



Rear-Engine Rider

Ariens 927061, 063, 065

Gravely 927060, 062, 064

Service Manual

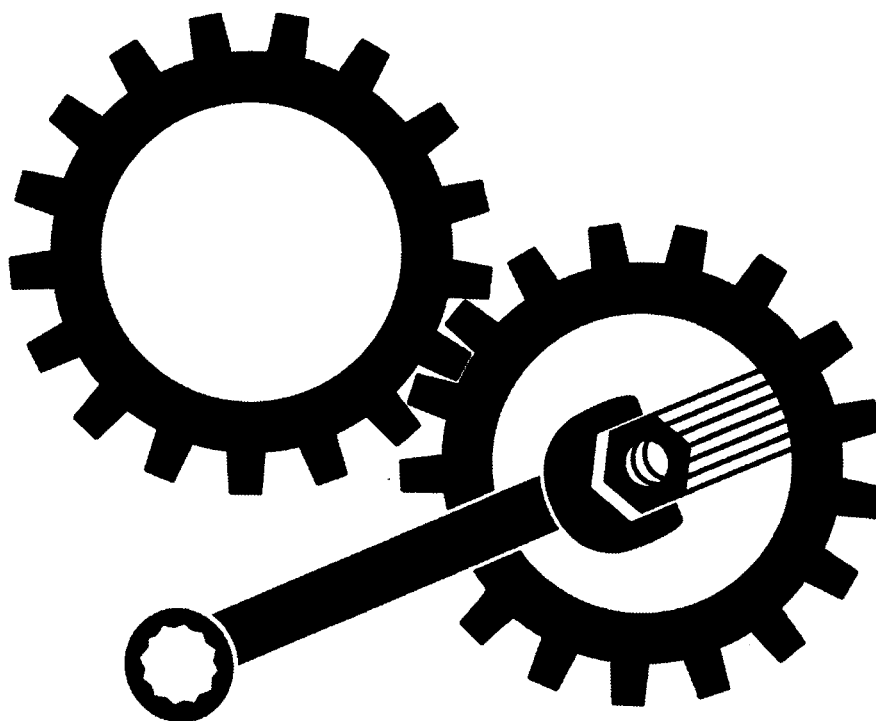


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SECTION 1 - INTRODUCTION

1.1 THE MANUAL

The purpose of this manual is to provide complete instructions for service, maintenance, disassembly, repair, and installation of the mechanical components for the Rear-Engine Rider.

Dealer trained service personnel should use this manual as a supplement to and reminder of the training sessions conducted by the company.

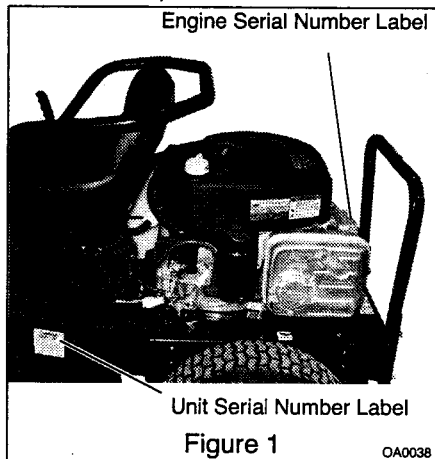
Read all information for servicing a part or system before repair work is started to avoid needless disassembly.

All reference to left, right, front, or rear are given from operator seated in operation position and facing the direction of forward travel.

1.2 MODEL AND SERIAL NUMBERS

When ordering replacement parts or making service inquiries, know the Model and Serial numbers of your unit and engine.

Numbers are located on the product registration form in the unit literature package. They are printed on a serial number label, located on the frame of your unit.



- Record Unit Model and Serial numbers here.

- Record Engine Model and Serial numbers here.

1.3 PRODUCT REGISTRATION

The Ariens/Gravely dealer must register the product at the time of purchase. Registering the product will help the company process warranty claims or contact you with the latest service information. All claims meeting requirements during the limited warranty period will be honored, whether or not the product registration card is returned. Keep a proof of purchase if you do not register your unit.

Customer Note: If the dealer does not register your product, please fill out, sign, and return the product registration card to Ariens/Gravely.

1.4 UNAUTHORIZED REPLACEMENT PARTS

Use only Ariens/Gravely replacement parts. The replacement of any part on this unit with anything other than an Ariens/Gravely authorized replacement part may adversely affect the performance, durability, and safety of this unit and may void the warranty. Ariens/Gravely disclaims liability for any claims or damages, whether warranty, property damage, personal injury or death arising out of the use of unauthorized replacement parts.

1.5 DISCLAIMER

Ariens/Gravely reserves the right to discontinue, change, and improve its products at any time without notice or obligation to the purchaser.

The descriptions and specifications contained in this manual were in effect at printing. Equipment described within this manual may be optional. Some illustrations may not be applicable to your unit.

⚠ WARNING ⚠

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

SECTION 2 - SAFETY



WARNING: This cutting machine is capable of amputating hands and feet and throwing objects. Failure to observe the safety instructions in the manuals and on decals could result in serious injury or death.

Slopes are a major factor related to loss-of-control and tip-over accidents. Operation on all slopes requires extra caution.

Tragic accidents can occur if the operator is not alert to the presence of children. Never assume that children will remain where you last saw them.

Gasoline is extremely flammable and the vapors are explosive, handle with care.

Disengage attachment, stop unit and engine, remove key, engage parking brake, and allow moving parts to stop before leaving operator's position.

2.1 SAFETY ALERTS

These are safety alert symbols. They mean:

•**ATTENTION!**

•**YOUR SAFETY IS INVOLVED!**

When you see this symbol:

•**BECOME ALERT!**

•**OBEY THE MESSAGE!**



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OL3900

2.2 SIGNAL WORDS

The safety alert symbols above and signal words below are used on decals and in this manual.

Read and understand all safety messages.



DANGER: IMMINENTLY HAZARDOUS SITUATION! If not avoided, **WILL RESULT** in death or serious injury.



WARNING: POTENTIALLY HAZARDOUS SITUATION! If not avoided, **COULD RESULT** in death or serious injury.



CAUTION: POTENTIALLY HAZARDOUS SITUATION! If not avoided, **MAY RESULT** in minor or moderate injury. It may also be used to alert against unsafe practices.

2.3 NOTATIONS

NOTE: General reference information for proper operation and maintenance practices.

IMPORTANT: Specific procedures or information required to prevent damage to unit or attachment.

2.4 SAFETY RULES

If unit is to be used by someone other than original purchaser; loaned, rented or sold, **ALWAYS** provide this manual and any needed safety training before operation.

Read, understand, and follow all safety practices in Owner/Operator Manual before assembling, using or working on this mower.

ALWAYS remove key from ignition and wire from spark plug before assembly, or working on this unit.

Inspect unit before each use for: missing or damaged decals and shields, correctly operating safety interlock system, and deterioration of grass catchers. Replace or repair as needed.

ALWAYS check overhead and side clearances carefully before operation. **ALWAYS** be aware of traffic when crossing or operating along streets or curbs.

Keep children, people, and pets away. Be alert and shut off unit if anyone enters work area. Keep children under watchful care of a responsible adult.

NEVER allow children to operate or play on or near unit.

Keep area of operation clear of all toys, and debris. Thrown objects can cause injury.

Stay alert for hidden hazards, holes, and ruts.

Avoid uneven or rough terrain. **DO NOT** operate near drop offs, ditches, or embankments. Unit can suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.

Dust, fog, etc. can reduce vision and cause an accident. Operate unit only when there is good visibility and light.

Data indicates that operators, age 60 and above, are involved in a larger percentage of riding mower related injuries. These operators should evaluate their ability to operate the riding mower safely enough to protect themselves and others from serious injury.

Only trained adults may operate unit. Training includes being familiar with controls and actual operation.

NEVER operate unit after or during the use of medication, drugs or alcohol.

NEVER allow anyone to operate this unit when their alertness or coordination is impaired.

Wear adequate safety gear, sturdy shoes, and protective gloves.

DO NOT wear loose clothing or jewelry and tie back hair that may get caught in rotating parts.

Protect eyes, face and head from objects that may be thrown from unit. Wear appropriate hearing protection. Always wear safety goggles or safety glasses with side shields when operating mower.

Avoid sharp edges. Sharp edges can cut. Moving parts can cut off fingers or a hand.

ALWAYS keep hands and feet away from all rotating parts during operation. Rotating parts can cut off body parts.

ALWAYS keep hands away from all pinch points.

DO NOT touch unit parts which might be hot from operation. Allow parts to cool before attempting to maintain, adjust or service.

NEVER place your hands or any part of your body or clothing inside or near any moving part while unit is running.

NEVER direct discharge towards persons or property. Thrown objects may ricochet back towards operator. ALWAYS stand clear of the discharge area.

ALWAYS disengage attachment, stop unit and engine, remove key, engage parking brake, and allow moving parts to stop before leaving operator's position.

Use extreme caution on gravel surfaces.

Disengage PTO when attachment is not in use and when crossing gravel surfaces.

DO NOT operate unit if safety interlock system is damaged or disabled. Check safety interlock before each use.

ALWAYS remove key to prevent unauthorized use.

DO NOT operate at too fast a rate. Slow down before turning.

Stop engine before removing grass catcher or unclogging chute.

DO NOT mow on wet grass. Reduced traction could cause sliding.

DO NOT try to stabilize the machine by putting your foot on the ground.

Know the weight of loads. Limit loads to those you can safely control and the unit can safely handle.

ALWAYS keep protective structures, guards and panels in good repair, in place and securely fastened.

Do not operate without either entire grass catcher or the discharge guard in place.

DO NOT operate in reverse unless absolutely necessary. ALWAYS look down and behind before and while backing; especially for children.

Follow the manufacturer's recommendations for wheel weights or counterweights to improve stability when using attachments.

NEVER carry passengers—especially children—even with blades off.

Use extra care when approaching blind corners or objects that may obscure vision of hidden obstacles and children.

If you cannot back up a slope or you feel uneasy on it, do not mow it.

Mow up and down slopes, not across them.

Use slow speed on any slope. Tires may lose traction on slopes even though the brakes are functioning properly.

Keep all movements on the slope *slow* and *gradual*. DO NOT make sudden changes in speed or direction.

Use extra care while operating machines with grass catcher or other attachments. They can affect stability of the machine.

Avoid starting, stopping, or turning on a slope. If tires lose traction, disengage the blades and proceed slowly *straight* down the slope.

DO NOT operate on slopes over 10°.

DO NOT park on slopes unless necessary. If unit is parked on a slope, ALWAYS chock or block wheels and set parking brake.

DO NOT disengage or bypass transmission and coast downhill.

Tow only with a machine that has a hitch designed for towing. Do not attach towed equipment except at the hitch point.

Follow the manufacturer's recommendations for weight limits for towed equipment and towing on slopes.

NEVER allow children or others in or on towed equipment.

On slopes, the weight of the towed equipment may cause loss of traction and loss of control.

Travel slowly and allow extra distance to stop.

Use extra care when loading or unloading unit onto trailer or truck.

Secure unit chassis to transport vehicle. NEVER secure from rods or linkages that could be damaged.

DO NOT transport machine while engine is running.

Keep unit free of grass clippings, leaves, and other debris. Clean up oil or fuel spills.

This product is equipped with an internal combustion type engine. DO NOT use unit on or near any unimproved, forest-covered or brush covered land unless exhaust system is equipped with a spark arrester meeting applicable local, state or federal laws. A spark arrester, if it is used, must be maintained in effective working order by operator.

Fuel is highly flammable and its vapors are explosive. Handle with care. Use an approved fuel container.

NO smoking, NO sparks, NO flames. ALWAYS allow engine to cool before servicing.

NEVER fill fuel tank when engine is running or hot from operation.

NEVER fill or drain fuel tank indoors.

NEVER overfill fuel tank.

Replace fuel cap securely and clean up spilled fuel.

NEVER fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before filling.

When practical, remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.

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.

If fuel is spilled on clothing, change clothing immediately.

Avoid Electric Shock. Objects contacting both battery terminals at the same time may result in injury and unit damage. DO NOT reverse battery connections.

Explosive Gases from battery can cause death or serious injury. Poisonous battery fluid contains sulfuric acid and its contact with skin, eyes or clothing can cause severe chemical burns.

NO flames, NO sparks, NO smoking near battery.

ALWAYS wear safety glasses and protective gear near battery.

DO NOT TIP battery beyond a 45° angle in any direction.

ALWAYS keep batteries out of reach of children.

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.

Reverse connections may result in sparks which can cause serious injury. Always connect positive (+) lead of charger to positive (+) terminal, and negative (-) lead to negative (-) terminal.

ALWAYS disconnect negative (-) cable FIRST and positive (+) cable SECOND. ALWAYS connect positive (+) cable FIRST, and negative (-) cable SECOND.

A frozen battery can explode and result in death or serious injury. DO NOT charge or jump start a battery containing frozen fluid. Thaw the battery before putting on a charger or jump starting.

ALWAYS keep protective structures, guards, and panels in good repair, in place and securely fastened. NEVER modify or remove safety devices.

DO NOT change engine governor settings or over-speed engine.

Fumes from engine exhaust can cause injury or death. DO NOT run engine in an enclosed area. Always provide good ventilation.

ALWAYS maintain unit in safe operating condition. Damaged or worn out muffler can cause fire or explosion.

Stop and inspect equipment if you strike an object or if there is an unusual vibration. Repair, if necessary, before restarting. Never make adjustments or repairs with the engine running.

Mower blades are sharp and can cut you. Wrap the blade(s) or wear gloves, and use extra caution when servicing them. NEVER weld or straighten mower blades.

Rotation of one blade may cause rotation of the other blades.

Check brake operation frequently. Adjust and service as required.

Keep all hardware properly tightened.

Stored energy in springs can cause injury.

Maintain or replace safety and instruction labels, as necessary.

Never store the machine or fuel container inside a building where there is an open flame, such as a water heater.

Allow engine to cool completely before storing in closed area or covering unit.

For extended storage, clean unit thoroughly. See Engine Manual for proper storage.

Use only attachments or accessories designed for your unit.

Check attachment components frequently. If worn or damaged, replace with manufacturer's recommended parts.

2.5 SERVICE POSITION



CAUTION: Remove enough fuel so that no spillage will occur. Remove battery to prevent spillage of electrolyte.



WARNING: Always block wheels and know that jack stands or blocks used are stable, strong or secure and will hold the weight of the unit during maintenance.

To ensure that unit is positioned in the proper service position:

1. Place jack stands under rear transaxle only.
2. If jacks are not available, place support blocks under the transaxle at the rear of unit.

2.6 CLEANING AND STORAGE

IMPORTANT: Never spray unit with water or store unit outdoors to help prevent sealed bearing rust or corrosion. Water can seep into sealed bearings and reduce component life. Bearings are sealed against dirt and debris only.

A unit that is excessively dirty should be cleaned before work starts. Cleaning will occasionally uncover trouble sources. Dirt and abrasive dust reduce the efficient work life of parts and can lead to costly replacement.

When taking unit out of extended storage:

1. Check for any damage or loose parts. Repair, replace or tighten hardware before operation.
2. If a preservative fluid was used in fuel tank, drain and discard. Fill fuel tank with fresh new fuel.

2.7 MOVING THE UNIT MANUALLY



WARNING: DO NOT disengage or bypass transmission and coast downhill.

Disengage transmission bypass lever to drive unit and engage transmission bypass lever to push unit manually (Figure 3).

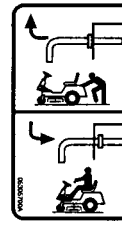
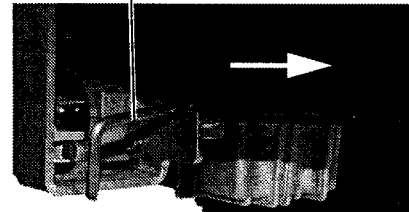


Figure 2

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Disengage transmission bypass lever to drive unit and engage transmission bypass lever to push unit manually, Figure 3.

Transmission Bypass Lever Disengaged to Drive Unit



Transmission Bypass Lever Engaged to Drive Unit

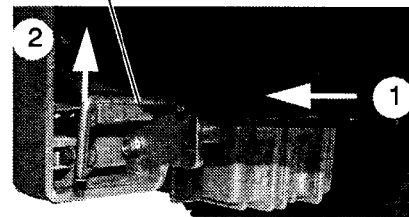


Figure 3

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SECTION 3 - SPECIFICATIONS

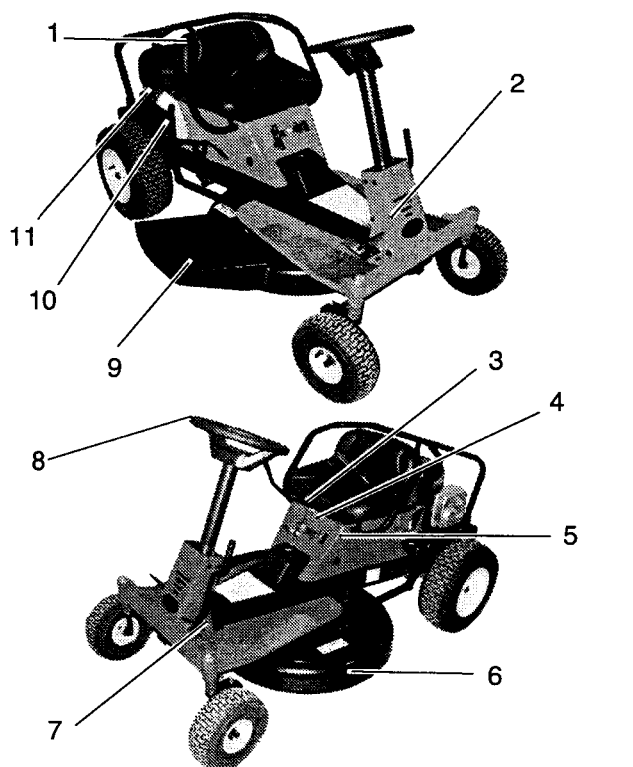
Model Number	927061/927060	927063/927062	927065/927064
Description	1028	1232	1440
Engine Manufacturer	Briggs & Stratton		
Engine Power - hp (kW) @ governed RPM	10 (7.46)	12 (8.9)	14 (10.4)
Max Governed RPM	3150		
Fuel Tank Capacity - gal (L)	1.6 (6.06)		
Starter	Electric		
Transmission	Hydrostatic		
Speed: Forward - mph (km/h)	5.5 (8.85)		
Reverse - mph (km/h)	2.5 (4.02)		
Power Take-Off	Electric PTO Clutch/Brake		
Battery	12 Volt Maintenance Free		
Parking Brake	Internal Hydrostatic Transmission Brake		
Cutting Height - in. (cm)	1-1/4 - 4 (3.18 - 10.2)		
Cutting width - in. (cm)	28 (71)	32 (81.3)	40 (102)
Max Tire Pressure:			
Front - psi (kPa)	24 (165)		
Rear - psi (kPa)	12 (82.7)		
Tire Size: Front - in. (cm)	4 x 3.5 x 10 (10.2 x 8.84 x 25.4)	4.10 x 3.5 x 10 (10.4 x 8.84 x 25.4)	4.10 x 3.5 x 10 (10.4 x 8.84 x 25.4)
Rear - in. (cm)	8 x 6.5 x 16 (20.3 x 16.5 x 40.6)	8 x 6.5 x 16 (20.3 x 16.5 x 40.6)	8 x 6.5 x 18 (20.3 x 16.5 x 45.7)
Turning Radius	12 (30.5)		
Weight — lbs (kg)	390 (177)	400 (181)	435 (197)
Height — in. (cm)	38.7 (98.4)		40 (102)
Length — in. (cm)	66 (168)		67 (170)
Width — in. (cm)	33 (83.8)		37 (94)
Max. Towing Capacity - lbs (kg)	100 (45)		
Max. Tongue Weight - lbs (kg)	30 (13.6)		

SECTION 4 - GENERAL MAINTENANCE & ADJUSTMENTS

4.1 CONTROLS AND FEATURES



WARNING: AVOID INJURY. Read and understand the entire *Safety* section before proceeding.



- | | |
|------------------------------|----------------------|
| 1. Seat | 6. Mower Deck |
| 2. Forward and Reverse Pedal | 7. Parking Brake |
| 3. Throttle Lever | 8. Steering Wheel |
| 4. PTO Switch | 9. Discharge Chute |
| 5. Ignition Switch | 10. Mower Lift Lever |
| | 11. Fuel Tank |

Figure 4

OA0039

4.2 SAFETY INTERLOCK SYSTEM



WARNING: Safety interlock failure and improper operation of unit can result in death or serious injury. Check system before each use to make sure it is functioning properly.

Perform the following tests to ensure safety interlock system is working properly.

Test	Directional Control Pedal	PTO	Parking Brake	Engine
1	Neutral	Off	Engaged	Starts
2	Forward	Off	Engaged	Doesn't Start
3	Reverse	Off	Engaged	Doesn't Start
4	Neutral	On	Engaged	Doesn't Start
5	Neutral	Off	Disengaged	Doesn't Start
6*	Forward	Off	Engaged	Shuts Off
7*	Reverse	Off	Engaged	Shuts Off
8*+	Neutral	On	Disengaged	Shuts Off
9*+	Neutral	Off	Disengaged	Shuts Off
10*+	Neutral	Off	Engaged	Runs

*Test with engine running.

+Operator lifts off seat.

4.3 FILLING FUEL TANK



WARNING: EXPLOSIVE VAPORS and FLAMMABLE FUEL can result in serious injury or death. Handle fuel with care. ALWAYS use an approved fuel container.

No Smoking!

No Lighted Materials!

No Open Flame!

Allow engine to cool.

Use caution with fuel. Fuel is very flammable. Keep fuel in a clean and tight container. Keep fuel away from fire or heat. Never put fuel in the fuel tank while the engine is running or hot. Clean up any spilled fuel before starting the engine.

1. Clean fuel cap and surrounding area to prevent dust, dirt, and debris from entering fuel tank.

2. Remove fuel cap.

IMPORTANT: See Engine Manual for correct type and grade of fuel.

3. Fill fuel tank to 1/2 in. (1.3 cm) below bottom of filler neck. See *Specifications* for fuel tank capacity.

4. Replace fuel cap.

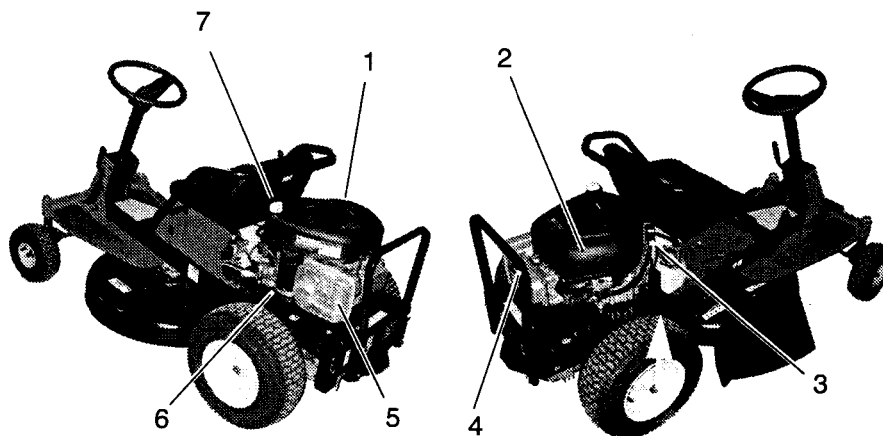
4.4 GENERAL LUBRICATION



WARNING: AVOID INJURY. Read and understand the entire *Safety* section before proceeding.

NOTE: Use Figure 5 to locate items called out in maintenance schedule.

IMPORTANT: Proper maintenance can prolong life of unit. The following chart shows recommended service schedule. Refer to maintenance instructions in Engine Manual for additional information.



- 1. Cooling System
- 2. Air Filter
- 3. Fuel Filter
- 4. Spark Plug

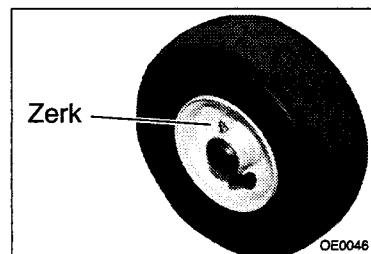
- 5. Muffler
- 6. Oil Drain Petcock
- 7. Oil Fill/Dipstick

Figure 5

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Interval	Task	Action
Each Use	Check Safety Interlock System	<p>WARNING: Safety interlock system failure and improper operation of unit can result in death or serious injury. Test this system each time unit is operated. If this system does not function as described, do not operate until repairs are made.</p> <p></p>
	Check Parking Brake	Engage parking brake and engage transmission bypass lever (see <i>Moving Unit Manually</i>). Push unit. If unit rolls, contact your Ariens/Gravely dealer.
	Clean Unit	Clean engine, battery, seat, mower deck, etc. of all dirt and debris. Do not use solvents, hard cleaners, or abrasives. Protect painted surfaces with automotive type wax.
	Check Tires	See <i>Specifications</i> for correct tire pressure.
	Check Mower Blade(s)	Check for worn or damaged blade(s) (see <i>Sharpening Mower Blade</i>).
	Check Engine Oil	Use oil fill/dipstick to check engine oil level. Add engine oil if needed, refer to Engine Manual for detailed instructions.

Interval	Task	Action
25 Hours or Every Season	Check Battery	Keep battery and battery terminals clean (see <i>Cleaning Battery and Battery Cables</i>).
	Lubricate Unit	Apply grease to two front wheel zerks.
	Clean Air Filter ¹	Clean air filter. Refer to Engine Manual for detailed instructions.
50 Hours or Every Season	Change Engine Oil ²	Drain engine oil by opening oil drain plug. Refer to Engine Manual for detailed instructions.
	Check Fasteners	Check mower blade mounting hardware and all other fasteners. Replace fasteners that are missing or damaged. Tighten all nuts and bolts to correct torque value.
	Inspect Muffler and Spark Arrestor	Replace muffler and spark arrestor (if equipped) if corroded. Contact your Ariens Dealer.
100 Hours or Every Season	Replace Spark Plug	Replace spark plug. Refer to Engine Manual for detailed instructions.
	Replace Fuel Filter	Replace fuel filter. Refer to Engine Manual for detailed instructions.
	Clean Cooling System ¹	Clean cooling system. Refer to Engine Manual for detailed instructions.
	Check All Belts	Replace worn or deteriorated belts. Check hydrostatic belt (see <i>Hydrostatic Belt Replacement</i>). Check PTO belt (see <i>PTO Belt Replacement</i>). Check mower belt (see <i>Mower Belt Replacement (927064)</i>).
¹ Service more often when operating under heavy loads, high temperatures, or dusty conditions. Replace air filter if very dirty. ² Change after first 5 to 8 hours of use. Change every 25 hours when operating under heavy loads or in high temperatures.		



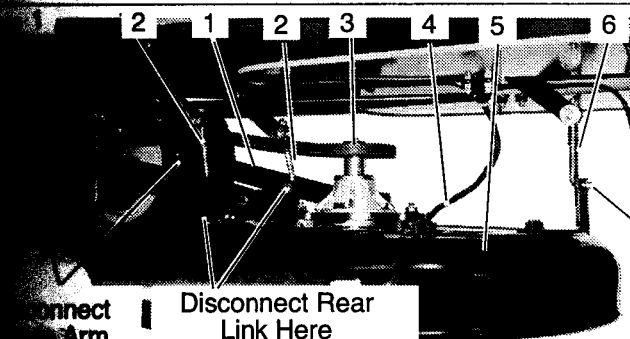
4.5 REMOVE AND INSTALL 28 AND 32-INCH MOWER DECK

Remove (Figure 6)

1. Remove PTO belt.
2. Disconnect electric clutch connector.
3. Disconnect guide arms from unit.
4. Disconnect two rear links and front guide from mower deck.
5. Slide mower deck out from under unit.

Install

1. Slide mower deck under unit.
2. Install guide arms on unit.
3. Connect electric clutch connector.
4. Install PTO belt.
5. Install front guide and rear links on mower deck.



1. Guide Arm
2. Rear Link
3. PTO Belt
4. Electric Clutch Connector
5. Mower Deck
6. Front Guide

Disconnect
Front Guide
Here

Figure 6

OE0032

LEVELING 28 AND 32-INCH MOWER

DECK

Set on a level surface, with tires inflated to correct pressure, and mower lift lever in the middle position.

Check (Figure 7)

Cutting height should be within 1/4 in. (6.35 mm) on each side of mower deck.

Set mower blade(s) in line with discharge chute, and measure distance from bottom of mower blade to ground.

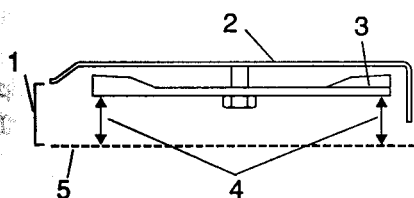
Be certain the key is off and the spark plug wire is removed. By hand rotate the measured blade to opposite side of the deck.

CAUTION: Use gloves or wrap a rag over the sharp edges of the blade to prevent injury.

Measure the distance of the same blade edge on the new side (side opposite the discharge chute) of the deck.

Adjust mower deck if needed.

Mower Deck Shown From The Front



- | | |
|----------------------------|------------------------|
| 1. Discharge Chute Opening | 3. Mower Blade Opening |
| 2. Mower Deck | 4. Cutting Height |
| | 5. Ground |

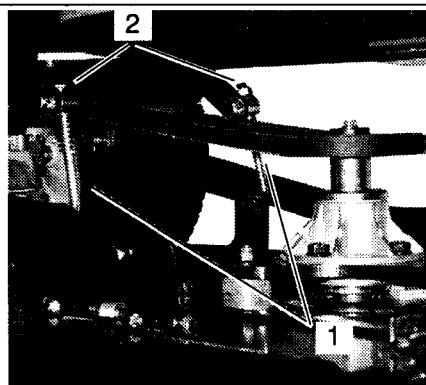
Figure 7

OA0009

Adjust (Figure 8)

NOTE: Raise low side of mower deck half the measured distance between low and high side of mower deck. Lower high side of mower deck half the measured distance between high and low side of mower deck.

1. On low side: Turn trunnion nut clockwise several turns.
2. On high side: Turn trunnion nut counterclockwise several turns.
3. Check that mower deck is level.



1. Rear Guide
2. Trunnion Nut

Figure 8

OE0033

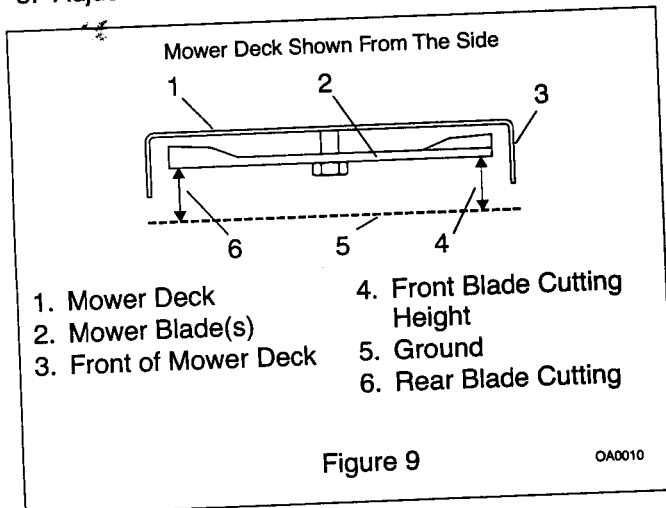
4.7 MOWER DECK PITCH ADJUSTMENT

Adjust on a level surface, with tires inflated to correct air pressure, and mower lift lever in the middle position.

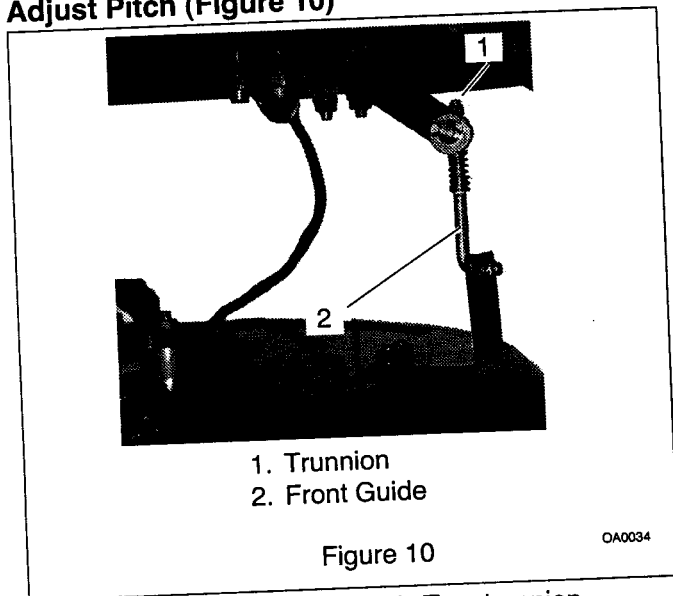
NOTE: The front blade cutting height should be 1/16 - 3/8 in. (1.59 - 9.53 mm) lower than the rear blade cutting height.

Check (Figure 9)

1. With the end of the mower blade(s) facing forward, measure distance from bottom of mower blade(s) to the ground at front of mower deck.
2. Turn mower blade(s) 180 degrees and measure distance from bottom of mower blade(s) to the ground at rear of mower deck.
3. Adjust mower deck if needed.



Adjust Pitch (Figure 10)



1. To raise front of mower deck: Turn trunnion clockwise several turns.
2. To lower front of mower deck: Turn trunnion counterclockwise several turns.

3. Check mower blade pitch.

- If mower blade pitch is not correct, go to step 4.
- If mower blade pitch is correct, the adjustment is complete.

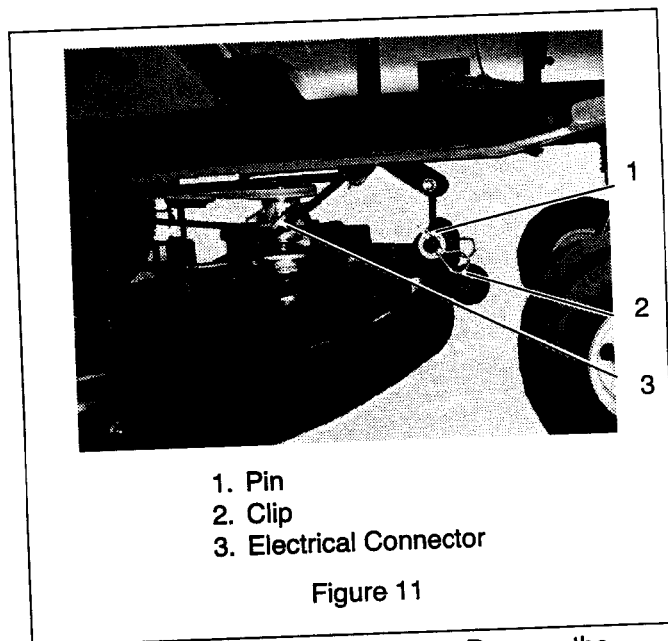
4. Check mower blade pitch.

5. Readjust as required.

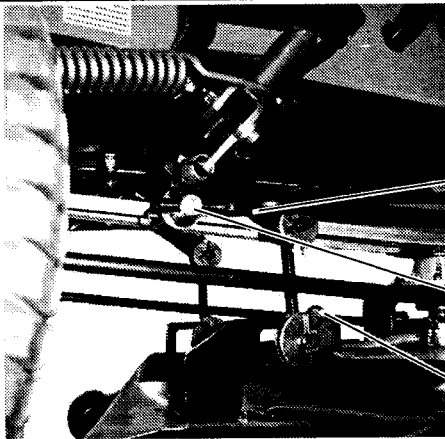
4.8 REMOVE AND INSTALL 40-INCH MOWER DECK

Remove with the engine off and the mower deck raised up, place support blocks under the frame of the mower deck.

1. Lower the mower deck onto the support blocks using the height adjustment lever. This will remove tension on the linkage supporting the deck.
2. Unplug the electrical connector to the electric clutch (Figure 11).



3. Release the idler tension spring. Remove the mower belt from engine pulley.
4. At the front support, pull one clip and remove the pin from the link.
5. At the rear of the deck pull the bottom clip (Figure 12) and remove the washer before pulling out the linkage. Repeat for the other support.
6. Slide the deck out from under the mower.



1. Deck Lift Rod
2. Trunnion
3. Bottom Clip

Figure 12

4.9 LEVELING THE 40-INCH MOWER DECK

Adjust on a level surface with tires inflated to the correct air pressure. The lift lever should be in the middle position.

NOTE: The cutting height should be within 1/4 inch (6.35 mm) side to side on the same blade. Either blade may be used. For convenience use the blade next to the discharge chute.

1. With the key removed and the spark plug wire off, rotate the blade by hand until one edge is at the discharge opening.



CAUTION: Use gloves or wrap a rag over the sharp edges of the blade to prevent injury.

2. Measure the distance from the bottom of the blade to the ground.
3. Rotate the blade half of a turn. This will place the opposite end of the blade at the discharge chute. The measured end of the blade will be at the center of the mower deck.
4. Measure the distance of the same blade edge to the ground.
5. Adjust mower deck if needed.

4.10 ADJUST LEVEL OF MOWER DECK

NOTE: Raise low side of mower deck half the measured distance between low and high side of mower deck. Lower high side of mower deck half the measured distance between high and low side of mower deck.

1. On low side: Remove bottom spring clip (Figure 13) and rotate the link rod clockwise (shorten) several turns. Reattach link rod to mower deck.

2. On the high side: Remove bottom spring clip and rotate the link rod counterclockwise (lengthen) several turns. Reattach link rod to mower deck.
3. Check level.

4.11 MOWER HEIGHT ADJUSTMENT

1. Place deck lift handle in middle position. If mower deck needs adjustment **both** the deck lift rod and the link rods must be changed to maintain level.
2. Adjust the rear of the deck by pulling the pins on the two trunnions and screwing the trunnion up or down the link rod as needed.
3. The front is adjusted by removing the pin on the rod pivot and screwing the pivot on the deck lift rod as needed.

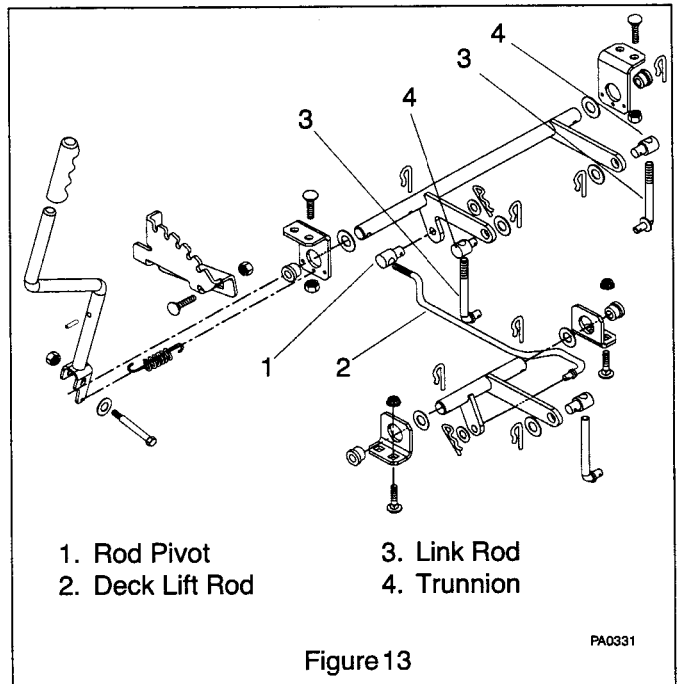


Figure 13

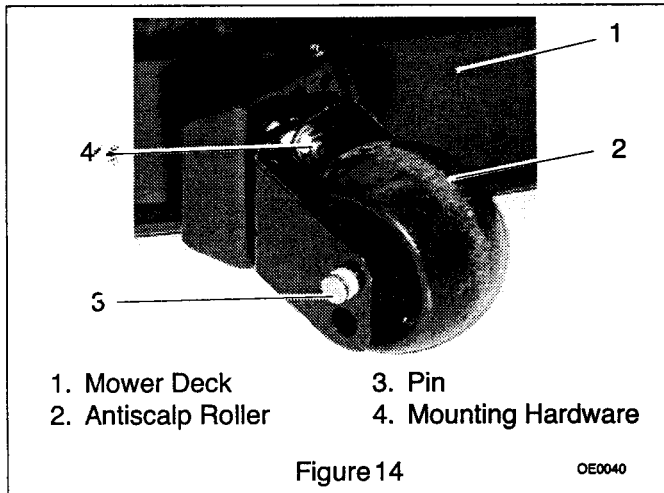
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4.12 ANTISCALP ROLLER ADJUSTMENT

IMPORTANT: Antiscalp rollers prevent lawn scalping. DO NOT use antiscalp rollers to set cutting height. Adjust all antiscalp rollers to same height.

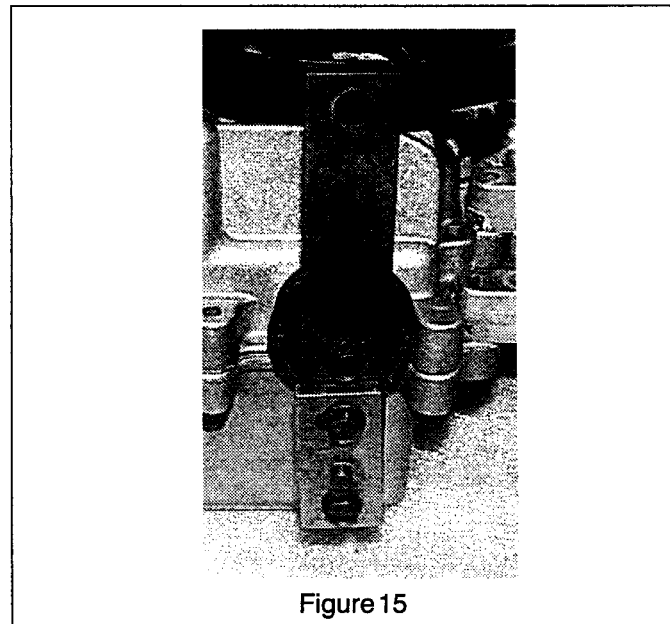
NOTE: Adjust on a level surface, with tires inflated to correct air pressure (see *Specifications*).

1. Select cutting height.
2. Adjust all antiscalp rollers to within 1/2 inch (1.27 cm) of ground (Figure 14).

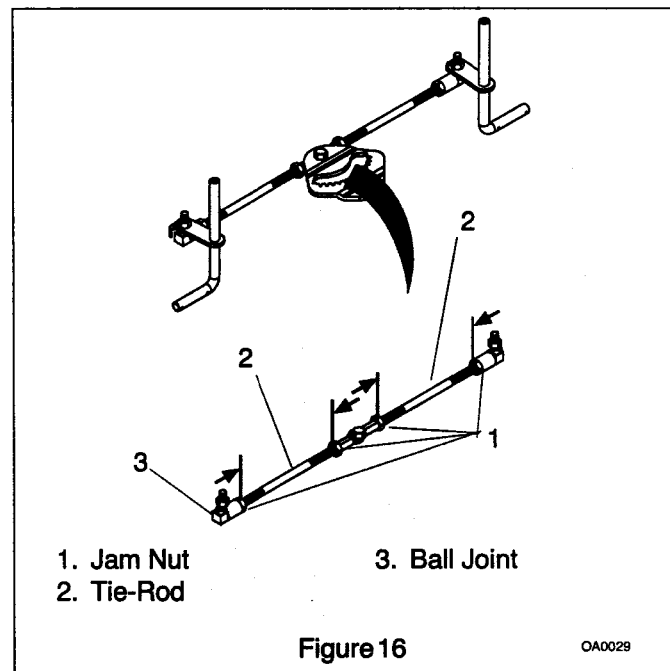


4.13 TRANSMISSION NEUTRAL ADJUSTMENTS

1. Shut off engine.
2. Position rear wheels off the ground. Be careful to secure the unit to the lift or position the unit to face a wall for safety.
3. Engage seat switch and start the engine. Disengage the parking brake. The drive wheels should not be rotating. To adjust the neutral setting for no wheel rotation:
4. Remove linkage to the shift arm. Test for wheel rotation again as per #3 above.
5. If adjustment is necessary, loosen the two bolts on the shift link, Figure 15.
6. The shift arm is spring returned to neutral. Adjust the shift link until the wheels stop rotating. Tighten the two bolts on the shift link.
7. Reattach the linkage to the shift arm.



4.14 FRONT WHEEL ALIGNMENT



1. Measure the distance between jam nuts.

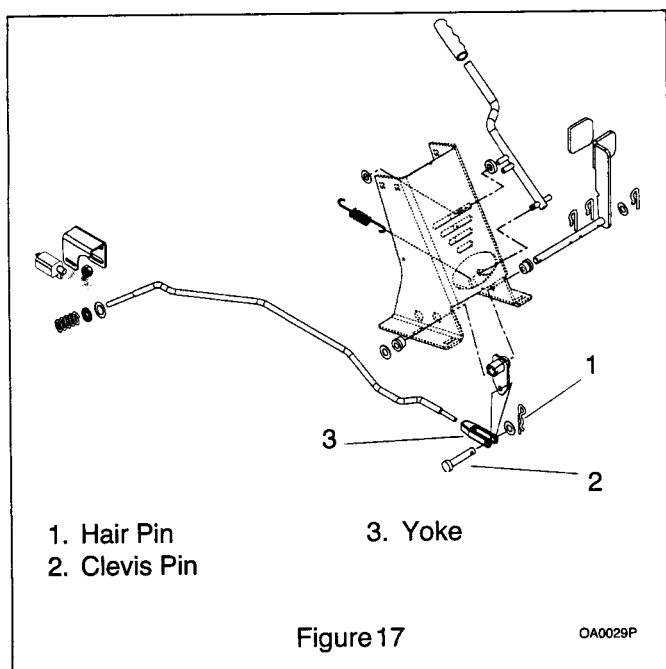
NOTE: The distance between jam nuts should be 7-5/8 to 7-3/4 in. (19.4 to 19.7 cm).

2. Adjust if needed (Figure 16).
3. Turn steering wheel to straight position.
4. Loosen the outer jam nut on the tie-rod that is to be adjusted.
5. Disconnect the ball joint from the weldment.
6. Screw the ball joint on the tie-rod to achieve the correct length.
7. Reattach ball joint to weldment.
8. Tighten jam nut against ball joint.

4.15 REAR WHEEL AND HYDRO DRIVE

When the unit is turned off and the parking brake is engaged, the unit should not roll. If the unit rolls, the parking brake should be adjusted.

4.16 ADJUST PARKING BRAKE



To Adjust Brake: (Figure 17)

1. Pull hair pin.
2. Remove clevis pin and lower the yoke.
3. Screw the yoke further onto the linkage rod.
4. Reattach the yoke and test the brake.

SECTION 5 - ENGINE

5.1 ENGINE TROUBLESHOOTING

The following troubleshooting chart is to be used to isolate engine problems and give possible causes and corrective action responses.

The troubleshooting key is generic and can be used for several types of engines. Use only those possible causes and corrective actions that apply to the unit.

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)	CORRECTIVE ACTION
Black Exhaust	1, 20, 22, 25, 29, 31, 32, 33	repair or replace
Blue/White Exhaust	4, 20, 25, 31, 33, 34	repair or replace
Difficult Starting	1, 5, 7, 8, 9, 10, 20, 21, 22, 29, 31, 32, 33	repair or replace
Erratic Running	1, 7, 8, 9, 10, 20, 21, 23, 26, 29, 33, 59, 62	repair or replace
Excessive Fuel Consumption	1, 20, 22, 23, 25, 39, 31, 32, 33	repair or replace
Excessive Crankcase Pressure	25, 31, 33, 34, 45, 58	repair or replace
High Oil Pressure	4, 41	repair or replace
Knocking	22, 26, 29, 31, 33, 36, 46, 59	repair or replace
Loss of Power or System	1, 8, 10, 20, 21, 22, 23, 25, 26, 31, 32, 33	repair or replace
Low Cranking Power	2, 3, 4, 11	repair or replace
Low Oil Pressure	3, 36, 37, 39	repair or replace
Misfiring	10, 20, 25, 26, 28, 29, 32	repair or replace
Overheating	1, 19, 25,	repair or replace
Poor Compression	25, 28, 29, 31, 32, 33, 34, 59,	repair or replace
Starts and Stops	1, 6, 10, 62	repair or replace see electrical systems see engine service manual
Vibration	20, 23, 25, 26, 29, 33, 45, 49	repair or replace
Will Not Crank	2, 11, 45	charge battery or replace
Will Not Start	1, 10, 62	repair or replace see electrical systems see engine service manual

TROUBLESHOOTING KEY					
1	Restriction in air cleaner	22	Incorrect grade of fuel	43	Faulty suction pipe
2	Bad electrical connection	23	Sticking throttle/restricted movement	44	Choked oil filter
3	Faulty starter motor	24	Exhaust pipe restriction	45	Bad solenoid switch
4	Incorrect grade of lubricating oil	25	Leaking cylinder head gasket	46	Incorrect piston height
5	Low cranking speed	26	Overheating	47	Damaged fan
6	Fuel tank empty	27	Cold running	48	Faulty engine mounting
7	Controls not in correct operation position	28	Incorrect tappet adjustment	49	Incorrectly aligned flywheel and/or flywheel housing
8	Blocked fuel feed line	29	Sticking valves	50	Faulty thermostat
9	Faulty fuel lift pump	30	Incorrect high pressure pipes	51	Restriction in water jacket
10	Choked fuel filter	31	Worn cylinder bores	52	Loose fan belt
11	Battery capacity low	32	Pitted valves and seats	53	Choked radiator
12	Air in fuel system	33	Broken, worn or sticking piston ring(s)	54	Faulty water pump
13	Faulty fuel injection pump	34	Worn valve stems and guides	55	Choked breather pipe
14	Faulty fuel injectors or incorrect type	35	Restriction in air cleaner	56	Damaged valve stem oil deflector (if fitted)
15	Incorrect use of cold start equipment	36	Worn or damaged bearings	57	Coolant level too low
16	Faulty cold start equipment	37	Insufficient oil in sump	58	Blocked sump strainer
17	Broken fuel injection pump drive	38	Bad/defective oil temperature switch	59	Broken valve spring
18	Incorrect fuel pump timing	39	Oil pump worn	60	Exhaust or vacuum pipe leak
19	Incorrect valve timing	40	Pressure relief valve sticking open	61	Bad or defective water temperature switch
20	Poor compression	41	Pressure relief valve sticking closed	62	Bad spark plug(s)
21	Blocked fuel tank vent	42	Broken relief valve spring		

5.2 CHECKING ENGINE OIL

Check the engine oil daily prior to use.

IMPORTANT: Never operate the engine with the oil below the low mark on the dipstick. See the engine manual for oil specifications and oil filter service instructions.

To check oil level:

1. Move the unit to level location.
2. Clean around the dipstick and filter tube to prevent dirt from entering the engine.
3. Remove the dipstick and wipe off the oil on the dipstick.
4. Put the dipstick back into the engine and tighten in place and remove again.
5. When the dipstick is removed, note the oil level. Oil should be between the full and add mark.
6. Replace dipstick.
7. If required, add 5W30 below 40° or 30W above 40°. Do not overfill.
8. Clean up any spillage that may have occurred.

5.3 CHANGING OIL



WARNING: DO NOT touch parts which are hot. Allow parts to cool before servicing.

Engine muffler and other parts will be hot if unit has been running.

1. Engine oil should be changed after the first five hours of operation and every 25 hours there after.
2. Move the unit to a level and well ventilated area and set the parking brake.
3. If the engine is cold, let the unit run for five minutes.
4. When the engine is warm, stop the engine.
5. Clean the area around the dipstick and (drain hose).
6. Put an open container that will hold at least one gallon of oil under the drain hose.
7. Open the drain valve.
8. Allow the engine oil to drain completely into the one gallon container. Remove container and contents for future recycling as required.
9. Close the oil drain valve.
10. If used, remove the oil filter.
11. Clean the oil filter port and install a new oil filter according to the instructions on the oil filter. Fill with new oil to the "full" mark on the dipstick.
12. Start and run the engine for one minute. Stop the engine and recheck the oil level. Add oil as necessary.

13. Check for leakage at the drain plug and oil filter if used. Tighten the fittings as necessary if leakage occurs.

14. Release the parking brake.

15. Return the unit into service.

5.4 CHECKING ENGINE COOLING

IMPORTANT: To prevent severe damage to the engine, proper cooling will need to be maintained.

1. Check the air intake screen on the engine each day.
2. The air intake screen must be kept clean. Remove any grass, dirt, or debris that may have accumulated.
3. Check the engine cooling yearly.

5.5 CLEANING THE AIR CLEANER

1. Check the air cleaner element every day.
2. Clean the air cleaner precleaner every 25 hours. See your engine manual for instructions.
3. Apply oil and reinstall over the paper air filter element.
4. Wipe out the air cleaner cover to remove any dirt build up in the cover.
5. Reinstall the cover over the air cleaner prior to operating the engine. See your Engine Manual.

5.6 CHANGING THE AIR CLEANER ELEMENT

Replace the air cleaner element when clogged or every 100 hours. Do not attempt to clean. See your Engine Manual for instructions.

5.7 INSPECT MUFFLER/SPARK ARRESTER

Inspect muffler and (if equipped) spark arrester. Replace muffler if corroded, as it could create a fire hazard and/or damage.

5.8 REPLACE SPARK PLUGS

Spark plug type and gap setting are shown in *Specifications*. See Engine Manual for detailed instructions.

5.9 ENGINE REMOVAL

1. Remove the hood from the units engine.
2. Remove the negative cable from the battery.
3. Remove the main drive belt from the engine sheave by releasing the idler tension spring.
4. Remove the throttle and choke control from the engine.

5. Remove the electrical wiring from the engine (charge lead, starter cable, fuel solenoid lead, and magneto kill wire).
6. Remove fuel line from engine first. Drain fuel from the line back into fuel tank.
7. Remove the engine bolts.
8. Lift engine out of the unit and off the frame with a hoist (engine).
9. Service, overhaul, or replace engine as required.
10. If replacing engine with a new engine, the following items will have to be removed (if used) from old engine. These items will not be included with a new engine: engine sheave and key, mounting hardware, and engine wiring harness.

5.10 ENGINE INSTALLATION

1. Check the engine base and unit frame for damage before installing the engine.
2. Place the throttle and choke controls, fuel line, and electrical wires out of the way prior to installing the engine.
3. Once the engine is bolted onto the frame, tighten the mounting hardware.
4. Install the engine sheave, belts, springs, electrical wiring, throttle, and choke controls.
5. Install the negative battery cable onto the battery.
6. Install the fuel line.
7. Fill engine with 30W above 32°F (0°C) or 5W30 below 32°F (0°C).
8. Install the engine cover, then test operation and function of the engine.



WARNING: AVOID EXHAUST FUMES! DO NOT run engine in an enclosed area. ALWAYS provide good ventilation and wait until hazard has been removed.

9. Check the fluid levels as follows:

Start the engine and allow it to reach to operating temperature. DO NOT operate engine for more than two minutes.

Shut the engine off, wait for engine to cool, and be sure the engine oil level is between the full and add marks on the dipstick. If it is below the add mark, add recommended oil. DO NOT overfill.

SECTION 6 - DRIVE TRAIN

6.1 HYDRO TRANSMISSION TROUBLESHOOTING

The following troubleshooting chart is to be used to isolate hydro transmission problems and give possible

cause and corrective action responses. The troubleshooting key is generic and can be used for several types of transmissions. Use only those possible causes and corrective actions that apply to the unit.

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)
Axles will not turn	1, 7, 8, 12, 16, 18, 28, 32, 38, 42, 46
Difficult starting	1, 6, 7, 8, 12, 16, 25, 26, 28, 38, 42, 46
Erratic running	1, 4, 6, 7, 8, 12, 18, 25, 26, 28, 42, 46, 55
Jerky when starting	1, 4, 7, 8, 12, 18, 28, 38, 46
Jumps out of gear	N/A
Knocking	4, 8, 12, 18, 28, 37, 42
Loss of power or system	4, 12, 18, 28, 37, 42, 46
Noisy	4, 12, 18, 26, 28, 32, 37, 42
Oil leakage	4, 22, 51, 16
Operates hot	4, 16, 28, 32, 35, 42
Operates in one direction only	1, 8, 12, 30, 46
Pump failure	4, 12, 37
Speed loss under load	1, 4, 6, 7, 11, 12, 18, 26, 28, 37, 46, 51
Will not drive	1, 7, 8, 18, 28, 37, 38, 46, 48
Will not shift	

TROUBLESHOOTING KEY					
1	Inspect control linkage	22	Inspect hoses and lines for wear	43	Burrs on gearing
2	Inspect acceleration valves	23	Inspect implement relief valve	44	Gears improperly installed
3	Inspect charge check valves	24	Inspect charge pump	47	Shifting washer in backwards
4	Incorrect grade of lubricating oil	25	Bad transmission pump	48	Shifter/Brake shaft keyways damaged
5	Low cranking speed	26	Overheating	49	Unit clutch not disengaging
6	Controls not in correct operation position	27	Cold running	50	Shifter stop assembled backwards
7	Belts are missing, too tight, loose or glazed	28	Bad transmission motor	51	Improper fit of case to cover
8	Overload of vehicle	29	Check system pressure	52	Dowel pins not installed
9	Replacement parts damaged	30	Shift rod grooves worn	53	Differential bevel gears broken
10	Replacement parts improperly installed	31	Reverse chain broken	54	Spring in shifter weak or broken
11	Improperly torqued attaching screws	32	Damaged cooling fan	55	Worn or stripped gear teeth
12	Air in hydraulic system	33	Inspect auxiliary relief valve		
13	Broken shifter stop	34	Inspect cooling fan		
14	Inspect charge check valves	35	Inspect transmission cooling fins		
15	Inspect acceleration valves	36	Worn or damaged bearings		
16	Check oil level-gear box sump or reservoir	37	Metallic pieces or foreign objects in unit		
17	Inspect heat exchanger	38	Inspect for loosely mounted components		
18	Inspect bypass valve	39	Steering column loose or binding		
19	Inspect charge pressure	40	Pressure relief valve sticking open		
20	Inspect inlet filter	41	Pressure relief sticking closed		
21	Inspect charge relief valve	42	Broken relief valve spring		

6.2 TRANSAXLE FLUID RECOMMENDATIONS

The fluids used in the transaxle has been carefully selected, and only equivalent or better products should be used.

Typically, an engine oil with a minimum rating of 55 sus at 210°F and an API classification of SH/CD is recommended. A 20W-50 engine oil has been selected for use by the factory.

6.3 HYDROSTATIC BELT REPLACEMENT

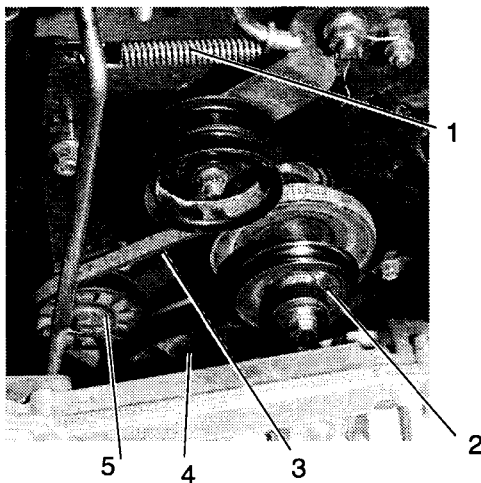
Remove (Figure 18)

1. Remove PTO belt (see *PTO Belt Replacement*).



CAUTION: Use care when releasing idler spring tension. Keep body parts well away from idler when performing this operation

2. Push idler towards the inside of the unit and remove hydrostatic belt from idler.
3. Remove hydrostatic belt from engine sheave and hydrostatic transmission pulley.



- | | |
|---------------------|------------------------------------|
| 1. Idler Spring | 4. Hydrostatic Transmission Pulley |
| 2. Engine Sheave | |
| 3. Hydrostatic Belt | 5. Idler |

Figure 18

OA0031

Install

1. Install hydrostatic belt on hydrostatic transmission pulley and engine sheave.
2. Push idler towards the inside of the unit and place hydrostatic belt on idler.
3. Slowly release idler until hydrostatic belt rests firmly against idler.
4. Install PTO belt (see *PTO Belt Replacement*).

6.4 REMOVE TRANSMISSION

NOTE: Internal transmission repairs should only be made by qualified personnel. This manual will describe removing and replacing the transmission, Figure 19. Other repairs should be made following the procedures in the Peerless Manual.

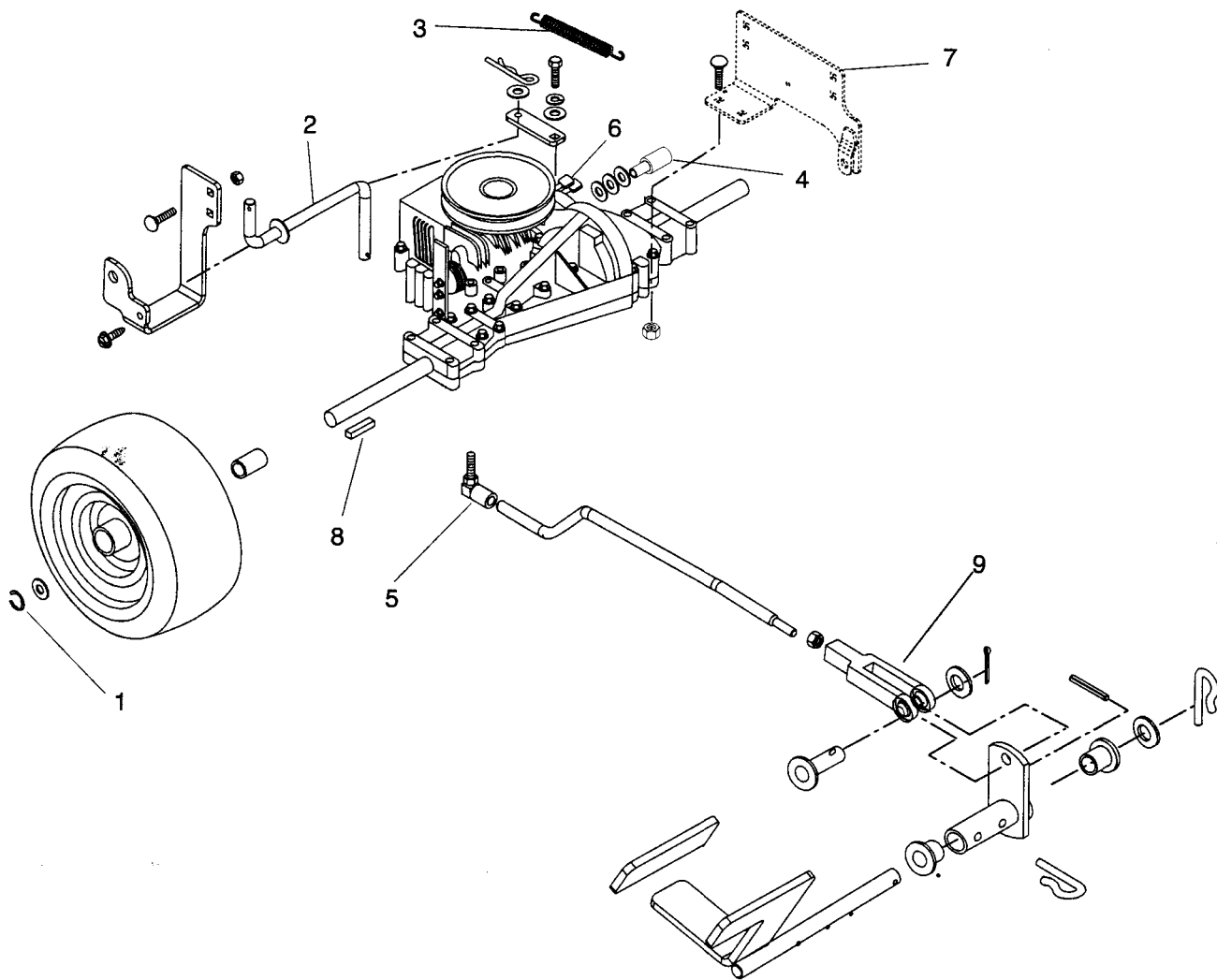
1. Place unit on a flat surface and remove the negative lead from the battery.
2. Remove key and spark plug wire.
3. Remove mower deck.
4. Raise and block the units frame on jack stands behind the transaxle on the frame.
5. Disconnect dump valve linkage by pulling the pin.
6. Remove both wheels by removing snap ring.
7. Push idler for drive belt towards the inside of the unit and remove drive belt.
8. Remove tension spring and disconnect brake linkage.
9. Disconnect drive linkage ball joint.
10. Unplug neutral switch located under the pulley.
11. Unbolt front support.
12. Support drive unit and unbolt each side (by output shafts).
13. Lower drive and remove.

NOTE: The brakes and direction linkage are installed by Peerless. No adjustments should be needed. If the neutral setting is not correct refer to *Transmission Neutral Adjustments*. For other repairs consult the Peerless Manual.

6.5 INSTALL TRANSMISSION

The drive unit is installed in the reverse order of removal.

Check the linkages for brakes and direction for correct length. Adjust as needed. The square keys for the wheels should be replaced if they show any wear.



1. Snap Ring
2. Dump Valve Rod
3. Tension Spring
4. Brake Linkage Trunnion
5. Drive Linkage Ball Joint

6. Neutral Switch Plugs
7. Front Support
8. Square Key
9. Yoke

Figure 19

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SECTION 7 - MOWER DECK

7.1 PTO BELT REPLACEMENT

Remove

1. Lower mower deck to the ground.

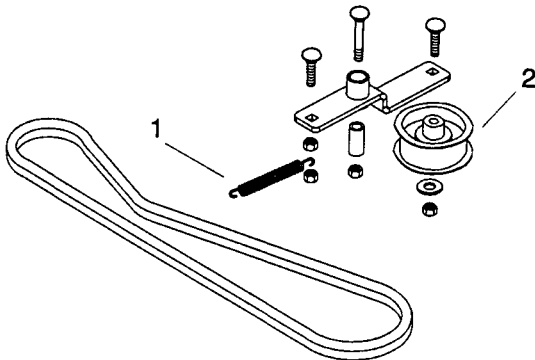


CAUTION: Use care when releasing idler spring tension. Keep body parts well away from idler when performing this operation.

2. Pull idler towards the outside of the unit and remove PTO belt from idler.
3. Remove PTO belt from mower deck pulley and engine sheave.

Install

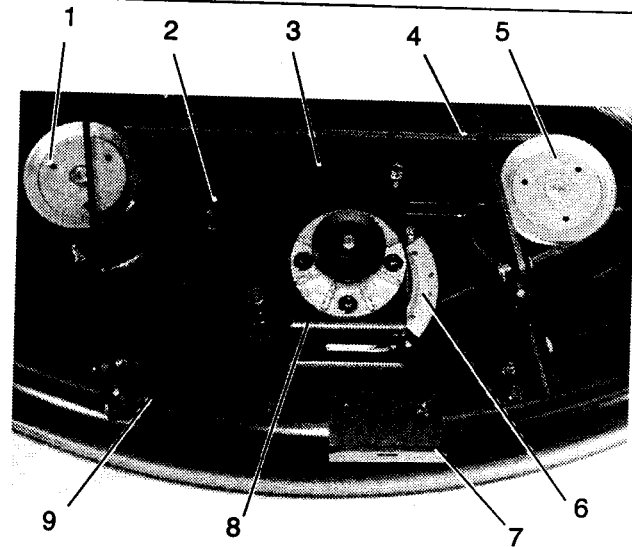
1. Install PTO belt on engine sheave and mower deck pulley.
2. Pull idler towards the outside of the unit and place PTO belt on idler.
3. Slowly release idler until PTO belt rests firmly against idler.



1. Idler Spring
2. Idler Pulley

Figure 20

7.2 MOWER BELT REPLACEMENT - 40-INCH DECK (927064)



- | | |
|-----------------|-------------------|
| 1. Right Pulley | 5. Left Pulley |
| 2. Idler | 6. Clutch |
| 3. Idler Spring | 7. Front Bracket |
| 4. Mower Belt | 8. Clutch Bracket |
| | 9. Mower Deck |

Figure 21

Remove (Figure 21)

1. Remove mower deck (see *Remove and Install 40 inch Mower Deck*).



CAUTION: Use care when releasing idler spring tension. Keep body parts well away from idler when performing this operation.

2. Remove idler spring.
3. Remove front bracket and clutch bracket.
4. Remove mower belt.

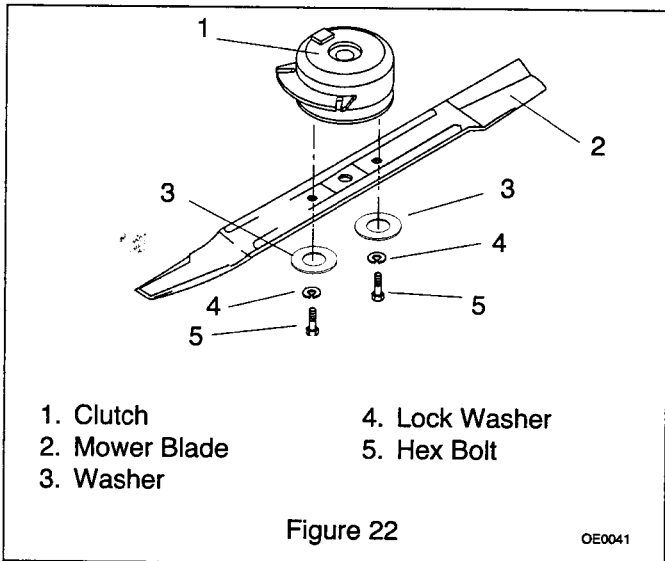
7.3 MOWER BLADE REPLACEMENT



CAUTION: Mower blades are sharp and can cut you. Wrap the blades or wear gloves, and use extra caution when servicing them.

28 And 32-inch Mower Decks (Figure 22)

Remove



- | | |
|----------------|----------------|
| 1. Clutch | 4. Lock Washer |
| 2. Mower Blade | 5. Hex Bolt |
| 3. Washer | |

Figure 22

OE0041

1. Place mower lift lever in the highest position.
2. Block mower blade to prevent rotation.
3. Remove mower blade from clutch.

Install

1. Install mower blade on clutch.
2. Torque hex bolts to 45-55 lb-ft (61-75 Nm).

40-inch Mower Deck (Figure 23)

NOTE: The 40-inch mower deck has two mower blades.

Remove

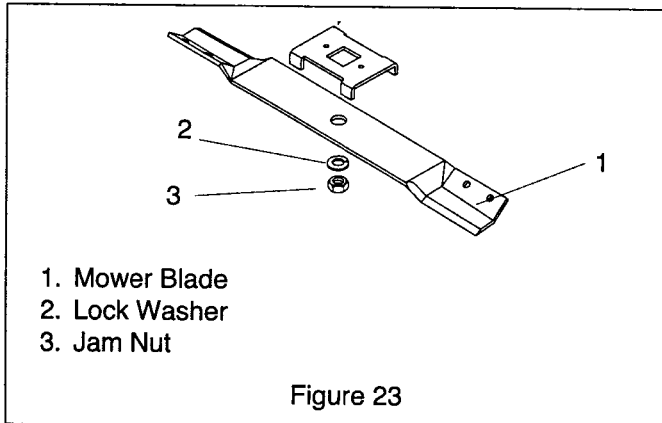


Figure 23

1. Place mower lift lever in the highest position.
2. Block mower blades to prevent rotation.
3. Remove mower blades and blade trays from spindles.

Install

1. Install blade trays and mower blades on spindles.
2. Torque 3/4 in. jam nuts to 50-60 lb-ft (68-81 Nm).

7.4 ELECTRIC CLUTCH - 28 AND 32-INCH MOWER DECKS

Remove (Figure 24)

1. Remove mower deck from unit.
2. Remove mower blade and debris shield.
3. Unbolt clutch from anti-rotation stop.
4. Remove bolt from center of spindle shaft. Clutch should slide off the shaft.

Install

Clutch is installed in reverse order.

NOTE: Check keyways for burrs.

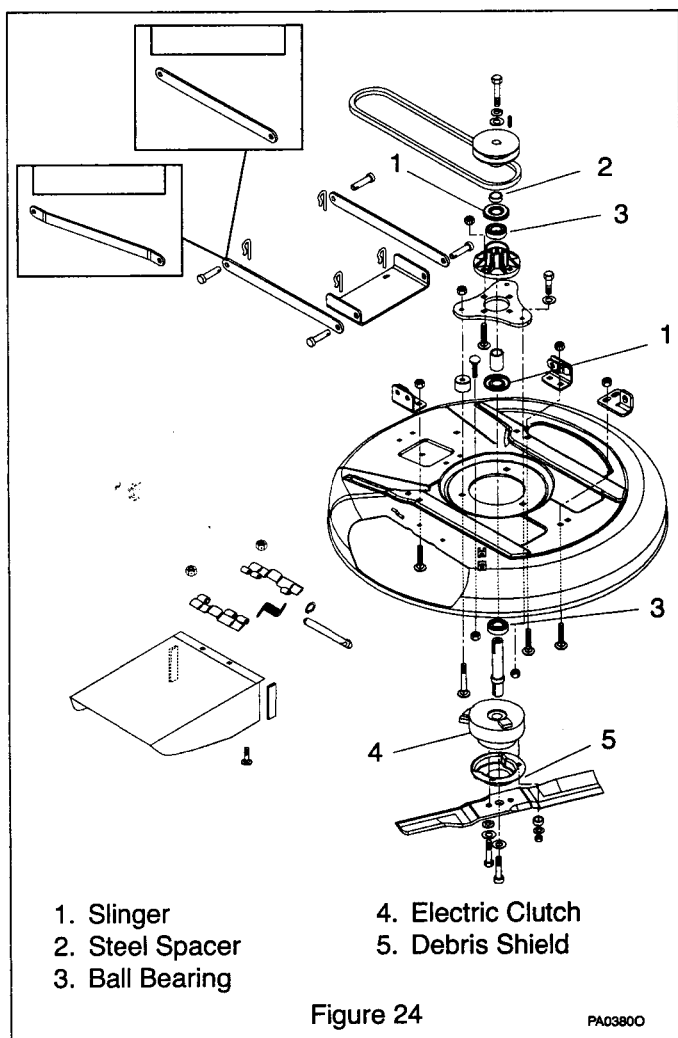
7.5 28 AND 32-INCH MOWER SPINDLE REPAIR

To remove the spindle bearings:

1. Remove mower deck from the unit.
2. Unscrew the bolt at the center of the top pulley.
3. Remove the pulley and key from the shaft. The shaft with the clutch and blades should drop out of the spindle housing.
4. Press out the bearings. Remove the spacer and slinger from inside the spindle housing.

The bearing should be replaced, do not service.

Reinstall in reverse order.



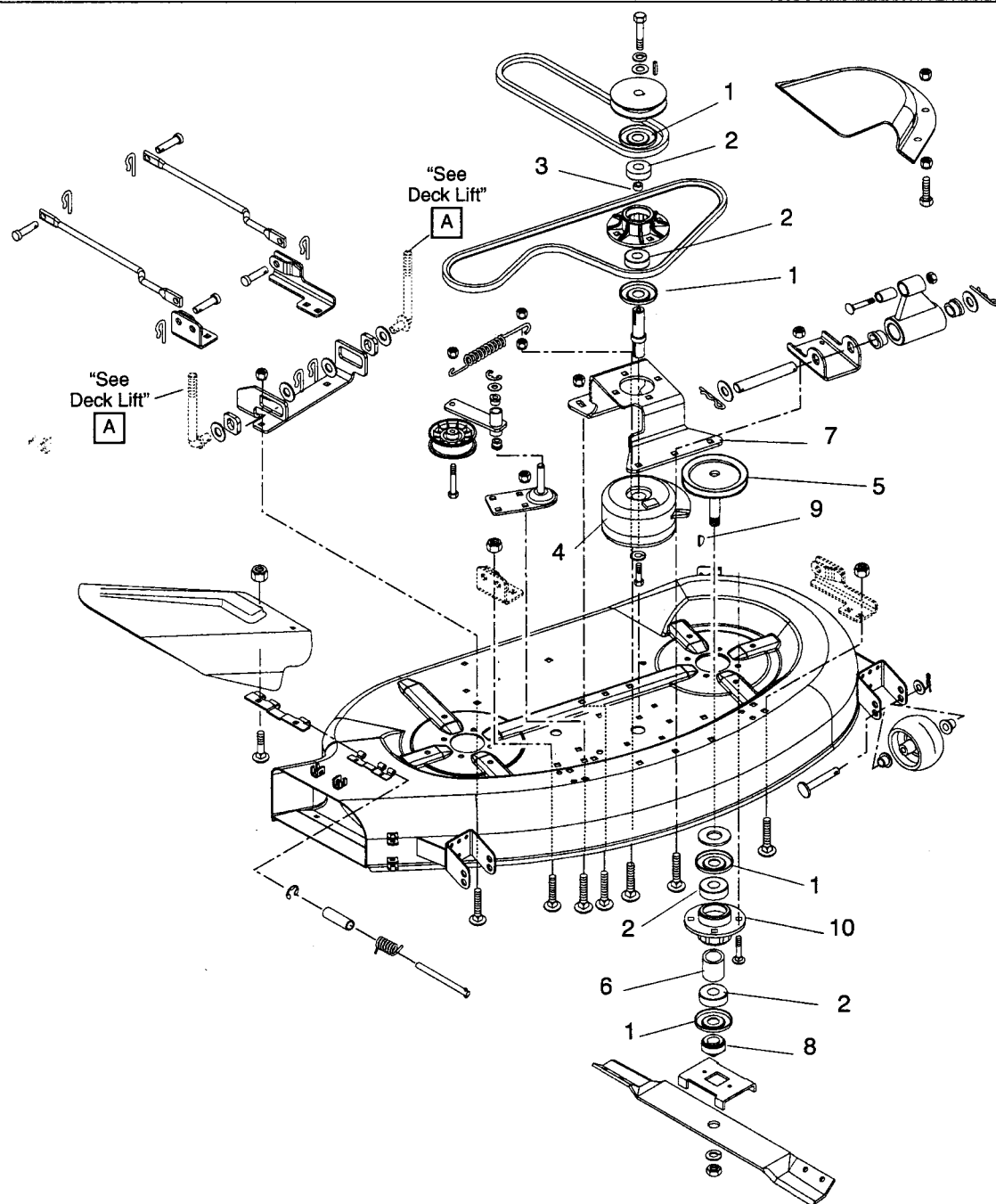
7.6 40-INCH MOWER SPINDLE REPAIR

To repair the blade spindles (Figure 25):

1. Remove the mower deck from the unit.
2. Remove spindle cover.
3. Remove drive belt from spindle sheave by removing idler arm spring. The belt can be taken off the sheave.
4. Unscrew nut from center of blade. Remove blade. Pry off blade hub to remove. Remove woodruff key. The spindle and sheave should push upward.
5. Remove the four bolts for the spindle housing.
6. Press out bearings.

The bearing should be replaced, do not service.

Install in reverse order.



- 1. Slinger
- 2. Ball Bearing
- 3. Spacer
- 4. Electric Clutch
- 5. Spindle Sheave

- 6. Spacer
- 7. Clutch Bracket
- 8. Blade Hub
- 9. Woodruff Key
- 10. Spindle Housing

Figure 25

PA0372

7.7 40-INCH MOWER REPLACE THE ELECTRIC CLUTCH (FIGURE 25)

Remove

1. Remove the mower deck from the unit.
2. Remove drive belt by depressing the idler arm to provide slack.
3. Unbolt the clutch bracket.
4. Unbolt clutch from anti-rotation stop.
5. Remove bolt from center of spindle shaft. The clutch should pull off the spindle.

Install

Clutch is installed in reverse order.

NOTE: Check keyways for burrs.

7.8 40-INCH MOWER REPLACE CLUTCH SPINDLE BEARINGS

1. Remove the mower deck from the unit.
2. Remove drive belt by removing idler arm spring. The clutch spindle has two bearings, one on each side of the housing.

NOTE: Bearings are pressed in.

3. Unscrew the top bolt to remove the sheave and key. The top bearing is accessible.
4. Unbolt housing from the mower deck to gain access to the second bearing.

The bearings should be replaced, do not service.

Assemble in reverse order.

SECTION 8 - FUEL SYSTEM

8.1 FUEL SYSTEM TROUBLESHOOTING

The following troubleshooting chart is to be used to isolate fuel system problems and give possible causes and corrective action responses.

The troubleshooting key is generic and can be used for several types of transmissions. Use only those possible causes and corrective actions that apply to the unit.

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)	CORRECTIVE ACTION
Hard starting	1, 3, 4, 6, 11, 12, 14, 16, 17, 18	clean, repair or replace
Fuel leak at carburetor	5, 7, 17	repair or replace
Engine floods	5, 15, 17	repair or replace
Will not idle	1, 2, 3, 6	repair or replace
Rich idle	1, 6, 14	repair or replace
Idles with needle closed	14	repair or replace
Hunts erratic idle	2, 3, 6, 7, 12, 13, 14, 15, 16	repair or replace
Idles fast lean	2, 3, 7	repair or replace
Will not accelerate	1, 6, 11, 12, 14, 15, 16	repair or replace
Over rich acceleration	1, 15	repair or replace
Hesitates	2, 6, 11, 12, 16	repair or replace
Will not run at high speed	1, 11, 12, 14, 16	repair or replace
Low power	1, 3, 11, 14, 15, 16, 17, 18	repair or replace
Hunts at high speed	3, 6, 7, 12, 14, 15, 16, 18	repair or replace
Runs with needle closed	14	repair or replace
Engine overspeeds	2, 3, 7, 14	repair or replace

TROUBLESHOOTING KEY	
1	Plugged air filter
2	Leaky carburetor gasket
3	Throttle or choke shaft worn
4	Choke not functioning properly
5	Plugged atmospheric vent
6	Air bleed restricted
7	Damaged or leaky O-rings
8	Damaged diaphragm
9	Stuck or dirty ball check
10	Diaphragm upside down
11	Plugged tank or vent
12	Fuel pickup restricted
13	Idler port restricted
14	Damaged adjustment needle and seat
15	Incorrect float height
16	Main nozzle restricted
17	Dirty, stuck needle and seat
18	Fuel inlet plugged

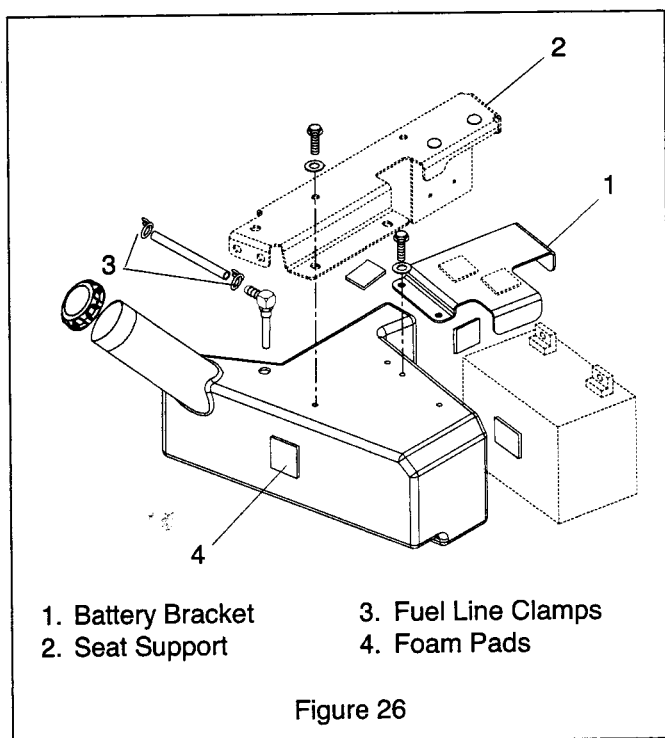
8.2 FUEL TANK REMOVAL

1. Remove seat and disconnect wires (Figure 26).
2. Remove rear hood if applicable.
3. Remove battery cover.
4. Loosen bolts to gas tank and remove top bracket.



WARNING: Gasoline is volatile. Keep away from sparks and open flame. Gasoline fumes will ignite.

5. Drain gas into the suitable container and dispose of it properly.
6. Disconnect fuel hose.
7. Remove fuel tank.



8.3 FUEL SYSTEM CONTAMINATION

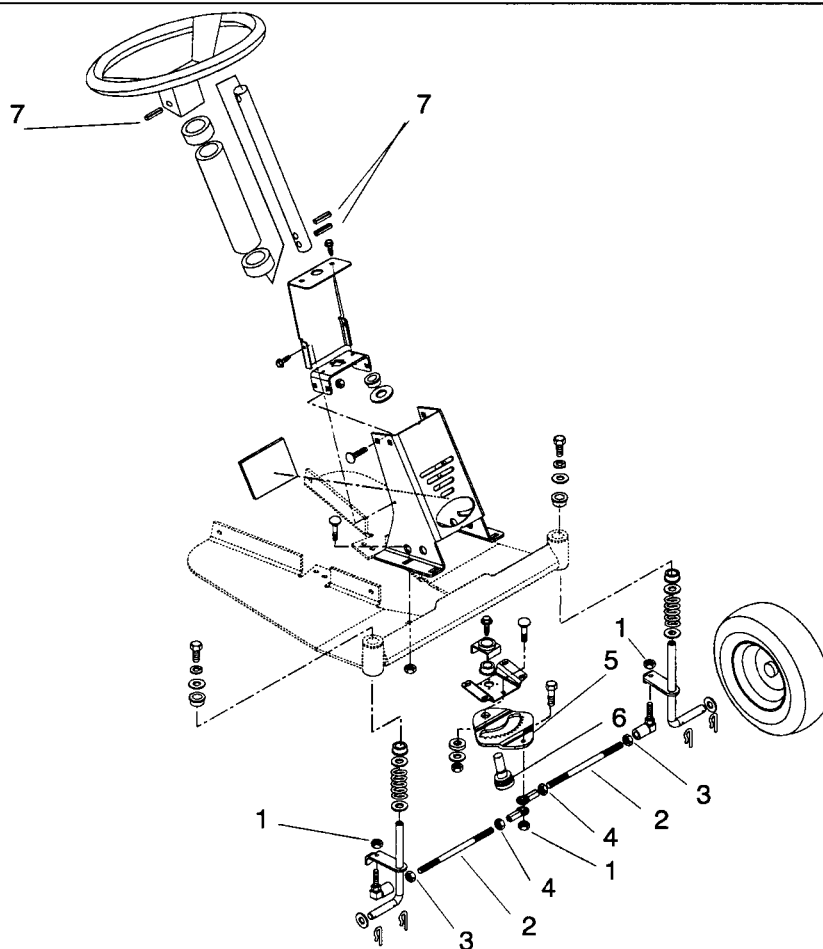
Any time fuel contamination is found in the fuel system (dirt, water algae, etc.) replace the fuel, fuel filter and flush the fuel lines. Remove the carburetor bowl and clean. Replace all items that cannot be cleaned. Reassemble the fuel system and check for proper operation.

SECTION 9 - FRONT SUSPENSION

9.1 STEERING

The steering, steering links, and spindle weldments require only minor maintenance (Figure 27).

Check moving parts for wear and grease as needed. Replace any bent parts and keep front wheels in alignment. (See section *Front Wheel Alignment*)



- 1. Locking Nut-Nylon Insert
- 2. Steering Link
- 3. Jam Nut

- 4. Locking Nut with Top Flange
- 5. Steering Gear
- 6. Pinion
- 7. Roll Pins

Figure 27

PA02420

9.2 REPLACE STEERING PINION AND GEAR (FIGURE 27)

Remove

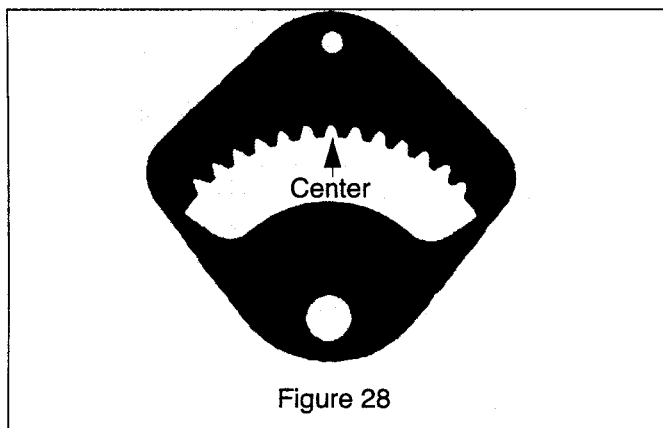
1. Remove steering wheel by punching out roll pin.
2. Slide tube and plugs off steering shaft.
3. Access the two roll pins that secure the pinion and drive them out. The pinion should slide out of the steering shaft.
4. Unbolt the steering gear from the linkage.
5. Remove the four bolts from the steering gear bracket. Remove the assembly.

NOTE: The steering gear is stepped downward. It will not function if installed upside down.

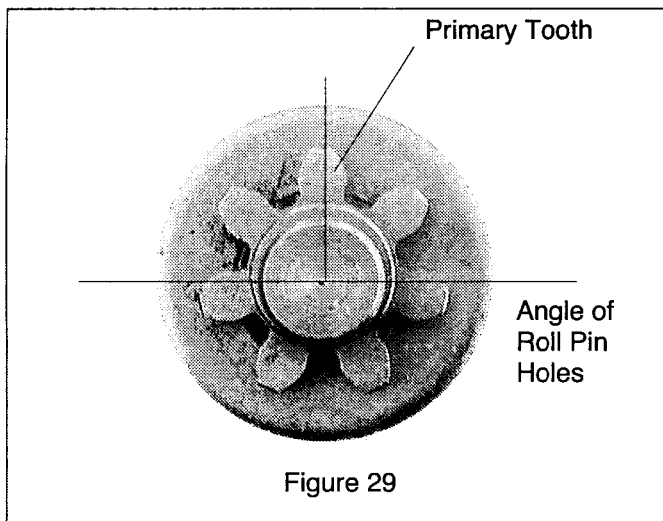
6. Unbolt the steering gear.

Install

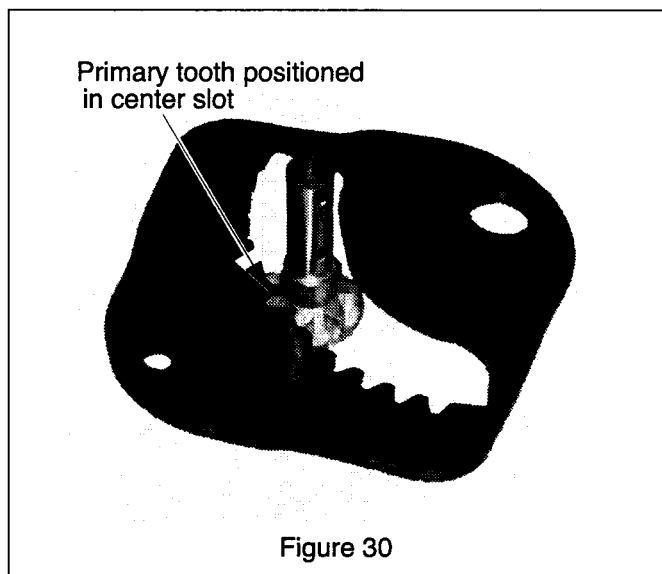
1. Bolt the steering gear to the bracket. Observe top and bottom placement.
2. The steering gear has thirteen roots or slots. Find the center slot and mark it, Figure 28.



The pinion is designed to have a tooth opposite a slot. Secondly, the orientation of the roll pin holes is perpendicular to one of the teeth (primary), Figure 29.



3. Find the primary tooth of the pinion and mark its' location on the backside (bottom) of the circular flange.
4. Insert the pinion shaft first, upward into the steering gear. The primary tooth must position into the center slot of the steering gear, Figure 30.



5. The steering tube can be placed in position over the shaft of the pinion. Be certain to hold pinion in place with steering gear.
6. The steering tube has two holes for roll pins. Use one to hold position by placing a rod or punch through it. The shafts can be rotated to allow the first roll pin to be driven into position.
7. Remove the locating rod and drive the second roll pin into position.
8. Slide the steering tube and plugs over the shaft and position the steering wheel to align the roll pin holes. Drive the steering wheel roll pin into position.
Check assembly. With the steering wheel centered rotationally the steering gear should have the hole for the linkage centered forward.
9. Attach the steering linkage to the steering gear.

SECTION 10 - ELECTRICAL

10.1 TOOLS

There are some specialized tools and test equipment that are needed for electrical repair work. A brief description of these follows.

Long or needle nose pliers - used to connect or bend wires and connectors in close quarters.

Diagonal cutters - used to cut wires or trim connections.

Wire stripper/crimping tool - available separately or as a combination tool. Used to strip insulation from wires of various sizes, crimp terminals and connector or wires.

Soldering gun or soldering iron - used to solder all splices and connections to terminals, connector, etc. A soldering gun is faster and more convenient than waiting for a soldering iron to heat.

Multimeter - analog or digital, to measure voltage, amperage and ohms.

Tachometer - used to measure engine speed.

Required to properly test alternator and charging circuits where output is dependent upon engine speed.

Heat gun - used to shrink insulated tubing in place. Used to replace electrical tape or insulated sleeving. To use, place a piece of shrink tubing over a wire joint, heat with the heat gun, until it shrinks slightly around the joint.

Supplies - electrical tape, rosin core solder (never use acid or acid core solder on electrical joints), an assortment of various size terminals, connectors, insulated or heat shrink tubing (for use on joints and connections), and an assortment of automotive type wire (in several colors).

Ariens Company recommends that all work be done in a professional manner. The use of the tubing to cover joints and the soldering of connections contribute to a professional looking job. In addition to a pleasing appearance, repairs made in this manner are more likely to withstand vibration. (The weakest points in an electrical system are the joints where wires are attached.)

Replace all defective components with Ariens/Gravely replacement parts only. Engine parts, such as rectifiers or alternator components should be secured through the nearest engine service center.

Ariens Company does not recommend attempting to repair electrical components. Most do not lend themselves to repair and you would have more money invested in "time of repair" than the part would cost and the results may not be as good.

10.2 ELECTRICAL MEASUREMENTS

In many electrical circuits, there is some visible effect which indicates that the circuit is functioning properly. A switch is turned "ON" and a lamp lights. A key is turned, a starter motor runs and cranks the engine. If the lamp does not light, or the starter motor does not run, some means of measuring voltage, current flow, resistance and continuity is needed, (continuity means there is a complete electrical path through the circuit or component.)

To know exactly what conditions exist in an electrical circuit requires AC and DC Voltmeter, AC and DC Ammeter, and an Ohmmeter.

Multimeter

A single combination meter that does all of these things is available. Such a meter is called a Multimeter or Volt-Ohm-multitester (VOM). Meters of this kind are available in many forms and all change functions and ranges with switches, or by plugging test leads into different jacks. Multimeters are available in two basic types, Analog and Digital.

Analog Meters

Analog Meters have a needle that moves across a scale to give a reading. The longer the scale, the easier it is to read and more accurate the reading will be. A jeweled movement is used in this type of meter is more likely to be damaged through rough handling (except for overloaded Protected Meters) or by measuring high values that exceed the range set on the meter than a digital meter. They provide excellent service for the money as long as they are used with care.

Digital Meters

Digital Meters do not have a movement and are therefore more rugged. The reading shows up directly on a display window of some type. Since they read direct, no skill in reading the scale is required, nor is it necessary to set the range. The meter switches the ranges automatically. One has only to select the function DC Volts, AC Ampere, Ohms, etc., connect the test leads, and the reading is shown on the display. Because of the internal circuitry and the lack of a movement, these meters are not likely to be damaged by overloads. In the discussions that follow, either type of meter may be used. Test procedures are the same. It is best to learn proper procedures, even though some meters may be more forgiving of mistakes. Where differences in use may occur, they will be covered in the discussion.

Voltage Measurement

There are two basic rules to be remembered when using a voltmeter. A voltmeter measures the voltage difference between the test leads and the voltmeter is always connected across the circuit under test.

Current Measurement

The two rules to remember when measuring current with an ammeter are; an ammeter measures the current that flows through the meter, and to measure current an ammeter must be connected into the circuit. The latter rule means that the circuit must be opened, and the ammeter wired into it. Because this procedure is usually difficult, an ammeter is seldom used for troubleshooting.

Resistance Measurement

An Ohmmeter is used to make resistance measurements and to check continuity through wires and electrical components.

There is one rule to keep in mind when using an ohmmeter. The ohmmeter has a self contained battery and requires no electrical power. Using the ohmmeter on a circuit that has power applied may result in damage to the meter.

IMPORTANT: Disconnect the equipment battery when making Ohmmeter test or damage to the Ohmmeter may result.

IMPORTANT: An ohmmeter reads the resistance of whatever component is connected between the test leads. It can be used to check wires, coils, light bulbs, or any item that conducts current.

10.3 BATTERY

When charging battery, remove it from unit first. Keep batteries out of reach of children. ALWAYS follow information provided on battery by battery manufacturer. Lead acid batteries generate explosive gases. Severe chemical burns can result from improper handling of battery electrolyte. Wear safety glasses and proper protective gear when handling batteries to prevent electrolyte from coming in contact with eyes, skin or clothing.



WARNING: ELECTRIC SHOCK may result in injury and/or damage to unit.

DO NOT allow tools or other objects to come into contact with both terminal at the same time. ALWAYS remove Negative (-) Cable first to reduce risk of sparks when removing battery. ALWAYS connect Positive (+) Cable first, then connect Negative (-) Cable when installing battery.



WARNING: EXPLOSIVE GASES can result in serious injury or death. ALWAYS keep open flames, sparks, or smoking materials away from battery.

POISONOUS BATTERY FLUID contains sulfuric acid and its contact with skin, eyes or clothing can cause severe chemical burns. ALWAYS wear safety glasses and protective gear near battery.

DO NOT TIP any battery beyond 45 degree angle in any direction.

ALWAYS KEEP BATTERIES OUT OF REACH of children.



WARNING: REVERSE CONNECTIONS may result in sparks which may result in injury. ALWAYS connect/disconnect cables in proper order.

Battery Electrolyte First Aid

-External contact: Flush with water.

-Eyes: Flush with water for at least 15 minutes and get medical attention immediately!

-Internal contact: Drink large quantities of water. Follow with Milk of Magnesia, beaten egg or vegetable oil. Get medical attention immediately!

IMPORTANT: In case of internal contact, DO NOT induce vomiting!

Inspection, Cleaning, Drying, and Maintenance

Inspect the top of battery, terminals, cables, terminal posts, and case for any accumulation of dirt, corrosion cracks or loose or broken parts. Keep battery and its terminals clean. Inspect monthly to maintain best performance. Replace battery if damaged.

Remove hold down and bolt and lift battery out. Clean or service battery away from unit. Remove corrosion from battery terminals and cable connections with wire brush, then wash with a weak baking soda solution.

Scrub the exterior of the battery and cable terminals with a nonmetallic brush which has been dipped into a mixture of baking soda and water.

After cleaning, apply a thin coat of grease or petroleum jelly to terminals and cable ends to retard corrosion. Reinstall battery.

Check the alternator voltage regulator output (if used) at every periodic maintenance inspection. Over charging is a common cause of battery failure.

Electrolyte Level

Every 25 hours of operation, check electrolyte level of each cell by removing caps one at a time. The electrolyte level should be at level indicated. Use distilled water to fill each cell if needed. Install and tighten each cap after checking.

IMPORTANT: When distilled water is added to battery during freezing weather, battery must be charged to mix water with electrolyte, or water will remain at top and freeze.

Battery Charger

Under normal conditions, the engine alternator will have no problem keeping battery charged. When unit has set for an extended period of time without operation and the battery has been completely discharged, a battery charger will be required for recharging.

Before using a charger, an attempt can be made to recharge the battery using the engine alternator by jump starting the unit and allowing the engine to run.

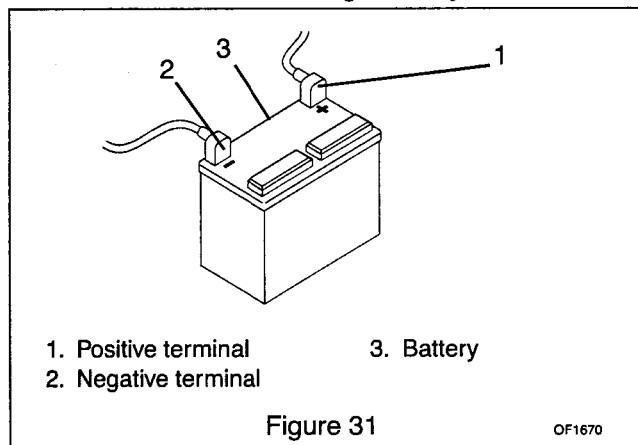
Charging A New Battery



WARNING: FROZEN BATTERIES CAN EXPLODE and result in death or serious injury.
DO NOT charge a frozen battery. Let the battery thaw out before putting on a charger.

IMPORTANT: DO NOT fast charge. Charging at a higher rate will damage or destroy battery.

ALWAYS follow information provided on battery by battery manufacturer. Contact battery manufacturer for extensive instructions to charge battery.



1. Put unit into service position to gain access to battery.
2. Disconnect negative (-) cable first, then positive (+) cable.
3. Remove hold down and remove battery.
4. Place battery on bench or other well ventilated place where electrolyte spill will not create damage.
5. Remove caps and fill each cell to level indicated with electrolyte at $1.230 \pm$ specific gravity and 80 degrees F (27 degrees C).
6. Let battery stand for one half hour.
7. Check electrolyte level and add more if necessary.

8. Connect positive (+) lead of charger to positive (+) terminal, and negative (-) lead to negative (-) terminal.
9. Charge the battery at two and a half amps for ten hours or until all cells are gassing freely and the specific gravity is constant over three 30 minute intervals.
10. Immediately after charging, check the electrolyte level. If low, add distilled water to bring cell up to required level.
11. Replace caps finger tight, wash off and dry battery.
12. Reinstall battery into unit and connect positive (+) cable first, then negative (-) cable.

Specific Gravity Check

The specific gravity should be checked with a hydrometer.

NOTE: The specific gravity should be checked in each cell and should be the same for all cells. A variation in a cell reading could be an indication of a problem. Subtract .004 from 1.265 for each 10°F below 80°F or add .004 to 1.265 for each 10°F above 80°F.

A special temperature compensated hydrometer is used to read the battery's state of charge.

The reading on the hydrometer gauge should be above 1.225. If the reading falls below 1.225 specific gravity there will be an insufficient charge.

ALWAYS charge the battery until the specific gravity of 1.265 is reached over 3 successive readings. Check monthly to ensure charge is maintained. The approximate state of charge can be determined by the cell specific gravity of the rested open circuit voltage at room temperature and the charging time can be estimated. For example:

OCV	Specific Gravity	% of Charge	Charging Time
12.60	1.265	100%	---
12.4	1.225	75%	3 hours
12.20	1.180	50%	7 hours
12.00	1.130	25%	10 hours
11.80	1.100	0%	12 hours

If using an automatic tapering 12 volt charger, choosing a good quality 5 to 10 amps 15VDC minimum output charger and charge for 3 to 12 hours according to the battery state of charge (see table above) or until the specific gravity in each cell reaches 1.255 - 1.265 specific gravity at 80 degrees F.

If using a constant current charger, charge at 1 to 2 amperes for the time given on the table above or until full specific gravity is reached.

IMPORTANT: Charging at higher rates will damage the battery and cause excessive gassing and acid spewing.

Jump Starting

The unit used for jump starting should have a 12 volt battery with at least 500 cold cranking amperes, and a negatively grounded system.

1. Ensure battery is not frozen. If the fluid is frozen, remove battery from unit and allow to thaw before charging.
2. Connect the positive (+) jumper cable to the positive (+) terminal of the discharged battery.
3. Connect the other end of the same jumper cable to the positive (+) terminal of the booster battery.
4. Connect one end of the second jumper cable to the negative (-) terminal of the booster battery.
5. Make the final jumper cable connection to the engine block or the furthest ground point away from the discharged battery.



WARNING: Make sure cables are clear of any moving engine parts before starting engine.

6. Start engine (refer to Owner's Manual). If engine will not start after several tries, unit or battery may need service.
7. After engine starts, leave cables connected for one to two minutes.
8. Disconnect cables in reverse order.
9. Operate unit as normal to charge battery.

Storage

The battery is a perishable item and it should be stored properly to obtain a long, useful life. Batteries not in use will self discharge.

If the battery will not be used for more than three months, it should be removed and stored in a cool, dry place.

Any collection of dirt, grease, or electrolyte should be removed from the top of the battery.

The battery must be recharged monthly or when the cell specific gravity reads less than 1.255 specific gravity. Before reinstalling the battery in the spring, it should always be fully recharged.

10.4 SWITCHES

Switches either open a circuit to stop current flow or close and allow current to flow through.

A normally open (N.O.) switch prevents current flow until the switch is actuated, completing the circuit and allowing current to flow through it. An example is a light switch - the lights are off until the switch is actuated and the lights go on.

A normally closed (N.C.) switch allows current to flow until the switch is actuated, breaking the circuit and stopping current flow through it. An example is an ignition switch that grounds the magneto when in the off position (completing the circuit) but opens the circuit when in the ON position allowing the engine to operate.

Switches are selected with regard to Current rating (contacts must be of sufficient size to carry the required current), Voltage rating (switches insulated for specific voltages), Case or housing (switches that are exposed to moisture and must be sealed to prevent moisture from entering), and Actuating type (push, pull, rotary, momentary contact, or micro switches).

NOTE: Check that the connections to the switches are secure and that a switch is being activated properly before performing electrical test on switches. (Safety switches on speed selector and clutch levers may be out of adjustment and not activating.)

IMPORTANT: When checking switches, remove them from their respective circuit by disconnecting the wires from the switch at the connector(s). Damage could result to the meter or machine components if switches are left in.

Normally Open Switch

To test a normally open switch (key, headlight, safety, or seat) connect the ohmmeter across the switch terminals. Meter should indicate open circuit (infinite resistance). Activate the switch. The ohmmeter should read up scale to zero resistance (Close Circuit). This indicates the switch is operating properly. Also check from each terminal to the switch case (if case is metal). reading should show infinite resistance indicating no short to ground.

Variation from test results described indicates a defective switch.

Normally Closed Switch

To test a normally closed switch connect the ohmmeter across the switch terminals. Meter should indicate a closed circuit (zero resistance). Activate the switch and the meter should move to open circuit (infinite resistance). Check from each terminal to ground (switch case). Meter should show open circuit (infinite resistance).

Variation from test results described indicates a defective switch.

Ignition Switch

NOTE: Refer to the wiring diagram of the unit involved to determine switch functions and test using the methods described.

The ignition switch incorporates a number of functions, although not all functions are used on all equipment. The switch has three positions: OFF, RUN, and a momentary contact START position. Use an ohmmeter to check the continuity of the switch in each position.

OFF Position - Should be continuity between contacts G and M. These connections ground the engine magneto and stop the engine in the OFF position.

RUN Position - Should be continuity between contacts B and A. These connections supply power to the rest of the wiring harness. Connections G and M open to each other.

START Position - Hold switch in START position while testing. There should be continuity between contacts S1 and S2. These connections apply power to close the solenoid contacts and operate the starter motor.

In addition to the above test, place the switch in the run position and check between each contact and ground (metal case) to be sure no terminals are grounded. If the switch is operating properly, there will be no continuity between contacts other than those described.

10.5 SOLENOID AND RELAYS

Solenoid and relays are both magnetically operated devices. Both devices operate on the principle that passing a current of electricity through a coil of wire will create a magnetic field strong enough to attract a piece of iron or steel. Each device uses this principle in a slightly different manner.

Relay - A basic relay consists of a coil of wire wound around a soft iron (magnetic) core. When current is passed through the coil, the core is magnetized and pulls down on a magnetic lever. The lever in turn is attached to several switch contacts which open or close other electrical circuits. In this fashion, a small current can control one or more larger electrical currents and actuate several other devices. In most cases a relay contact moves only a fraction of an inch and the magnetic pull is small.

Solenoid - A basic solenoid consists of a coil of wire wound around a hollow tube. A magnetic core slides inside the tube. When current is passed through the coil, the core is pulled into the solenoid with considerable force. With proper design, a solenoid can exert considerable force over a distance of several inches. A solenoid can therefore, pull a lever, close a heavy contact, or perform other jobs that require a straight line pull.

If a relay or solenoid fails to operate, the cause may be either electrical or mechanical.

To check electrically, connect a voltmeter across the coil of the device and activate the circuit that operates the relay or solenoid. If the meter indicates no voltage is applied, the cause is in the control circuit.

If the meter indicates proper voltage across the coil but the device does not function, remove the power, disconnect the wiring and check the continuity of the coil with an ohmmeter. The meter should indicate resistance, in the order of 3 to 5 ohms, if the coil is intact. A high resistance indicates an open coil and a defective device.

There are also a number of mechanical problems that may cause the problem.

The starter solenoid in the Ariens/Gravely equipment is a sealed unit used to actuate the starter motor on the engines. These solenoids may have three or four connections. The two large connections carry high current to operate the starter motor. The small connections are connected to the coil and carry the control current.

To check the solenoid, disconnect the cables to the starter motor, turn the ignition switch to the start position, and listen for the solenoid to snap inside contacts closed.

If no snap is heard, check across the coils with a voltmeter. The voltage should read 12 volts with the ignition switch in the start position. If no voltage appears, the defect is in the start circuit.

If the voltage is correct, turn off the power and check continuity of the coil with an ohmmeter. If the coil is open, the solenoid is defective and must be replaced.

If the coil has the proper voltage applied, and the continuity check indicates the coil is intact, the solenoid plunger is stuck or the contacts are welded shut and the solenoid must be replaced.

If the solenoid snaps shut, but the start does not operate, check across the large contacts with an ohmmeter. If there is no continuity when the solenoid snaps shut, the contacts are defective and the solenoid must be replaced.

10.6 FUSES

Fuses are connected in electrical circuits to protect the circuits from damage due to overload or short circuits. Fuses are a "weak link" in the circuit. They contain a metal link designed to melt when a certain current value is exceeded thus opening or disconnecting the wiring. Once a fuse blows or melts it must be discarded and replaced with a new fuse of the same value.

Since the function of the fuse is to protect the circuit, NEVER attempt to defect the protective device by bridging or replacing with a device of a higher current rating.

Electrical testing of these devices is simple. Since the device either conducts current (and is therefore

functioning) or the device is open and is therefore defective. Use an ohmmeter to check for continuity.

10.7 DIODES AND RECTIFIERS

Diodes are solid state, semiconductor devices. They contain no moving parts and conduct current better in one direction than the other. They are electrical "check valves" and permit current flow in one direction, but not in the other.

Diodes allow current to flow through one circuit without "backing up" into another. In engine alternator circuits, a diode is used to convert current which flows back and forth (AC) in a circuit to current which flows only in one direction (DC). A device which converts alternating current to a direct current is called a RECTIFIER. A diode is one type of rectifier.

To check a diode, isolate it from the circuit by disconnecting one end. With a multimeter set on the lowest ohms scale setting, measure the resistance in one direction, reverse the test leads, and measure in the other direction. Readings should be high in one direction and low in the other. (If the readings are low in both directions, the diode is shorted, and if the readings are high, the diode is open.) If the readings are the same in both directions, the diode is defective and must be replaced.

IMPORTANT: Diodes are marked to indicate polarity (a band on one end, an arrow on the side, or they fit on a holder only one way).

Rectifiers

A battery is charged through the use of an alternator located in or on the engine. A charging circuit contains a rectifier because alternators produce alternating current (AC) and batteries require direct current (DC) for charging.

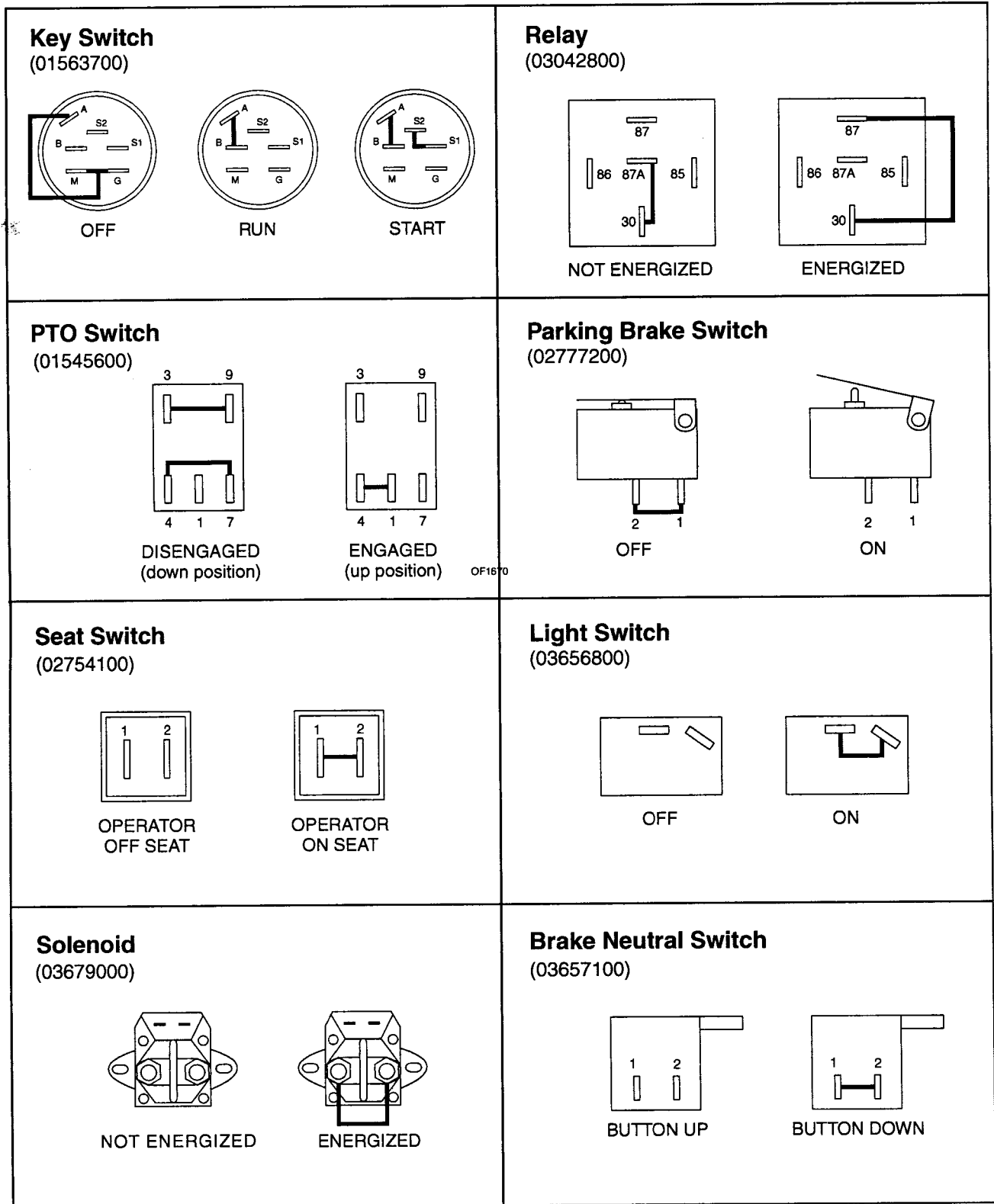
The rectifier may be built into the engine or it may be an external part. It may also contain a regulator to prevent overcharging the battery. (Servicing of rectifiers built into the engine should be done by an approved engine manufacturer's service center. Such a service center has access to the information and parts required to test and repair or replace engine components, including rectifiers and regulators.)

Units that contain both a rectifier and regulator are tested in a working circuit to make sure the regulator portion of the device is operating.

10.8 CONTINUITY DIAGRAM

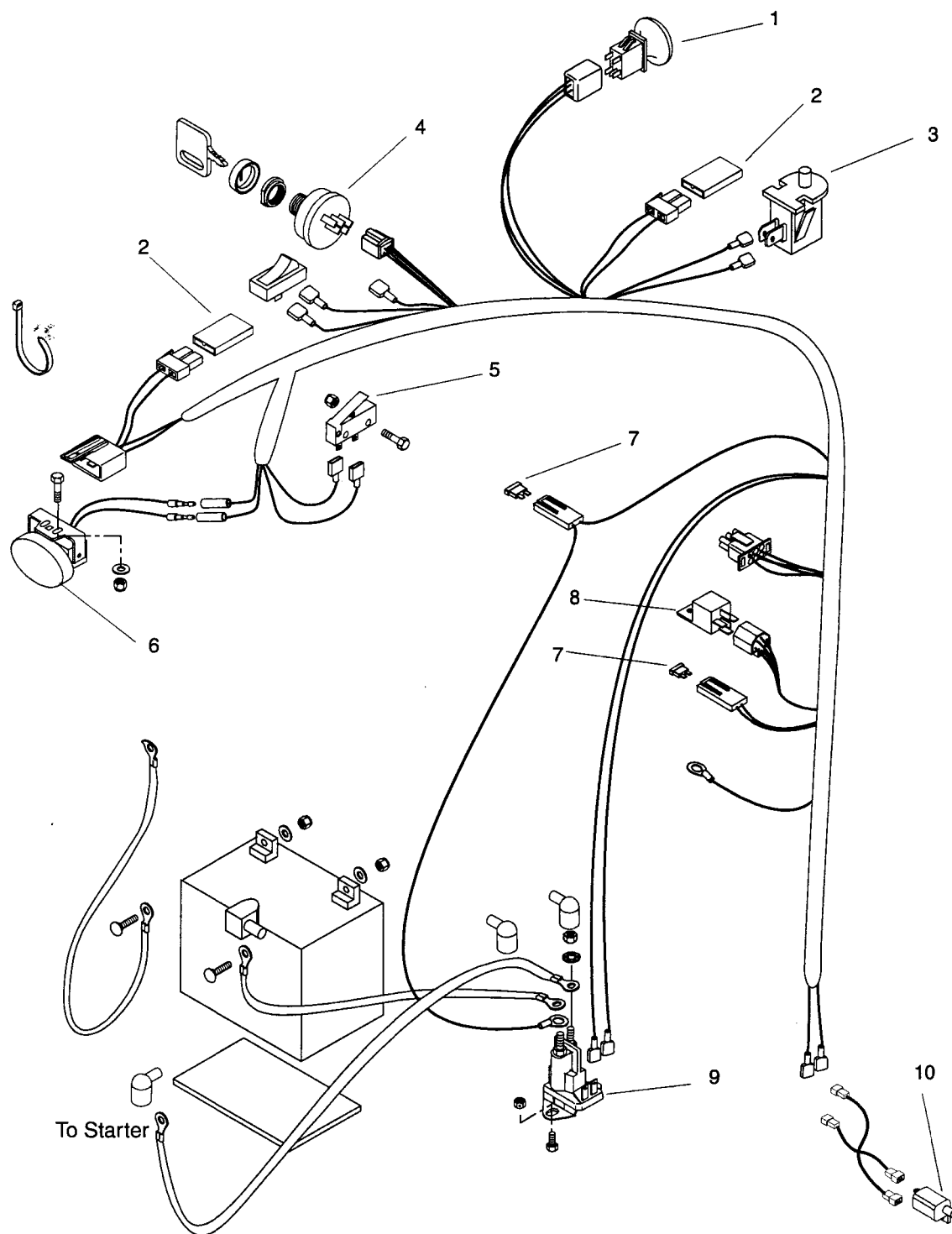
Model 927061, 063, 065

The diagrams below show the various states of connection for electrical components.
The solid lines on switches show continuity.
NOTE: All switches are viewed from the rear.



10.9 ELECTRICAL SYSTEM

Model 927061, 063, 065

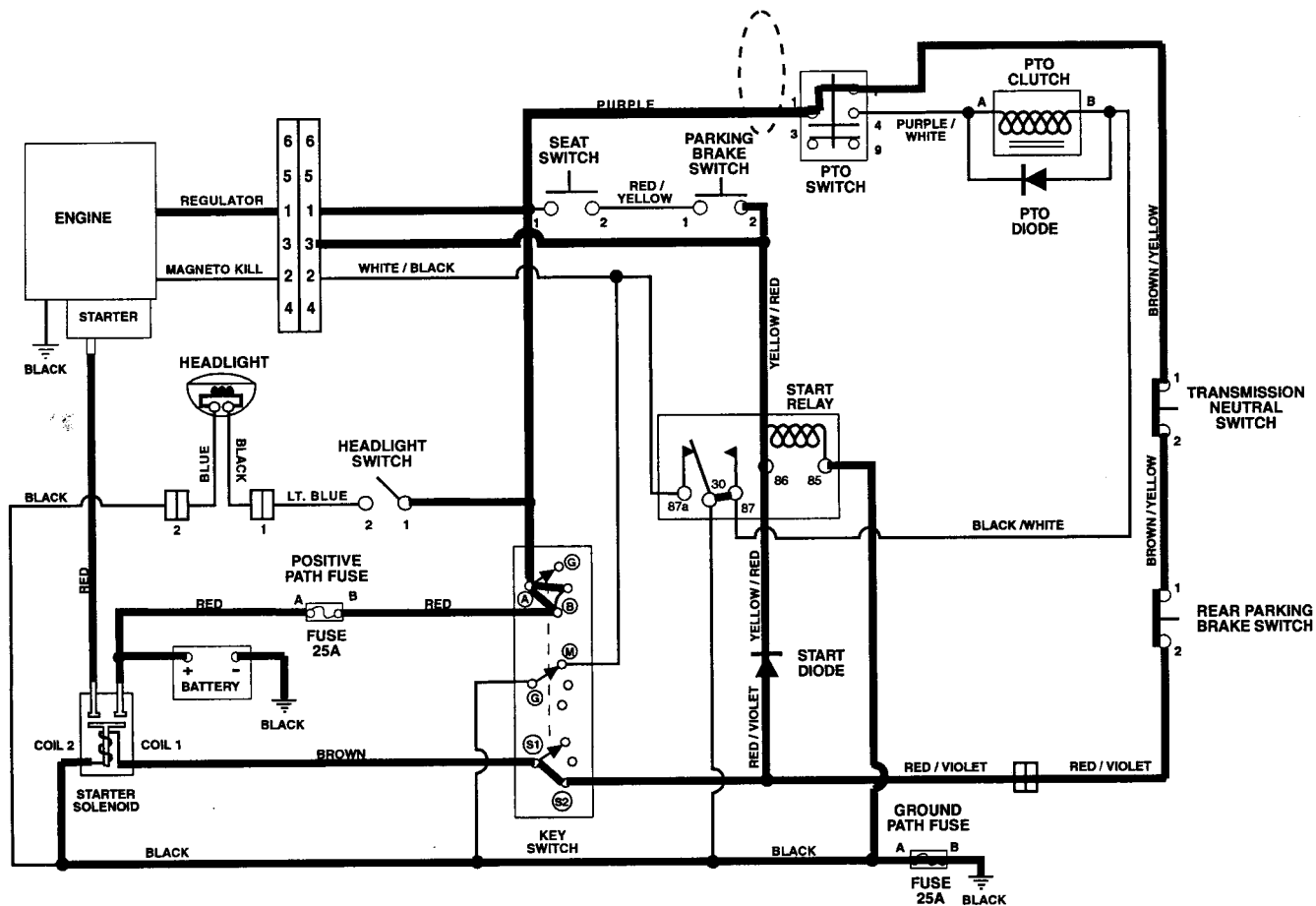


- 1. Clutch Switch
- 2. Diode
- 3. Switch
- 4. Key Switch
- 5. Light Switch (optional)

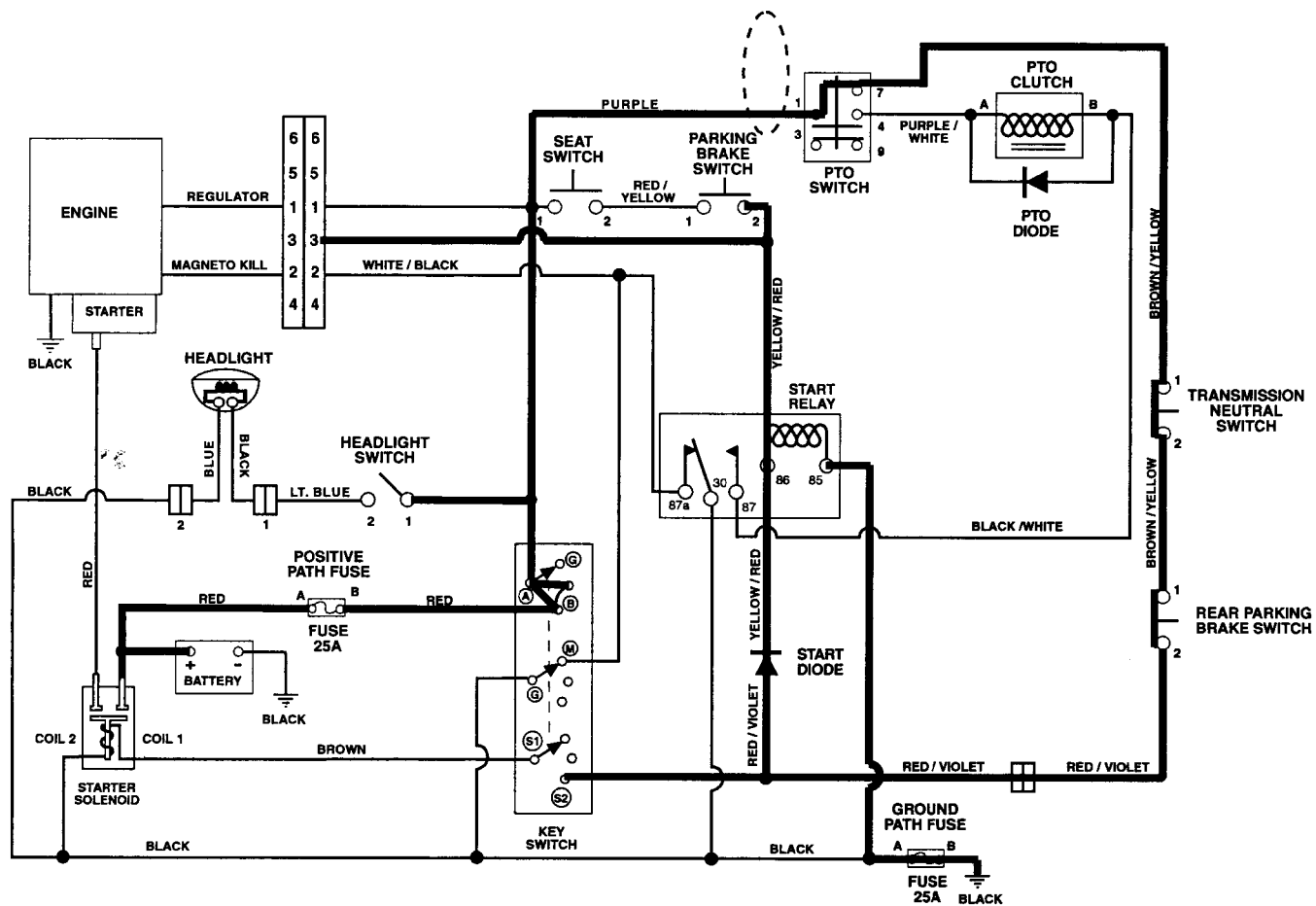
- 6. Light (optional)
- 7. 25 Amp Fuse
- 8. Relay
- 9. Solenoid
- 10. Single Pole N.O. Switch

10.10 WIRING DIAGRAMS

Models 927061, 063, 065, 060, 062, 064 - START



Models 927061, 063, 065, 060, 062, 064 - RUN PTO OFF



Models 927061, 063, 065, 060, 062, 064 - RUN PTO ON

