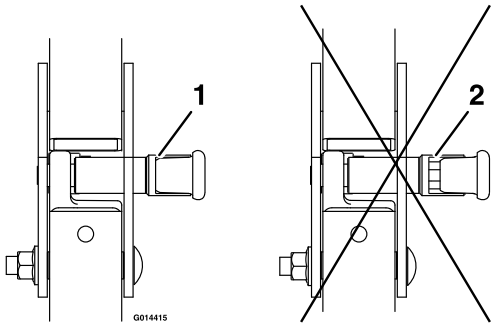



**Figure 12**

1. Engaged
2. Partially engaged — Do Not operate with ROPS in this condition.

**Important: Always use the seat belt with the roll bar in the operate (raised) position. Ensure that the rear part of the seat is secured with the seat latch.**

## Open the Fuel Shut-Off Valve

Rotate the valve and align with the fuel line to open.

## Starting the Engine

1. Move the motion control levers out to the neutral lock position.
2. Pull up and back on the parking brake lever to engage the parking brake.
3. Push down on the PTO switch to the "disengage" position.

   **Note:** It is not necessary for the operator to be in the seat to start the engine.
4. Place the throttle midway between the "SLOW" and "FAST" positions.
5. On a cold engine, push the choke lever forward into the "ON" position.

   On a warm engine, leave the choke in the "OFF" position.
6. Turn 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 cool-down period between starting attempts. Failure to follow these guidelines can burn out the starter motor.**
7. If the choke is in the "ON" position, gradually return choke to the "OFF" position as the engine warms up.

## Engaging the PTO

**⚠ 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 push-pull switch engages the cutting blades. Be sure that all persons are clear of the mower deck and discharge area before engaging PTO.

**Important: Operator must be in seat before the PTO can be engaged.**

1. Set the throttle midway between the "SLOW" and "FAST" positions.
2. Pull the PTO switch outward to engage the blades.
3. Place the throttle in the "FAST" position to begin mowing.

## Disengaging the PTO

1. Set the throttle midway between the "SLOW" and "FAST" positions.
2. Push the PTO switch in to disengage the blades.

## Stopping the Engine

1. Bring the unit to a full stop.
2. Move the motion control levers out to the neutral lock position.
3. Engage the parking brake.
4. Place the throttle midway between the "SLOW" and "FAST" positions.
5. Disengage the PTO.
6. Allow the engine to run for a minimum of 15 seconds, then turn the ignition switch to the "OFF" position to stop the engine.
7. Remove the key to prevent children or other unauthorized persons from starting engine.
8. 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

**⚠ CAUTION**

**Machine can spin very rapidly by positioning one lever too much ahead of the other. Operator may lose control of the machine, which may cause damage to the machine or injury.**

- **Use caution when making turns.**
- **Slow the machine down before making sharp turns.**

**Important: To begin movement (forward or backward) the operator must be in the seat, the brake lever must be disengaged (pushed down) before the motion control levers can be moved in or the engine will stop.**

When the motion control levers are positioned fully outward (apart) in the T-slot, the drive system is in the neutral lock position (Figure 13).

When the motion control levers are moved directly inward (together) the drive system is in the neutral operate position.

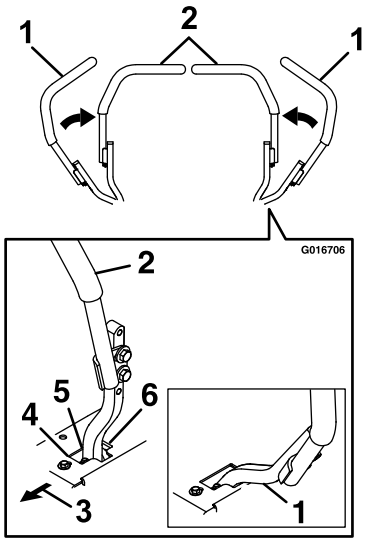



**Figure 13**

1. Neutral lock position (handles out)
2. Neutral operate position (handles in)
3. Front of Unit
4. Forward
5. Neutral (operate)
6. Reverse

### Driving Forward

1. Release the parking brake.
2. Move the motion control levers inward to the center to the neutral position.
3. To move forward in a straight line, move both levers forward with equal pressure.

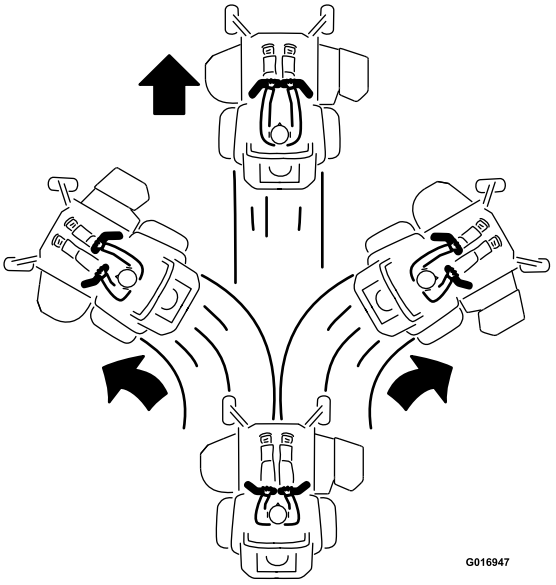



**Figure 14**

To turn left or right, pull the motion control lever back toward neutral in the desired turn direction.

The machine will move faster the farther the motion control levers are moved from the neutral position.

4. To stop, position both motion control levers in the neutral operate position.

### Driving in Reverse

1. Move the motion control levers inward to the neutral operate position.
2. To move rearward in a straight line, move both levers rearward with equal pressure.

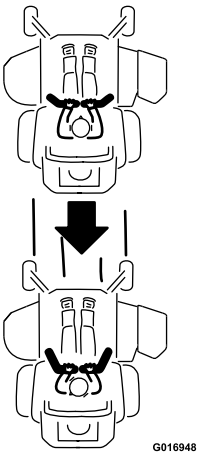



**Figure 15**

To turn right, release pressure on the RH motion control lever and the rear of the machine will move towards the rear and to the right.

To turn left, release pressure on the LH motion control lever and the rear of the machine will move towards the rear and to the left.

3. To stop, position both motion control levers in the neutral operate position.

## Adjusting the Cutting Height

The cutting height of the mower deck is adjusted from 1 1/2 to 5 inches (3.8 cm to 12.7 cm) in 1/4 inch (6.4 mm) increments.

1. Stop the machine and move the motion control levers outward to the neutral locked position.
2. Disengage the PTO.
3. Raise and lock the deck to the 5 inch (12.7 cm) transport position (Figure 16).

   The deck is raised by pushing the foot operated deck lift pedal forward. The pedal is located at the front right corner of the floor pan.

   **Note: When changing the cutting height positions, always come to a complete stop and disengage the PTO.**

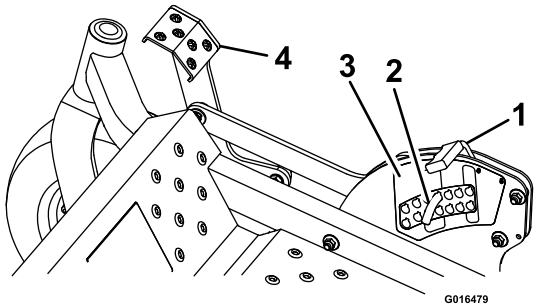



**Figure 16**

1. Transport lock handle
2. Height adjustment pin
3. Height of cut decal
4. Deck foot pedal

4. Insert the height adjustment pin into the hole corresponding to the desired cutting height.

   See the decal on the side of the deck lift plate for cut heights.

5. Push the foot lever forward, pull the transport lock handle rearward and let the deck lower down to the predetermined cut height by slowly decreasing foot pressure allowing the foot lever to travel rearward.

## 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 motion control levers outward 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. After adjusting the height of cut, adjust the anti-scalp rollers by removing the nyloc nut, spring disc washer, and bolt.
6. Place the rollers in one of the positions shown (Figure 17). Rollers will maintain 3/4 inch (19 mm) clearance to the ground to minimize gouging and roller wear or damage.

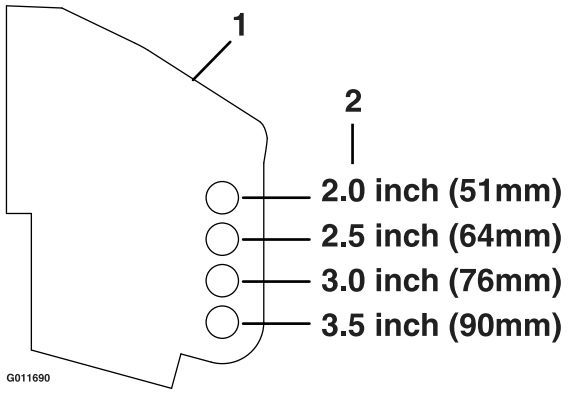



**Figure 17**

For cutting heights above 3.5 inches (90 mm) use the bottom hole. The rollers will still be effective against scalping.

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

**For Maximum Deck Flotation,** place the rollers one hole position lower. Rollers should maintain 1/4 inch (6.4 mm) clearance to the ground. **Do Not** adjust the rollers to support the deck.

7. Be sure the roller bolts are installed with the spring disc washer between the head of the bolt and the mounting bracket (see Figure 18).

   **Note:** The foot operated deck lift assist lever can be used to momentarily lift the deck to clear objects. Be sure that PTO is disengaged.

8. Torque the 3/8 nyloc nut to 50–55 ft-lb (68-75 N-m).

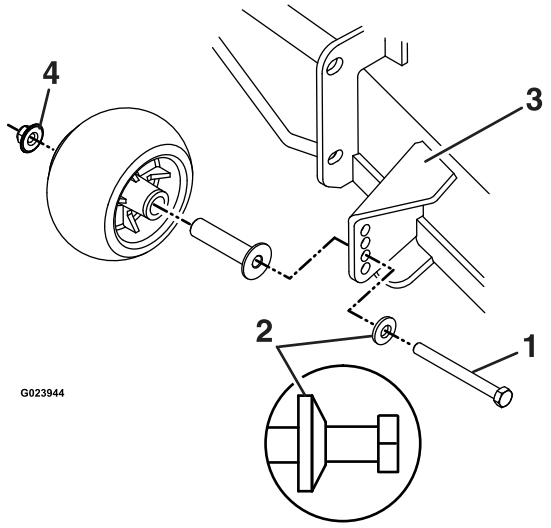



**Figure 18**

1. 3/8-16 X 3 3/4 Grade 8 bolt
2. Spring disc washer (cone towards bolt head)
3. Front right anti-scalp bracket shown
4. 3/8 nyloc-torque to 50-55 ft-lb (68-75 N-m)

# Transporting

## Transporting a Unit

Use a heavy-duty trailer or truck to transport the machine. Lock brake and block wheels. Securely fasten the machine to the trailer or truck with straps, chains, cable, or ropes. If possible, both front and rear straps should be directed down and outward from the machine. Be sure that the trailer or truck has all necessary lighting and marking as required by law. Secure a trailer with a safety chain.

**⚠ CAUTION**

**This unit does not have proper turn signals, lights, reflective markings, or a slow moving vehicle emblem. Driving on a street or roadway without such equipment is dangerous and can lead to accidents causing personal injury. Driving on a street or roadway without such equipment may also be a violation of State laws and the operator may be subject to traffic tickets and/or fines.**

**Do Not drive a unit on a public street or roadway.**

**⚠ WARNING**

**Loading a unit on a trailer or truck increases the possibility of backward tip-over. Backward tip-over could cause serious injury or death.**

- **Use extreme caution when operating a unit on a ramp.**
- **Use only a single, full width ramp; Do Not use individual ramps for each side of the unit.**
- **If individual ramps must be used, use enough ramps to create an unbroken ramp surface wider than the unit.**
- **Do Not exceed a 15° angle between ramp and ground or between ramp and trailer or truck.**
- **Avoid sudden acceleration while driving unit up a ramp to avoid tipping backward.**
- **Avoid sudden deceleration while backing unit down a ramp to avoid tipping backward.**

## Loading a Unit

Use extreme caution when loading units on trailers or trucks. One full width ramp that is wide enough to extend beyond the rear tires is recommended instead of individual ramps for each side of the unit. The lower rear section of the tractor frame extends back between the rear wheels and serves as a stop for tipping backward. Having a full width ramp provides a surface for the frame members to contact if the unit starts to tip backward. If it is not possible to use one full width ramp, use enough individual ramps to simulate a full width continuous ramp.

Ramp should be long enough so that the angles between the ramp and the ground and the ramp and the trailer or truck Do Not exceed 15°. A steeper angle may cause mower deck components to get caught as the unit moves from ramp to trailer or truck. Steeper angles may also cause the unit to tip backward. If loading on or near a slope, position the trailer or truck so it is on the down side of the slope and the ramp extends up the slope. This will minimize the ramp angle. The trailer or truck should be as level as possible.

**Important: Do Not attempt to turn the unit while on the ramp, you may lose control and drive off the side.**

Avoid sudden acceleration when driving up a ramp and sudden deceleration when backing down a ramp. Both maneuvers can cause the unit to tip backward.

# 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 5 hours | • Change the engine oil. |
| After the first 100 hours | • Change the hydraulic filter and fluid. |
| Before each use or daily | • Check the engine oil level.<br>• Check the mower blades.<br>• Check the safety interlock system.<br>• Check the rollover protections systems (roll bar) knobs.<br>• Check the seat belt.<br>• Check for loose hardware.<br>• Check the hydraulic oil level in the expansion tank.<br>• Clean the engine and exhaust system area.<br>• Clean the hydro fan cooling guards.<br>• Clean the grass and debris build-up from the machine and cutting deck.<br>• Clean the grass build-up from under the cutting deck. |
| Every 50 hours | • Check the tire pressures.<br>• Check the condition of the belts.<br>• Grease the deck and pump idler pivots.<br>• Check spark arrester (if equipped). |
| Every 100 hours | • Change the engine oil. (May need more often under severe conditions.)<br>• Remove the engine shrouds and clean the cooling fins. |
| Every 200 hours | • Check the spark plugs. |
| Every 250 hours | • Replace the primary air cleaner element — check secondary air cleaner element; replace if dirty. (May need more often under severe conditions. See the Engine Owner's Manual for additional information.) |
| Every 500 hours | • Replace the secondary air cleaner element (May need more often under severe conditions. See the Engine Owner's Manual for additional information.)<br>• Change the hydraulic filter and fluid (Every 250 hours if using Mobil 1 15W50)<br>• Check the park brake adjustment. |
| Monthly | • Check the battery charge. |

# 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 according to the engine manufacturer's recommendations. 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

### Service Interval: Monthly

**⚠ WARNING**

**CALIFORNIA**
**Proposition 65 Warning**

**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.**

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

## Recommended Jump Starting Procedure

### 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 19.

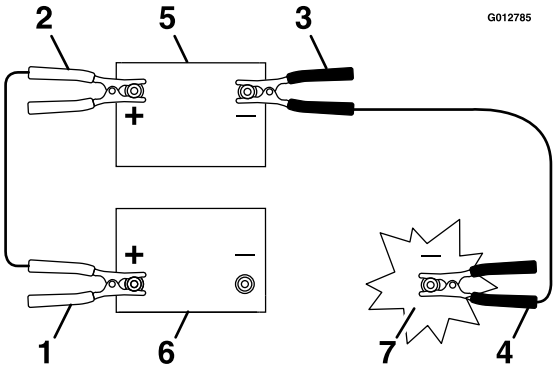



**Figure 19**

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 the splined bushing through the blade with the bushing flange on bottom (grass) side of blade.

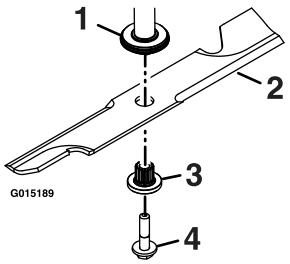



**Figure 20**

1. Spindle
2. Blade
3. Splined bushing
4. Blade bolt washer assembly — Torque to 50-60 ft-lb (68-81 N-m) Apply lubricant to threads as needed to prevent seizing. Copper-based anti-seize preferable. Grease acceptable substitute.

B. Apply lubricant to the threads of the blade bolt as needed to prevent seizing. Copper based anti-seize is preferable. Grease is an acceptable substitute.

C. Install the splined bushing/blade assembly and blade bolt washer assembly into the spindle. Install blade bolt finger tight.

D. Place wrench on the top spindle nut then torque the blade bolts to 50-60 ft-lb (68-81 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.**

# Check Safety Interlock System

### Service Interval: Before each use or daily

**Note:** To prevent engine cut-outs on rough terrain the seat kill switch has a 1/2 second delay.

1. Check starting circuit. Starter **should** crank with, parking brake **engaged**, PTO **disengaged** and motion control levers moved out in the **neutral lock** position. The operator does not need to be in the seat to start the engine.

   Try to start with **operator in seat**, parking brake disengaged, PTO disengaged and motion control levers in the **neutral lock** position - starter **must not crank**.

   Try to start with **operator in seat**, parking brake engaged, PTO **engaged** and motion control levers in the **neutral lock** position - starter **must not crank**.

   Try to start with **operator in seat**, parking brake **engaged**, PTO **disengaged**, **and the left motion control lever in**, starter **must not crank**, repeat again with the **right lever in**, then with **both levers in** - starter **must not crank**.

2. Check the kill circuits. Run engine at one-third throttle, **disengage** parking brake and **raise off** of seat (but do not get off of machine) engine **must initiate shutdown** after approximately 1/2 second has elapsed (seat has time delay kill switch to prevent cut-outs on rough terrain).

   Run engine at one-third throttle, **engage PTO** and **raise off** of seat (but do not get off of machine) engine **must initiate shutdown** after one second has elapsed if the handles are in. The delay will be 1/2 second if the handles are out.

   Run engine at one-third throttle, with brake disengaged, move levers in and raise off seat (but do not get off of machine) engine must **initiate shutdown** after 1/2 second has elapsed.

   Again, run engine at one-third throttle, brake **engaged**, and move **left motion control lever in** - engine **must initiate shutdown** after 1/2 second has elapsed.

   Repeat again moving the **right lever in**, then moving **both levers in** - engine **must initiate shutdown** after 1/2 second has elapsed whether operator is **on seat or not**.

**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 Rollover Protections Systems (Roll Bar) Knobs

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

Check that both the mounting hardware and the knobs are in good working condition. Make sure the knobs are fully engaged with the ROPS in the raised position. The upper hoop of the roll bar may need to be pushed forward or pulled rearward to get both knobs fully engaged.

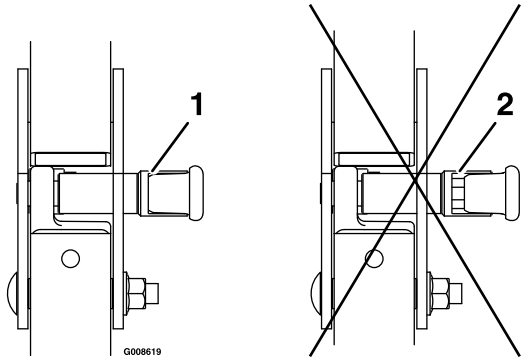



**Figure 21**

1. Engaged
2. Partially engaged — Do Not operate with ROPS in this condition.

# Check Seat Belt

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

Visually inspect seat belt for wear, cuts, and proper operation of retractor and buckle. Replace before operating if damaged.

# Check for Loose Hardware

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

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. 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 250 hours—Replace the primary air cleaner element — check secondary air cleaner element; replace if dirty. (May need more often under severe conditions. See the Engine Owner's Manual for additional information.)**

**Every 500 hours—Replace the secondary air cleaner element (May need more often under severe conditions. See the Engine Owner's Manual for additional information.)**

1. Stop engine, wait for all moving parts to stop, and remove key. 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/Yearly (whichever comes first) (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 is located on the left hand side of the engine. Place pan under machine to catch oil. Remove plug from end of drain hose. Allow oil to drain and replace oil drain plug. Torque plug to 20-24 ft-lb.
4. Replace the oil filter every other oil change. Clean around oil filter and unscrew filter to remove. Before reinstalling new filter, 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 1/2 to 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.
7. Wipe up any spilled oil from engine deck mounting surfaces.

# Check Hydraulic Oil Level

### Service Interval: Before each use or daily

1. Stop engine and wait for all moving parts to stop. Engage parking brake.
2. Wait until the unit cools before checking the hydraulic oil.
3. Check expansion tank and if necessary add Exmark Premium Hydro Oil to the FULL COLD line (see Figure 22).

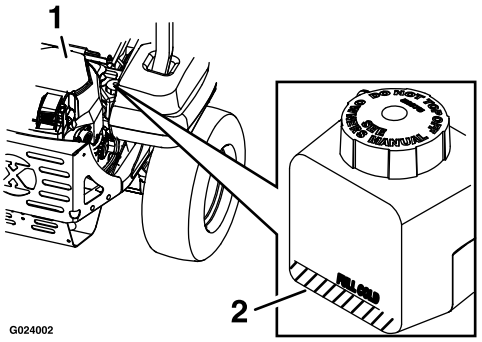



**Figure 22**

1. Engine
2. Expansion tank

# Check Tire Pressures

### Service Interval: Every 50 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 13 psi (90 kPa).
4. Check tire pressure in caster tires.
5. Inflate caster tires to 13 psi (90 kPa).

# Check Condition Of Belts

### Service Interval: Every 50 hours

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Remove left and right belt shields on deck and lower the deck to inspect deck drive belt.
3. Check under machine to inspect the pump drive belt.

**Note:** No adjustments are required for belt tension.

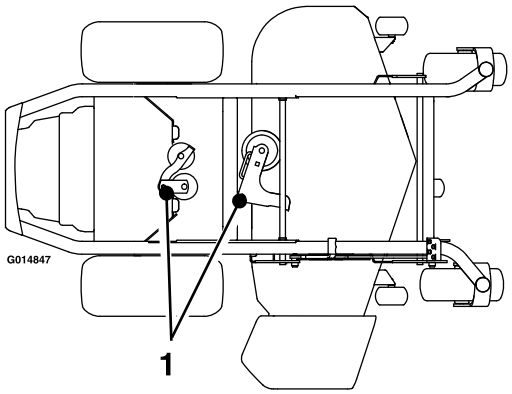
# Lubricate Grease Fittings

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

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Lubricate fittings with one to two pumps of 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** |
| 1. Deck and Pump Idler Pivots | 1 | 2 | 50 hours |




# Lubricate Caster Wheel Hubs

### Service Interval: As required

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.

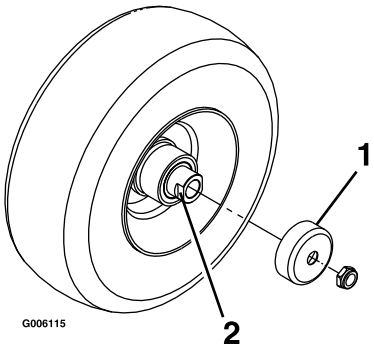



**Figure 23**

1. Seal guard
2. Spacer nut with wrench flats

2. Remove caster wheel from caster forks.
3. Remove seal guards from the wheel hub.
4. Remove one of the spacer nuts from the axle assembly in the caster wheel. Note that thread locking adhesive has been applied to lock the spacer nuts to the axle. Remove the axle (with the other spacer nut still assembled to it) from the wheel assembly.
5. Pry out seals, and inspect bearings for wear or damage and replace if necessary.
6. Pack the bearings with a NGLI grade #1 multi-purpose grease.
7. Insert one bearing, one new seal into the wheel.

   **Note:** Seals (Exmark P/N 103-0063) must be replaced.
8. If the axle assembly has had both spacer nuts removed (or broken loose), apply a thread locking adhesive to one spacer nut and thread onto the axle with the wrench flats facing outward. Do Not thread spacer nut all of the way onto the end of the axle. Leave approximately 1/8 inch (3 mm) from the outer surface of the spacer nut to the end of the axle inside the nut.
9. Insert the assembled nut and axle into the wheel on the side of the wheel with the new seal and bearing.
10. With the open end of the wheel facing up, fill the area inside the wheel around the axle full of NGLI grade #1 multi-purpose grease.
11. Insert the second bearing and new seal into the wheel.
12. Apply a thread locking adhesive to the 2nd spacer nut and thread onto the axle with the wrench flats facing outward.
13. Torque the nut to 75-80 in-lb (8-9 N-m), loosen, then re-torque to 20-25 in-lb (2-3 N-m). Make sure axle does not extend beyond either nut.
14. Reinstall the seal guards over the wheel hub and insert wheel into caster fork. Reinstall caster bolt and tighten nut fully.

**Important: To prevent seal and bearing damage, check the bearing adjustment often. Spin the caster tire. The tire should not spin freely (more than 1 or 2 revolutions) or have any side play. If the wheel spins freely, adjust torque on spacer nut until there is a slight amount of drag. Reapply thread locking adhesive.**

# Check Spark Plugs

### Service Interval: Every 200 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 between the fuel tank and the engine. Replace when necessary.

| Replacement Filters | |
|---|---|
| Kohler | **Kohler** P/N 24 050 13 |
| Kawasaki | **Kawasaki** P/N 49019-0014 |

**Note:** It is important to reinstall the fuel line hoses and secure with plastic ties the same as they were originally installed at the factory to keep the fuel line away from components that could cause fuel line damage.

# Change Hydraulic System Filter and Fluid

### Service Interval: After the first 100 hours
### Every 500 hours thereafter (Every 250 hours if using Mobil 1 15W50)

1. Stop engine, wait for all moving parts to stop, and allow engine to cool. Remove key and engage parking brake.
2. Locate the two filters under the transmissions. Remove filter guards.
3. Carefully clean area around filters. It is important that no dirt or contamination enter hydraulic system.
4. Unscrew filters to remove and allow oil to drain from drive system.

   **Important: Before reinstalling new filters, apply a thin coat of Exmark Premium Hydro Oil on the surface of the filters rubber seal.**

   Turn the filters clockwise until rubber seal contacts the filter adapter then tighten the filter an additional 3/4 to 1 full turn.

5. Remove the vent plug on each transmission and fill through expansion reservoir, when oil comes out of vent reinstall plug.

   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 |

   Torque plugs to 180 in-lb (244 N-m). Continue to add oil until it reaches the FULL COLD line on the expansion reservoir.

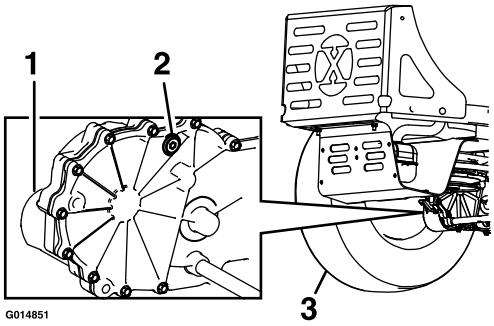



**Figure 24**

1. Oil filter
2. Vent plug
3. Left rear tire

6. 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 deck 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.**

7. Start engine and move throttle control ahead to 1/2 throttle position. Disengage parking brake.

**⚠ WARNING**

**Engine must be running and drive wheels must be turning so adjustments can be performed. Contact with moving parts or hot surfaces may cause personal injury.**

**Keep fingers, hands, and clothing clear of rotating components and hot surfaces.**

A. With the bypass valve open and the engine running, slowly move the directional control in both forward and reverse (5 or 6 times).

B. With the bypass valve closed and the engine running, slowly move the directional control in both forward and reverse directions (5 to 6 times). Check the oil level, and add oil as required after stopping the engine.

C. It may be necessary to repeat steps A and B until all the air is completely purged from the system. When the transaxle operates at normal noise levels and moves smoothly forward and reverse at normal speeds, then the transaxle is considered purged.

**Note:** Do Not change the 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.

# Check Spark Arrester (if equipped)

**Service Interval: Every 50 hours**

**⚠ WARNING**

**Hot exhaust system components may ignite gasoline vapors even after the engine is stopped. Hot particles exhausted during engine operation may ignite flammable materials. Fire may result in personal injury or property damage.**

**Do Not refuel or run engine unless spark arrester is installed.**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Wait for muffler to cool.

3. If any breaks in the screen or welds are observed, replace arrester.
4. If plugging of the screen is observed, remove arrester and shake loose particles out of the arrester and clean screen with a wire brush (soak in solvent if necessary). Reinstall arrester on exhaust outlet.

## Thread Locking Adhesives

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

- ROPS spring pin housing.
- Sheave and clutch retaining bolt in the end of engine crankshaft.
- Hydro cross member mounting bolts

Thread locking adhesives are required for some hardware on engines — see the Engine manual.

## Copper-Based Anti-seize

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

On threads of Blade Bolts. See **Check Mower Blades** section.

## Dielectric Grease

Dielectric grease is used on all blade type electrical connections to prevent corrosion and loss of contact. Dielectric grease should not be applied to sealed connectors.

# *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.

**⚠ CAUTION**

**Raising the mower deck 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.**

## Deck Leveling

1. Position the mower on a flat surface.
2. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
3. Check the tire pressure in the drive tires. Proper inflation pressure for tires is 13 psi (90 kPa). Adjust if necessary.
4. Position the transport lock in the latching position.
5. Carefully rotate the blades from side to side.
6. Measure between the outside cutting edges and the flat surface (Figure 25 and Figure 26). If both measurements are not within 3/16 inch (5 mm), an adjustment is required; continue with this procedure.

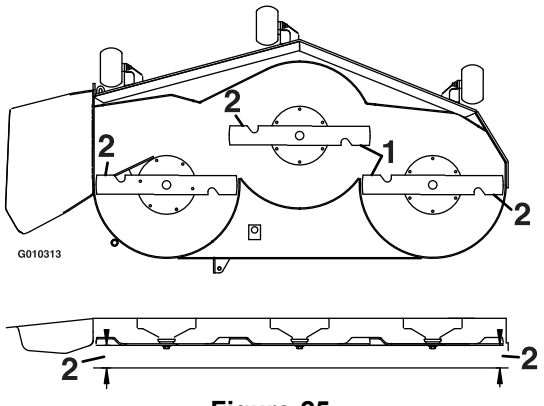



**Figure 25**
48, 52, and 60 Inch Decks

1. Blades side to side
2. Measure here

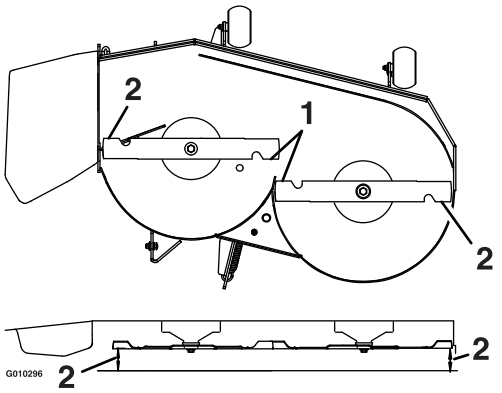



**Figure 26**
44 Inch Deck

1. Blades side to side
2. Measure here

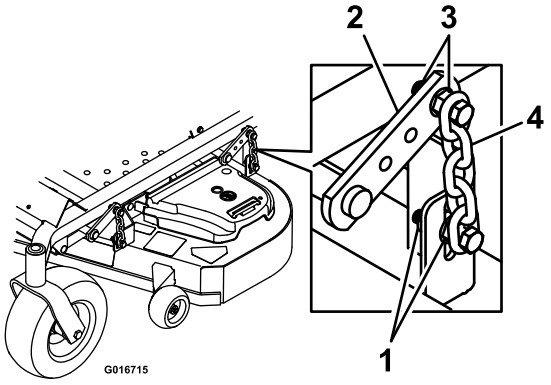



**Figure 27**

1. Leveling adjust locking nuts
2. Deck lift arm
3. Deck hanger
4. Chain

7. Set anti-scalp rollers to top holes or remove completely for this adjustment.
8. Set the height-of-cut lever to the 3 inch (76 mm) position. Place two "B" thick blocks (see Block Height and Rake Table) under the rear edge of the cutting deck skirt; one on each side of the cutting deck. Place two "A" thick blocks under each side of the front edge of the deck, but not under the anti-scalp roller brackets.

**Block Height and Rake Table**

| Deck Size | Front Block Height "A" | Rear Block Height "B" | Rake "R" |
|---|---|---|---|
| 44 | 2.69 inches (6.8 cm) | 2.99 inches (7.6 cm) | 1/8–3/8 inch (3.2–9.5 mm) |
| 48, 52, & 60 | 2.77 inches (7.0 cm) | 2.81 inches (7.1 cm) | 1/16–5/16 inch (1.6–7.9 mm) |

9. Carefully rotate the blades side to side (Figure 25 and Figure 26).
10. Loosen the leveling adjust locking nuts (item 1 Figure 27) on all four corners so that the deck is sitting securely on all four blocks. Make sure that the slack is removed from the deck hangers and the deck lift foot lever is pushed back against the stop, then tighten the four leveling adjust locking nuts.
11. Recheck that blocks fit just snugly under the deck skirt. Make sure all attachment bolts are tight
12. Continue leveling the deck by checking the front-to-rear blade slope; refer to **Adjusting the Blade Slope.**
13. Recheck blades for levelness and repeat deck leveling procedure if necessary.

# Adjusting the Blade Slope

1. Check the front-to-rear blade level any time you install the mower. If the front blade tip is not "R" (see Block Height and Rake Table in **Deck Leveling**) lower than the rear blade tip, adjust the blade level using the following instructions:
2. Park the machine on a level surface and disengage the blade control switch.
3. Move the motion control levers outward to the neutral position, engage the parking brake, stop the engine, remove the key, and wait for all moving parts to stop before leaving the operating position.
4. Check the air pressure of all four tires. If needed, adjust to the recommended inflation; refer to **Checking the Tire Pressure** in Drive System Maintenance section.
5. Check and adjust the side-to-side blade level if you have not checked the setting; refer to **Deck Leveling**.
6. Set the height-of-cut lever to the 3 inch (76 mm) position. Place two "B" thick blocks (see Block Height and Rake Table in **Deck Leveling**) under the rear edge of the cutting deck skirt; one on

each side of the cutting deck. Place two "A" thick blocks (see Block Height and Rake Table in **Deck Leveling**) under each side of the front edge of the deck, but not under the anti-scalp roller brackets.

7. Loosen the leveling adjust locking nuts (item 1 Figure 27) on all four corners so that the deck is sitting securely on all four blocks. Make sure that the slack is removed from the deck hangers and the deck lift foot lever is pushed back against the stop, then tighten the four leveling adjust locking nuts.
8. Carefully rotate the blades so they are facing front to rear (Figure 28).
9. Measure from the tip of the front blade to the flat surface and the tip of the rear blade to the flat surface (Figure 28). If the front blade tip is not "R" (see Block Height and Rake Table in **Deck Leveling**) lower than the rear blade tip, adjust the front deck hanger.

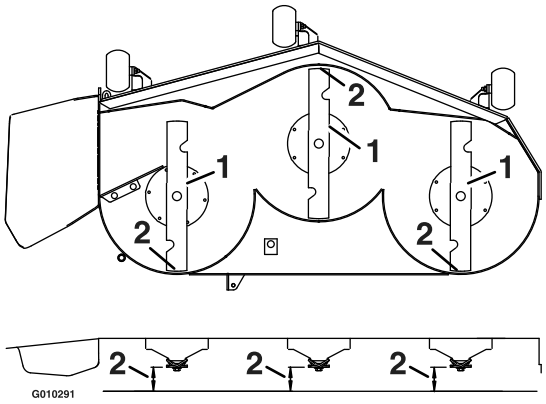



**Figure 28**

1. Blades front to rear 2. Measure here

10. When the front-to-rear blade slope is correct check the side-to-side level of the mower again; refer to **Deck Leveling**.

# Pump Drive Belt Tension

Self-tensioning - No adjustment necessary.

# Deck Belt Tension

Self-tensioning - No adjustment necessary.

# Adjusting the Parking Brake

**Service Interval: Every 500 hours**

Check to make sure brake is adjusted properly. This procedure must be followed after the first 100 hours or when a brake component has been removed or replaced.

1. Drive the machine onto a level surface.
2. Disengage the blade control switch (PTO), move the motion control levers to the neutral locked position and set the parking brake.
3. Stop the engine, wait for all moving parts to stop, and remove the key.
4. Setup the machine to be pushed by hand (see **Drive Wheel Release Valves** in the Operation section).
5. Raise the back of the machine up and support the machine with jack stands.

**⚠ CAUTION**

**Raising the mower deck 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.**

6. Engage/disengage the brake and check each drive tire to make sure each brake engages/disengages.
7. If adjustment is necessary, loosen the jam nut from the yoke on the side that needs adjustment. Remove the hairpin and clevis pin (see Figure 29).

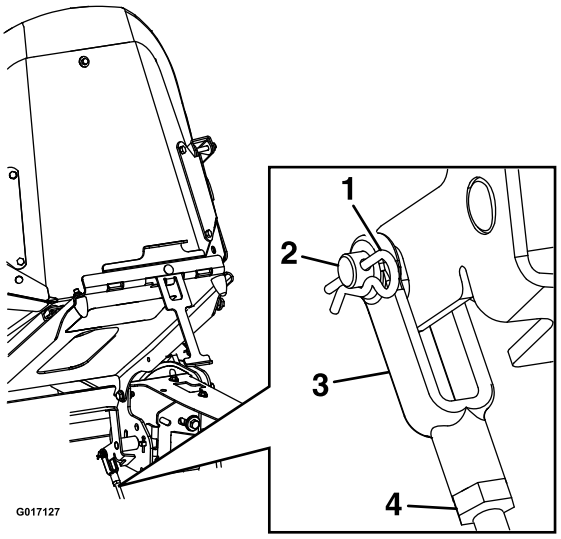



**Figure 29**

1. Hairpin
2. Clevis pin
3. Yoke
4. Jam nut

- Adjusting the Brake to Engage: Shorten the linkage by turning the yoke clockwise.
- Adjusting the Brake to Disengage: Lengthen the linkage by turning the yoke counterclockwise.

8. Reinstall the clevis pin and hair pin and tighten down the jam nut. Repeat step 6 and readjust if necessary.
9. When adjustment is complete, remove the jack stands or equivalent support and lower the machine.
10. Place the machine into the "operating" position. Refer to the **Drive Wheel Release Valves** section in Operation.

# Motion Control Handle Adjustment

**Adjusting the height:**

The motion control levers can be adjusted higher or lower for maximum operator comfort.

1. Remove the hardware holding the control lever to the control arm shaft (Figure 30).

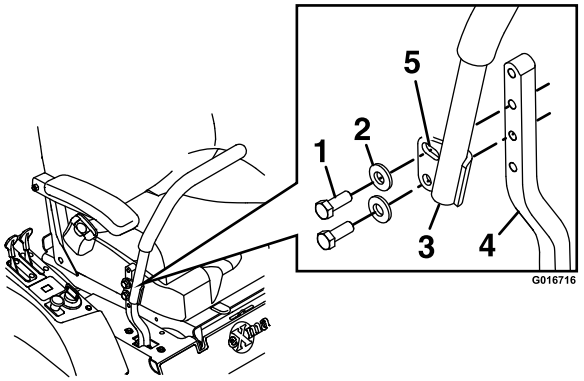



**Figure 30**

1. Bolts
2. Washer
3. Control lever
4. Control arm shaft
5. Slotted hole

2. Move the control lever to the next set of holes. Secure the lever with the hardware.
3. Repeat the adjustment for the opposite control lever.

**Adjusting the Tilt**

The motion control levers can be tilted fore or aft for maximum operator comfort.

1. Loosen the upper bolt holding the control lever to the control arm shaft.
2. Loosen the lower bolt just enough to pivot the control lever fore or aft Figure 30. Tighten both bolts to secure the control in the new position.
3. Repeat the adjustment for the opposite control lever.

# Full Forward Tracking Adjustment

If the machine travels or pulls to one side when the motion control levers are in the full forward position, adjust the cover plates.

1. Loosen the screws on a cover plate (see Figure 31).
2. Slide the cover plate backward or forward to adjust the travel of the lever and tighten the screws.
3. Drive the machine and check the full forward tracking.
4. Repeat steps 1 through 3 until desired tracking is obtained.

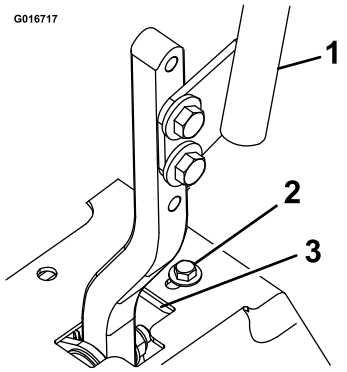



**Figure 31**

1. Control arm shaft
2. Tracking plate screw
3. Tracking plate

# Motion Control Linkage Adjustment

Located on either side of the unit, below the seat are the pump control linkages. Rotating the turnbuckle with a 1/2 inch wrench allows fine tuning adjustments so that the machine does not move in neutral. Any adjustments should be made for neutral positioning only.

## ⚠ WARNING

**Engine must be running and drive wheels must be turning so adjustments can be performed. Contact with moving parts or hot surfaces may cause personal injury.**

**Keep fingers, hands, and clothing clear of rotating components and hot surfaces.**

1. Prior to starting the engine, push the deck lift pedal and remove the height of cut pin. Lower deck to the ground.
2. Raise the rear of machine up and support with jack stands (or equivalent support) just high enough to allow drive wheels to turn freely.
3. Remove the electrical connection from the seat safety switch, located under the bottom cushion of the seat. The switch is a part of the seat assembly.
4. **Temporarily** install a jumper wire across the terminals in the connector of the main wiring harness.
5. Start engine. **Brake must be engaged and motion control levers out to start engine. Operator does not have to be in the seat.** Run engine at full throttle and release brake.
6. Run the unit at least 5 minutes with the drive levers at full forward speed to bring hydraulic oil up to operating temperature.

   **Note:** The motion control lever needs to be in neutral while making any necessary adjustments.
7. Bring the motion control levers into the neutral position. The control plate tabs should touch the return to neutral plates on the hydros. Adjust pump control rod lengths by loosening the nuts and rotating the turnbuckle in the appropriate direction until the wheels slightly creep in reverse (Figure 32). Move the motion control levers to the reverse position and while applying slight pressure to the lever allow the reverse indicator springs to bring the levers back to neutral. The wheels must stop turning or slightly creep in reverse.

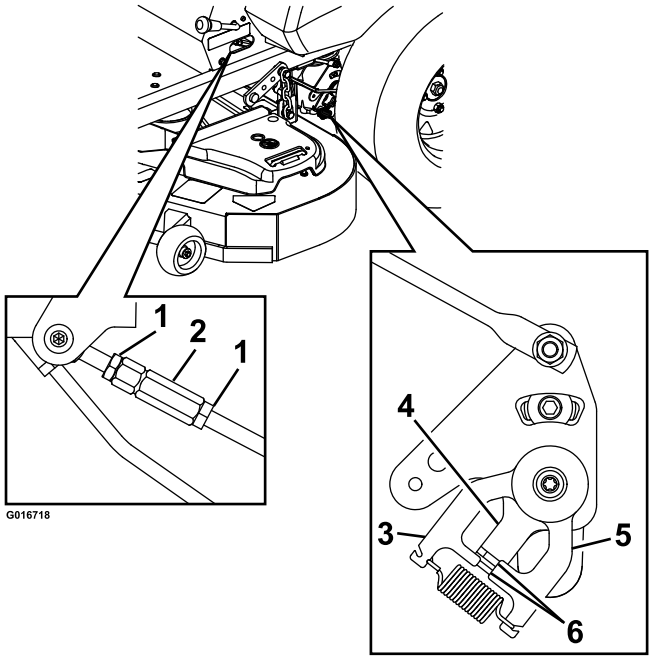



**Figure 32**

1. Nut
2. Turnbuckle
3. Stationary plate
4. Control plate
5. Return to neutral plate
6. Tabs touching return to neutral plate

8. Tighten nuts.
9. Shut off unit. Remove jumper wire from wire harness and plug connector into seat switch.
10. Remove the jack stands.

11. Raise the deck and re-install the height of cut pin.
12. Check that the machine does not creep in neutral with the park brake disengaged.

## Adjusting the Seat Ride Suspension

The number of seat springs can be changed to maximize rider comfort. More springs should be used with heavier operators and on rough terrain. Fewer springs should be used with lighter operators and when mowing smooth, well established lawns. Always keep the number of springs on the left and right side the same when adding and removing springs.

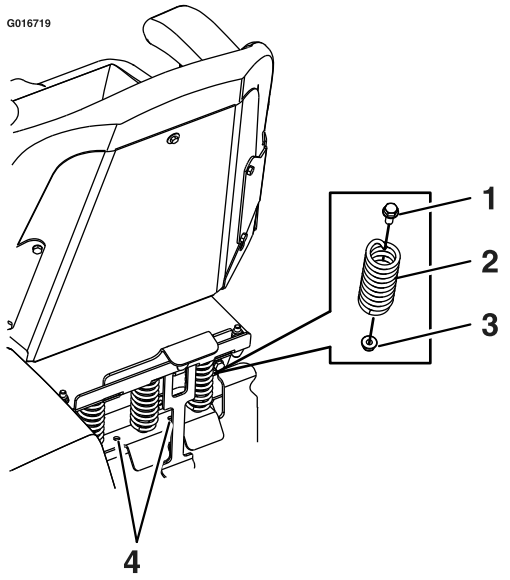



**Figure 33**

1. Bolt
2. Spring
3. Nut
4. Additional mounting holes

Up to five springs can be secured to the seat box with a nut and bolt, see Figure 33.

Refer to the Parts Manual for spring and hardware part numbers.

## Electric Clutch Adjustment

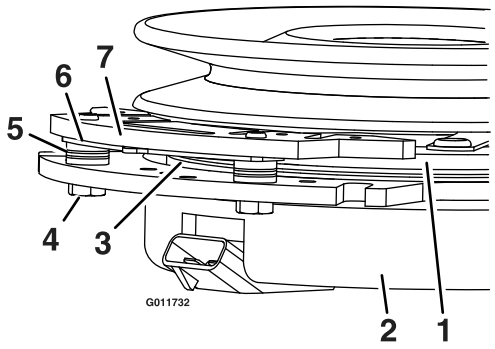



**Figure 34**

1. Armature
2. Field shell
3. Rotor
4. Brake mounting bolt
5. Brake spacer
6. Re-gap shim
7. Brake pole

**Removing the Shim:**

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake. Allow the machine to cool completely before starting these instructions.
2. Using a pneumatic line, blow out any debris from under the brake pole and around the brake spacers.
3. Check the condition of the wire harness leads, connectors, and terminals. Clean or repair as necessary.
4. Verify that 12V is present at the clutch connector when the PTO switch is engaged.
5. Measure the gap between the rotor and armature. If the gap is greater than .04 inch (1 mm), proceed with the following steps:

   A. Loosen both brake mounting bolts one-half to one full turn (see Figure 35).

   **Note:** Do Not remove the brake pole from the field shell/armature. The brake pole has worn to match the armature and needs to continue to match after the shim is removed to ensure proper brake torque.

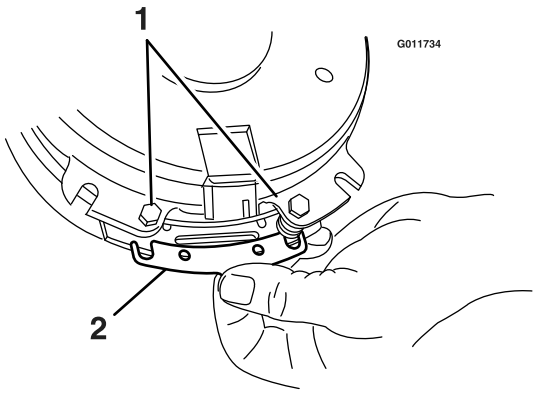



**Figure 35**

1. Brake mounting bolt 2. Shim

B. Using needle nose pliers, or by hand, take hold of the tab and remove the shim (Do Not discard the shim until proper clutch function has been confirmed).

C. Using a pneumatic line, blow out any debris from under the brake pole and around the brake spacers.

D. Re-torque each bolt (M6 x 1) to 10 ft-lb (13 N-m) +/-0.5 ft-lb (0.7 N-m).

E. Using a 0.010 inch thick feeler gauge, verify that a gap is present between the rotor and armature face on both sides of the brake pole as shown. (Due to the way the rotor and armature faces wear (peaks and valleys) it is sometimes difficult to measure the true gap.)

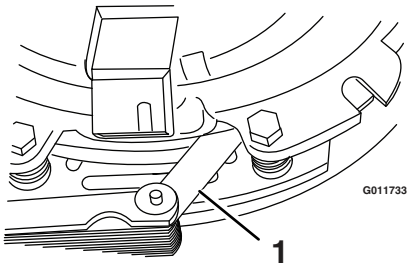



**Figure 36**

1. Feeler gauge

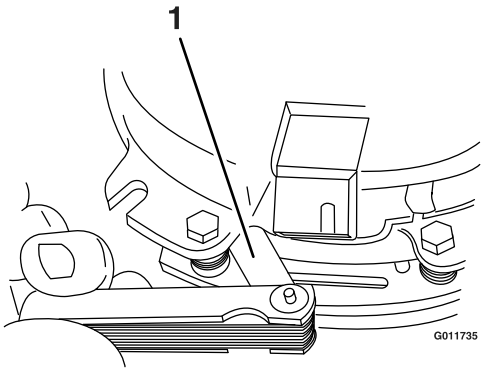



**Figure 37**

1. Feeler gauge

- If the gap is less than 0.010 inch, then reinstall the shim and reference the **Troubleshooting** section.
- If the gap is sufficient, proceed to the safety check in step F.

F. Perform the following safety check:

a. Sit on the seat and start the engine.

b. Make sure the blades Do Not engage with the PTO switch "off" and the clutch disengaged.

If the clutch does not disengage, reinstall the shim and reference the **Troubleshooting** section.

c. Engage and disengage the PTO switch ten consecutive times to ensure the clutch is functioning properly. If the clutch does not engage properly, reference the **Troubleshooting** section.

# *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 inadequate cooling.
3. Make sure cooling shrouds are reinstalled. Operating the engine without cooling shrouds will cause engine damage due to overheating.

## Clean Hydro Fan Cooling Fins

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

Removing debris from the hydro fan cooling fins will allow the hydro system to run cooler and improve the life of the hydro system.

1. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
2. Slide seat all the way forward.
3. Remove accumulated debris from the hydro fan cooling fins and upper surfaces.

## 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.

## Clean Grass Build-Up Under Deck

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

1. Park the machine on a level surface and disengage the blade control switch.
2. Stop engine, wait for all moving parts to stop, and remove key. Engage parking brake.
3. Raise deck to the transport (5 inch (12.7 cm) cutting height) position. Lift the front of unit and support unit using jack stands or equivalent support.

   **⚠ CAUTION**

   **Raising the mower deck 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.**

4. Clean out any grass build-up from underside of deck and in discharge deflector.

## 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.

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.

# 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 adjustment procedures (such as valves, governor, etc.). Have this work done by your **Engine Service Dealer**.

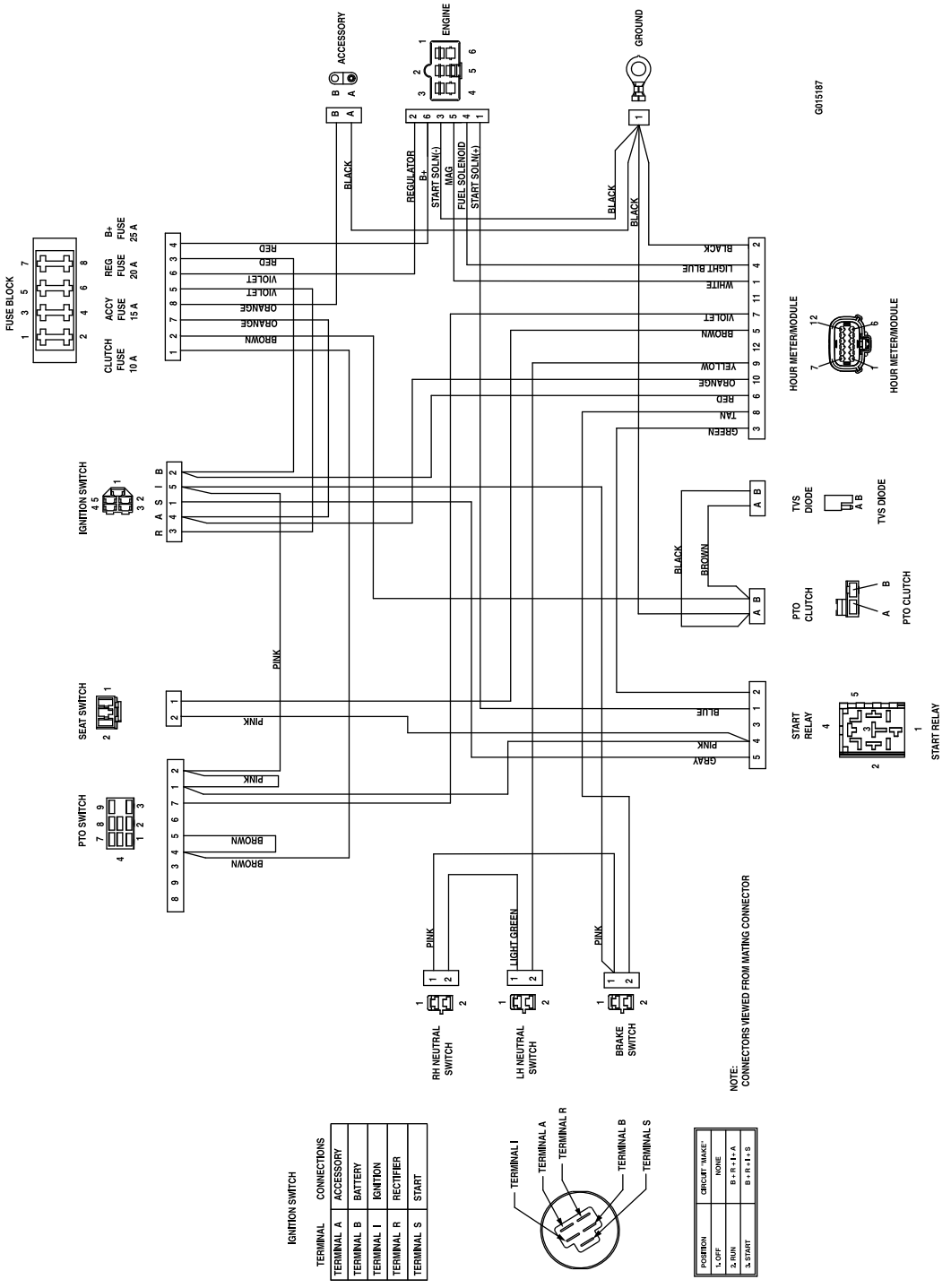
**Note:** When disconnecting electrical connectors DO NOT pull on the wires to separate the connectors.

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| Starter does not crank | 1. PTO is engaged. | 1. Disengage the PTO. |
| | 2. Parking brake is not engaged. | 2. Set the parking brake. |
| | 3. Drive levers are not in neutral lock position. | 3. Ensure the drive levers are in the neutral lock position. |
| | 4. Battery does not have a full charge. | 4. Charge the battery. See **Check Battery Charge** and **Recommended Jump Starting Procedure** sections in Maintenance. |
| | 5. Electrical connections are corroded, loose or faulty. | 5. Check the electrical connections for good contact. Clean connector terminals thoroughly with electrical contact cleaner, apply dielectric grease and reconnect. |
| | 6. Fuse is blown. | 6. Replace the blown fuse. |
| | 7. Relay or switch is defective. | 7. Contact an Authorized Service Dealer. |
| | 8. Faulty module. | 8. Replace module. |
| Engine will not start, starts hard, or fails to keep running | 1. Fuel tank is empty. | 1. Fill the fuel tank. |
| | 2. Fuel shutoff valve is closed. | 2. Open the fuel shutoff valve. |
| | 3. Oil level in the crankcase is low. | 3. Add oil to the crankcase. |
| | 4. The throttle and choke are not in the correct position. | 4. 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. |
| | 5. Dirt in fuel filter. | 5. Replace the fuel filter. |
| | 6. Dirt, water, or stale fuel is in the fuel system. | 6. Contact an Authorized Service Dealer. |
| | 7. Air cleaner is dirty. | 7. Clean or replace the air cleaner element. |
| | 8. Seat switch is not functioning properly. | 8. Check the seat switch indicator. Replace seat if needed. |
| | 9. Electrical connections are corroded, loose or faulty. | 9. Check the electrical connections for good contact. Clean connector terminals thoroughly with electrical contact cleaner, apply dielectric grease and reconnect. |
| | 10. Relay or switch is defective. | 10. Contact an Authorized Service Dealer. |
| | 11. Faulty spark plug. | 11. Clean, adjust or replace spark plug. |
| | 12. Spark plug wire is not connected. | 12. Check the spark plug wire connection. |
| | 13. Faulty module. | 13. Replace module. |

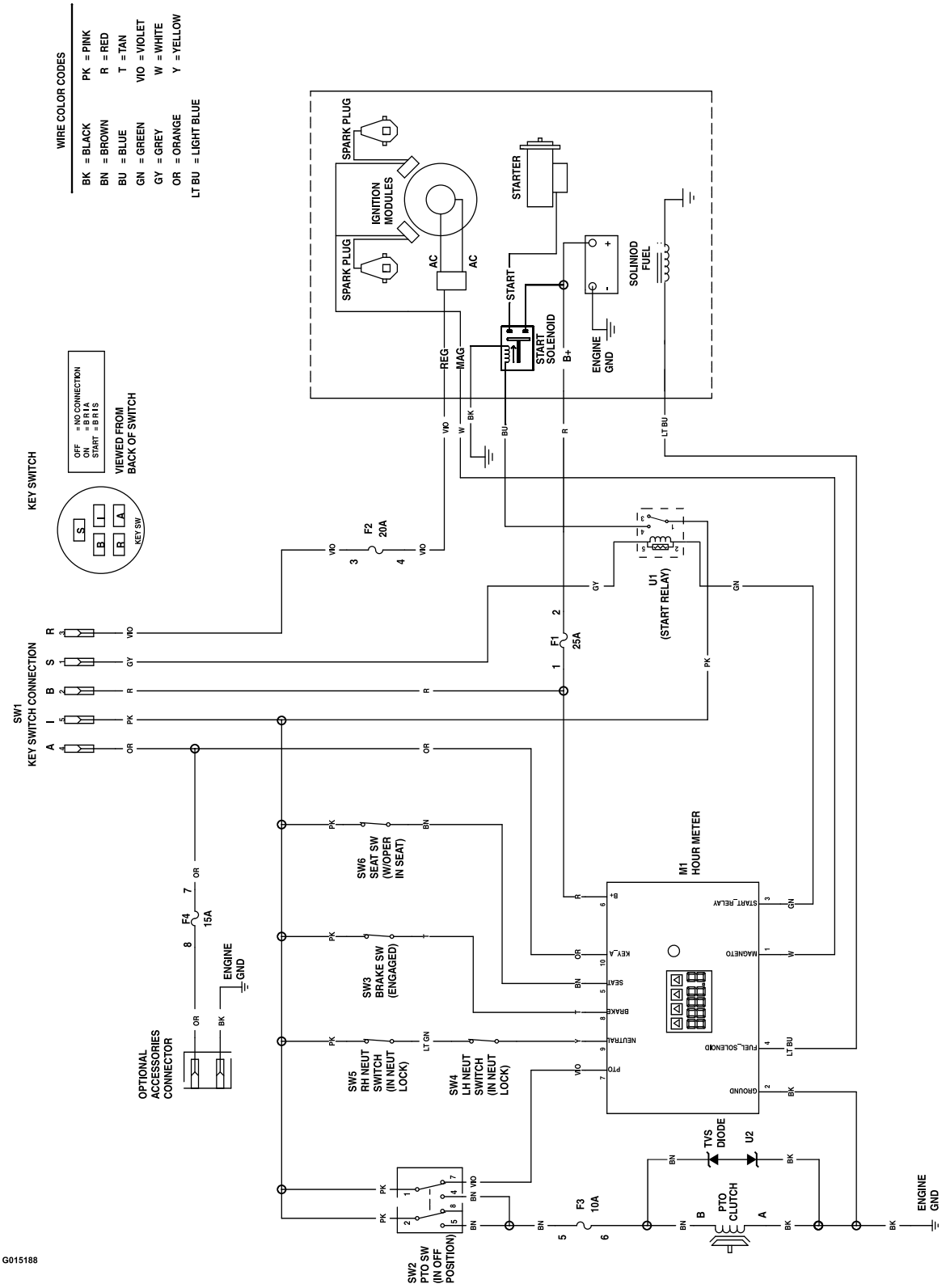
| Problem | Possible Cause | Corrective Action |
|---|---|---|
| Engine loses power | 1. Engine load is excessive<br>2. Air cleaner is dirty.<br>3. Oil level in the crankcase is low.<br>4. Cooling fins and air passages for the engine are plugged.<br>5. Dirt in fuel filter.<br>6. Dirt, water, or stale fuel is in the fuel system. | 1. Reduce the ground speed.<br>2. Clean or replace the air cleaner element.<br>3. Add oil to the crankcase.<br>4. Remove the obstructions from the cooling fins and air passages.<br>5. Replace the fuel filter.<br>6. Contact an Authorized Service Dealer. |
| Mower pulls left or right (with levers fully forward) | 1. Tire pressure in drive tires not correct. | 1. Adjust tire pressure in the drive tires. |
| Machine does not drive | 1. Drive release handle not in "operating" position.<br>2. Drive or pump belt is worn, loose or broken.<br>3. Drive or pump belt is off a pulley.<br>4. Broken or missing idler spring.<br>5. Hydraulic fluid level is low or too hot. | 1. Position handle in "operating" position; see **Drive Wheel Release Valves** section in Operation.<br>2. Change the belt.<br>3. Change the belt.<br>4. Replace the spring.<br>5. Add hydraulic fluid to reservoir or let it cool down. |
| Uneven cutting height. | 1. Blade(s) not sharp.<br>2. Cutting blade(s) is/are bent.<br>3. Mower deck is not level.<br>4. Underside of mower is dirty.<br>5. Tire pressure in drive tires not correct.<br>6. Blade spindle bent.<br>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. | 1. Sharpen the blade(s).<br>2. Install new cutting blade(s).<br>3. Level mower deck from side-to-side and front-to-rear.<br>4. Clean the underside of the mower.<br>5. Adjust tire pressure in the drive tires.<br>6. Contact an Authorized Service Dealer.<br>7. Replace blades, spindles and (or) check for damage to mower deck. |
| Abnormal vibration | 1. Cutting blade(s) is/are bent or unbalanced.<br>2. Blade mounting bolt is loose.<br>3. Engine mounting bolts are loose.<br>4. Loose engine pulley, idler pulley, or blade pulley.<br>5. Engine pulley is damaged.<br>6. Blade spindle is bent. | 1. Install new cutting blade(s).<br>2. Tighten the blade mounting bolt.<br>3. Tighten the engine mounting bolts.<br>4. Tighten the appropriate pulley.<br>5. Contact an Authorized Service Dealer.<br>6. Contact an Authorized Service Dealer. |
| Blades do not rotate. | 1. Drive belt is worn, loose or broken.<br>2. Deck belt is worn, loose or broken.<br>3. Deck belt is off pulley.<br>4. Broken or missing idler spring.<br>5. Drive belt not routed correctly. | 1. Check the belt tension.<br>2. Install new deck belt.<br>3. Install belt on clutch and deck pulleys, idlers, and tensioning idler per routing decal on deck.<br>4. Replace the spring.<br>5. Refer to belt routing decal on deck. |

# Schematics

## Electrical Diagram



# Electrical Logic Schematic



# Pioneer S-Series Turf Equipment
## 2 Year Limited Commercial Warranty
## 4 Year or 500 Hours Limited Consumer Warranty

### General 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.

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.

### Commercial Warranty Conditions

This warranty applies to Exmark Pioneer S-Series turf equipment sold in the U.S. or Canada for a period of two years for commercial usage.

This warranty includes the cost of parts and labor for a period of two years. This warranty does not cover pickup and delivery charges to and from any authorized Exmark Service Dealer.

### Consumer Warranty Conditions

This warranty applies to Exmark Pioneer S-Series turf equipment sold in the U.S. or Canada for a period of four years or 500 hours (whichever occurs first) for residential usage.

Residential usage means use of the product on the same lot as your home. Use at more than one location is considered commercial use, and the commercial use warranty detailed above would apply.

This warranty only includes the cost of parts and labor. For the first warrantable service repair, Exmark will cover up to $45 for associated pick-up and delivery charges to and from any authorized Exmark Service Dealer. Additional transportation charges may apply, contact your Dealer for details.

### Warranty Exceptions

| Warranty Exceptions | Warranty Period |
|---|---|
| • Bags, Belts and Tires | 90 days |
| • Battery | 1 Year Prorated |
| • Engine | * |

* 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.

### Items and Conditions Not Covered

This warranty does not cover the following:

- 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 as set forth in the maintenance section of the operator's manual.
- 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. 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

### 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.

G4500-748_B

# Service Record

| Date: | Description of Work Done: | Service Done By: |
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## 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

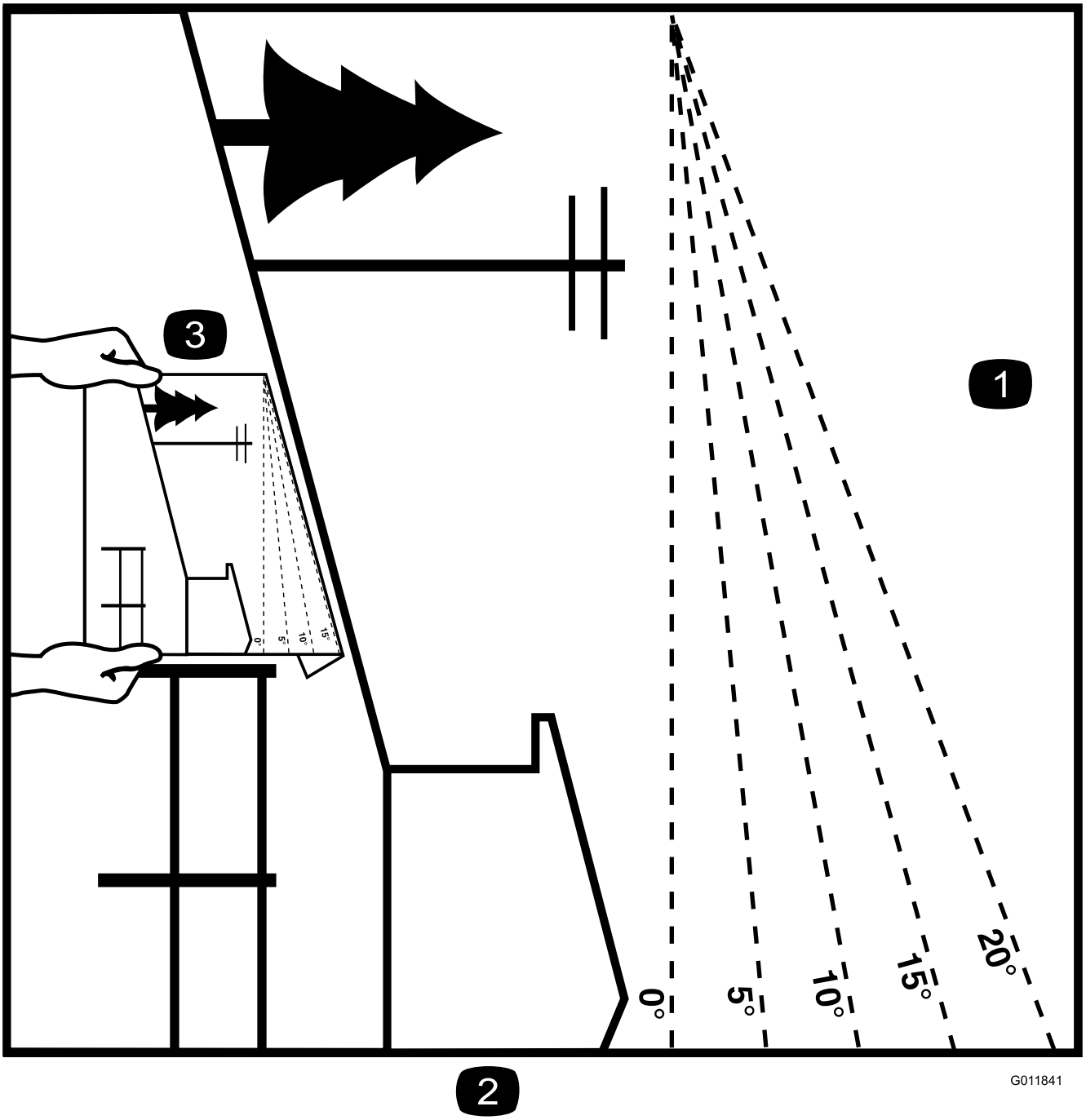



**Figure 38**

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1. The maximum slope you can safely operate the machine on is **15 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 15 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.

## EXMARK ACCESSORIES AND OPTIONS*

### MID-MOUNT RIDING ACCESSORIES AND OPTIONS

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

### OUT-FRONT RIDING ACCESSORIES AND OPTIONS

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

### WALK-BEHIND ACCESSORIES AND OPTIONS

GRASS CATCHER
MICRO-MULCH SYSTEM
TURF STRIPER
STANDON

*Some accessories and options not available for some models.

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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