ARIENS
THE KING OF SNOW

Service Manual

Deluxe Series Sno-Thro®

Models

921045 – Deluxe 24
(SN 180000 – 199999)

921046 – Deluxe 28
(SN 180000 – 199999)

921047 – Deluxe 30
(SN 180000 – 199999)

921048 – Deluxe 28 SHO
(SN 180000 – 199999)

921049 – Deluxe 30 EFI
(SN 180000 – 199999)

921323 – Deluxe 24 CE
(SN 180000 – 199999)

921324 – Deluxe 28 CE
(SN 180000 – 199999)

E10 E15 E20 E85

EN ENGLISH

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WELCOME

Before operating or servicing the unit, carefully and completely read the Operator's Manual and engine manual provided with the unit at time of purchase. They contain important safety instructions and information about unit controls.

Have Questions or Need Assistance?

www.ariens.com

A parts manual and an operator's manual for your unit are available for free download or purchase at www.ariens.com.

AriensCo recommends using only genuine Ariens replacement parts on this unit. Using unauthorized parts may adversely affect the performance, durability or safety of this unit and may void the warranty. Installing unauthorized parts will not automatically void the warranty; however, the warranty will not apply if the installation and use of unauthorized parts damages the unit. The AriensCo warranty applies solely to defects in AriensCo materials and / or factory workmanship. AriensCo disclaims liability for any claims or damages – whether warranty, property damage, personal injury or death – arising from using unauthorized replacement parts.

Be aware of your mechanical aptitude when applying information in this manual for service and / or repairs. If you are not comfortable or capable of completing service and / or repairs to the machine, take the machine to an authorized AriensCo service dealer.

SAFETY

Read these safety rules and follow them closely. Failure to follow these rules could lead to loss of control of unit, severe personal injury or death to you or bystanders, or result in damage to property or the machine.

PRACTICES & LAWS

Practice usual and customary safe working precautions. Learn applicable rules and laws in your area. Always follow the practices set forth in this manual.

EMISSION CONTROL SYSTEM

This equipment and/or its engine may include exhaust and evaporative emissions control system components required to meet U.S. Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB) regulations. Tampering with emission controls and components by unauthorized personnel may result in severe fines or penalties. Emission controls and components can only be adjusted by an AriensCo dealer or an authorized engine manufacturer's service center. Contact your AriensCo Equipment Retailer concerning emission controls and component questions.

REQUIRED OPERATOR TRAINING

Read and understand the Operator's Manual and decals on the unit. This information is for your safety and the proper use of your equipment. Failure to follow these instructions and warnings may cause death or serious injury. If you have purchased this product from an Ariens dealer, the dealer can provide you with training.

Familiarize yourself and any other operators with all controls and the safe use of the features of this unit. If you loan, rent or sell this product to others, provide them with all manuals.

If you have any questions, please call our customer support line at 920-756-4688 or contact us at www.ariensco.com. Do not use this equipment if, after reading the Operator's Manual and the on-board decals, you have any questions about the safe use of this product.

WARNING: AVOID INJURY. This snow thrower is capable of crushing or amputating body parts. Failure to observe the safety instructions in the manuals and on decals could result in serious injury or death.

ALWAYS disengage auger, stop unit and engine, remove key and allow moving parts to stop before leaving operator’s position.

SAFETY ALERT SYMBOL

This is the safety alert symbol. It means:

- **ATTENTION!**
- **YOUR SAFETY IS INVOLVED!**

When you see this symbol:

- **BECOME ALERT!**
- **OBEY THE MESSAGE!**

SIGNAL WORDS

The safety alert symbol above and signal words below are used on decals and in this manual. Read and understand all safety messages.

1. Danger

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

2. Warning

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

3. Caution

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

4. Notice

NOTICE: Indicates information or procedures that are considered important but not hazard related. If not followed, property damage could result.

5. Important

IMPORTANT: Indicates general reference information worthy of special attention.

SAFETY DECALS

The safety decals on your machine are visual reminders of the important safety information in this manual. All messages on your unit must be fully understood and carefully followed. Safety decals on the machine are explained below.

Always replace missing or damaged safety decals. Replacement decal information is in the parts manual for your machine. Decals can be ordered from your dealer.

See Figure 1 for safety decal locations.

Safety Decal Locations

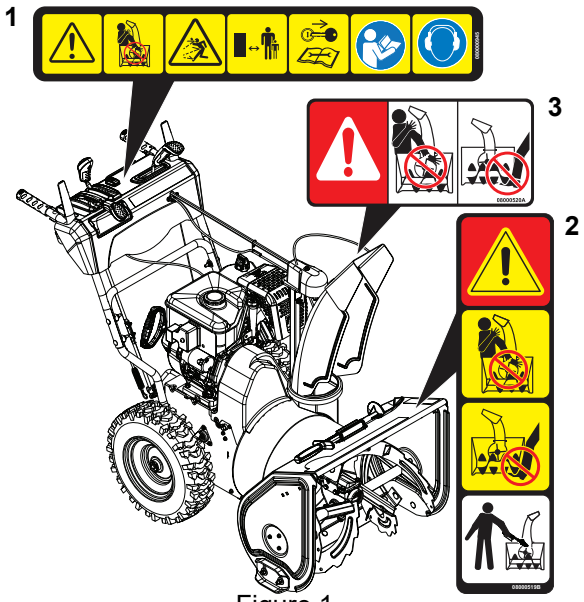


Figure 1

Safety Decal Descriptions

1. CAUTION!

Danger!

Only use clean-out tool to clear blockages. NEVER use your hands.

NEVER direct discharge towards persons or property that may be injured or damaged by thrown objects.

Keep people away from unit while operating. Keep children out of work area and under watchful care of a responsible adult.

Stop engine, remove key, and read manual before making any repairs or adjustments.

Read Operator's Manual.

Wear appropriate hearing protection.

2. DANGER!

Danger!

ROTATING PARTS! Only use clean-out tool to clear blockages. NEVER use your hands.

High-speed auger/impeller rotates below discharge opening. Wait for all moving parts to stop before removing clogs or servicing.

3. DANGER!

Danger!

ROTATING PARTS! Keep clear of auger while engine is running.

- Read Operator's Manual.
- Allow operation only by properly-trained adult, never children.
- Stop engine and remove ignition key prior to leaving the operator's position for any reason.
- Keep all controls, guards and safety devices properly serviced and functional.
- NEVER direct discharge towards persons or property that may be injured or damaged by thrown objects.

SAFETY RULES

The following safety instructions are based on the B71.3 specifications of the American National Standards Institute in effect at the time of production.

Training

Read, understand and follow all instructions on the machine and in the manual(s) before operating this unit. Be thoroughly familiar with the controls and the proper use of the equipment. Know how to stop the unit and disengage the controls quickly.

Never allow children to operate or play on or near the equipment. Never allow adults to operate the equipment without proper instruction.

Keep the area of operation clear of all persons, particularly small children. Be alert and shut off unit if children enter area.

Exercise caution to avoid slipping or falling, especially when operating the snow thrower in reverse.

Always remove key and/or wire from spark plug before assembly, maintenance or service. Unintentional engine start up can cause death or serious injury.

Complete a walk-around inspection of the unit to understand the unit, your work area and all safety decals.

Understand how to operate all controls, the functions of all controls and how to STOP in an emergency.

Preparation

Always check overhead and side clearances carefully before operation.

Always be aware of traffic when operating near streets or along curbs.

Thoroughly inspect the area where the equipment is to be used and remove all doormats, sleds, boards, toys, wires and other foreign objects.

Disengage all clutches and shift into neutral before starting the engine.

Use extension cords and receptacles as specified by the manufacturer for all units with electric drive motors or electric starting motors.

Handle fuel with care; it is highly flammable.

- Use an approved fuel container.
- Never add fuel to a running engine or hot engine.
- Fill fuel tank outdoors with extreme care. Never fill fuel tank indoors.
- 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 refueling is complete. Do not use a nozzle lock-open device.
- Replace gasoline cap securely and wipe up spilled fuel.
- If fuel is spilled on clothing, change clothing immediately.

Adjust the auger / impeller housing height to clear gravel or crushed rock surface.

Never attempt to make any adjustments while the engine is running (except when specifically recommended by manufacturer).

Always allow unit and engine to adjust to outdoor temperature before clearing snow.

Operation

Disengage all controls before starting engine.

Never leave a running unit unattended. Always stop engine and remove key before leaving unit to prevent unauthorized use.

Do not put hands or feet near or under rotating parts. Keep clear of the discharge opening at all times.

Moving and/or rotating parts can cut off body parts such as fingers or a hand. NEVER place your hands, other body part or clothing near any moving parts while unit is running.

Always keep hands away from all pinch points.

Do not touch parts which might be hot from operation. Allow parts to cool before attempting to maintain, adjust or service.

Thrown objects can cause injury. Check for weak spots on docks, ramps or floors. Avoid uneven work areas and rough terrain and stay alert for hidden hazards.

Exercise extreme caution when operating on or crossing gravel drives, walks or roads. Stay alert for hidden hazards or traffic.

After striking a foreign object, stop the engine, remove the wire from the spark plug, disconnect the cord on electric motors, thoroughly inspect the snow thrower for any damage, and repair the damage before restarting and operating the snow thrower.

If the unit should start to vibrate abnormally, stop the engine and check immediately for the cause. Vibration is generally a warning of trouble.

Stop the engine whenever you leave the operating position, before unclogging the auger / impeller housing or discharge chute, and when making any repairs, adjustments or inspections.

When cleaning, repairing or inspecting the snow thrower, stop the engine and make certain the auger / impeller and all moving parts have stopped. Disconnect the spark plug wire and keep the wire away from the plug to prevent someone from accidentally starting the engine.

Do not run the engine indoors, except when starting the engine and for transporting the snow thrower in or out of the building. Open the outside doors; exhaust fumes are dangerous.

Never operate the snow thrower without proper guards, and other safety protective devices in place and working.

Always stand clear of the discharge area when operating this unit.

Never direct the discharge toward people or areas where injury or property damage can occur from thrown objects. Keep children and others away.

Do not overload the machine capacity by attempting to clear snow at too fast a rate.

Never operate the machine at high transport speeds on slippery surfaces. Look behind and use care when operating in reverse.

Do not operate in reverse unless absolutely necessary. Always back up slowly and look down and behind before and while backing.

Do not carry passengers.

Disengage attachment when not in use and when traveling from one work area to another.

Disengage power to the auger / impeller when snow thrower is transported or not in use.

Use only attachments and accessories approved by the manufacturer of the snow thrower (such as wheel weights, counterweights or cabs).

This product is equipped with an internal combustion 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 used, must be maintained in effective working order by operator.

Never operate the snow thrower without good visibility or light. Always be sure of your footing, and keep a firm hold on the handles. Walk; never run.

Never operate unit after or during the use of medication, drugs or alcohol. Safe operation requires complete and unimpaired attention at all times.

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

Never touch a hot engine or muffler.

Avoid contact with sharp edges; sharp edges can cut.

Do not throw snow higher than necessary.

Clearing a Clogged Discharge Chute

Hand contact with the rotating auger / impeller inside the discharge chute is the most common cause of injury associated with snow throwers. Never use your hand to clean out the discharge chute.

To clear the chute:

1. SHUT THE ENGINE OFF!
2. Wait 10 seconds to be sure the auger / impeller blades have stopped rotating.
3. Always use a clean-out tool, not your hands.

Maintenance and Storage

Secure unit so it will not tip over during maintenance.

Before cleaning, removing clogs or making any inspections, repairs, etc., disengage clutch(es), stop engine, remove key, allow moving parts to stop and hot parts to cool.

Check shear bolts and other bolts at frequent intervals for proper tightness to be sure the equipment is in safe working condition.

Check clutch and brake operation frequently.

Do not change engine governor settings and do not over-speed engine.

Adjust and service as required. Motion of drive wheels and auger / impeller must stop quickly when clutch levers are released.

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

Keep unit free of ice or other debris. Clean up oil or fuel spills.

Always keep protective structures, guards, and panels in good repair and secured in place. Never modify or remove safety devices.

Never store the machine with fuel in the fuel tank inside a building where ignition sources are present such as hot water heaters, space heaters or clothes dryers. Close fuel valve and allow the engine to cool completely before storing in any enclosure or covering the unit.

Always refer to operator's manual for important details if the snow thrower is to be stored for an extended period.

Maintain or replace safety and instruction labels as necessary.

Run the machine a few minutes after throwing snow to prevent freeze-up of the auger / impeller.

Personal Protection

Do not operate the equipment without wearing adequate winter garments. Avoid loose fitting clothing that can get caught in moving parts. Wear footwear that will improve footing on slippery surfaces.

Wear adequate safety gear, including safety glasses with side shields and protective gloves.

Do not wear loose clothing or jewelry, and tie back hair that may get caught in rotating parts.

NEVER attempt to unclog or clean unit while engine is running. Rotating auger / impeller can cause serious injury.

Protect eyes, face and head from objects that may be thrown from unit. Wear appropriate hearing protection.

Always wear safety glasses or eye shields during operation or while performing an adjustment or repair to protect eyes from foreign objects that may be thrown from the machine.

Slope Operation

Exercise extreme caution when operating on slopes. DO NOT operate on steep slopes. DO NOT clear snow across the face of slopes; go up and down. Keep all movement on slopes slow and gradual.

Use a slow speed to avoid stops or shifts on slopes. Avoid starting or stopping on a slope. Do not park unit on a slope unless absolutely necessary. When parking on a slope always block the wheels.

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.

Fuel

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

Fuel is highly flammable and its vapors are explosive. Handle with care. Use only an approved gasoline container with an appropriately-sized dispensing spout.

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.

Replace fuel cap securely and clean up spilled fuel.

Never fill fuel 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 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.

Properly remove fuel before tipping unit up onto housing to avoid spills.

Towing/Transporting

Always stop engine, remove key and close fuel valve or drain fuel when transporting unit on a truck or trailer.

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.

Accessories

Use only AriensCo-recommended attachments or accessories that are designed for your unit and that are appropriate to your use and can be used safely in your application.

DRAINING FUEL SYSTEM

1. Move unit to an open, well-ventilated area with no flames or sparks.
2. Remove fuel tank cap and siphon fuel into a clean gasoline container.
3. Reinstall fuel tank cap and tighten.

Models 921045, 921046, 921047, 921048, 921323, 921324

1. Start engine to burn remaining fuel in fuel system and leave engine running until it stops due to lack of fuel. Refer to Operator's Manual for engine start procedure.
2. Stop engine, remove key and close fuel valve.

SERVICE POSITION

See Figure 2.

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

NOTICE: NEVER store unit in service position.

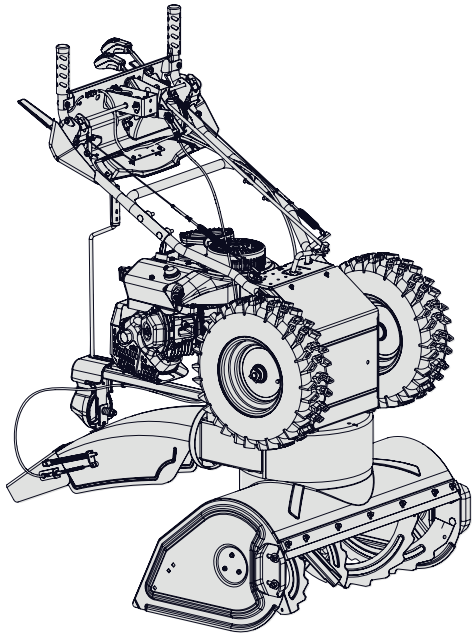


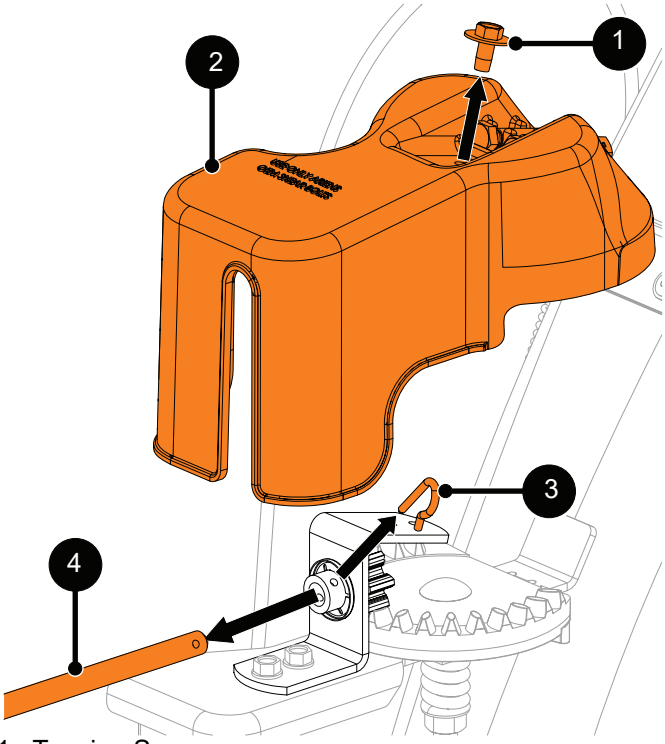
Figure 2

SEPARATE HOUSING FROM FRAME

Remove Auger Housing

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove hardware retaining chute gear cover to chute pedestal and remove cover.
4. Remove spring clip from chute rotation rod and remove rod from chute gears. See Figure 3.



1. Tapping Screw
2. Chute Gear Cover
3. Spring Clip
4. Chute Rotation Rod

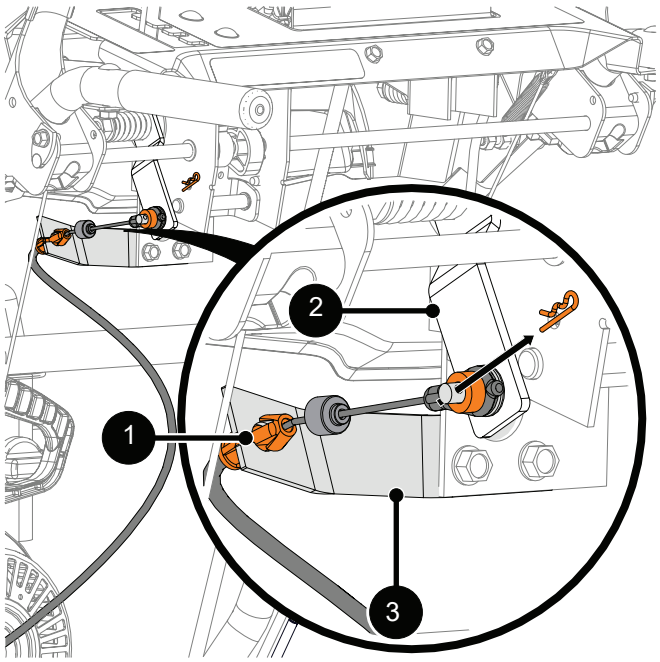
Figure 3

5. Remove hex rod from dash panel.

See Figure 4.

6. Remove hairpin, sleeve bushing and cable eyelet from deflector arm under control panel.
7. Using pliers, compress cable anchor tabs and remove anchor from deflector bracket.

IMPORTANT: Reinstall sleeve bushing and hairpin so parts are not misplaced.



1. Cable Anchor
2. Deflector Arm
3. Deflector Bracket

Figure 4

8. Remove chute deflector cable from J-clamp on engine mount. See Figure 5.

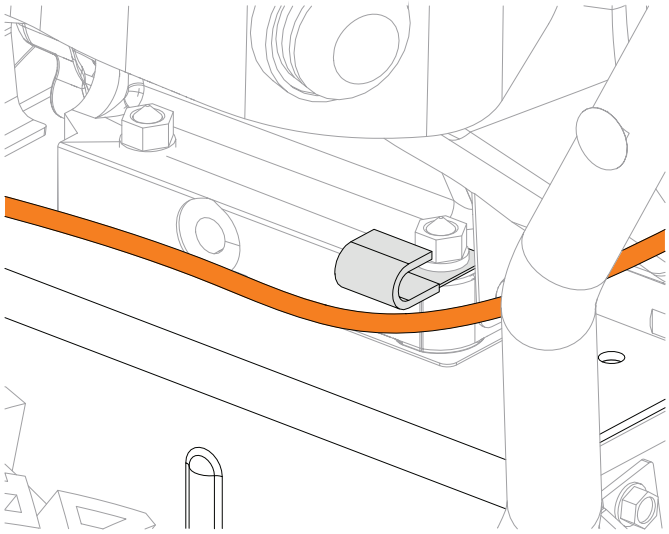


Figure 5

See Figure 6.

9. Loosen, but DO NOT remove tapping screws securing left and right side of belt cover to frame and remove belt cover.

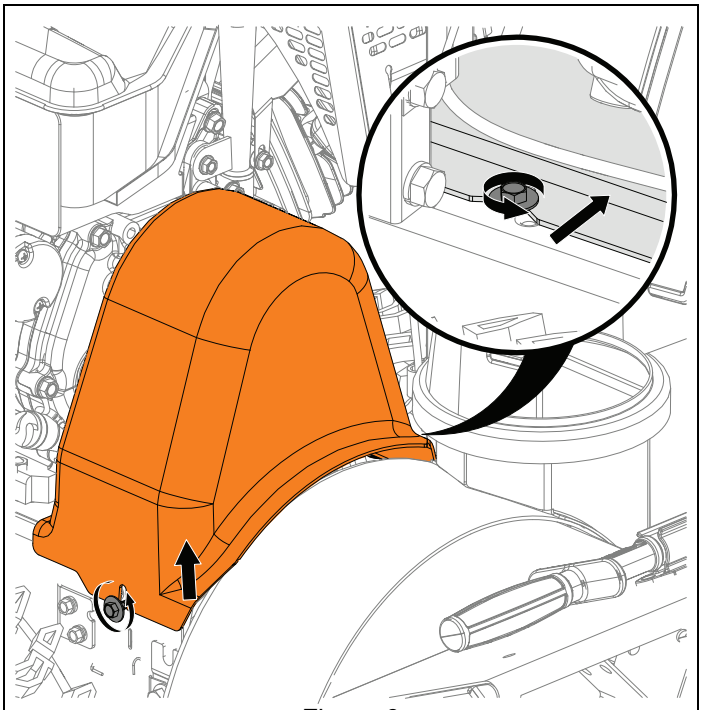


Figure 6

10. Remove hardware retaining belt finger to engine and remove belt finger. See Figure 7.

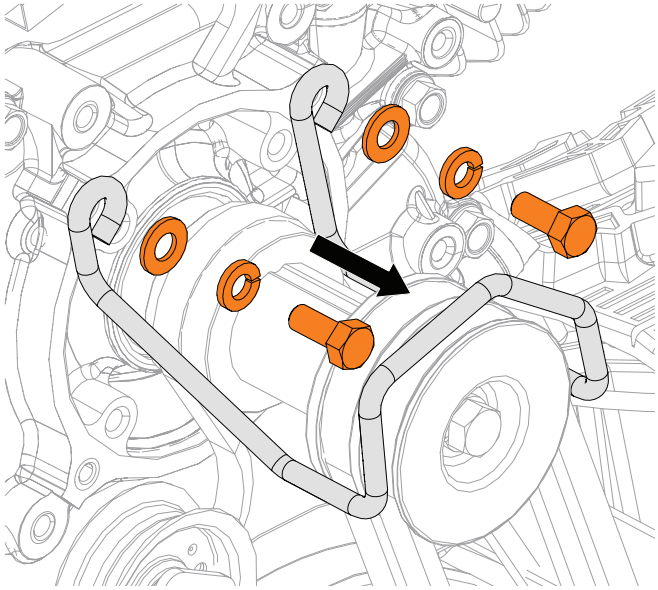


Figure 7

WARNING: AVOID INJURY. Attachment sheave edges are sharp. Wear thick gloves to remove belts from attachment sheave.

11. Remove attachment drive belts from attachment sheave. See Figure 8.

To assist belt removal, slowly pull recoil starter handle while gently guiding belts off of attachment sheave.

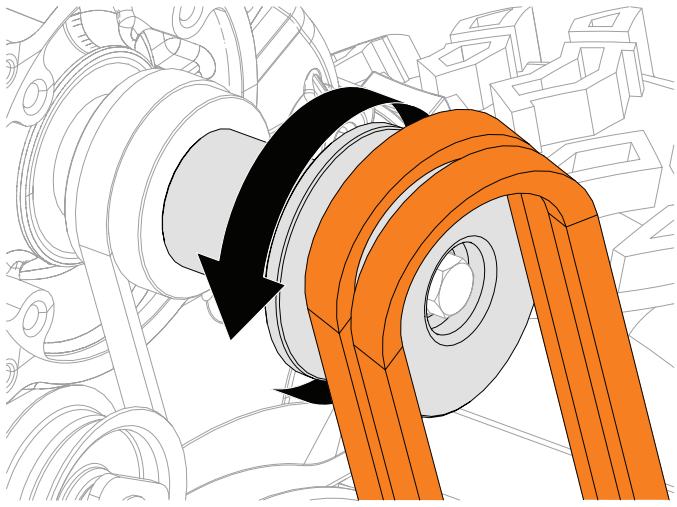


Figure 8

See Figure 9.

12. Position support, such as a trash can, under handlebars so tractor / frame remains upright when separated from auger housing.
13. Chock or block wheels to prevent tractor / frame movement.

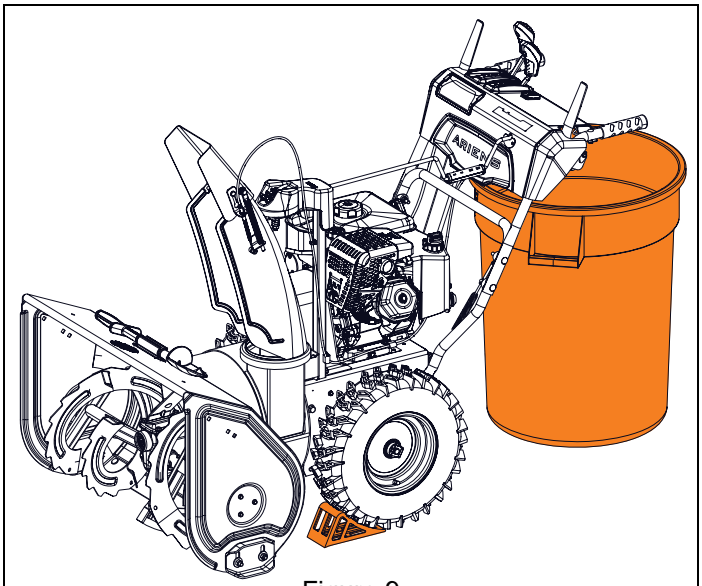


Figure 9

See Figure 10.

14. Remove hardware securing auger housing to frame.
15. Lift auger housing rear slightly to disengage from mount rod and separate from unit.

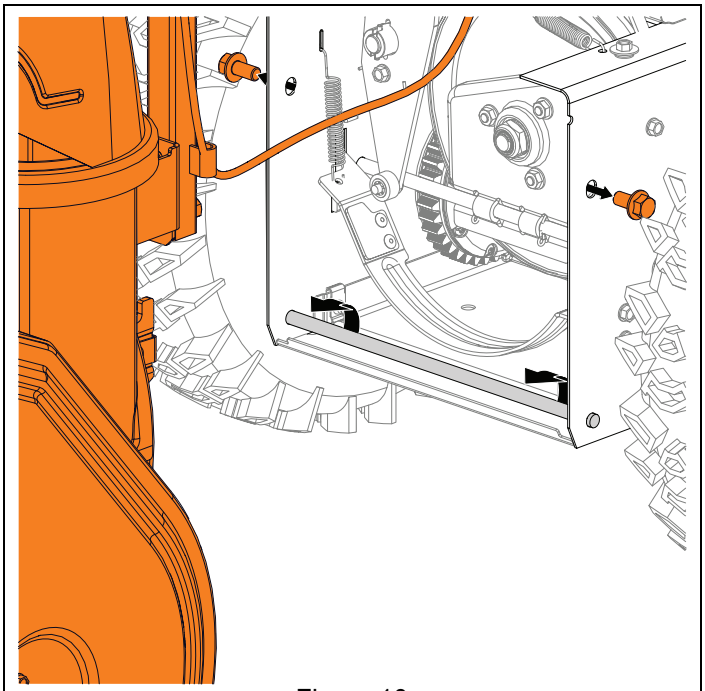


Figure 10

Reinstall Auger Housing

See Figure 11.

1. With assistance from a capable helper, engage attachment clutch lever so attachment brake will not obstruct attachment drive pulley in step 2.
2. Lift auger housing rear and lower mount brackets onto mount rod.

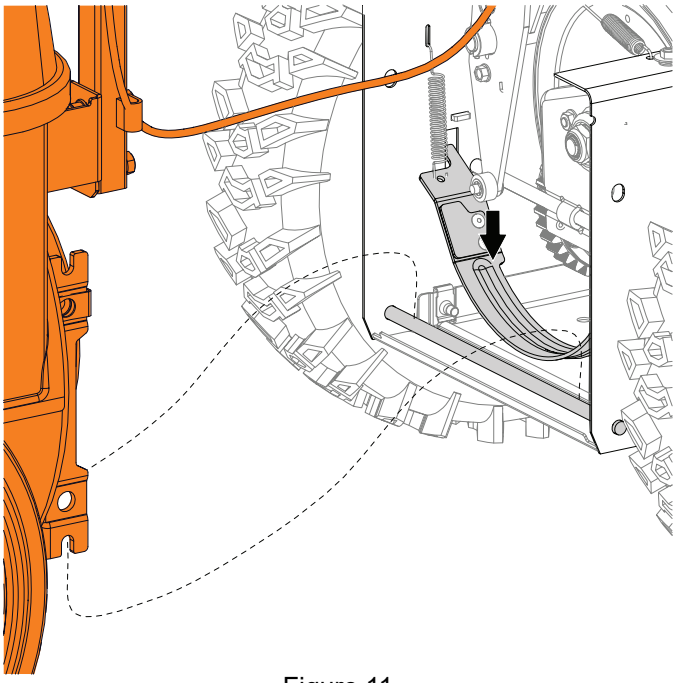


Figure 11

3. Release attachment clutch lever.
4. Align holes in mount brackets with holes in frame and secure housing to frame with two hex bolts, but DO NOT tighten.

IMPORTANT: Unit must be on a flat, level surface during steps 5 – 7.

5. Check tire pressure and adjust if necessary. Refer to Operator's Manual for specification.
6. Torque hex bolts installed in step 4 to 33.8 N•m – 70.1 N•m (24.9 lb-ft – 51.7 lb-ft).
7. Loosen skid shoe hardware and adjust skid shoes. Refer to Operator's Manual for adjustment procedure.

See Figure 12.

WARNING: AVOID INJURY. Attachment sheave edges are sharp. Wear thick gloves to install belts onto attachment sheave.

8. Reinstall attachment drive belts onto attachment sheave.

To assist belt installation, slowly pull recoil starter handle while gently guiding belts onto attachment sheave.

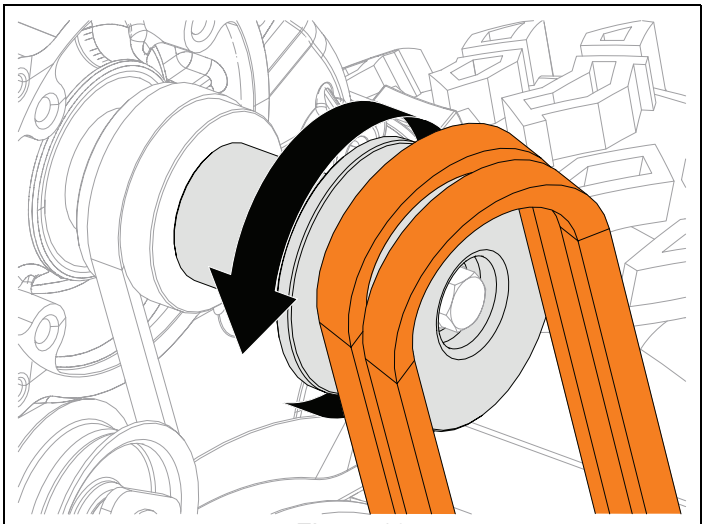
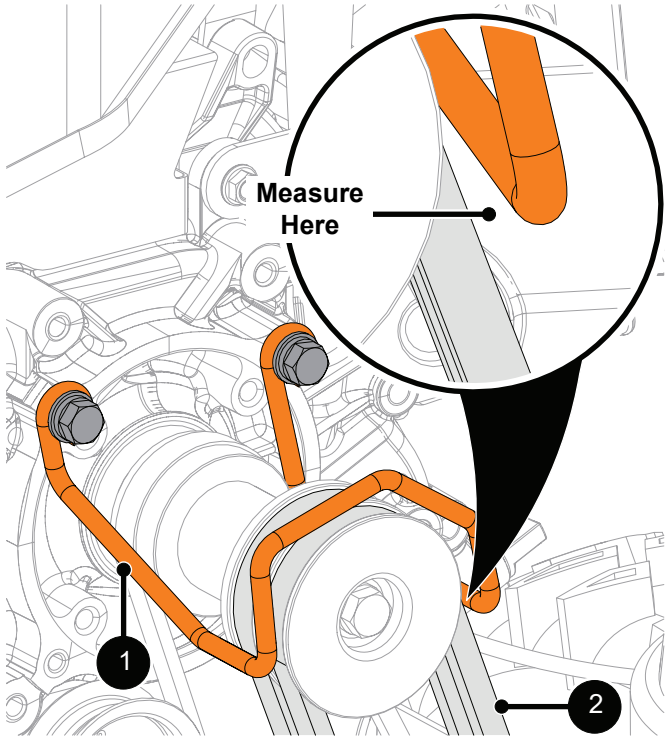


Figure 12

See Figure 13.

9. Reinstall belt finger and secure with two flat steel washers, two locking washers and two hex bolts.
10. Check belt finger clearance:
    - Engage attachment clutch lever and ensure belt finger located opposite belt idler is less than 3.2 mm (1/8") from belt, but not touching the belt.
    - If needed, adjust clearance by loosening hex bolts, repositioning belt finger, and tightening bolts.



1. Belt Finger
2. Attachment Drive Belts

Figure 13

11. Reinstall belt cover and secure left side with tapping screw. Position right side under tapping screw and tighten. See Figure 6.
12. Reinstall short end of chute rotation rod into control panel until opposite end clears chute gears.
13. Insert chute rotation rod into chute gear and secure with spring clip.
14. Reinstall deflector cable anchor into deflector bracket.
15. Remove sleeve bushing and hairpin from deflector arm and reinstall cable eyelet onto deflector arm pin. Reinstall sleeve bushing and hairpin. See Figure 14.

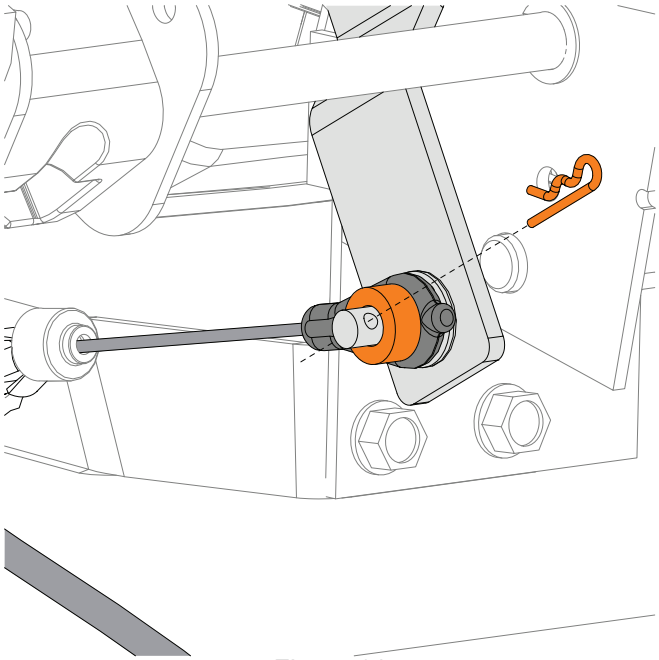


Figure 14

16. Reconnect spark plug wire.
17. Adjust chute lock cable and deflector cable. Refer to Operator's Manual for instructions.

IMPORTANT: Check all adjustments after first use.

WARNING: AVOID INJURY. Auger / impeller must stop within 5 seconds when attachment clutch lever is released.

BOTTOM COVER REMOVAL

Remove Bottom Cover

IMPORTANT: Save all hardware for reinstallation.

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire from engine.
3. Place unit in service position. See *Service Position* on page 7.
4. Remove hardware retaining bottom cover to frame and remove cover. See Figure 15.

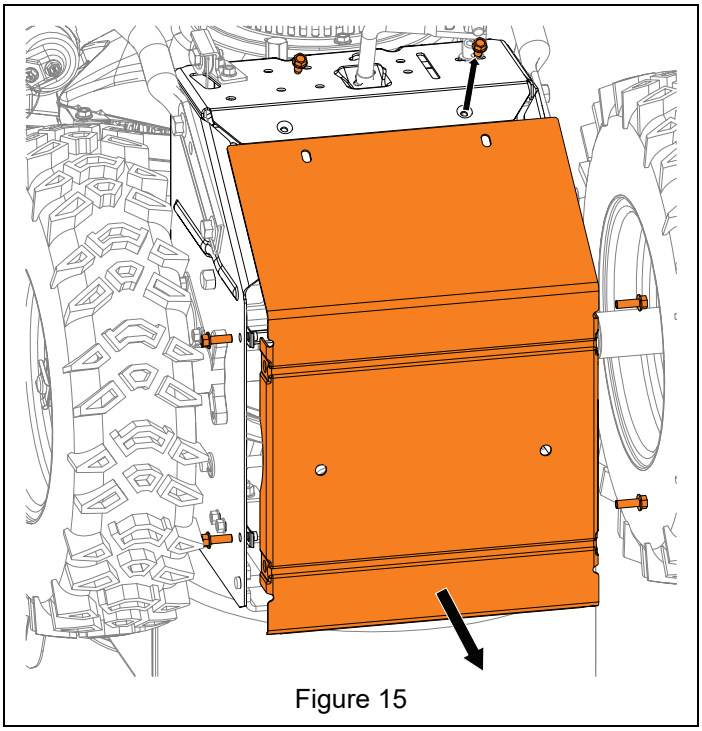


Figure 15

Install Bottom Cover

1. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
2. Return unit to operating position.

ATTACHMENT DRIVE BELT REPLACEMENT

Remove Attachment Drive Belts

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove auger housing. See *Separate Housing From Frame* on page 7.
4. Remove attachment drive belts from attachment drive pulley. See Figure 16.

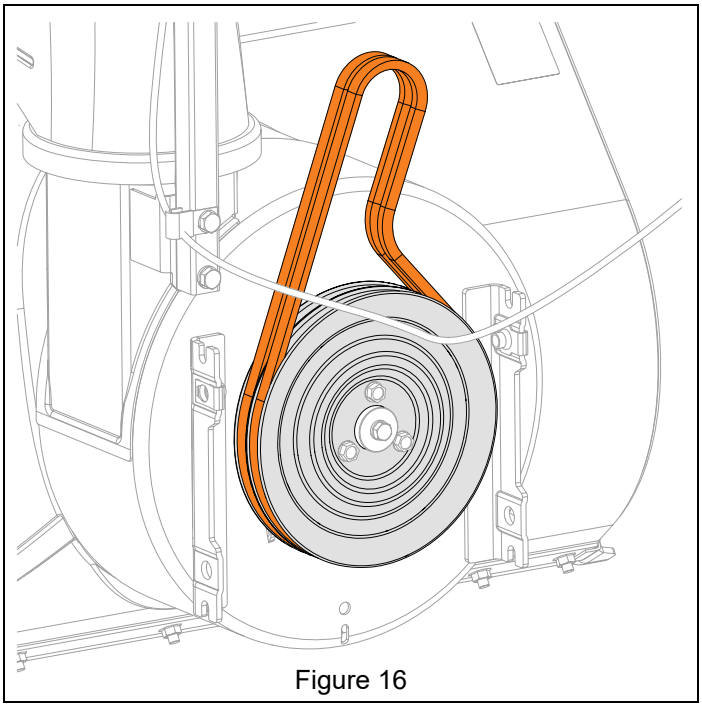


Figure 16

Install Attachment Drive Belts

1. Install belts onto attachment drive pulley.
2. Reinstall auger housing to frame. See *Reinstall Auger Housing* on page 10.

TRACTION DRIVE BELT REPLACEMENT

Remove Traction Drive Belt

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove belt cover and belt finger as shown in Figure 6 and Figure 7.
4. Slowly pull recoil starter handle while gently guiding attachment belts off engine sheave. See Figure 17.

To assist belt removal, slowly pull recoil starter handle while gently guiding belts off of attachment sheave.

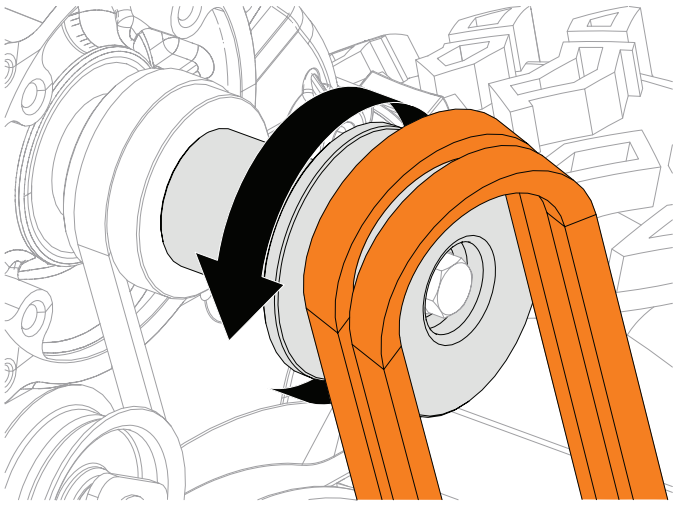


Figure 17

5. Loosen traction drive clutch cable. See Figure 18.

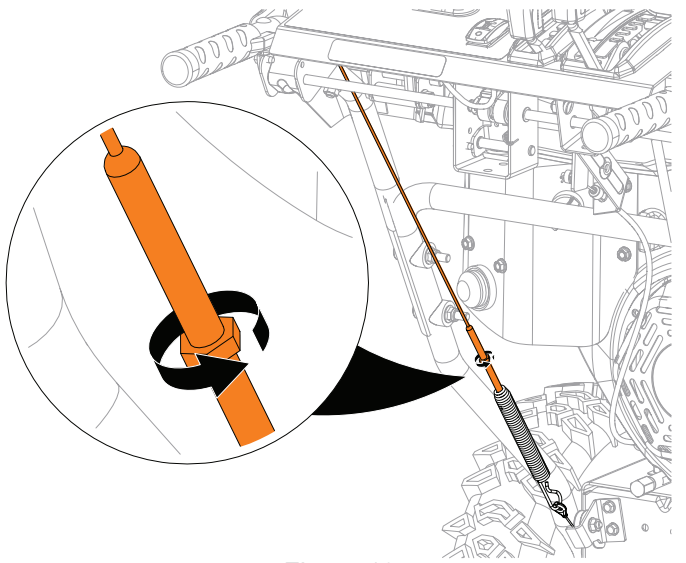
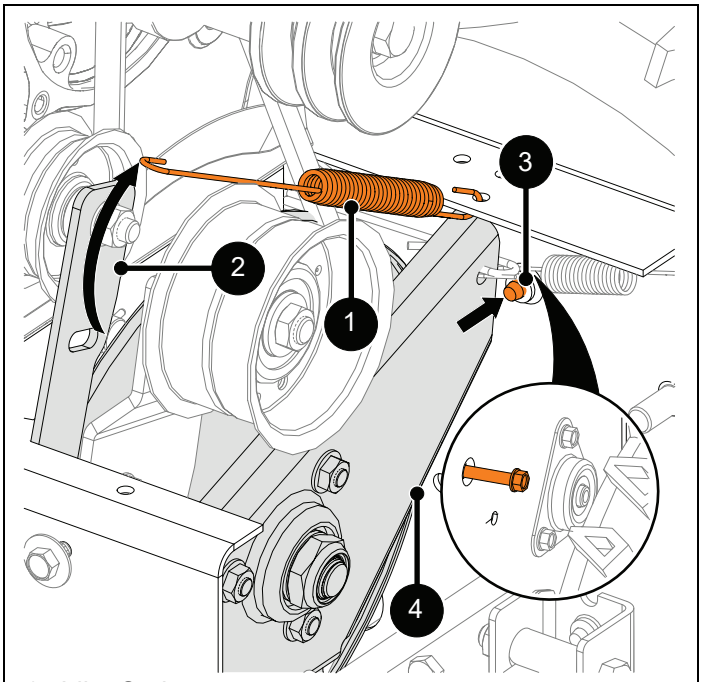


Figure 18

See Figure 19.

6. Disconnect idler spring from traction idler arm and remove spring.
7. Back out stop bolt far enough to allow swing gate to clear bolt. It is not necessary to remove stop bolt.



1. Idler Spring
2. Traction Idler Arm
3. Stop Bolt
4. Swing Gate

Figure 19

See Figure 20.

8. Rotate traction idler arm away from belt and rotate swing gate assembly forward.
9. Remove belt.

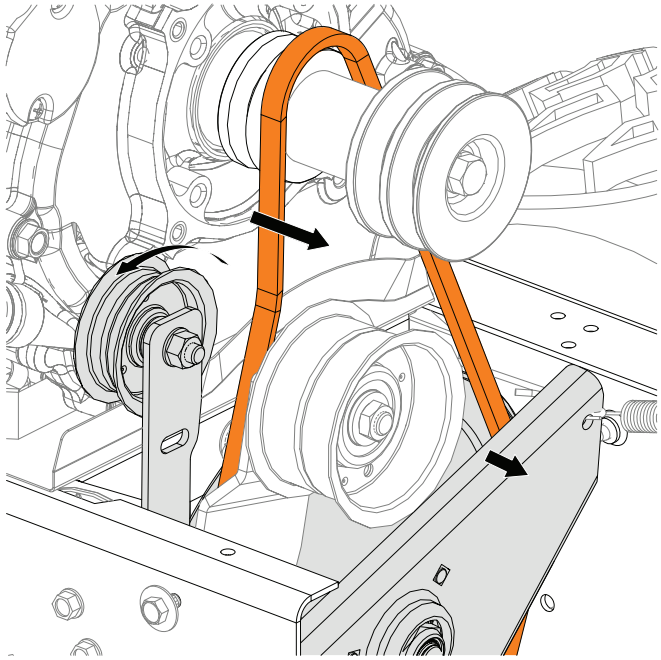
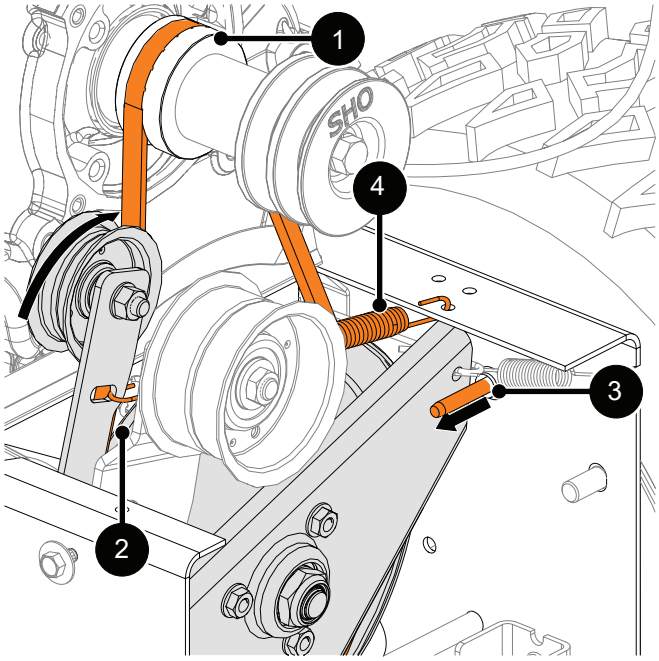


Figure 20

Install Traction Drive Belt

See Figure 21.

1. Install belt onto traction sheave and traction drive pulley.
2. Return swing gate assembly into upright position and thread stop bolt fully back into tractor frame.
3. Reconnect traction idler spring onto tractor frame and traction idler arm.



1. Traction Sheave
2. Traction Drive Pulley
3. Stop Bolt
4. Traction Idler Spring

Figure 21

4. Reinstall auger housing to tractor frame. See *Reinstall Auger Housing* on page 10.
5. Adjust traction drive clutch. Refer to Operator's Manual for adjustment procedure.
6. Reconnect spark plug wire.
7. Check all adjustments after first use.

DRIVE IDLER ASSEMBLY REPLACEMENT

Remove Attachment Drive Idler Assembly

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove auger housing. See *Separate Housing From Frame* on page 7.
4. Disconnect attachment brake spring from frame. See Figure 22.

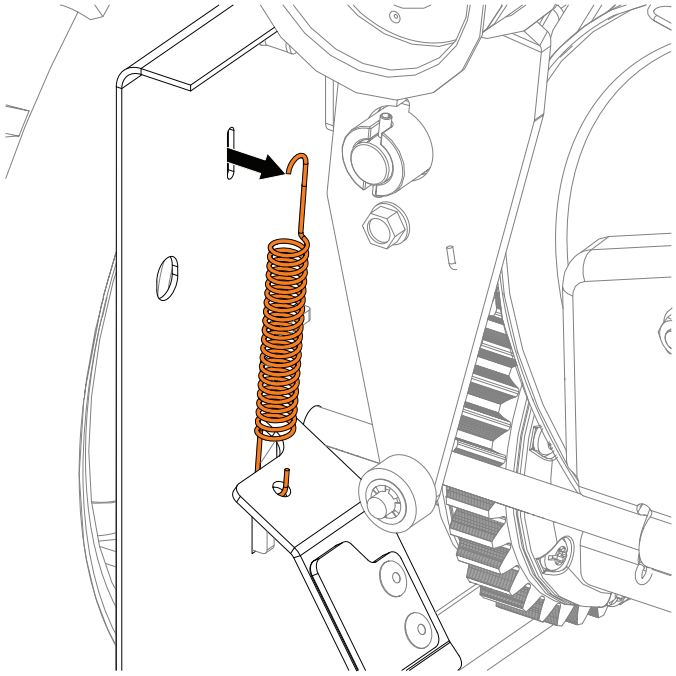
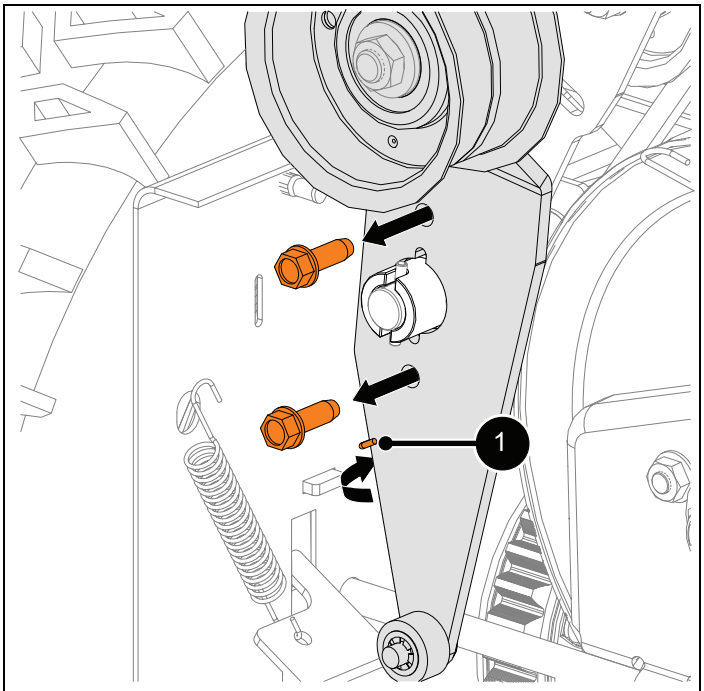


Figure 22

See Figure 23.

5. Disconnect torsion spring from attachment idler arm.
6. Remove tapping screws retaining attachment idler arm to hub and remove idler assembly.



1. Torsion Spring

Figure 23

Remove Traction Drive Idler Assembly

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove attachment drive idler assembly. See *Remove Attachment Drive Idler Assembly* on page 15.

See Figure 24.

4. Disconnect tension spring from traction drive idler arm.
5. Remove roll pin. Remove attachment idler arm hub from drive idler pivot rod.
6. Remove torsion spring from idler pivot rod.

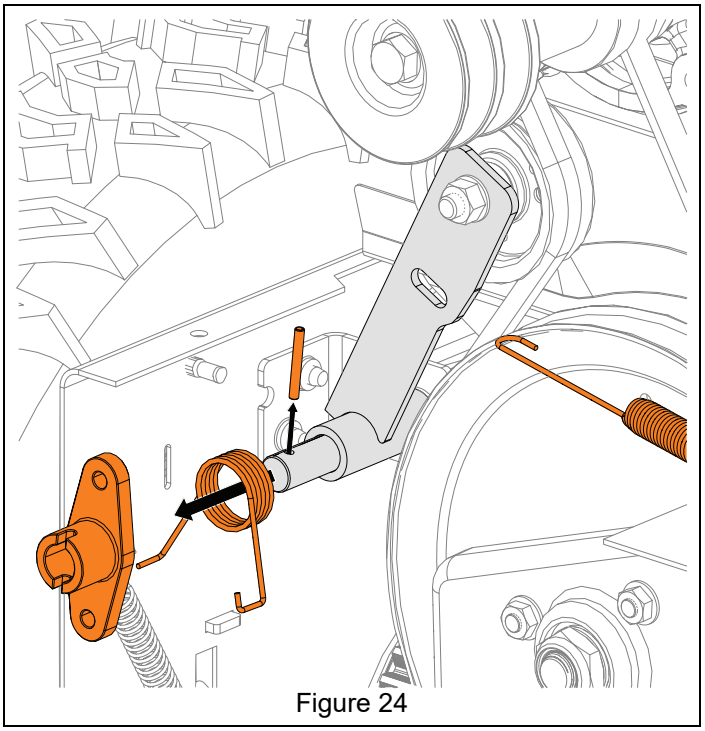


Figure 24

7. Remove traction idler arm assembly from pivot rod. See Figure 25.

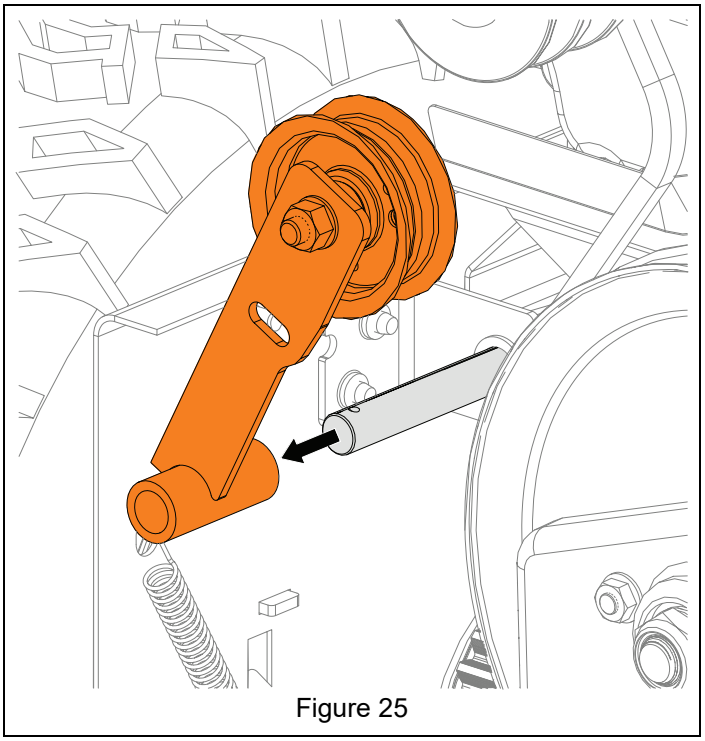


Figure 25

Install Traction Drive Idler Assembly

See Figure 26.

1. Reinstall traction drive idler assembly and torsion spring onto idler pivot rod.
2. Reinstall attachment idler arm hub onto idler pivot rod.

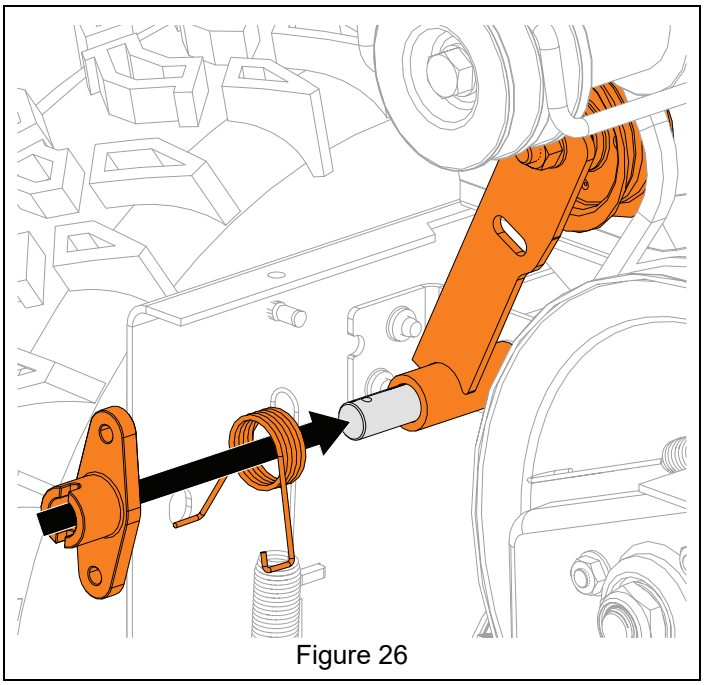


Figure 26

See Figure 27.

3. Align attachment arm idler hub with hole through pivot rod and reinstall roll pin.
4. Reinstall idler spring onto traction drive idler arm and ensure traction drive belt is aligned in all pulleys.

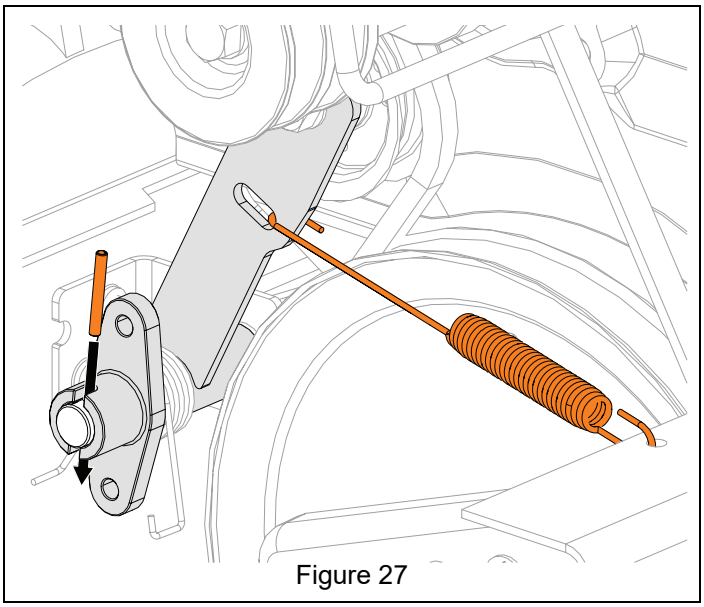


Figure 27

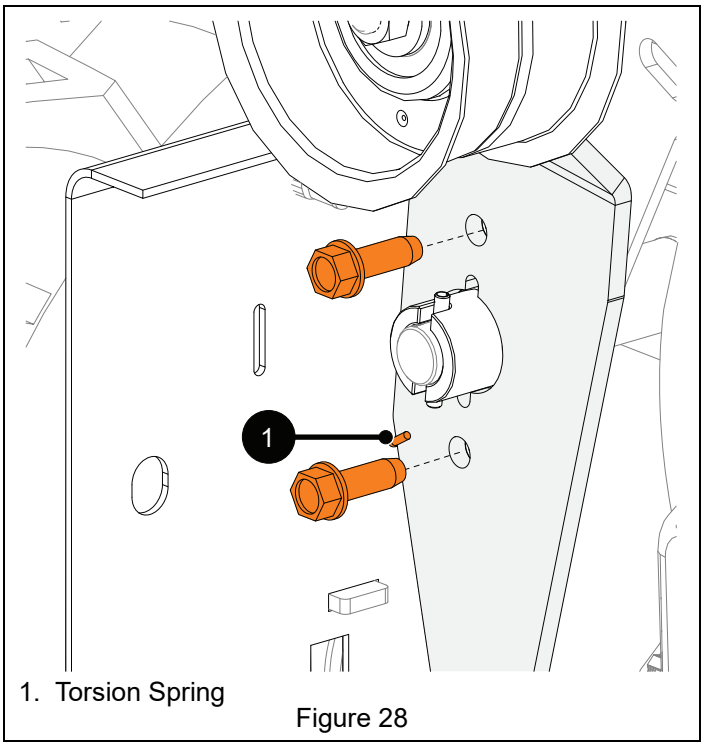
5. Reinstall attachment drive idler assembly. See *Install Attachment Drive Idler Assembly* on page 17.

Install Attachment Drive Idler Assembly

See Figure 28.

1. Secure attachment idler arm to hub with original tapping screws.
2. Reattach torsion spring around attachment idler arm.

IMPORTANT: Ensure attachment idler arm has tension.



1. Torsion Spring

Figure 28

3. Reinstall attachment brake spring onto frame. See Figure 29.

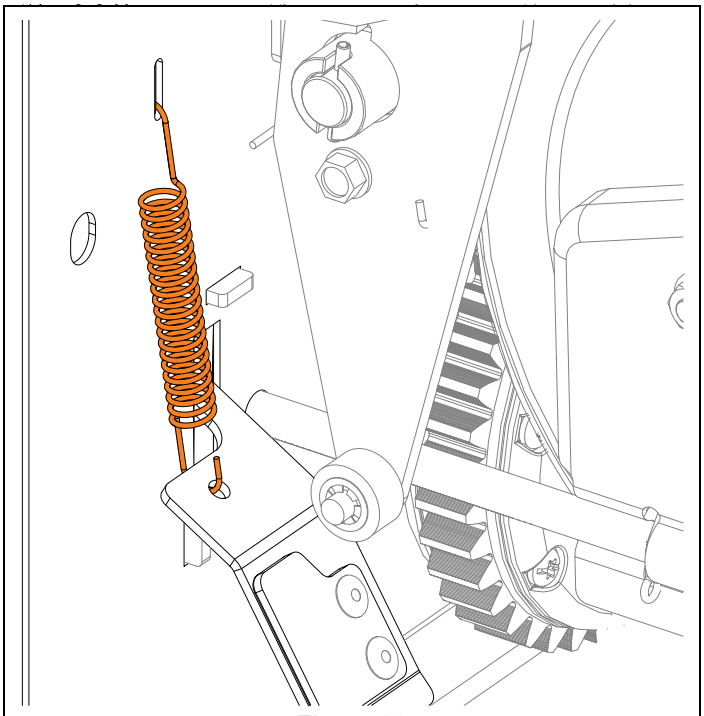


Figure 29

4. Reinstall auger housing. See *Reinstall Auger Housing* on page 10.
5. Adjust attachment drive clutch. Refer to Operator's Manual for adjustment procedure.
6. Reconnect spark plug wire.

IMPORTANT: Check all adjustments after first use.

ATTACHMENT BRAKE REPLACEMENT

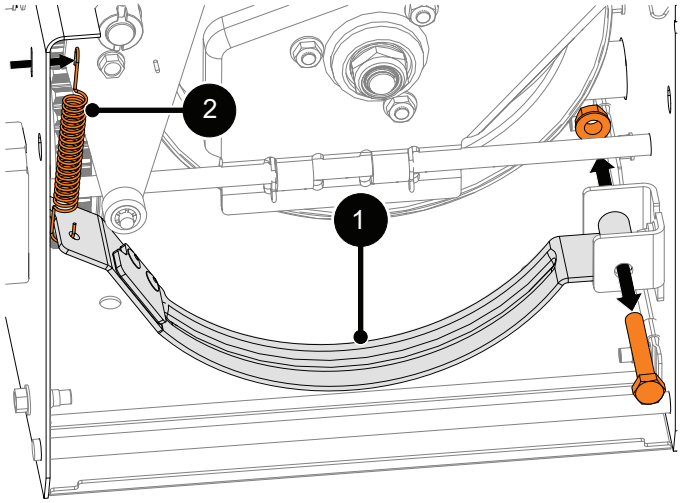
Remove Attachment Brake

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove auger housing. See *Separate Housing From Frame* on page 7.

See Figure 30.

4. Disconnect extension spring from frame.
5. Remove hardware retaining attachment brake arm to brake mount bracket and remove brake arm.



1. Attachment Brake Arm
2. Extension Spring

Figure 30

Install Attachment Brake

1. Secure attachment brake arm to brake arm bracket with original hex bolt and top locking flange nut, but DO NOT overtighten.

IMPORTANT: Brake arm MUST rotate freely after hardware has been tightened.

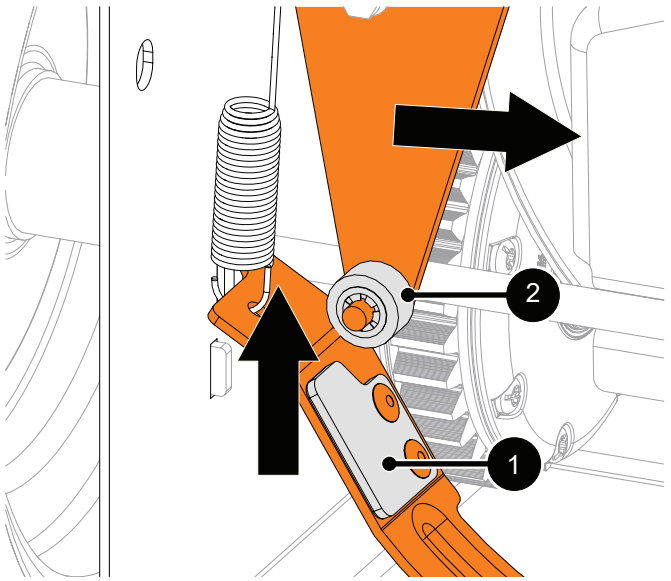
2. Using a flathead screwdriver or similar pry bar, reinstall extension spring hook onto attachment brake arm.

See Figures 31 and 32.

3. Engage and disengage attachment clutch to verify brake roller on attachment idler does not interfere with brake pad.

IMPORTANT: Ensure brake roller does not bind.

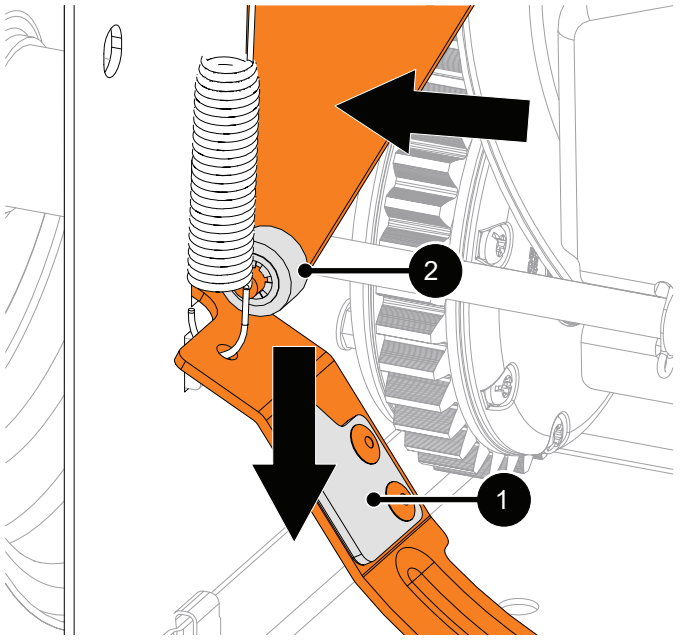
Attachment Clutch Disengaged / Brake Engaged



1. Brake Pad
2. Brake Roller

Figure 31

Attachment Clutch Engaged / Brake Disengaged



1. Brake Pad
2. Brake Roller

Figure 32

4. Reinstall auger housing to frame. See *Reinstall Auger Housing* on page 10.

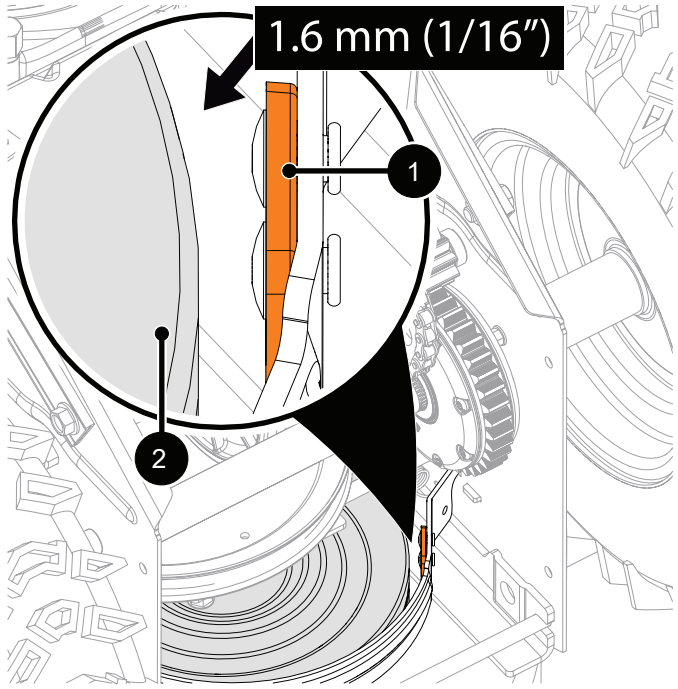
WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

5. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.

See Figure 33.

6. Check attachment brake:
   - When attachment clutch is disengaged, brake must contact attachment belt or pulley, whichever is closest.
   - When attachment clutch is engaged, brake must be more than 1.6 mm (1/16") away from attachment belt or pulley, whichever is closest.

IMPORTANT: If attachment clutch / brake is out of adjustment, refer to Operator's Manual for adjustment procedure.



1. Brake Pad
2. Attachment Pulley & Belt

Figure 33

7. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
8. Return unit to operating position.
9. Reconnect spark plug wire and fill fuel tank.

IMPORTANT: Check all adjustments after first use.

WARNING: AVOID INJURY. Auger / impeller must stop within 5 seconds when attachment clutch lever is released.

FRICTION DISC REPLACEMENT

Remove Friction Disc

IMPORTANT: Save all hardware for reinstallation.

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.

See Figure 34.

4. Remove hairpin securing adjustment pin to shift arm.
5. Remove adjustment pin from shift arm.

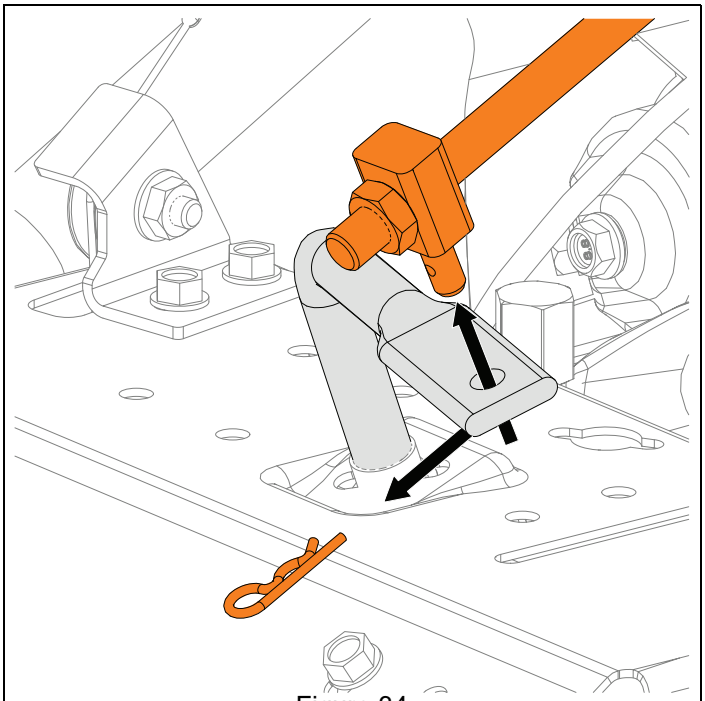


Figure 34

6. Remove snap clips from axle ends and remove wheels.

7. Remove hardware securing bearing to left side of frame and remove bearing. See Figure 35.

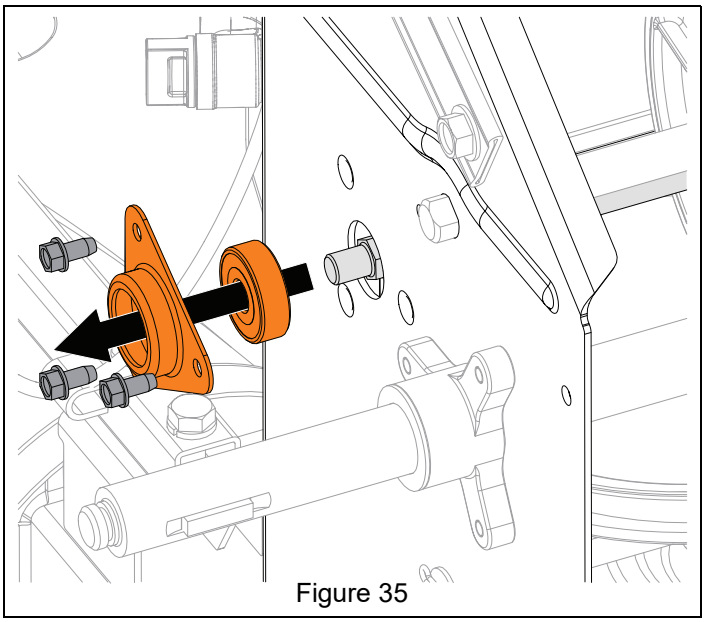


Figure 35

8. Remove two spring clips from hex shaft. See Figure 36.

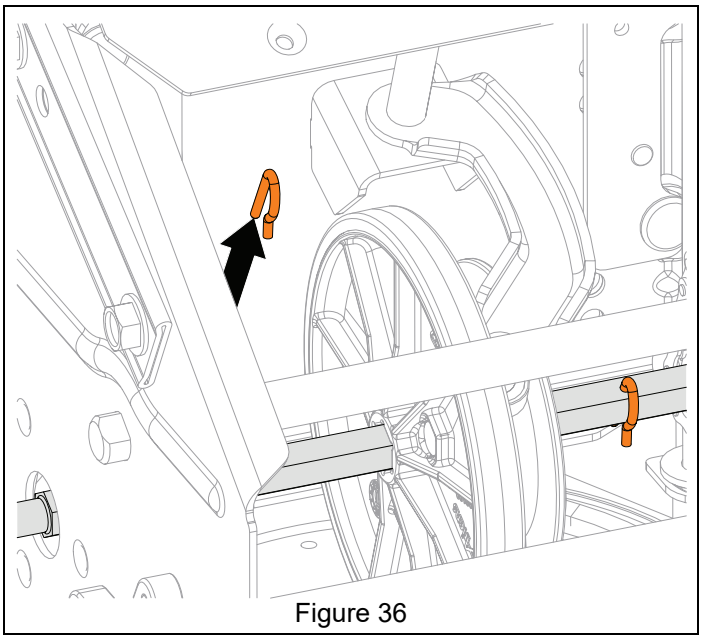


Figure 36

9. Remove hex shaft from pinion sprocket and friction disc assembly and remove friction disc assembly. See Figure 37.

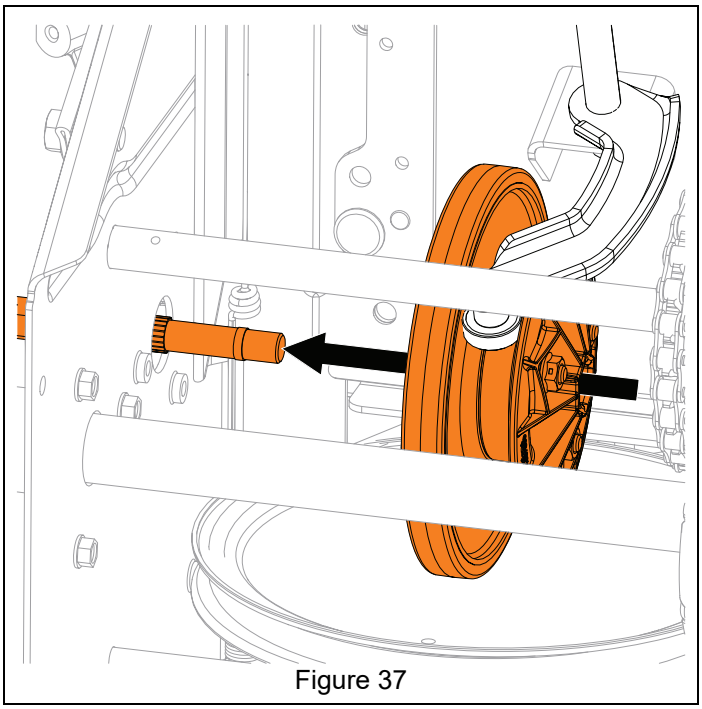


Figure 37

Install Friction Disc

1. Align friction disc assembly with shift fork roller bearing and hex shaft. See Figure 38.

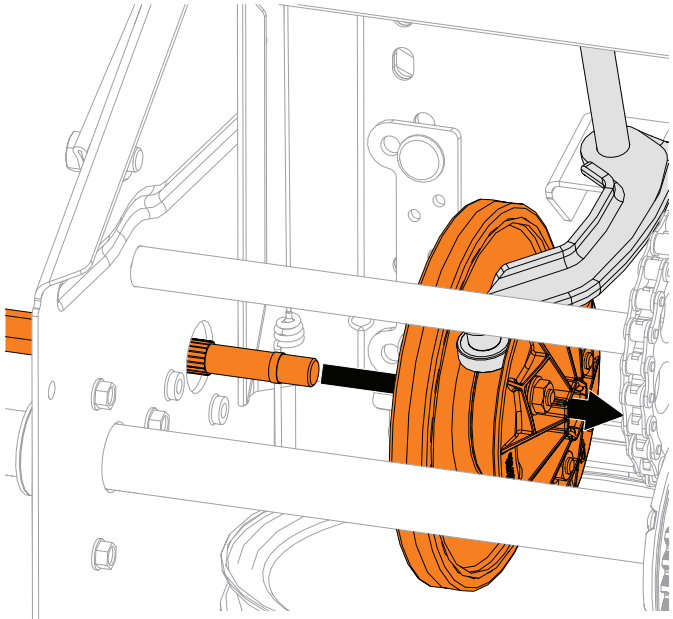


Figure 38

2. Insert hex shaft through friction disc, pinion sprocket and right side of frame. See Figure 39.

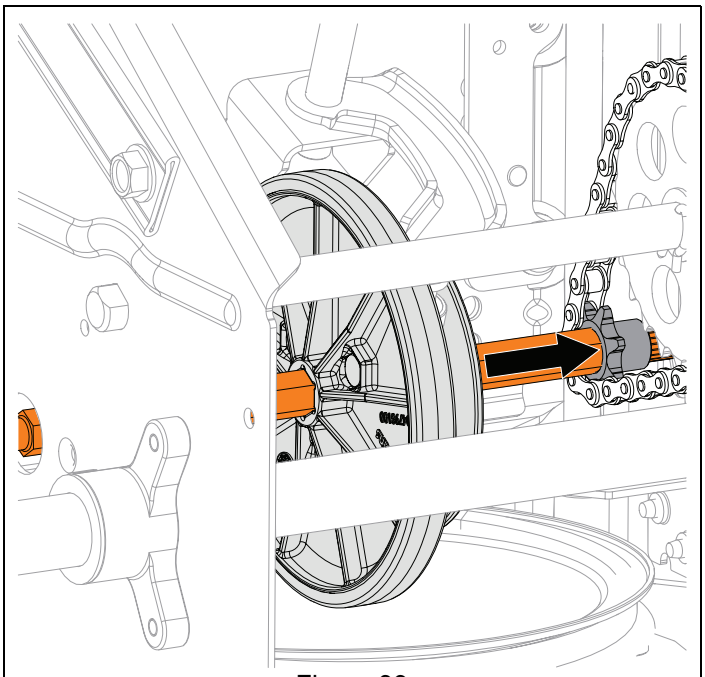


Figure 39

See Figure 40.

3. Reinstall bearing onto hex shaft end.
4. Reinstall bearing flange over bearing and secure to frame with three tapping screws.
5. Reinstall spring clips into hex shaft.

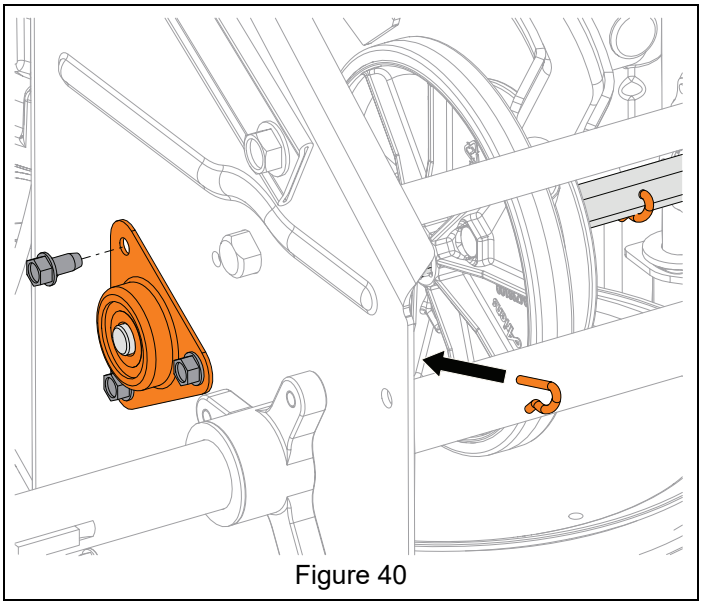


Figure 40

6. Reinstall adjustment pin onto shift arm and secure with hairpin.
7. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
8. Reinstall wheels onto axle and secure with snap clips.
9. Return unit to operating position.
10. Fill fuel tank and reconnect spark plug wire.
11. Adjust speed selector lever. Refer to Operator's Manual for adjustment procedure.

IMPORTANT: Check all adjustments after first use.

HEX SHAFT BEARING REPLACEMENT

Remove Bearing

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.

See Figure 41.

3. Remove hardware retaining bearing flange to frame and remove flange.
4. Remove bearing from hex shaft.

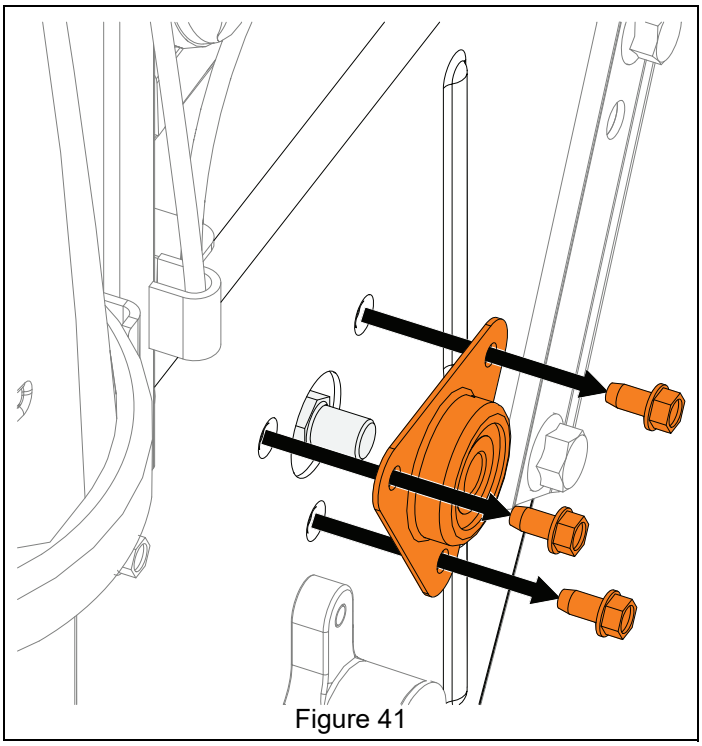


Figure 41

Install Bearing

1. Install bearing onto hex shaft end.
2. Install bearing flange over bearing and secure to frame with three tapping screws.

SWING GATE REPLACEMENT

Remove Swing Gate

NOTICE: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire from engine.
3. Under control panel, remove hairpin, washer and spring retaining upper traction clutch cable to clutch lever pin and disconnect cable. See Figure 42.

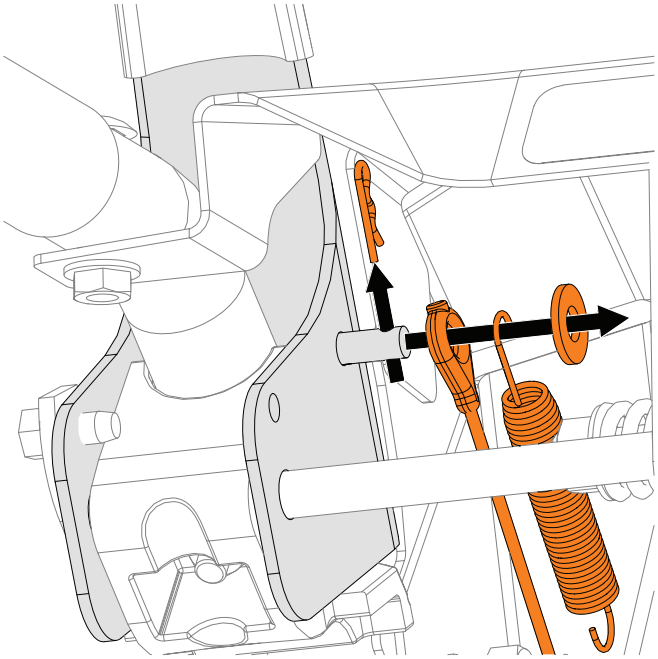


Figure 42

4. Remove belt cover. See Figure 6.
5. Disconnect traction drive idler spring. See Figure 43.

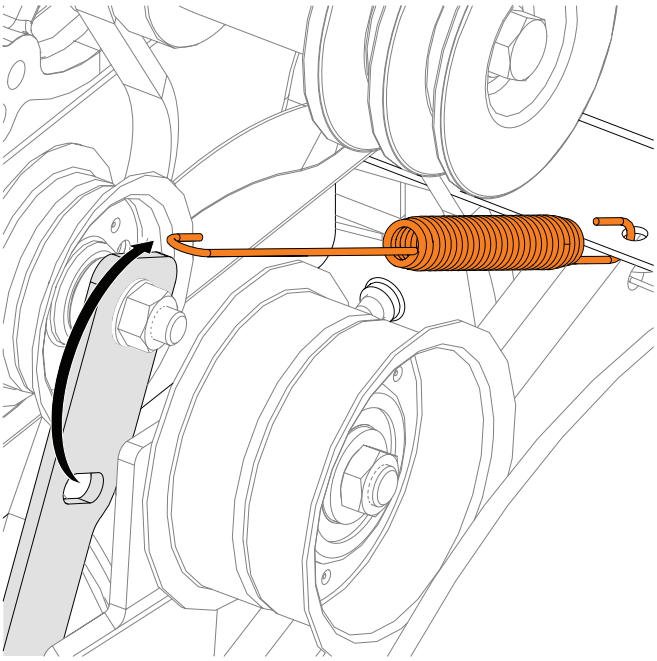
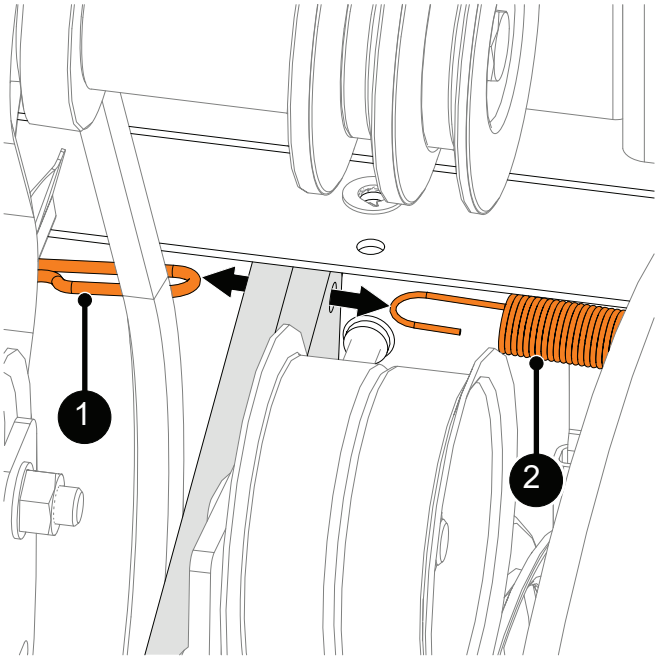


Figure 43

6. Back out stop bolt far enough to allow swing gate to clear bolt. It is not necessary to remove bolt.
7. Disconnect traction drive clutch cable and return spring from swing gate. See Figure 44.



1. Traction Drive Clutch Cable
2. Return Spring

Figure 44

8. Place unit in service position. See *Service Position* on page 7.

9. Remove bottom cover. See *Bottom Cover Removal* on page 12.
10. Remove snap clip from right side axle end and remove right wheel and axle key. Take care to not lose axle key. See Figure 45.

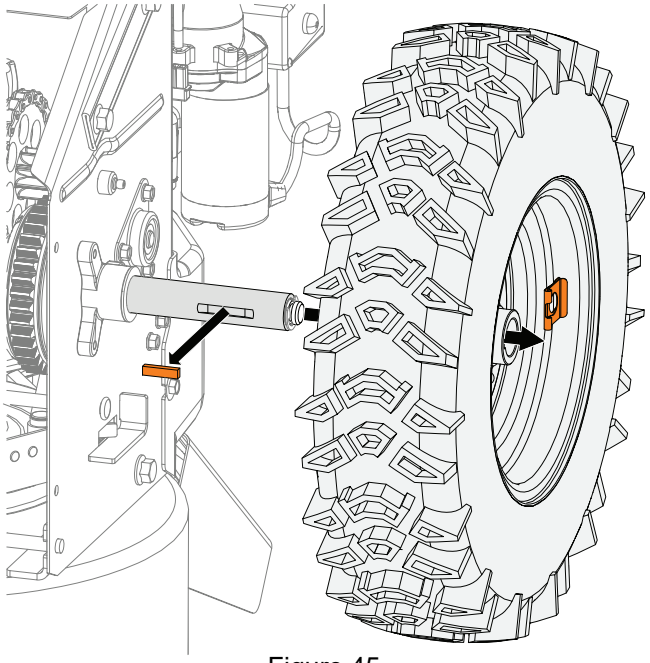


Figure 45

11. Remove hairpin and flat steel washer retaining swing gate pivot pin. See Figure 46.

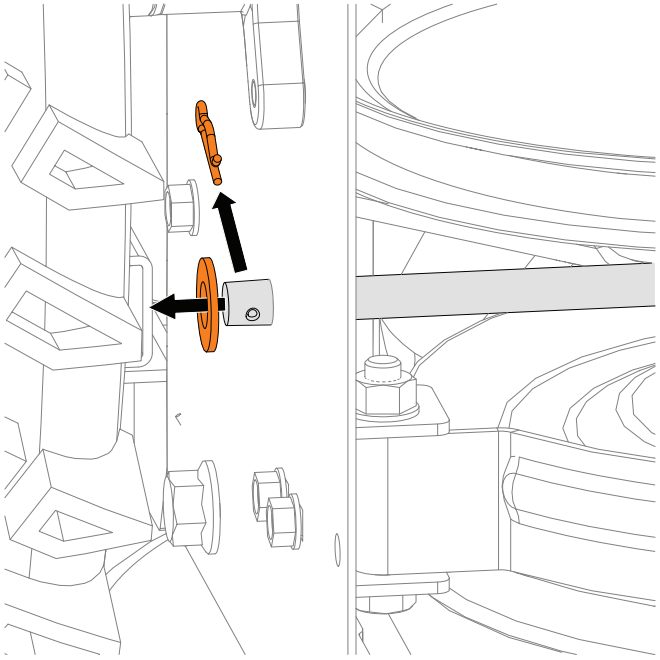


Figure 46

12. Remove two hair pins retaining swing gate assembly to swing gate pivot pin and remove pin. See Figure 47.

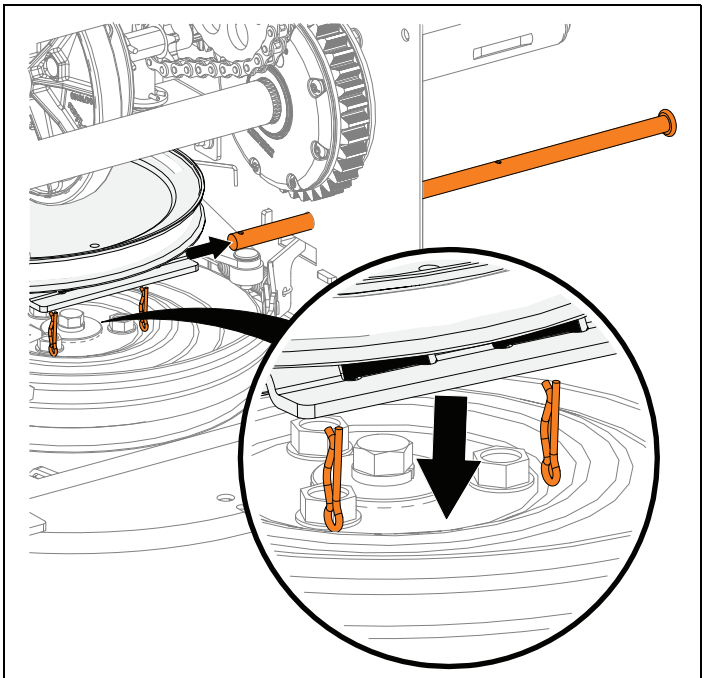


Figure 47

WARNING: AVOID INJURY. Wear thick gloves; traction drive pulley and engine sheave edges are sharp.

13. Disengage traction drive belt from traction drive pulley and remove swing gate assembly. See Figure 48.

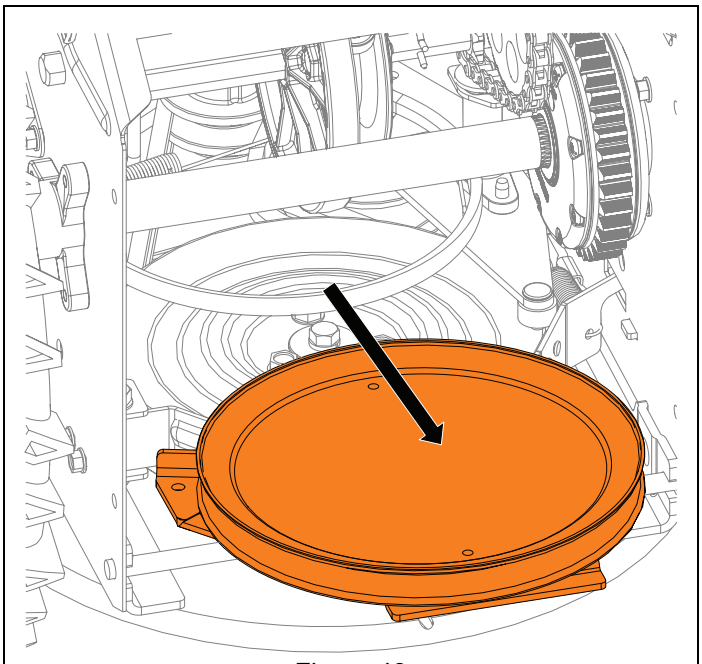


Figure 48

Install Swing Gate Assembly

WARNING: AVOID INJURY. Wear thick gloves; traction drive pulley and engine sheave edges are sharp.

1. Position swing gate assembly inside frame.
2. Reinstall traction drive belt on traction drive pulley.
3. Reinstall pivot rod through swing gate and secure in tractor frame with flat steel washer and hairpin. See Figure 49.

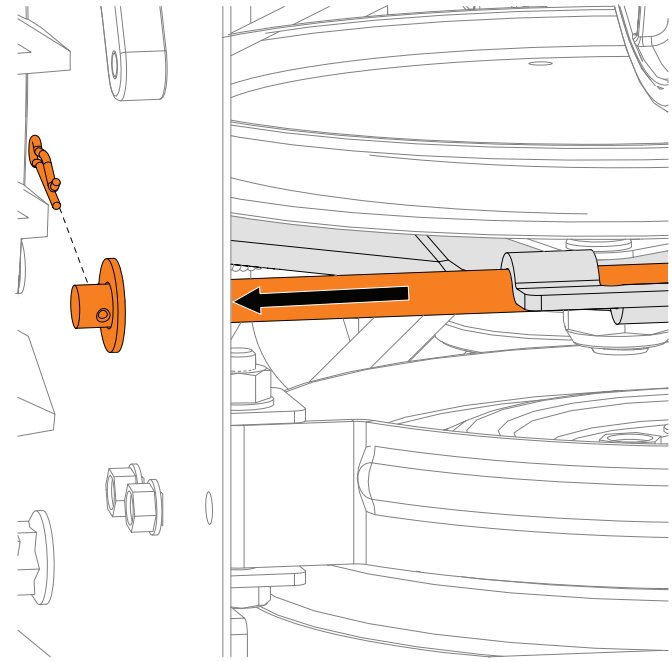


Figure 49

4. Secure swing gate assembly to pivot rod with two hairpins inserted curved side up at 90-degree angles to the gate. See Figure 50.

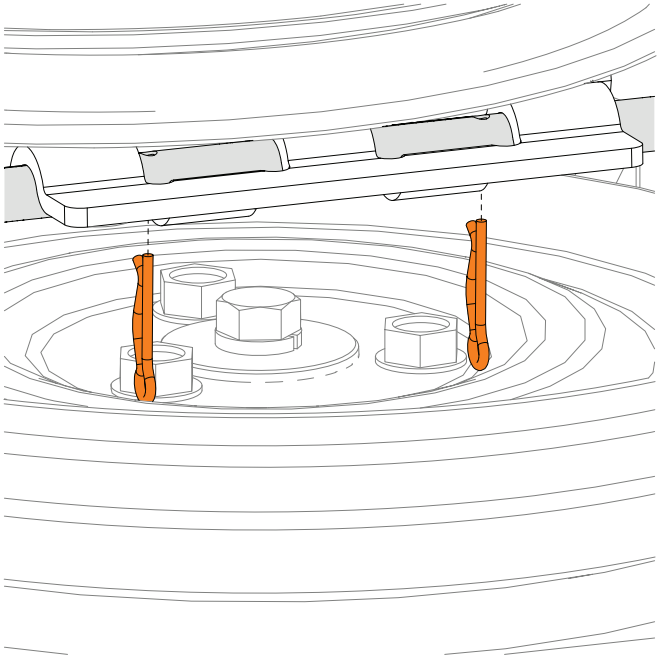


Figure 50

5. Reinstall bottom cover. See *Install Bottom Cover* on page 12.
6. Ensure axle key is in position and reinstall right wheel. Secure with snap clip. See Figure 45.
7. Return unit to operating position.
8. Reconnect traction drive clutch cable and return spring to swing gate. See Figure 44.
9. Thread stop bolt fully back into tractor frame.
10. Ensure that traction drive belt is correctly seated and reconnect traction drive idler spring. See Figure 43.
11. Under control panel, reconnect traction clutch cable to clutch lever pin. Install spring onto clutch lever pin and retain with washer and hairpin. See Figure 42.
12. Adjust traction drive clutch. Refer to Operator's Manual for adjustment procedure.
13. Reinstall belt cover.
14. Fill fuel tank and reconnect spark plug wire.

IMPORTANT: Check all adjustments after first use.

AUGER REPLACEMENT

Remove Auger

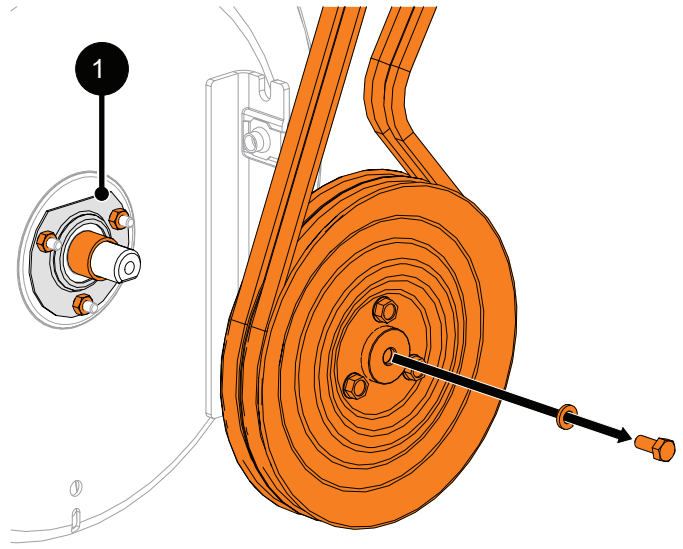
IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove auger housing. See *Separate Housing From Frame* on page 7.

See Figure 51.

CAUTION: AVOID INJURY. Attachment drive pulley edges are sharp. Wear gloves when handling pulley.

4. Hold attachment drive pulley in place and remove hardware securing pulley to impeller shaft.
5. Remove pulley and spacer from impeller shaft.
6. Loosen, but DO NOT remove hardware securing bearing plate to auger housing.



1. Bearing Plate

Figure 51

7. Remove hardware retaining support bushings to auger housing. See Figure 52.

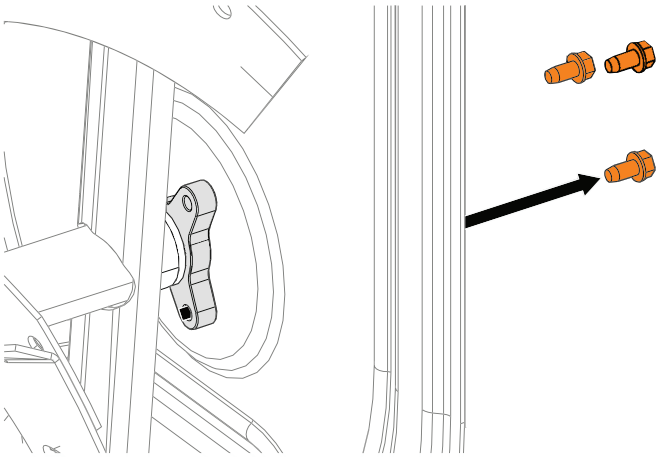


Figure 52

8. Remove hardware retaining gearcase support brackets to auger housing. See Figure 53.

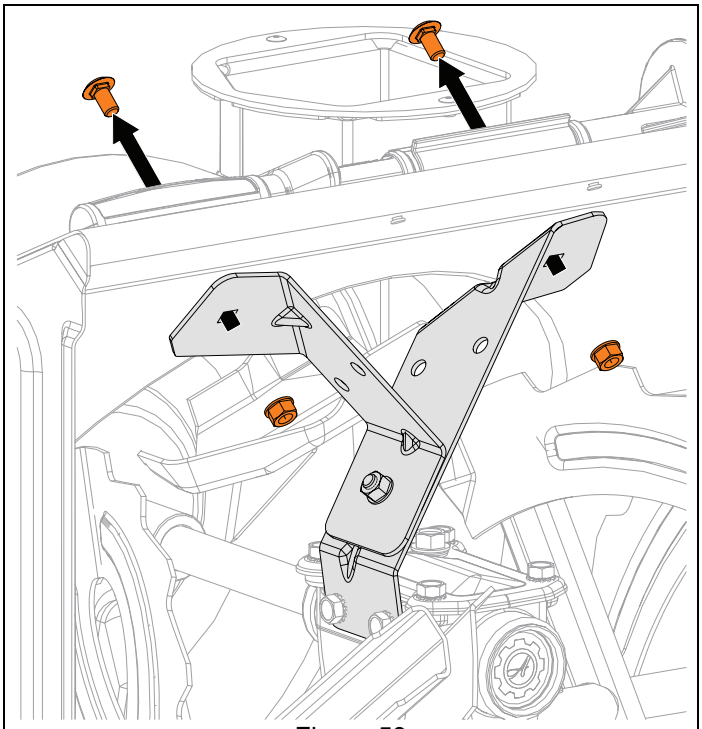


Figure 53

9. Remove auger assembly from housing. See Figure 54.

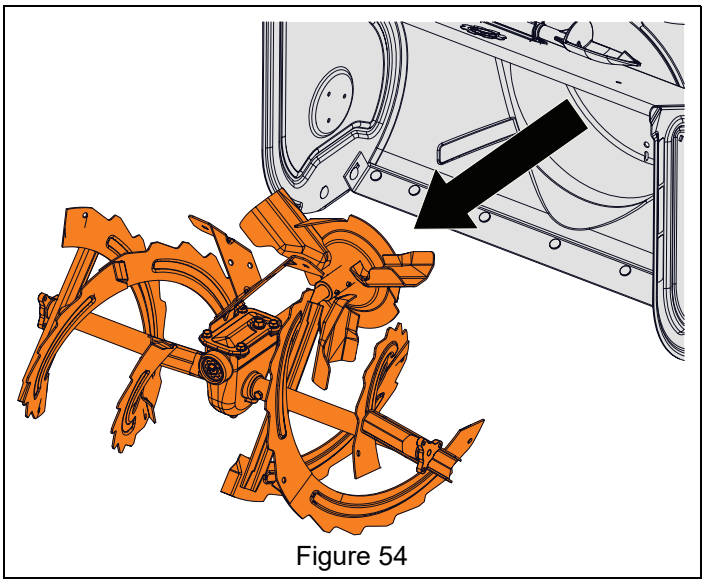


Figure 54

10. Remove shear bolt from auger shaft. See Figure 55.

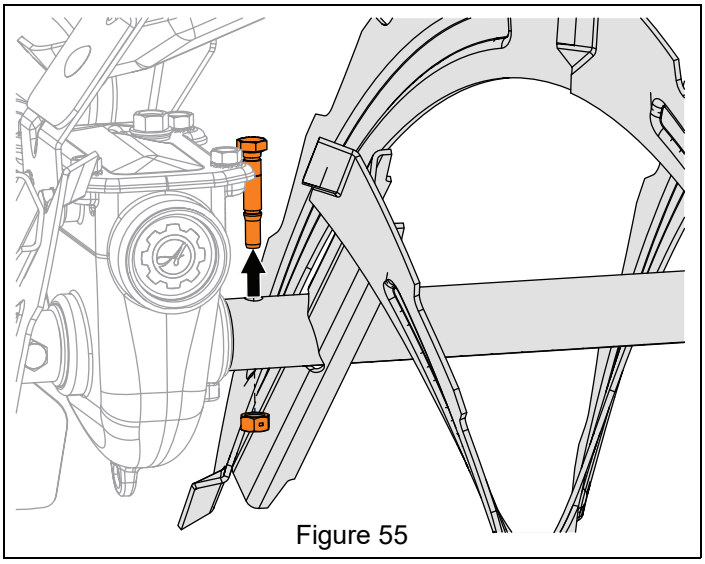


Figure 55

11. Remove support bushing and flange bushing from auger end. See Figure 56.

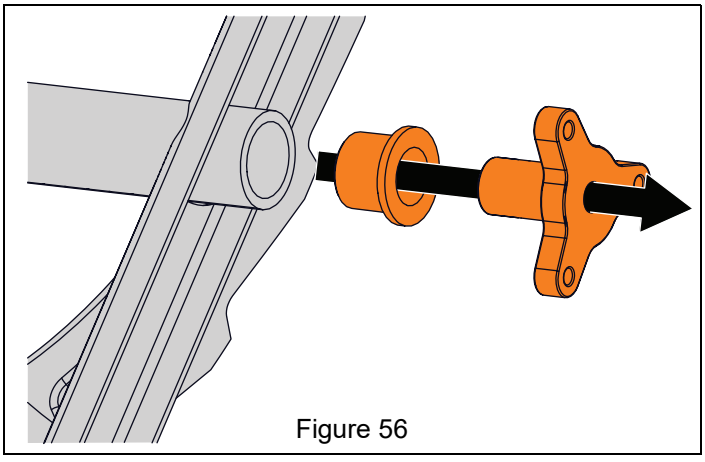


Figure 56

12. Remove auger. Use of penetrating oil or heat may be necessary to remove auger. See Figure 57.

IMPORTANT: If rust is present on auger shaft, remove with sand paper and wipe clean with oil.

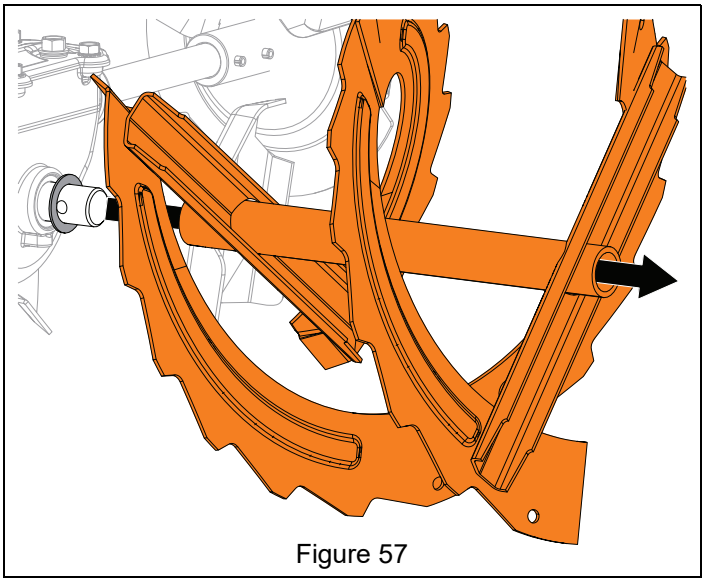


Figure 57

Install Auger

IMPORTANT: Ensure auger helix direction matches the original auger orientation.

1. Reinstall flange bushing and support bushing onto auger end. See Figure 58.

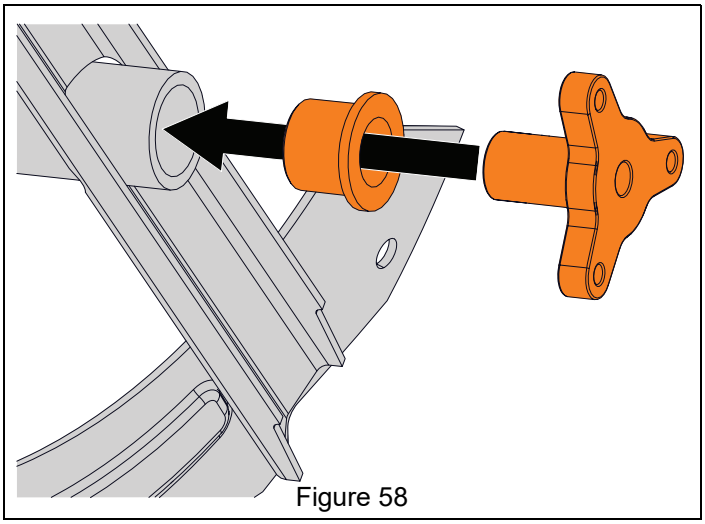


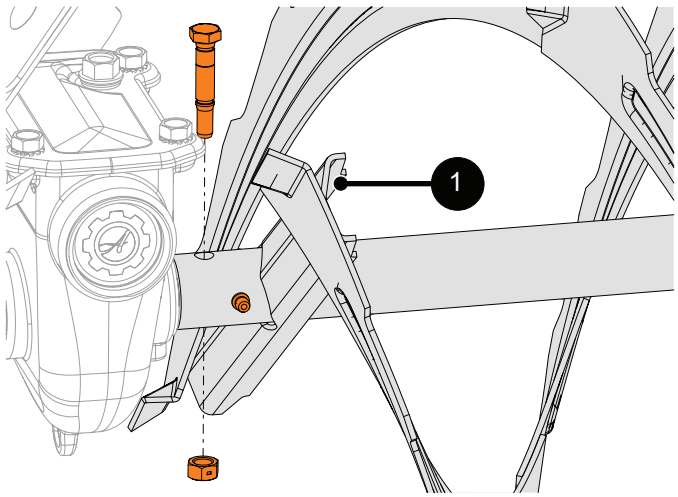
Figure 58

See Figure 59.

2. Install auger onto auger shaft with auger kickers facing gearcase.

IMPORTANT: Ensure auger helix direction matches the original auger orientation.

3. Apply grease to grease zerk.
4. Align holes in auger with holes in auger shaft and reinstall shear bolt. Torque bolt to 7.9 N•m – 16.5 N•m (5.8 lb-ft – 12.2 lb-ft). If torque wrench is unavailable, tighten until bolts no longer spin freely. DO NOT overtighten.



1. Kicker

Figure 59

5. Reinstall auger assembly into housing and seat impeller shaft end into ball bearing at housing rear. See Figure 60.

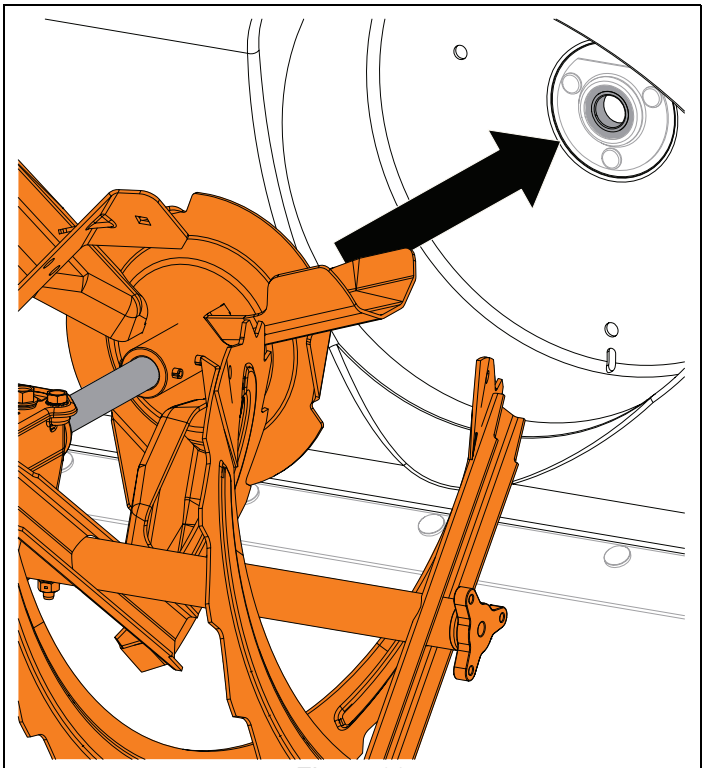


Figure 60

6. Secure support brackets to auger housing with original round head square neck bolts and top locking flange nuts. See Figure 61.

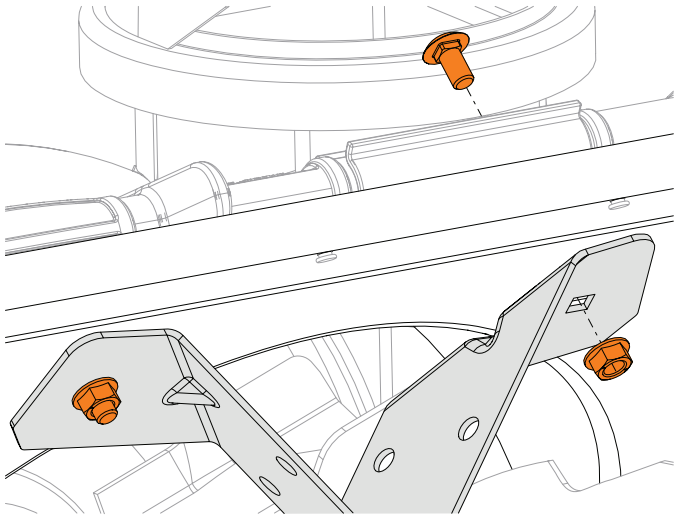


Figure 61

7. Secure support bushings to auger housing with six tapping screws. See Figure 62.

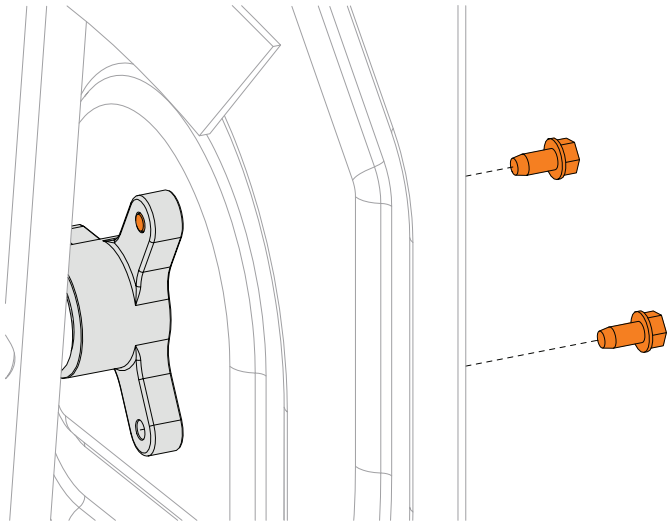
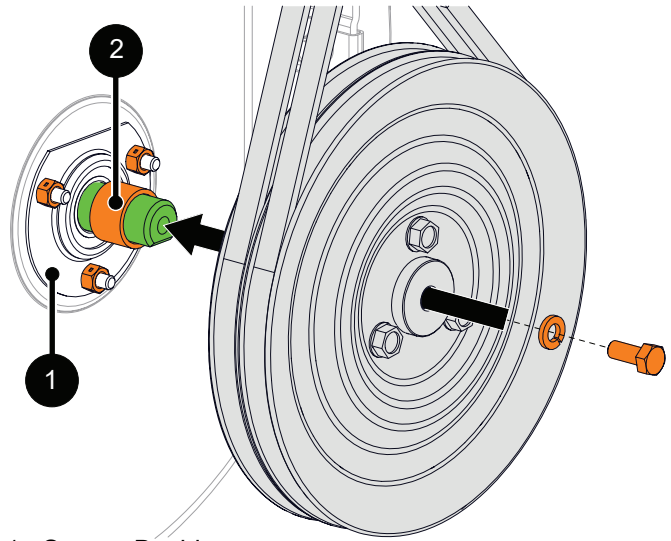


Figure 62

See Figure 63.

8. Tighten three hex nuts retaining bearing plate.
9. Apply a thin layer of anti-seize compound to impeller shaft end.
10. Reinstall spacer bushing onto impeller shaft.
11. Secure attachment drive pulley to impeller shaft with locking washer and hex bolt. Torque to 7.9 N•m – 16.5 N•m (5.8 lb-ft – 12.2 lb-ft).



1. Spacer Bushing
2. Bearing Plate

Figure 63

12. Reinstall housing to frame. See *Reinstall Auger Housing* on page 10.
13. Reconnect spark plug wire.
14. Adjust attachment clutch. Refer to operator's manual for instructions.

IMPORTANT: Check all adjustments after first use.

AUGER GEARCASE REPLACEMENT

Remove Gearcase Assembly

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove augers. See *Remove Auger* on page 26.

See Figure 64.

4. Remove hardware retaining support brackets to gearcase and remove brackets.
5. Remove washers from auger shaft.

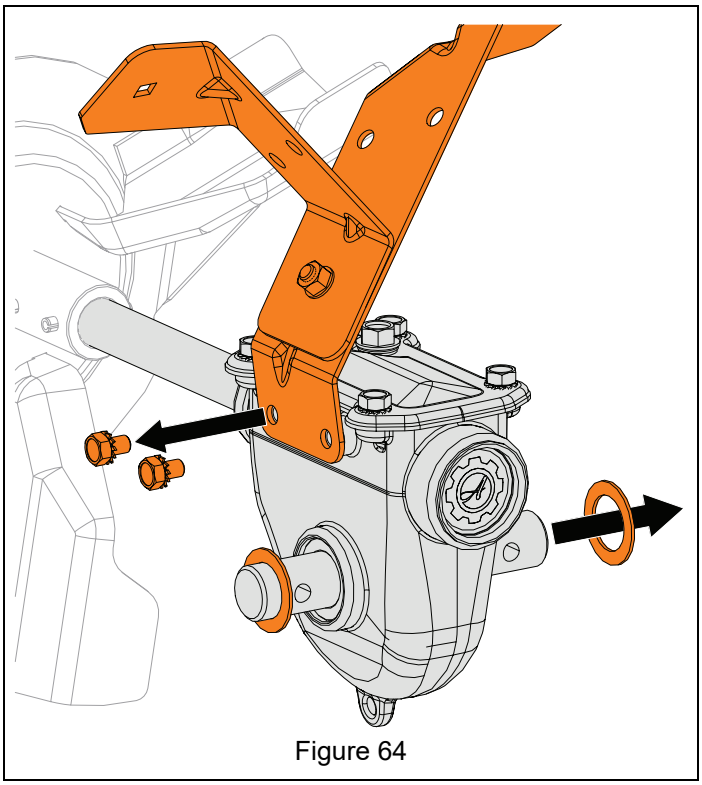


Figure 64

See Figure 65.

6. Remove roll pins retaining impeller to impeller shaft and remove impeller.

IMPORTANT: Use of penetrating oil or heat may be necessary to remove impeller.

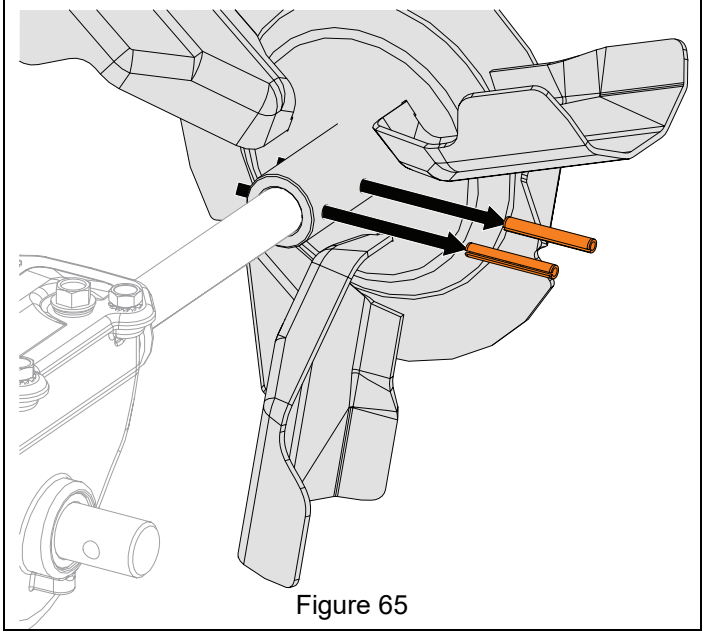


Figure 65

Install Gearcase Assembly

1. Secure impeller to impeller shaft with two roll pins.
2. Reinstall one flat steel washer onto each auger shaft end.
3. Reinstall support brackets to gearcase and secure with two external tooth locking bolts. See Figure 66.

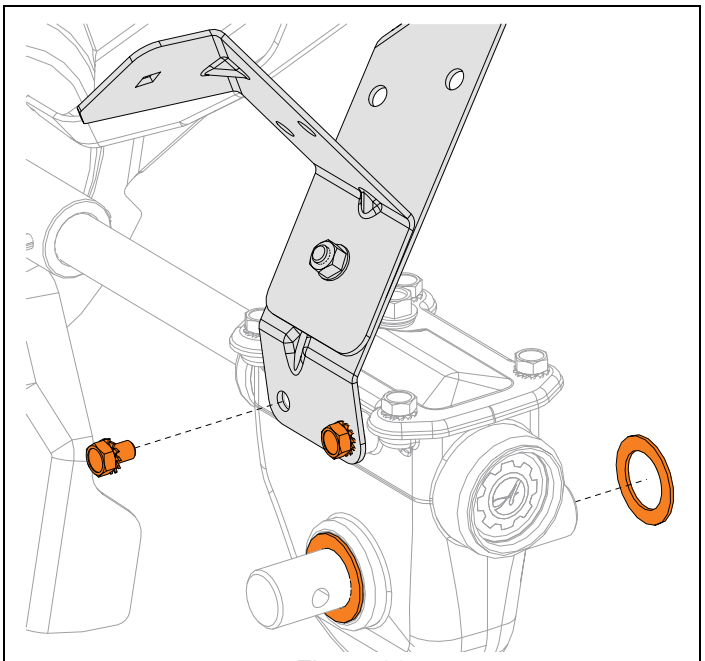


Figure 66

4. Reinstall augers. See *Install Auger* on page 27.
5. Reconnect spark plug wire.

IMPELLER REPLACEMENT

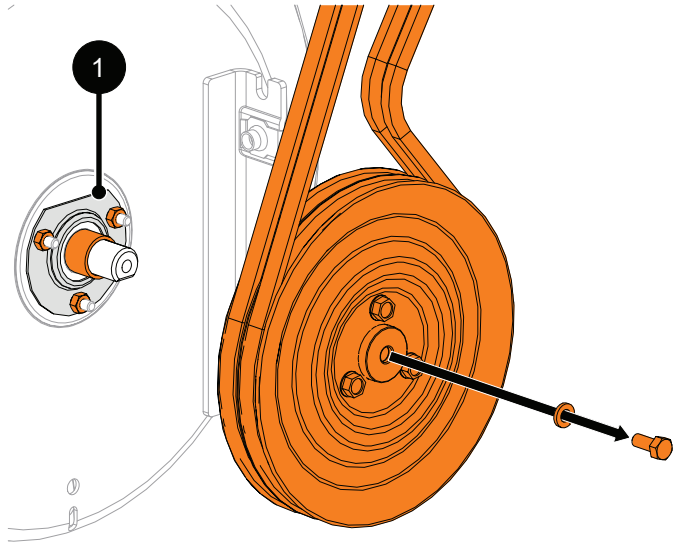
Remove Impeller

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove auger housing. See *Separate Housing From Frame* on page 7.

See Figure 67.

4. Remove hardware securing attachment drive pulley to impeller shaft.
5. Remove pulley and spacer from impeller shaft.
6. Loosen, but DO NOT remove bearing plate hardware.



1. Bearing Plate

Figure 67

7. Remove hardware securing auger bushings to auger housing. See Figure 52.
8. Remove auger assembly from housing. See Figure 54.

See Figure 65.

9. Remove two roll pins securing impeller to impeller shaft and remove impeller.

IMPORTANT: Use of penetrating oil or heat may be necessary to remove impeller.

Install Impeller

See Figure 68.

1. Apply a thin layer of anti-seize compound to impeller shaft.
2. Secure impeller to impeller shaft with two roll pins.

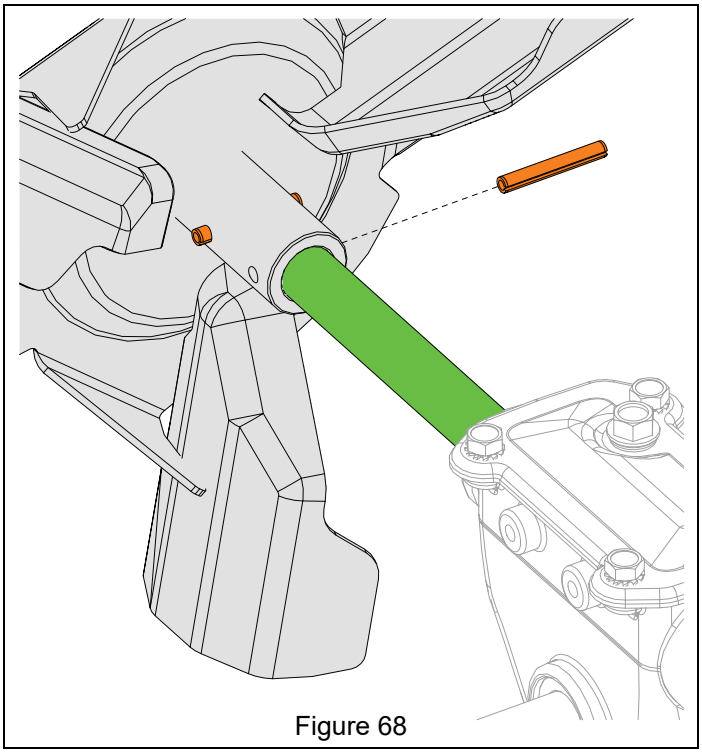


Figure 68

3. Reinstall auger assembly into housing and seat impeller shaft in ball bearing at housing rear. See Figure 60.
4. Secure support bushings to auger housing with six tapping screws. See Figure 69.

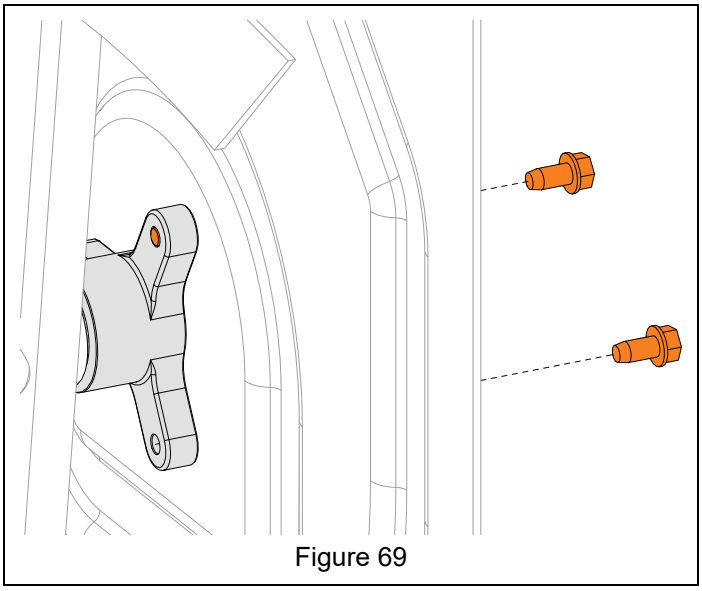
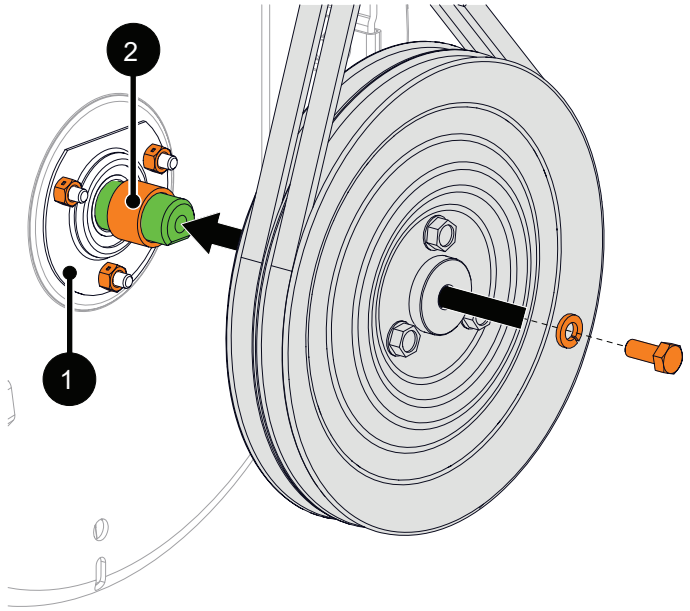


Figure 69

See Figure 70.

5. Tighten three hex nuts securing bearing plate to housing.
6. Apply a thin layer of anti-seize compound to impeller shaft end.
7. Reinstall spacer bushing onto impeller shaft.
8. Reinstall attachment drive pulley onto impeller shaft and secure with locking washer and hex bolt. Torque to 7.9 N•m – 16.5 N•m (5.8 lb-ft – 12.2 lb-ft).



1. Spacer Bushing
2. Bearing Plate

Figure 70

9. Reinstall auger housing to frame. See *Reinstall Auger Housing* on page 10.
10. Reconnect spark plug wire.

ENGINE REPLACEMENT

Remove Engine

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Drain gasoline from fuel system and tank. See *Draining Fuel System* on page 7.
4. Remove belt cover. See Figure 6.
5. Remove hardware securing belt finger to engine and remove belt finger. See Figure 7.
6. Disconnect idler spring from traction drive idler arm and remove spring. See Figure 71.

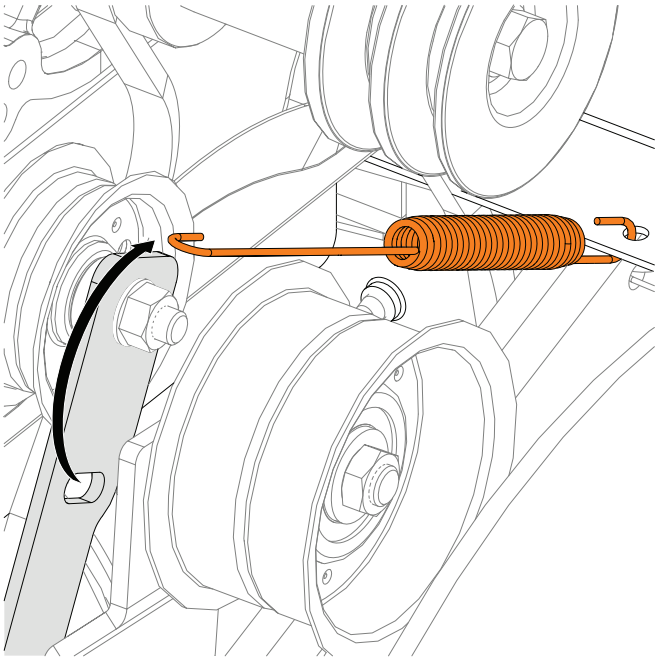


Figure 71

See Figure 72.

7. Remove engine mounting hardware.
8. Remove J-clamp and chute deflector cable from engine mount.

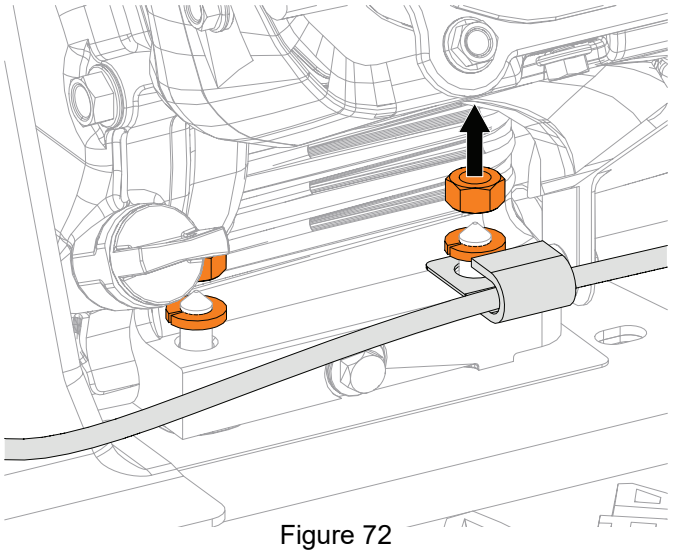


Figure 72

WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

9. Using a suitable lifting device or help from a capable assistant, lift engine and tilt forward slightly to relieve tension from belts. Remove belts from engine sheaves.
10. Lower engine onto a sturdy flat, level surface.

See Figure 73.

11. Remove hardware securing attachment sheave to crankshaft.
12. Remove attachment sheave and traction sheave from crankshaft.

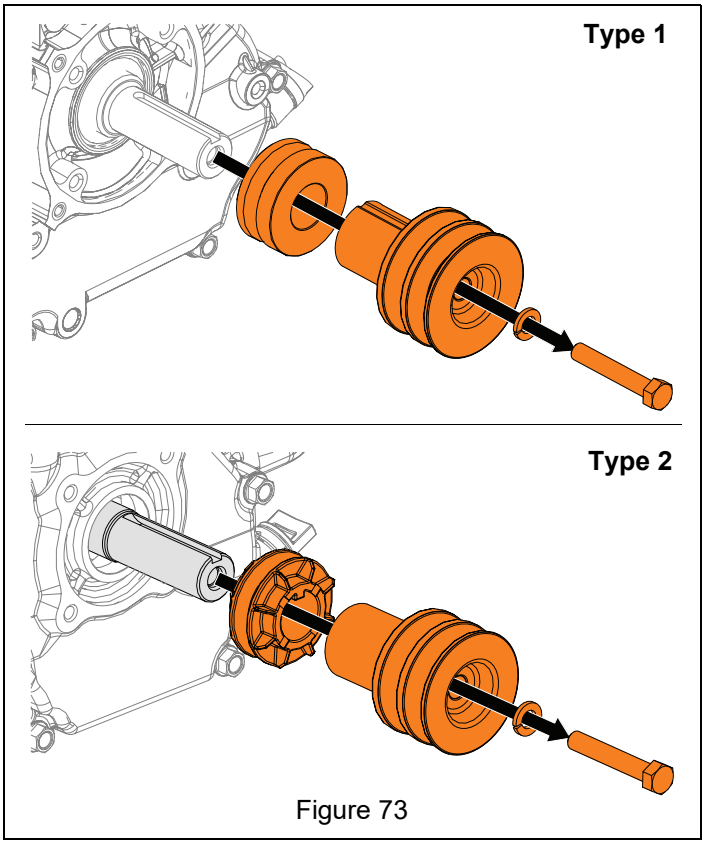


Figure 73

Install Engine

WARNING: AVOID INJURY. Engine is heavy. NEVER lift engine without a suitable lifting device or capable assistant.

1. Using a suitable lifting device or help from a capable assistant, lift engine and lower onto bolts in frame.
2. Position belts over crankshaft.
3. Reinstall J-clamp to left rear engine mounting position. See Figure 72.
4. Secure engine mount to frame with four locking nuts. Torque to 11.9 N•m – 17.9 N•m (8.8 lb-ft – 13.2 lb-ft).

See Figure 74 and Figure 75.

5. Reinstall traction drive sheave onto crankshaft.
6. Reinstall traction drive belt onto traction sheave.
7. Reinstall attachment drive sheave onto crankshaft.

IMPORTANT: Traction drive sheave must be reinstalled in the orientation shown in Figure 74 and Figure 75.

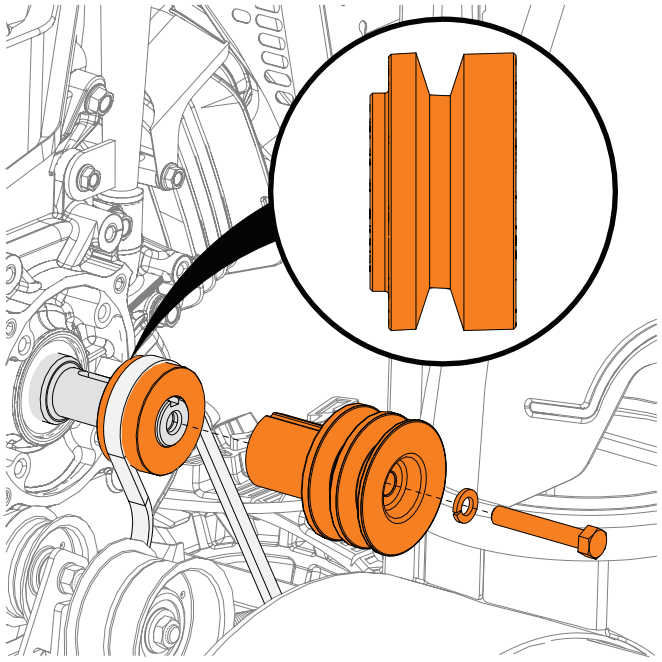


Figure 74

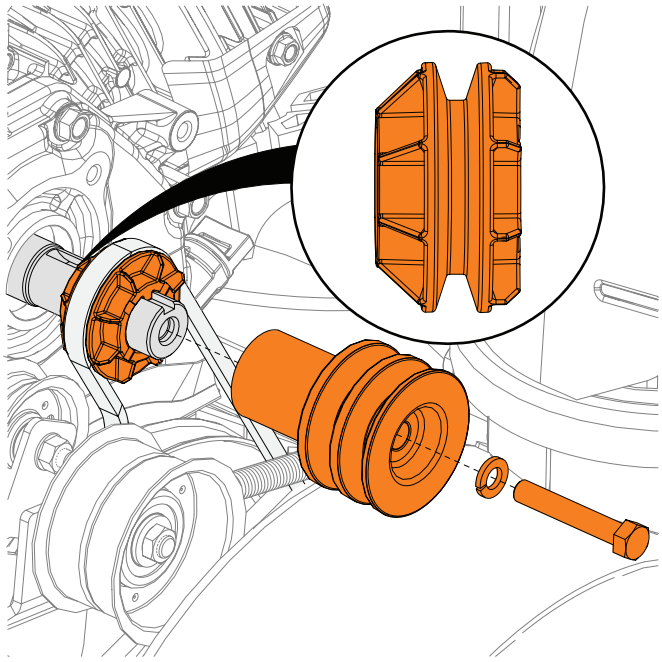


Figure 75

See Figure 76.

8. Reinstall idler spring to traction idler arm.
9. Secure attachment sheave to crankshaft with one locking washer and hex bolt. Torque bolt to 20.6 N•m – 35.7 N•m (15.2 lb-ft – 26.3 lb-ft).

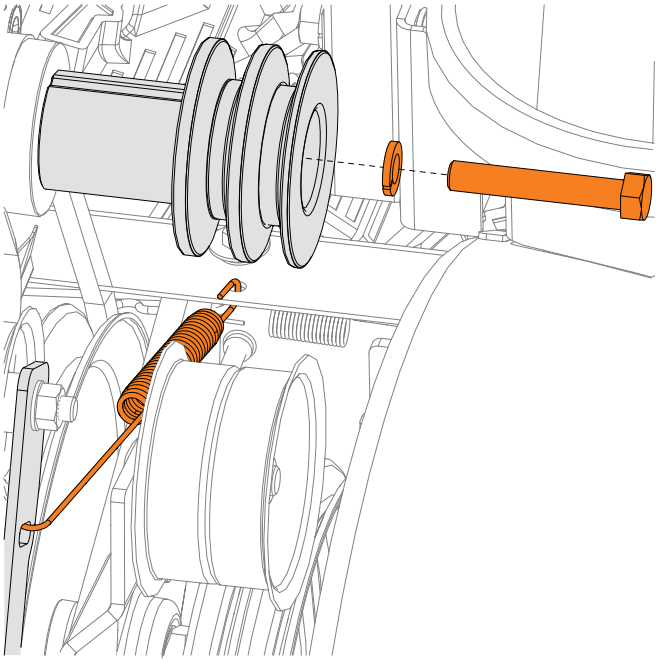


Figure 76

WARNING: AVOID INJURY. Attachment sheave edges are sharp. Wear thick gloves to install belts onto attachment sheave.

10. Reinstall attachment drive belts onto attachment sheave. See Figure 77.

To assist belt installation, slowly pull recoil starter handle while gently guiding belts into attachment sheave.

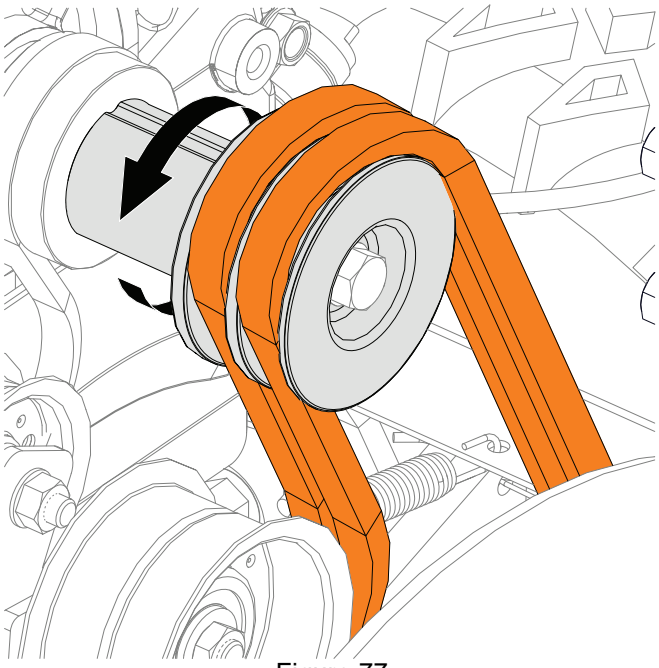
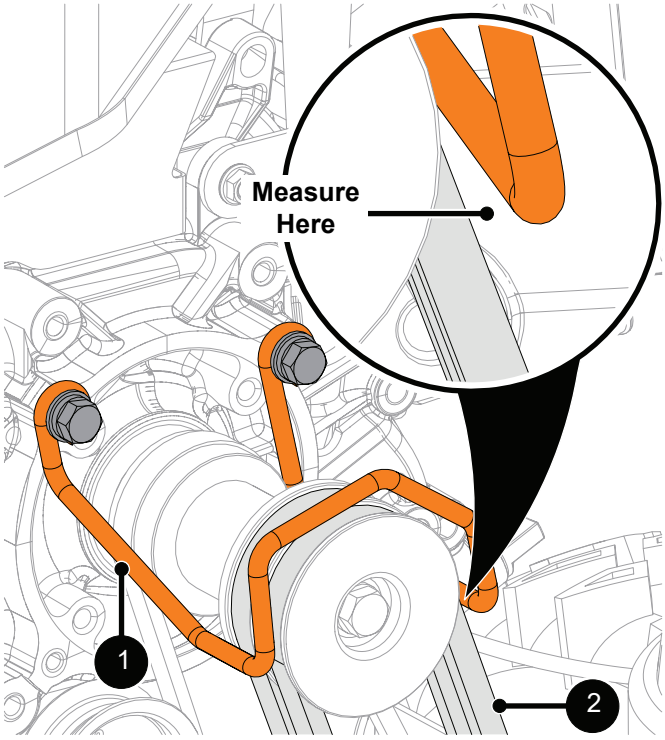


Figure 77

11. Reinstall belt finger and secure with original flat steel washers, locking washers and hex bolts as shown in Figure 7.

See Figure 78.

12. Check belt finger clearance:
    - Engage attachment clutch lever and ensure belt finger located opposite belt idler is less than 3.2 mm (1/8") from belt, but not touching the belt.
    - If needed, adjust clearance by loosening hex bolts, repositioning belt finger, and tightening bolts.



1. Belt Finger
2. Attachment Drive Belts

Figure 78

13. Reinstall belt cover and secure left side to frame with one tapping screw. Position right side of belt cover under tapping screw and tighten.
14. Reinstall chute deflector cable into J-clamp. Bend clamp slightly to secure cable in clamp.
15. Reconnect spark plug wire and fill fuel tank.

TRACTION DRIVE CABLE REPLACEMENT

Remove Traction Drive Clutch Cable

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Loosen traction drive clutch cable.
4. Under control panel, remove hairpin, flat washer and spring retaining upper traction clutch cable to clutch lever pin and disconnect cable. See Figure 79.

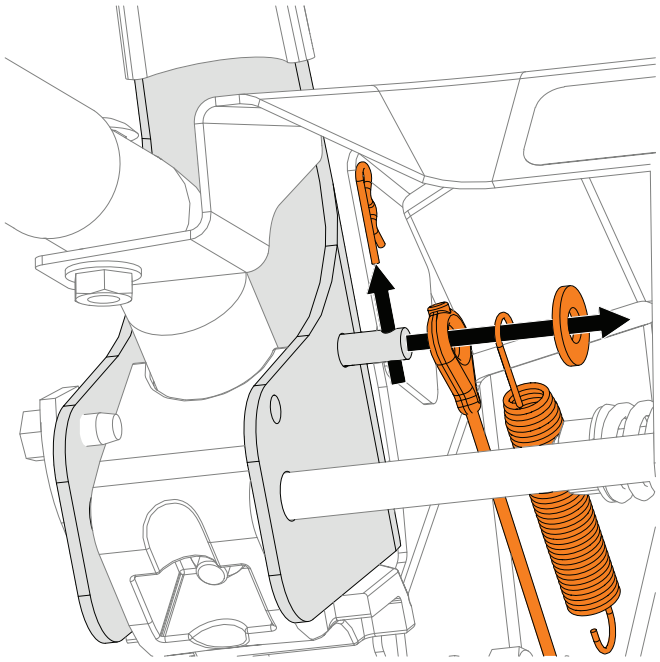


Figure 79

See Figure 80.

5. Disconnect lower traction drive cable from upper traction drive cable.
6. Loosen, but DO NOT remove shoulder bolt retaining cable pulley to cable pulley bracket.

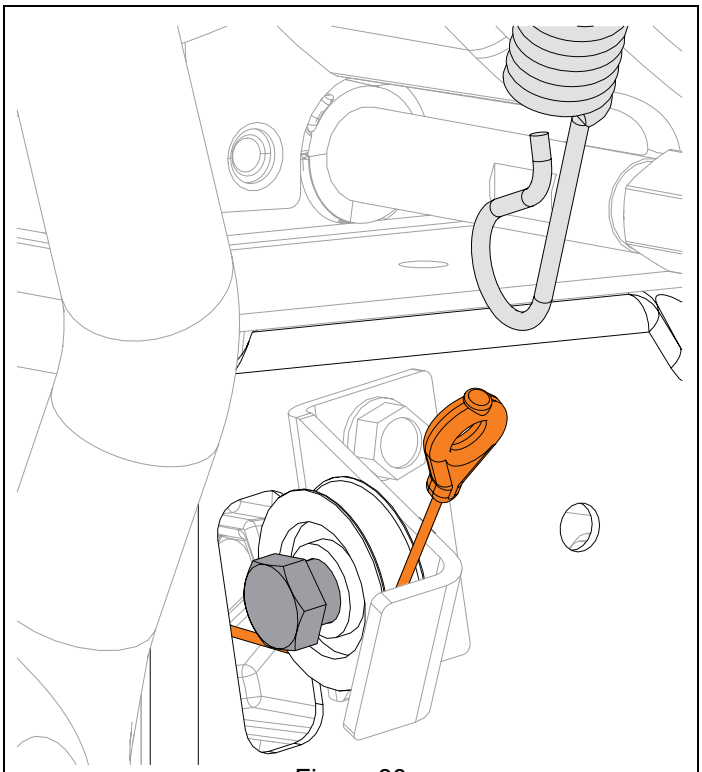


Figure 80

7. Remove belt cover. See Figure 6.

8. Disconnect lower traction clutch cable from swing gate. See Figure 81.

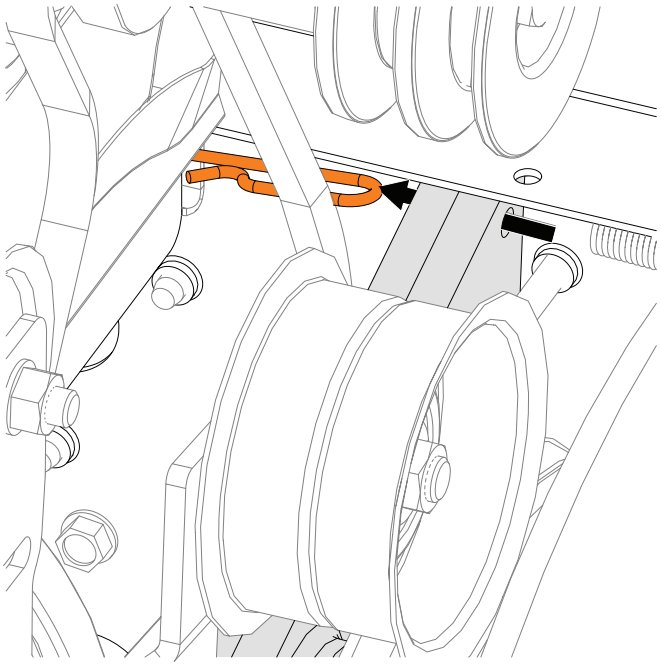


Figure 81

9. Remove cable.

Install Traction Drive Clutch Cable

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.

See Figure 82.

2. Route cable end with spring hook through hole in back cover.
3. Install cable end onto swing gate.

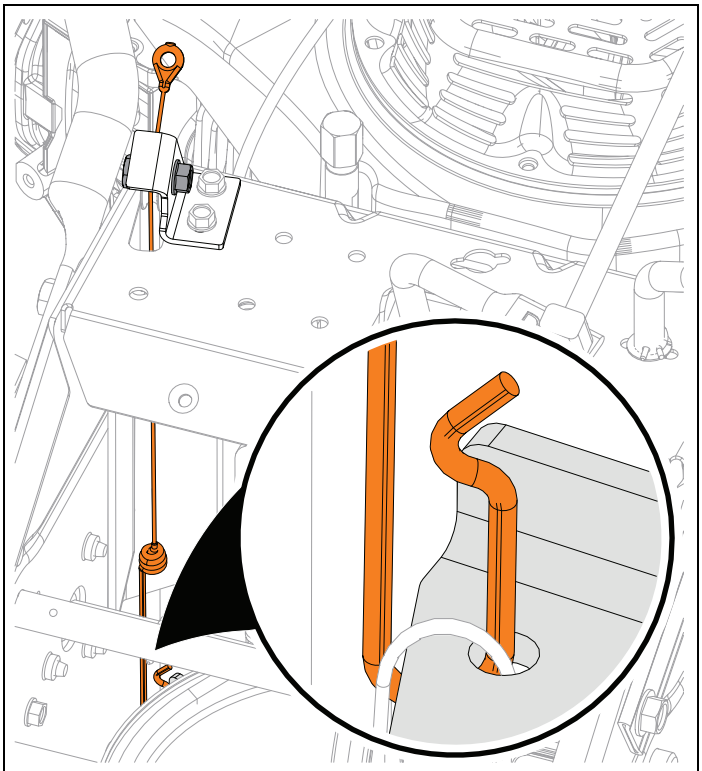


Figure 82

See Figure 83.

4. Align cable with cable pulley and tighten shoulder bolt.
5. Reconnect lower traction clutch cable to upper traction clutch cable.

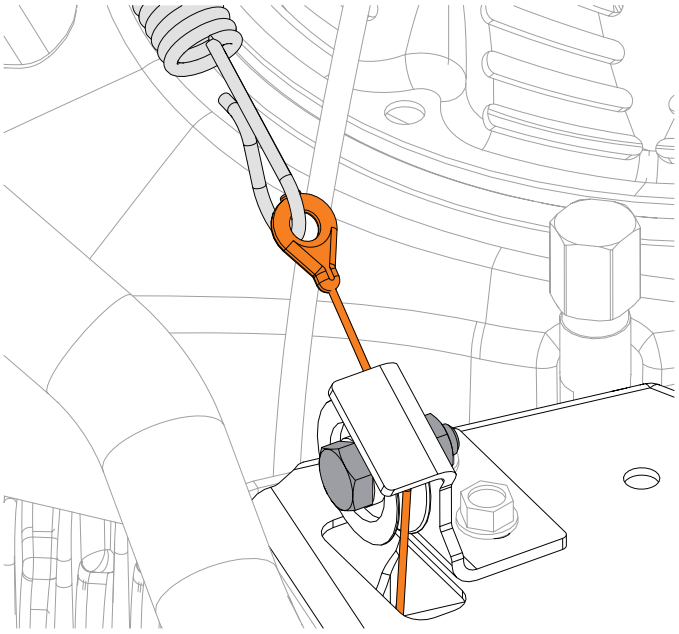


Figure 83

6. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
7. Reconnect upper traction clutch cable to traction clutch lever pin. Install spring on clutch lever pin and retain with one flat steel washer and hairpin. See Figure 79.
8. Return unit to operating position.
9. Adjust traction drive clutch. Refer to Operator's Manual for adjustment procedure.
10. Reconnect spark plug wire and fill fuel tank.

IMPORTANT: Check all adjustments after first use.

DUAL-HANDLE INTERLOCK CAM REPLACEMENT

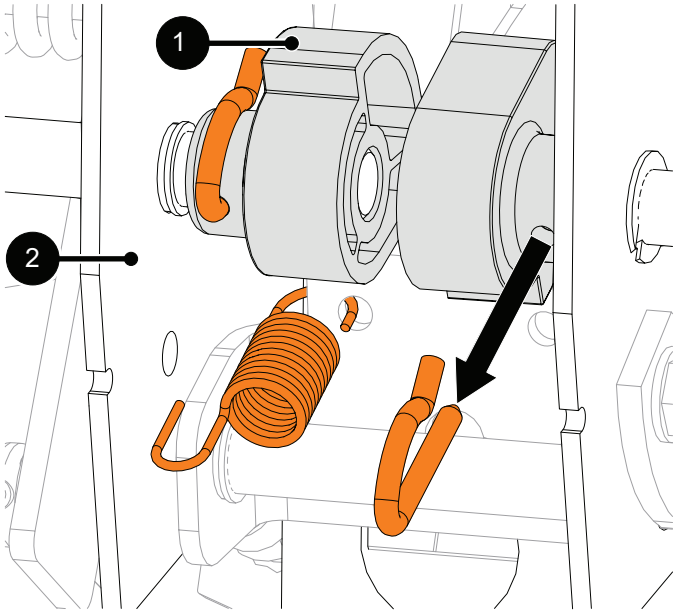
Remove Interlock Cam

IMPORTANT: Save all hardware for reinstallation.

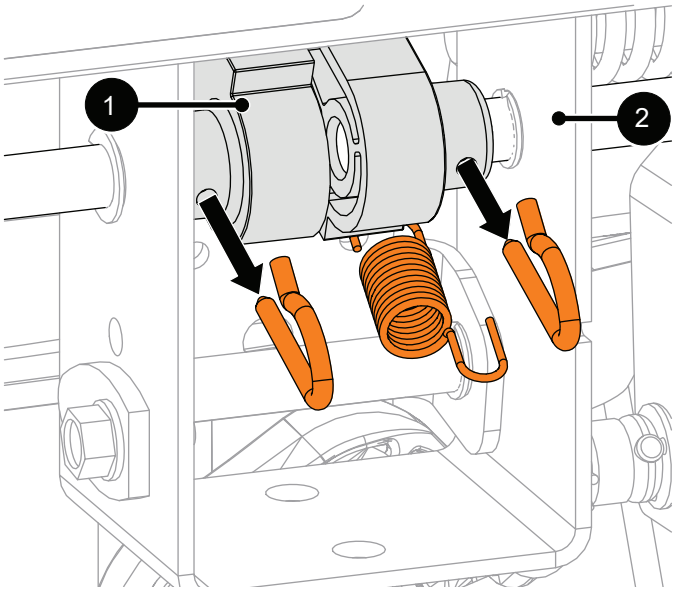
See Figure 84.

1. Remove spring from interlock bracket.
2. Remove two spring clips securing interlock cams to camshafts.

Models 921045, 921046, 921048



Models 921047, 921049, 921323, 921324



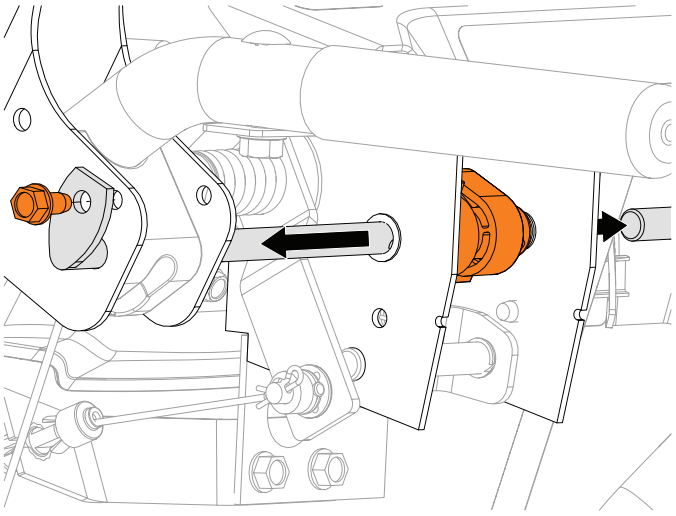
1. Interlock Cam
2. Interlock Bracket

Figure 84

IMPORTANT: Interlock cams will fall from camshafts in next step.

3. Remove hardware retaining camshafts to clutch levers and remove camshafts. See Figure 85.

Models 921045, 921046, 921048



Models 921047, 921049, 921323, 921324

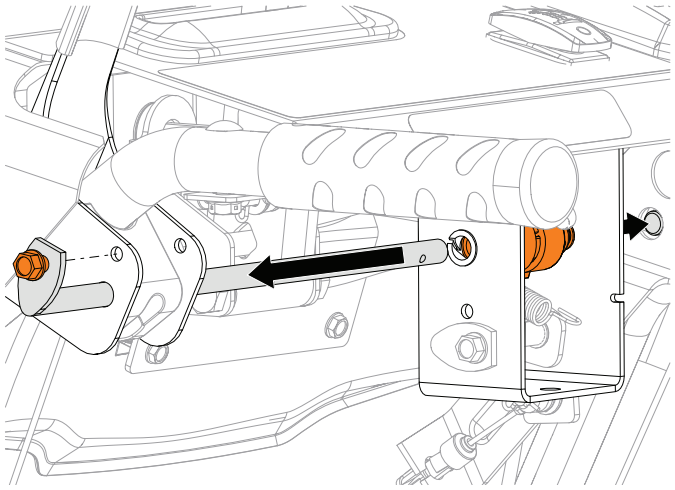


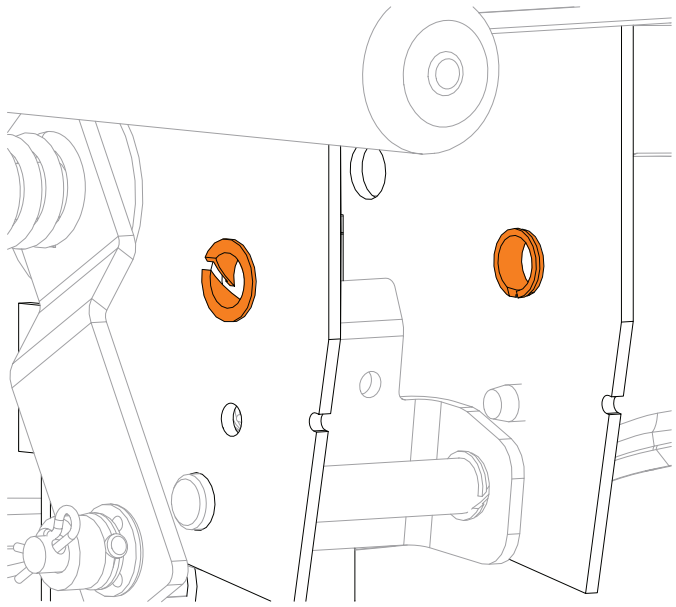
Figure 85

4. Remove cams.

Install Interlock Cams

IMPORTANT: Ensure nylon bushings are seated in interlock bracket. See Figure 86.

Models 921045, 921046, 921048



Models 921047, 921049, 921323, 921324

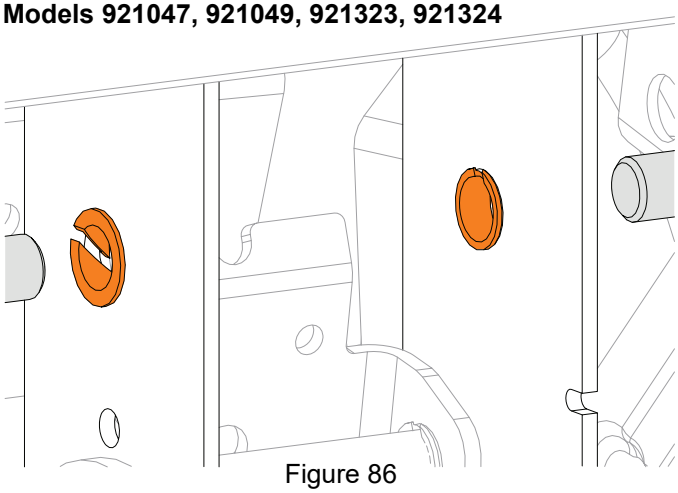
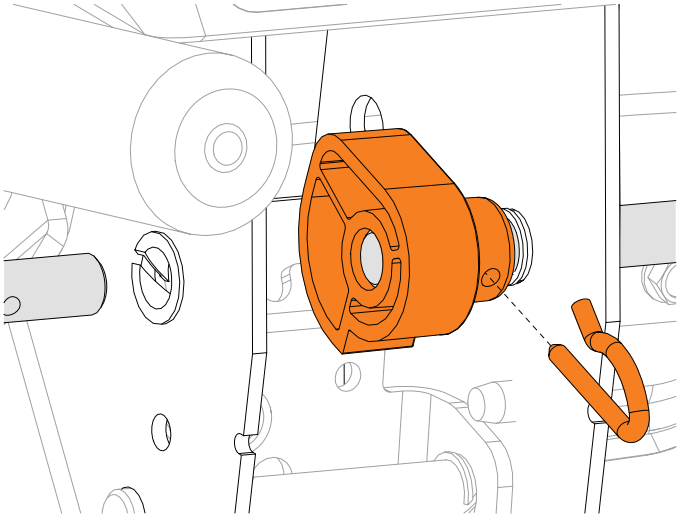


Figure 86

1. Reinstall right camshaft through interlock bracket and secure to clutch lever with one tapping screw.
2. Install interlock cam onto camshaft so flat edge is positioned downward. Secure with spring clip. See Figure 87.

Models 921045, 921046, 921048



Models 921047, 921049, 921323, 921324

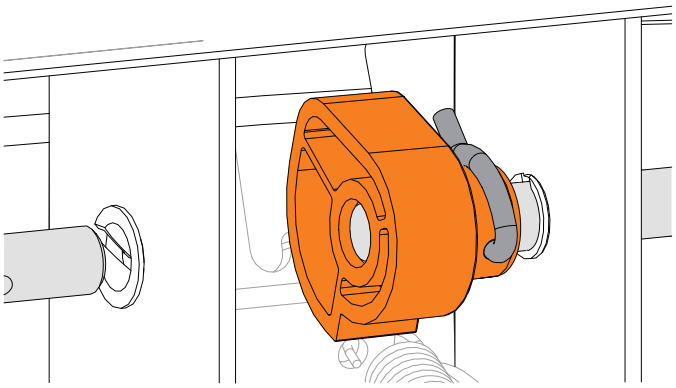
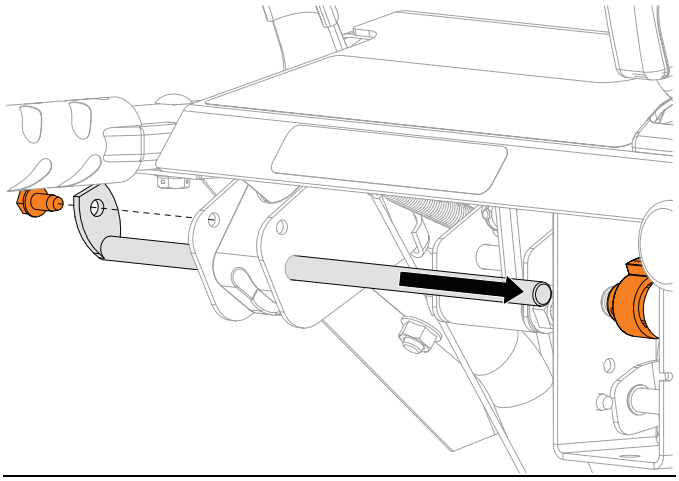


Figure 87

See Figure 88.

3. Position left interlock cam inside interlock bracket and align with left camshaft.
4. Insert camshaft through interlock bracket and into interlock cam.
5. Secure camshaft to clutch lever with one tapping screw.

Models 921045, 921046, 921048



Models 921047, 921049, 921323, 921324

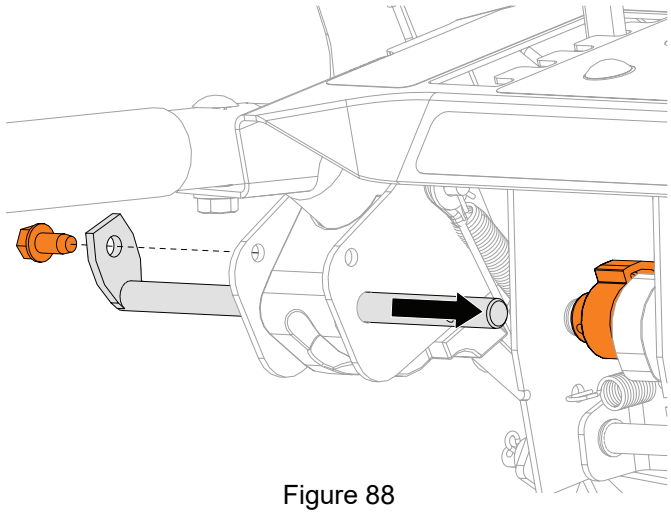
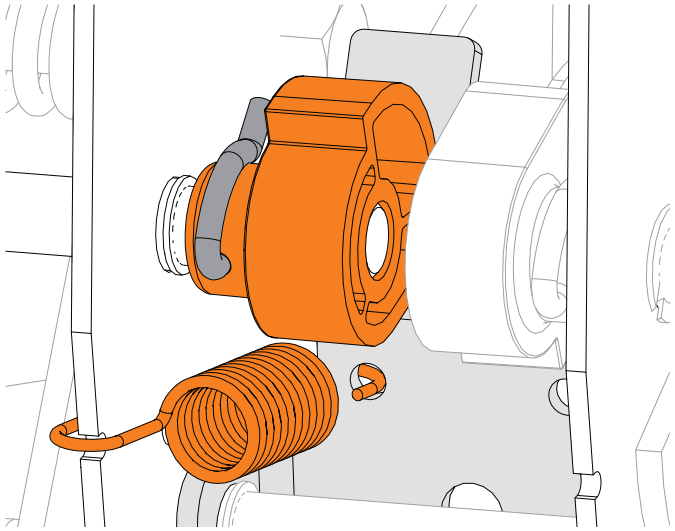


Figure 88

See Figure 89.

6. Rotate cam so flat edge is positioned upward and secure with spring clip.
7. Reconnect spring to interlock bracket.

Models 921045, 921046, 921048



Models 921047, 921049, 921323, 921324

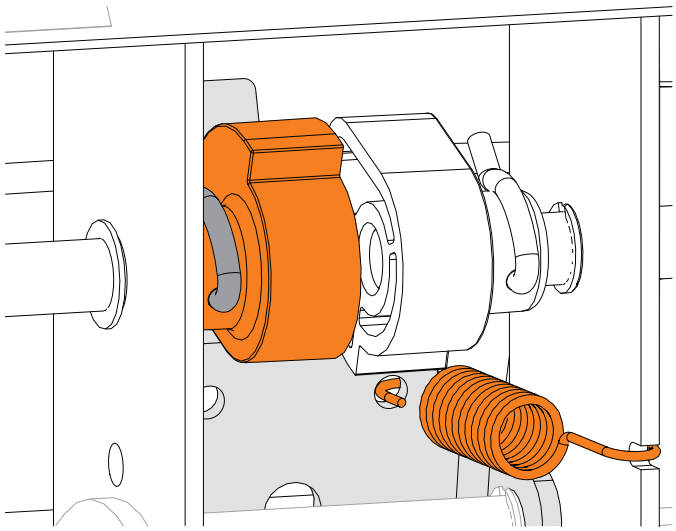


Figure 89

8. Check dual-handle interlock function. Refer to Operator's Manual for test procedure.

IMPORTANT: If dual-handle interlock continues to malfunction, see your Ariens dealer.

AXLE BUSHING REPLACEMENT

Remove Left Axle Bushing

IMPORTANT: Save all hardware for reinstallation.

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.
4. Remove snap clip from left axle end and remove wheel.

See Figure 90.

5. Remove axle key and flat steel washer from axle. Take care to not lose axle key.
6. Remove hardware securing axle bushing to frame and remove bushing.

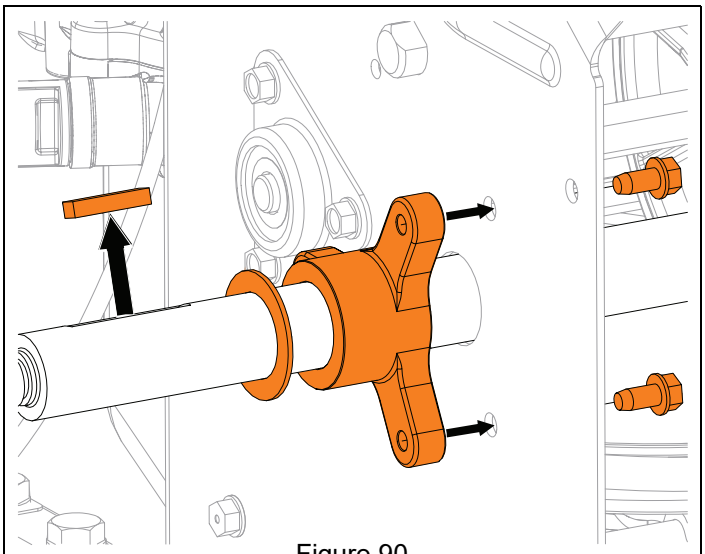


Figure 90

Install Left Axle Bushing

1. Install bushing onto axle and secure to frame with three tapping screws from inside frame.
2. Reinstall flat steel washer.
3. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
4. Ensure that axle key is in position and reinstall wheel. Secure with snap clip.
5. Return unit to operating position.
6. Reconnect spark plug wire and fill fuel tank.

Remove Right Axle Bushing

IMPORTANT: Save all hardware for reinstallation.

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.
4. Remove snap clips from axle ends and remove wheels and axle keys. Take care to not lose axle keys.

See Figure 91.

5. Remove left outer flat steel washer from long axle.
6. Remove E-ring from axle end.
7. Hold differential in place and remove long axle from differential and tractor housing.

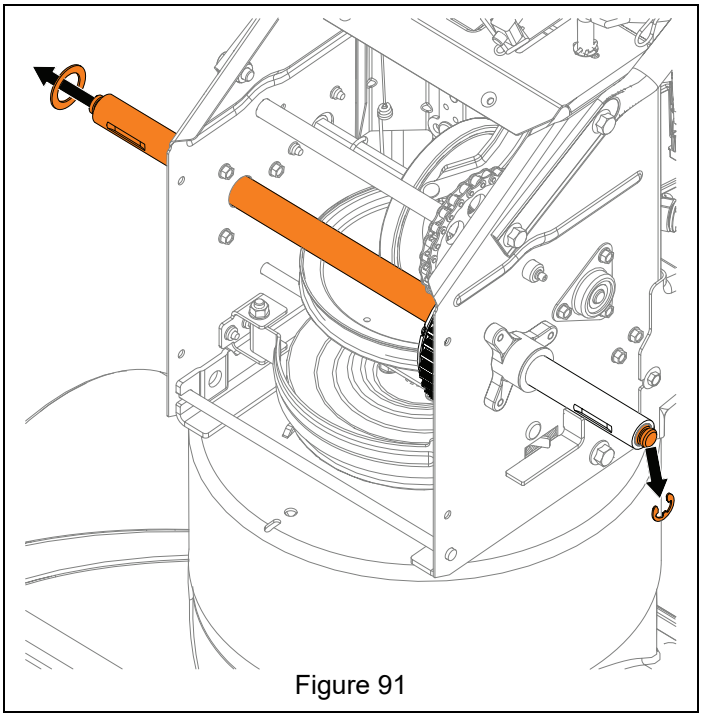


Figure 91

See Figure 92.

IMPORTANT: Two inner flat steel washers will fall when short axle is removed.

8. Remove outer flat steel washer from short axle.
9. Support differential gear and remove short axle.
10. Remove differential gear and two inner steel washers.

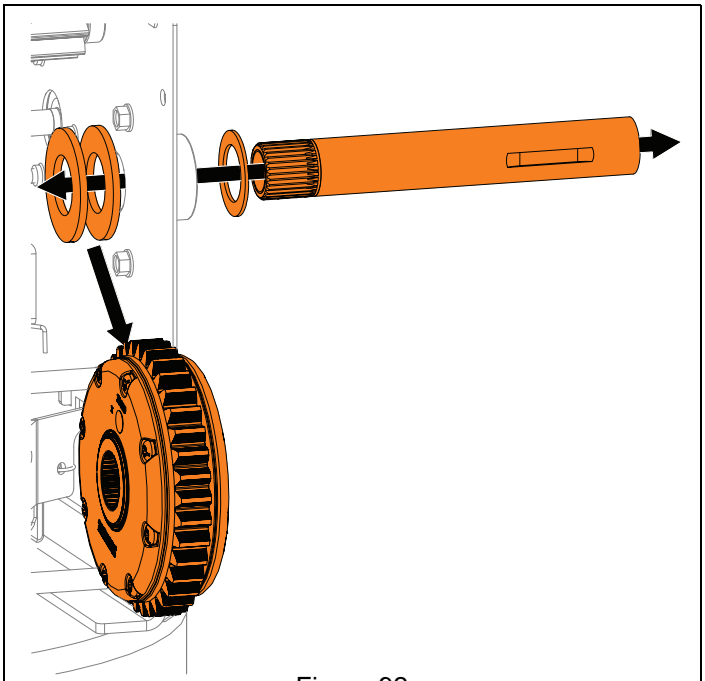


Figure 92

11. Remove tapping screws securing axle bushing to frame and remove bushing. See Figure 93.

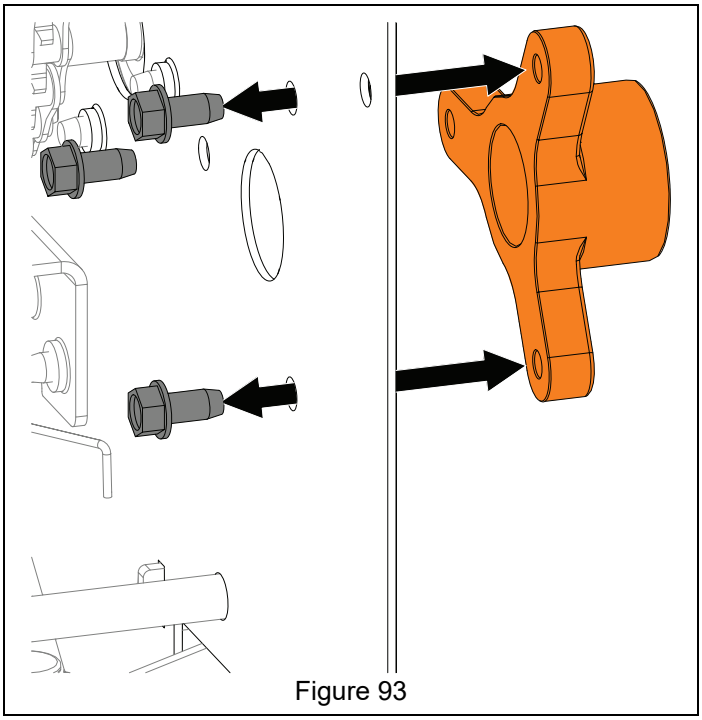


Figure 93

Install Right Axle Bushing

1. Secure bushing to frame exterior with three tapping screws from inside frame. See Figure 94.

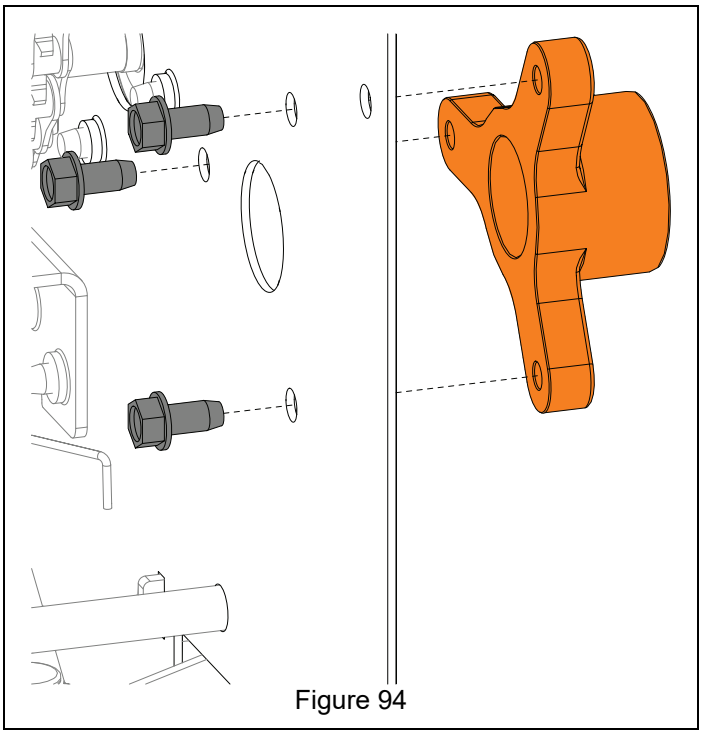


Figure 94

See Figure 95.

2. Reinstall short axle until a small portion of axle is through frame.
3. Reinstall two flat steel washers onto axle inside of frame.

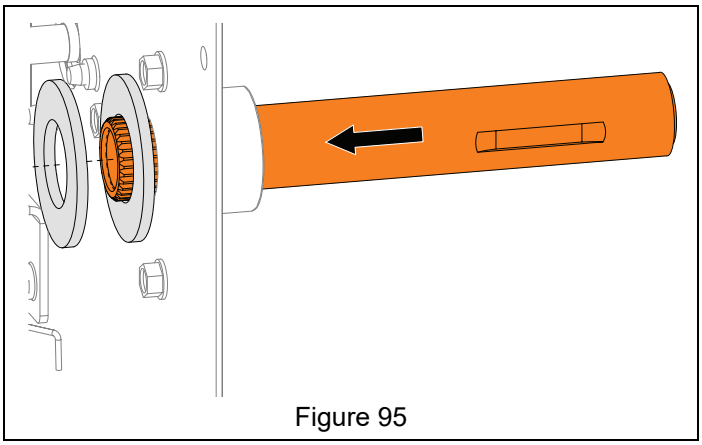


Figure 95

See Figure 96.

4. Align differential gear with pinion gear and short axle. Fully insert short axle into differential gear.
5. Reinstall outer flat steel washer on short axle.

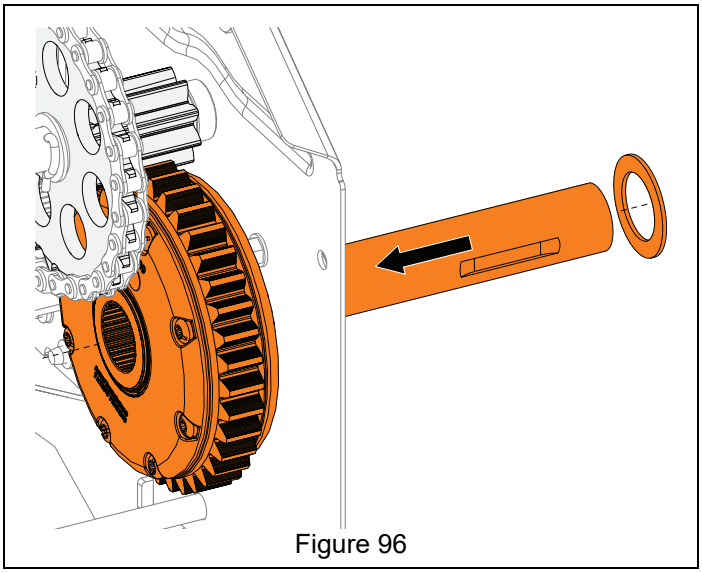


Figure 96

See Figure 97.

6. Reinstall long axle through frame and fully through differential gear and short axle.
7. Reinstall E-ring onto long axle end.
8. Reinstall left flat steel washer onto long axle.

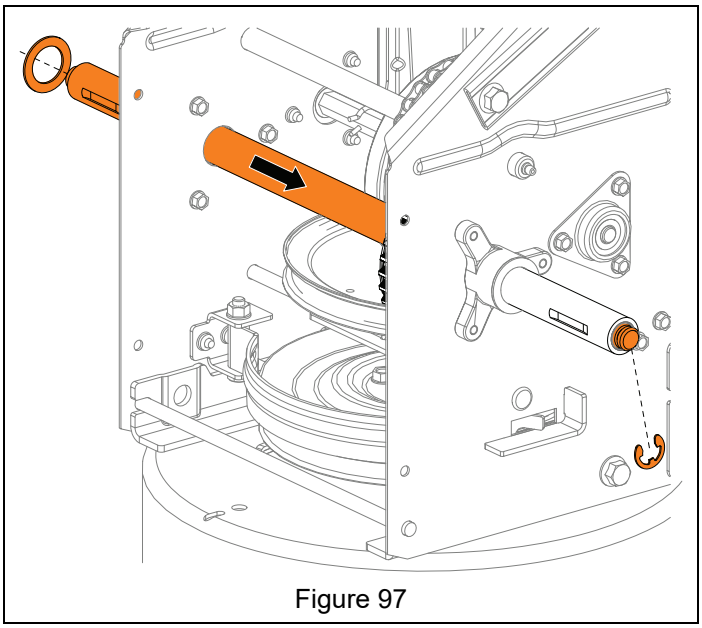


Figure 97

9. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
10. Ensure axle keys are in position and reinstall wheels. Secure with snap clips.
11. Return unit to operating position.
12. Reconnect spark plug wire and fill fuel tank.

FLANGE BUSHING REPLACEMENT

IMPORTANT: Save all hardware for reinstallation.

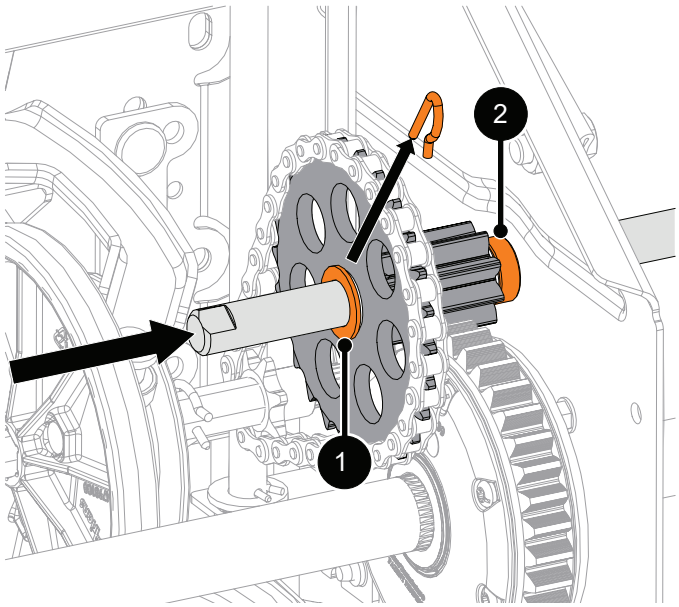
WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.
4. Remove snap clip from right axle end and remove right wheel and axle key. Take care to not lose axle key.

See Figure 98.

5. Remove spring clip from pinion shaft.
6. Remove pinion shaft.

IMPORTANT: Flat steel washer and sleeve bushing will fall when pinion shaft is removed.



1. Flat Washer
2. Sleeve Bushing

Figure 98

7. Remove pinion gear.
8. Remove flange bushings from pinion gear. Bushings are press fit so may be difficult to remove. See Figure 99.

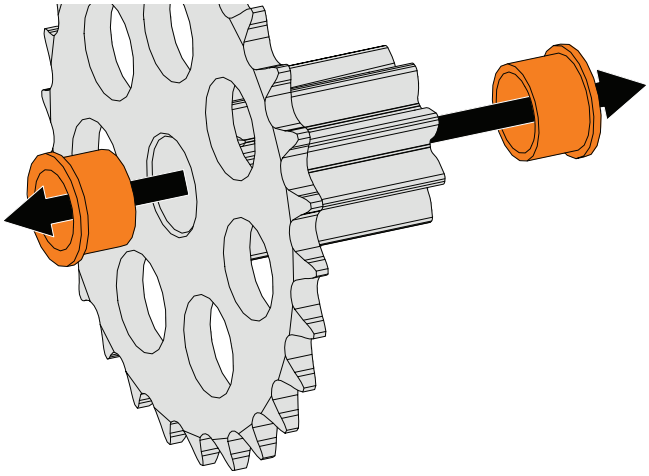


Figure 99

Install Flange Bushings

1. Install flange bushings into pinion gear. Bushings press fit into pinion gear.

See Figure 100.

2. Reinstall pinion gear into chain and align with differential gear.
3. Position sleeve bushing between pinion gear and frame.
4. Reinstall pinion shaft through frame, sleeve bushing and pinion gear.
5. Reinstall one flat steel washer onto pinion shaft.

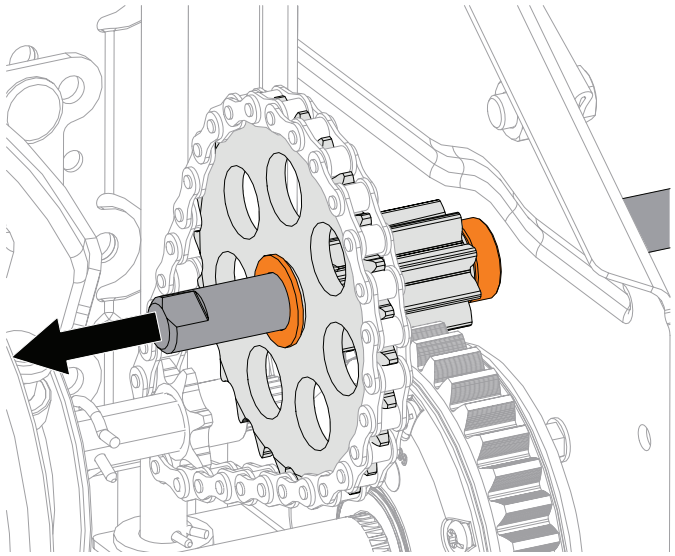


Figure 100

See Figure 101.

6. Insert pinion shaft end into left side of frame.
7. Position flat steel washer against pinion gear and reinstall spring clip.

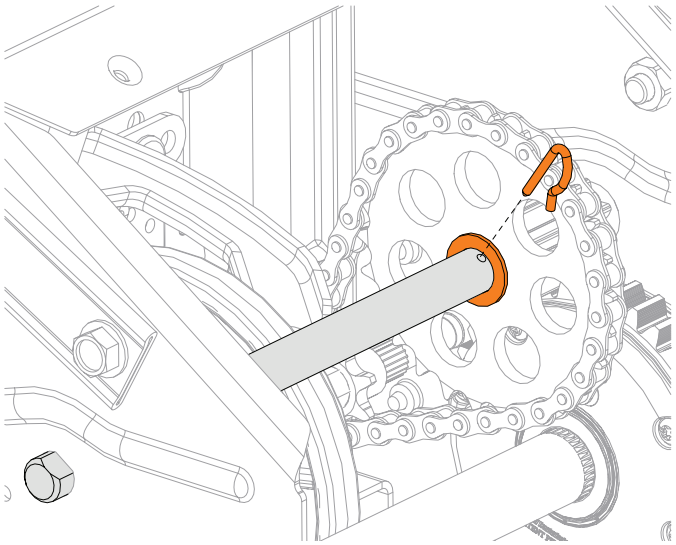


Figure 101

8. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
9. Ensure axle key is in position and reinstall wheel. Secure with snap clip.
10. Return unit to operating position.
11. Reconnect spark plug wire and fill fuel tank.

DIFFERENTIAL GEAR REPLACEMENT

Remove Differential Gear

IMPORTANT: Save all hardware for reinstallation.

WARNING: AVOID INJURY. Before placing unit in service position, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Place unit in service position and remove bottom cover. See *Service Position* on page 7 and *Bottom Cover Removal* on page 12.
4. Remove snap clips from axle ends and remove wheels and axle keys. Take care to not lose axle keys.

See Figure 102.

5. Remove left outer flat steel washer from long axle.
6. Remove E-ring from axle end.
7. Remove long axle from differential and tractor housing.

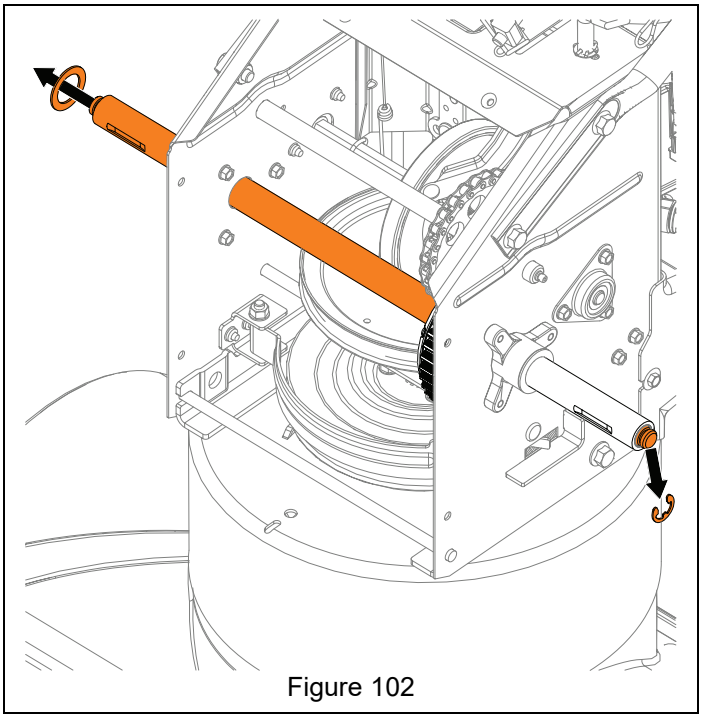


Figure 102

See Figure 103.

IMPORTANT: Two flat steel washers will fall when short axle is removed.

8. Remove outer flat steel washer from short axle.
9. Support differential gear and remove short axle.
10. Remove differential and two inner washers.

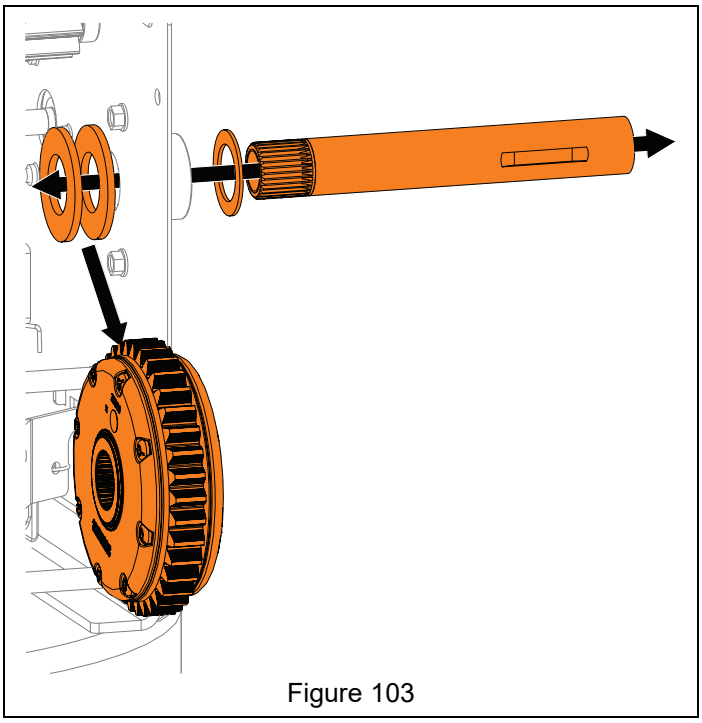


Figure 103

Install Differential Gear

See Figure 104.

1. Reinstall short axle until a small portion of axle is through frame.
2. Reinstall two flat steel washers onto axle inside of frame.

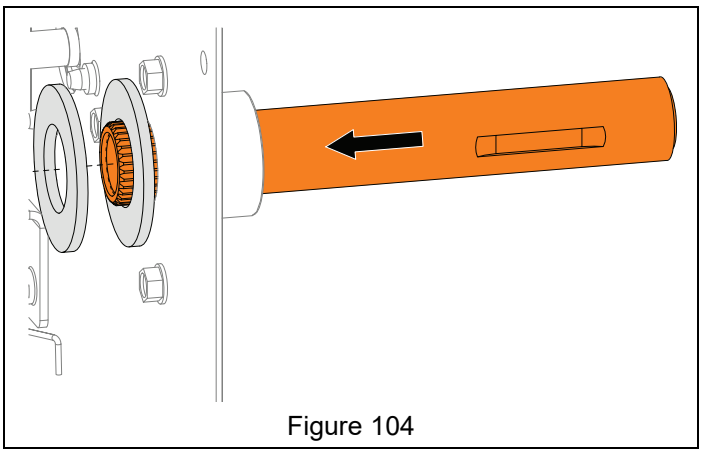


Figure 104

See Figure 105.

3. Align differential gear with pinion gear and short axle. Fully insert short axle into differential gear.
4. Reinstall flat steel washer on short axle.

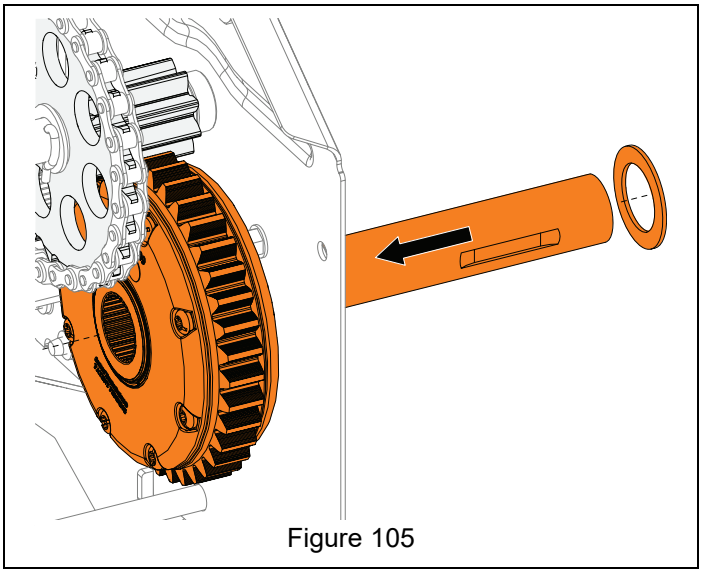


Figure 105

See Figure 106.

5. Reinstall long axle through frame and fully through differential gear and short axle.
6. Reinstall E-ring onto axle end.
7. Reinstall left flat steel washer onto long axle.

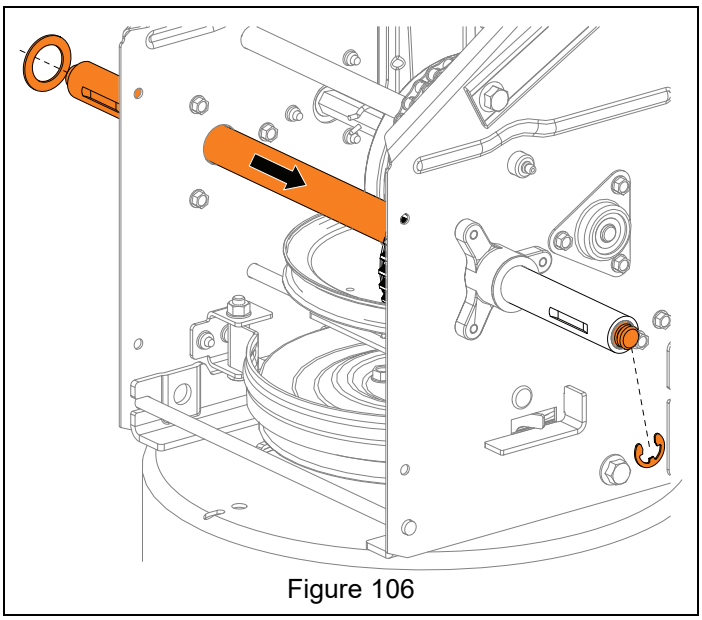


Figure 106

8. Reinstall bottom cover and secure with two tapping screws and four hex bolts.
9. Ensure that axle keys are in position and reinstall wheels onto axles. Secure with snap clips.
10. Return unit to operating position.
11. Reconnect spark plug wire and fill fuel tank.

CHUTE GEAR REPLACEMENT

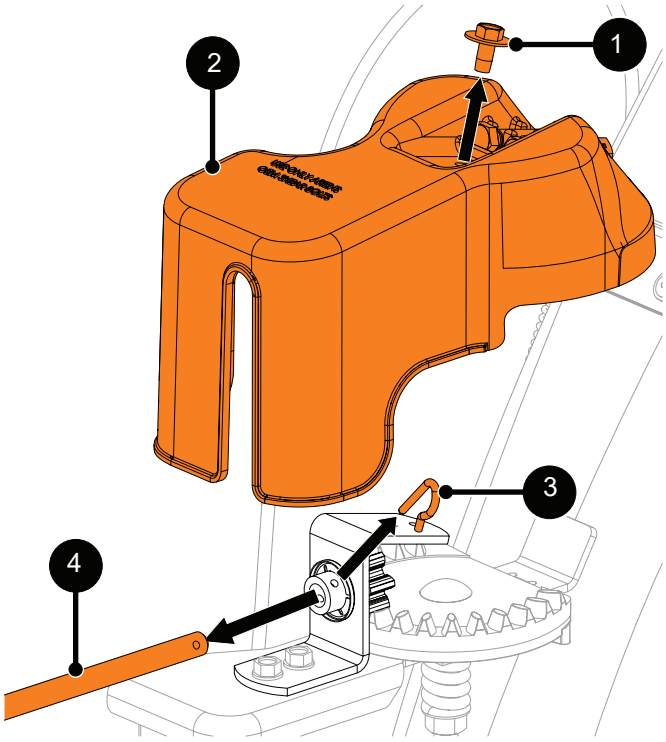
Remove Pinion Gear

IMPORTANT: Save all hardware for reinstallation unless specified otherwise.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire from engine.

See Figure 107.

3. Remove hardware retaining chute gear cover to chute and remove cover.
4. Remove spring clip from chute rotation rod and remove rod from chute gears.



1. Tapping Screw
2. Chute Gear Cover
3. Spring Clip
4. Chute Rotation Rod

Figure 107

5. Remove hardware securing pinion gear bracket to chute pedestal and remove bracket. See Figure 108.

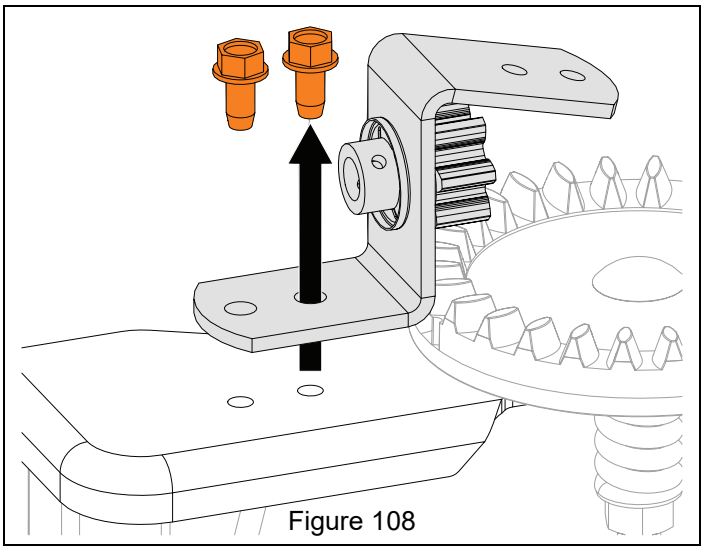
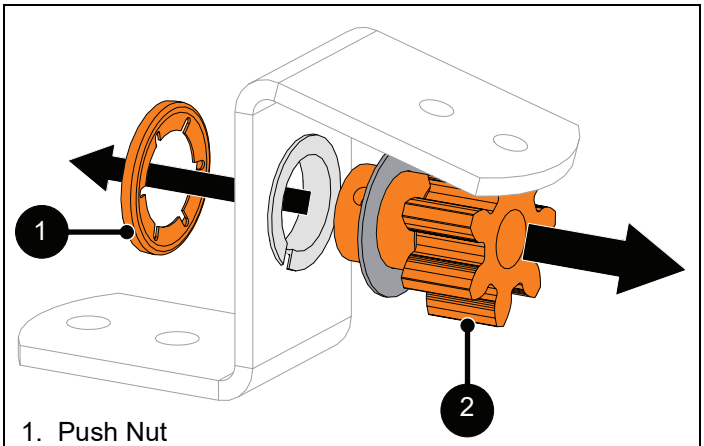


Figure 108

See Figure 109.

6. Remove push nut from pinion gear and discard.
7. Remove pinion gear and flat steel washer.



1. Push Nut
2. Pinion Gear

Figure 109

Install Pinion Gear

1. Install flat steel washer onto pinion gear.
2. Insert pinion gear through pinion gear bracket and secure with replacement push nut.
3. Secure pinion gear bracket to chute pedestal with two tapping screws.
4. Reinstall chute rotation rod into pinion gear and secure with spring clip.
5. Reinstall chute gear cover and secure with original tapping screw.
6. Reconnect spark plug wire.

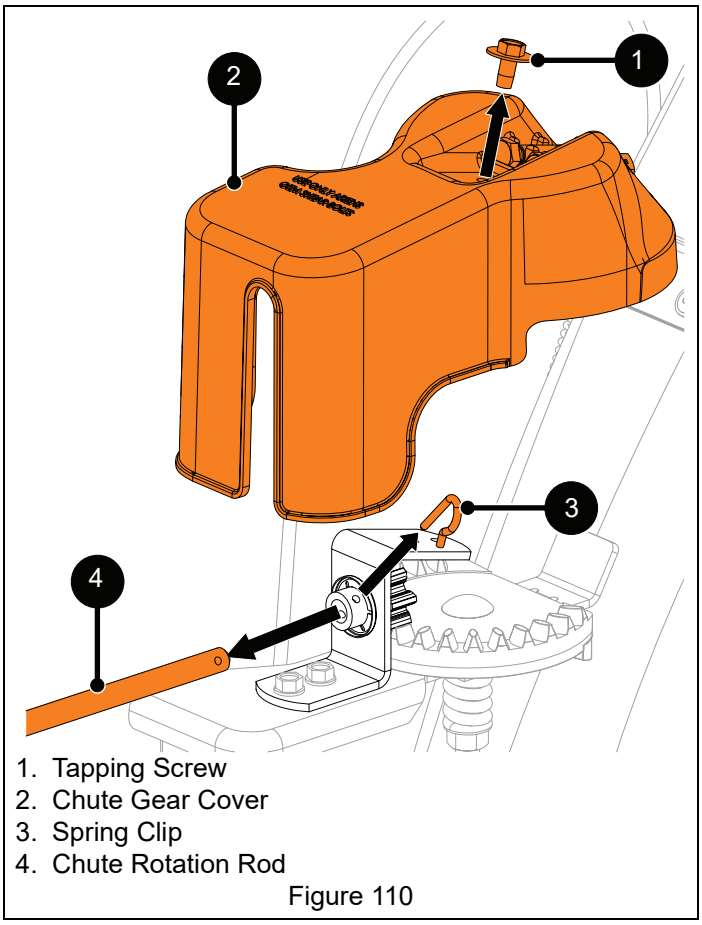
Remove Chute Rotation Gear

IMPORTANT: Save all hardware for reinstallation

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire from engine.

See Figure 110.

3. Remove hardware retaining chute gear cover and remove cover.
4. Remove spring clip from chute rotation rod and remove rod from chute gears.



1. Tapping Screw
2. Chute Gear Cover
3. Spring Clip
4. Chute Rotation Rod

Figure 110

5. Remove hardware securing pinion gear bracket to pedestal plate and remove bracket. See Figure 111.

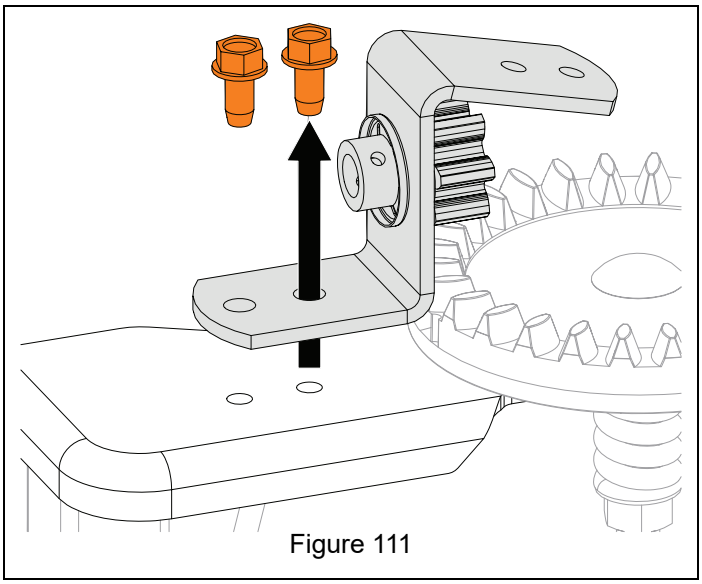


Figure 111

IMPORTANT: Support discharge chute so it remains upright.

6. Remove hardware retaining chute rotation gear to pedestal plate and remove gear. See Figure 112.

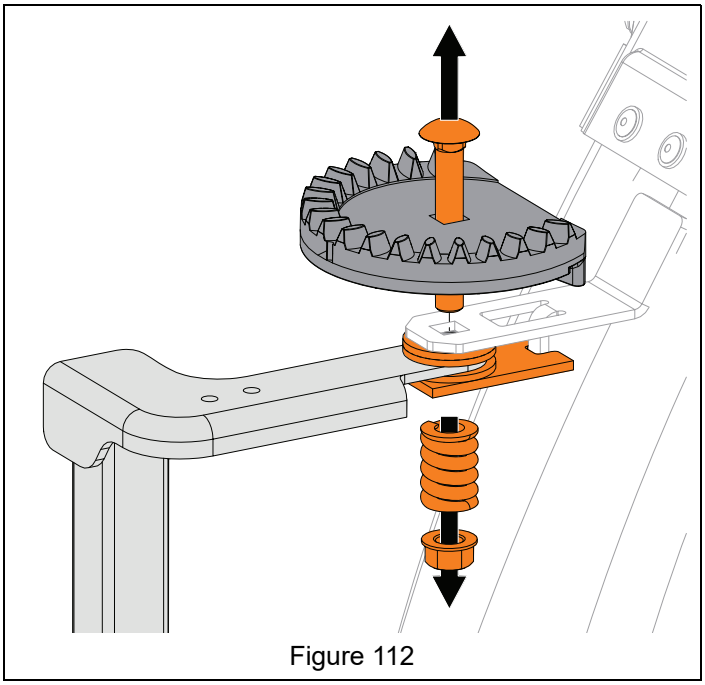


Figure 112

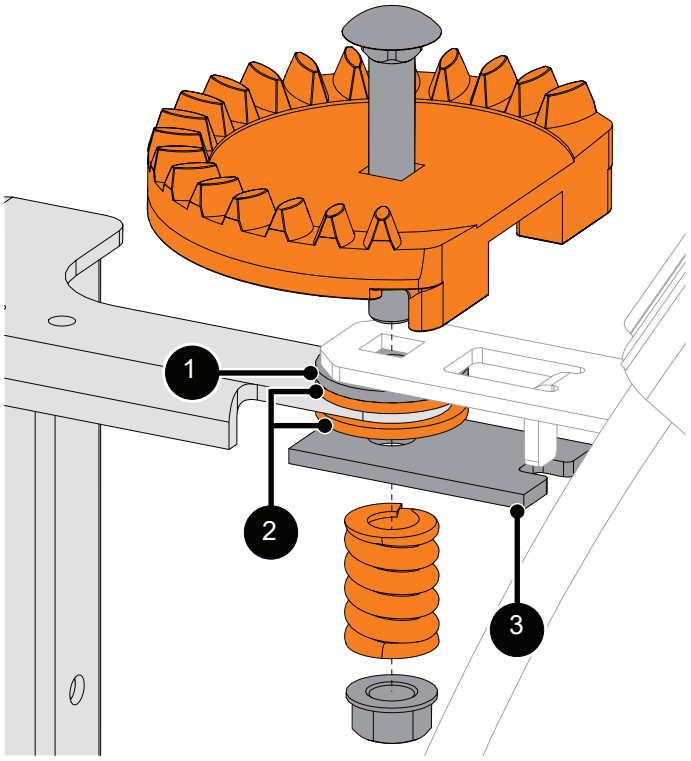
Install Chute Rotation Gear

1. Position discharge chute facing forward.

See Figure 113.

2. Position chute rotation gear on chute mount with flat edge square to chute mount bracket.
3. Reposition flat steel washer and friction washer between chute mount bracket and pedestal plate.
4. Insert round head square neck bolt through chute gear and pedestal plate.
5. Reinstall friction washer, friction plate and compression spring and secure with top locking flange nut.

IMPORTANT: Ensure friction plate aligns with chute mount bracket.



1. Flat Steel Washer
2. Friction Washer
3. Friction Plate

Figure 113

6. Secure pinion gear bracket to pedestal plate with original tapping screws.
7. Reinstall chute rotation rod into pinion gear and secure with spring clip.
8. Reinstall chute gear cover and secure with original tapping screw.
9. Reconnect spark plug wire.
10. Adjust discharge chute. Refer to Operator's Manual for adjustment procedure.

IMPORTANT: Check all adjustments after first use.

SCRAPER BLADE REPLACEMENT

Remove Scraper Blade

IMPORTANT: Save all hardware for reinstallation.

WARNING: AVOID INJURY. Before tipping unit onto handlebars, drain fuel from tank and fuel system. See *Draining Fuel System* on page 7. Ensure unit is secure and will not tip.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove hardware securing scraper blade ends to auger housing. See Figure 114.

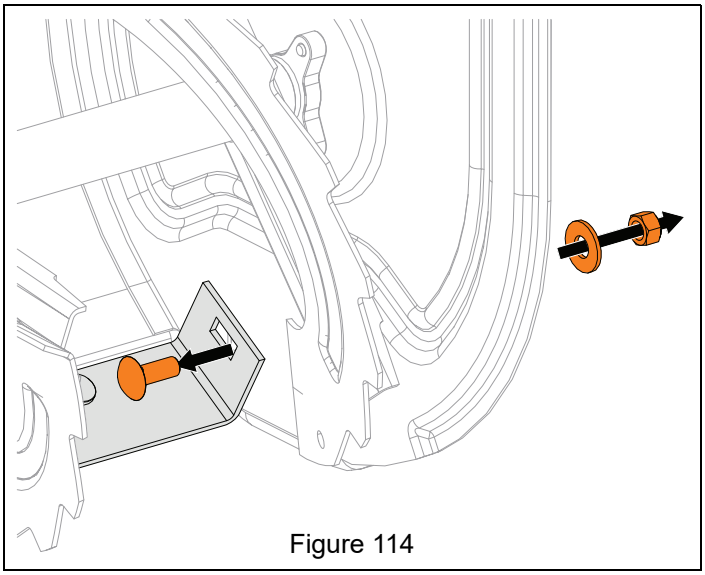


Figure 114

See Figure 115.

4. Slowly tip unit back so it rests on handlebars.
5. Remove remaining hardware securing scraper blade to auger housing and remove scraper blade.

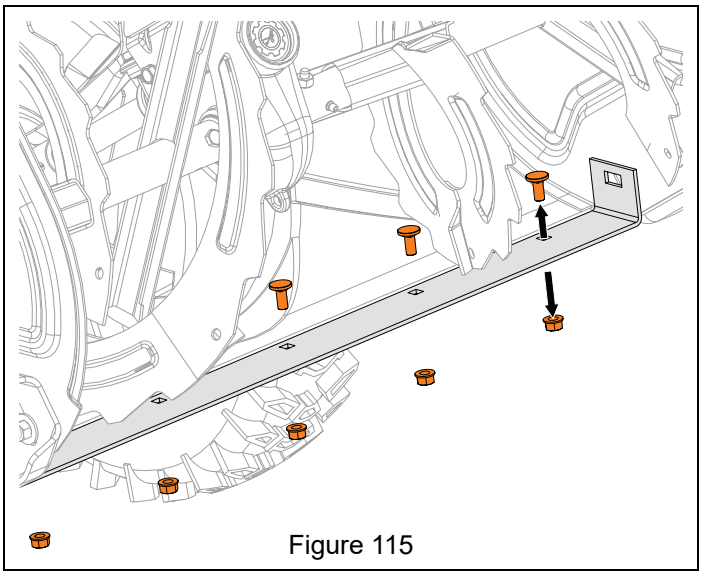


Figure 115

Install Scraper Blade

1. Position scraper blade inside auger housing and align with holes in housing.
2. Insert seven flat head square neck bolts through scraper blade from inside housing. Secure with seven top locking flange nuts.
3. Insert two round head square neck bolts through scraper blade ends and skid shoes from inside housing. Secure with two flat steel washers and two hex nuts.
4. Return unit to operating position.
5. Adjust scraper blade and skid shoes. Refer to Operator's Manual for adjustment procedures.
6. Reconnect spark plug wire and fill fuel tank.

IMPORTANT: Check all adjustments after first use.

HEADLIGHT REPLACEMENT

Remove Bulb

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Remove hardware securing headlight to control panel. See Figure 116.

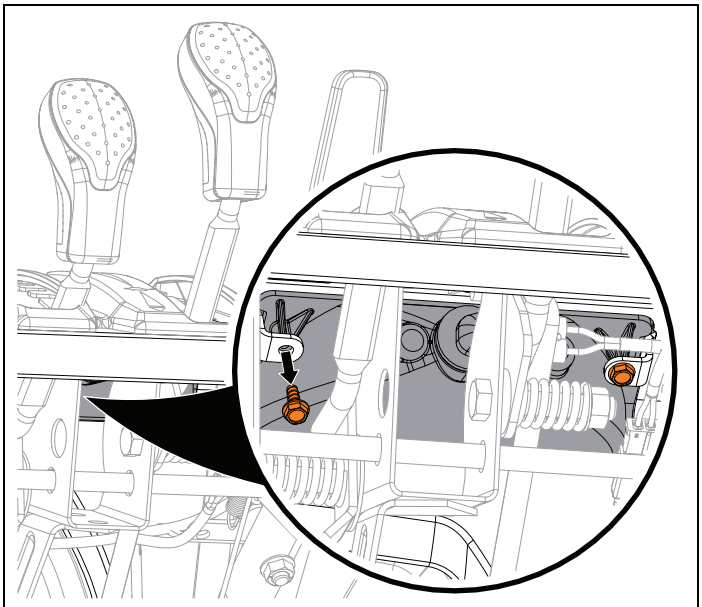


Figure 116

See Figure 117.

4. Remove headlight from control panel.
5. Disconnect wire harness from bulb.

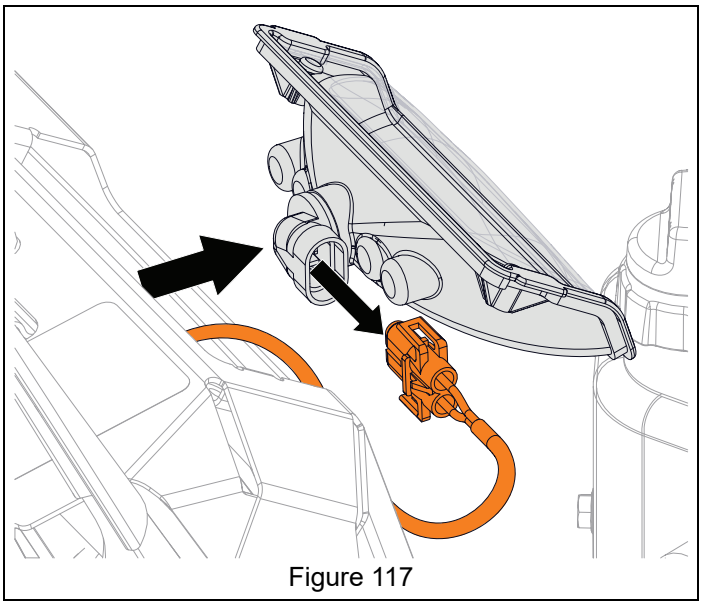


Figure 117

6. Turn bulb one-eighth turn counterclockwise and remove from headlight bezel. See Figure 118.

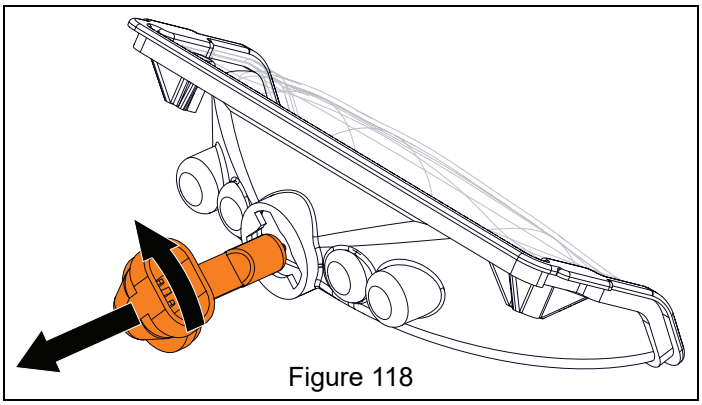


Figure 118

Install Bulb

NOTICE: DO NOT touch new bulb with bare hands; wear clean gloves. Body oil on a headlight bulb can increase bulb temperature and reduce life of the bulb.

1. Install bulb into headlight bezel and turn one-eighth turn clockwise.
2. Connect bulb to wire harness.
3. Reinstall headlight housing into control panel and secure with two tapping screws.
4. Reconnect spark plug wire.

EFI BATTERY REPLACEMENT

Model 921049

Remove Battery

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Disconnect wire harnesses from ECU.
4. Remove hardware retaining ECU bracket and remove bracket. See Figure 119.

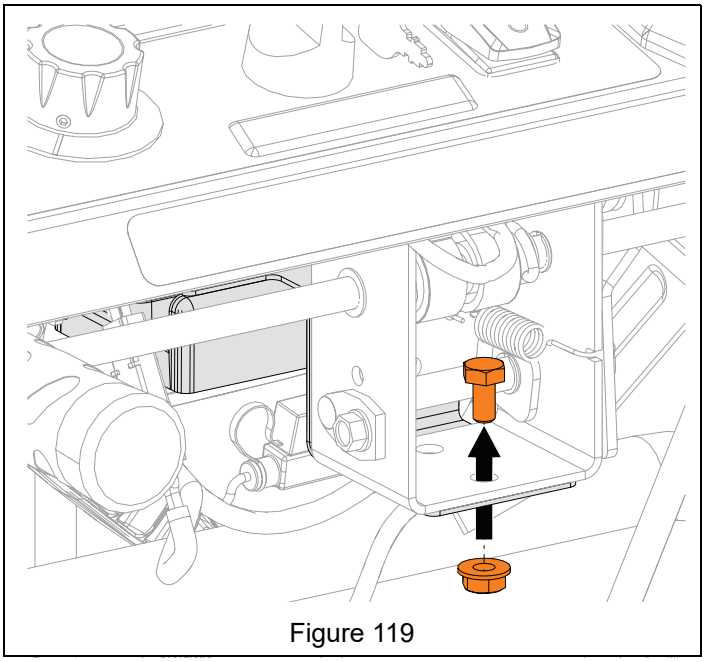


Figure 119

See Figure 120.

5. Disconnect wire harness from battery connector.
6. Remove hardware retaining battery bracket and remove bracket.

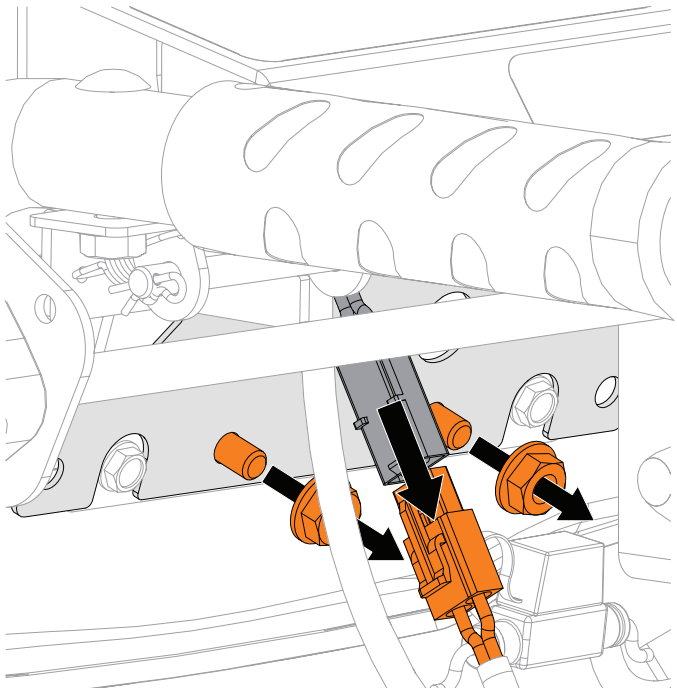


Figure 120

7. Cut cable ties retaining battery to battery bracket. Remove battery and dispose of properly.

Install Battery

1. Position battery in battery bracket and secure with two cable ties. See Figure 121.

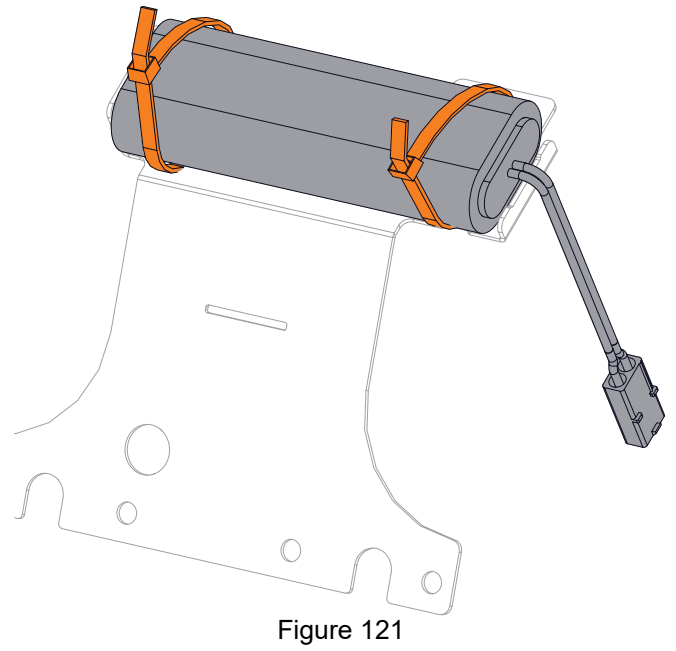


Figure 121

See Figure 122.

2. Secure battery bracket to control panel with original hardware.
3. Reconnect battery connector to wire harness.

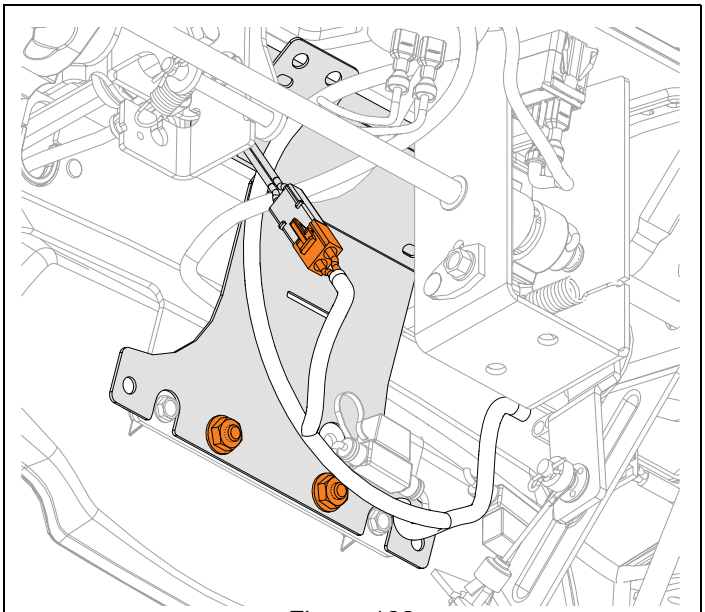


Figure 122

4. Reinstall ECU and secure to control panel with original hardware. See Figure 123.

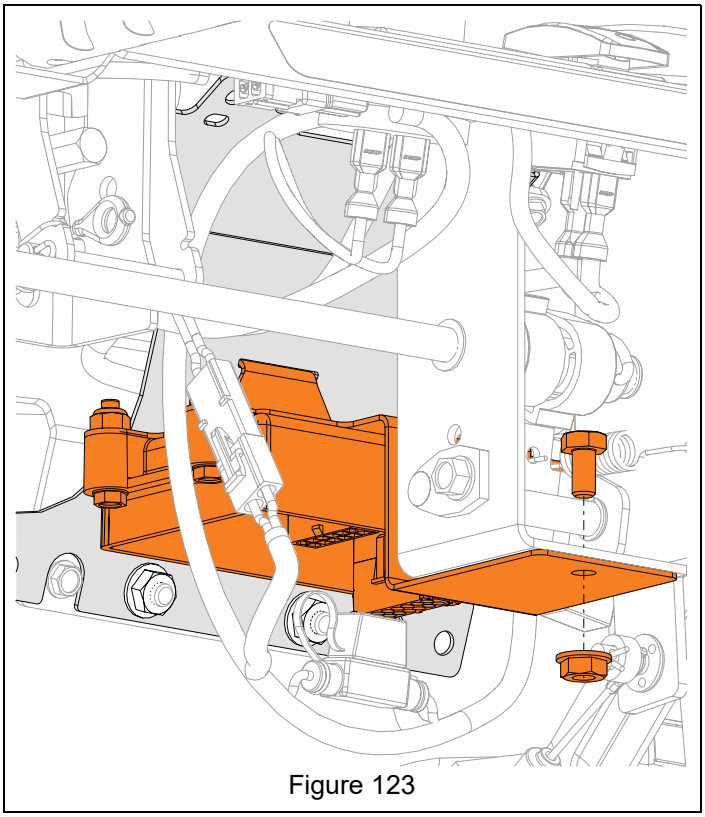


Figure 123

5. Reconnect wire harnesses to ECU.
6. Reconnect spark plug wire.

REPLACE ENGINE CONTROL UNIT (ECU)

Model 921049

Remove ECU

IMPORTANT: Save all hardware for reinstallation.

1. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
2. Disconnect spark plug wire.
3. Disconnect wire harnesses from ECU.
4. Remove hardware retaining ECU and bracket and remove bracket. See Figure 124.

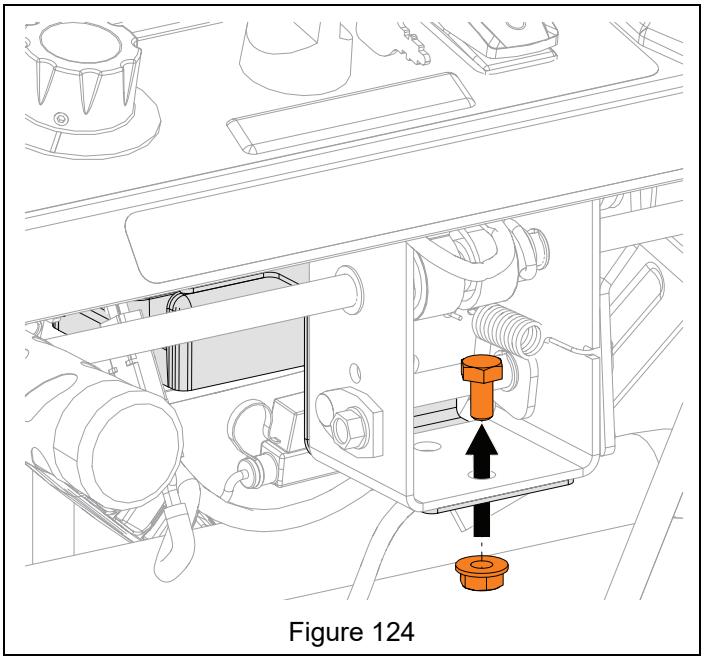


Figure 124

5. Remove hardware retaining ECU to bracket and remove ECU. See Figure 125.

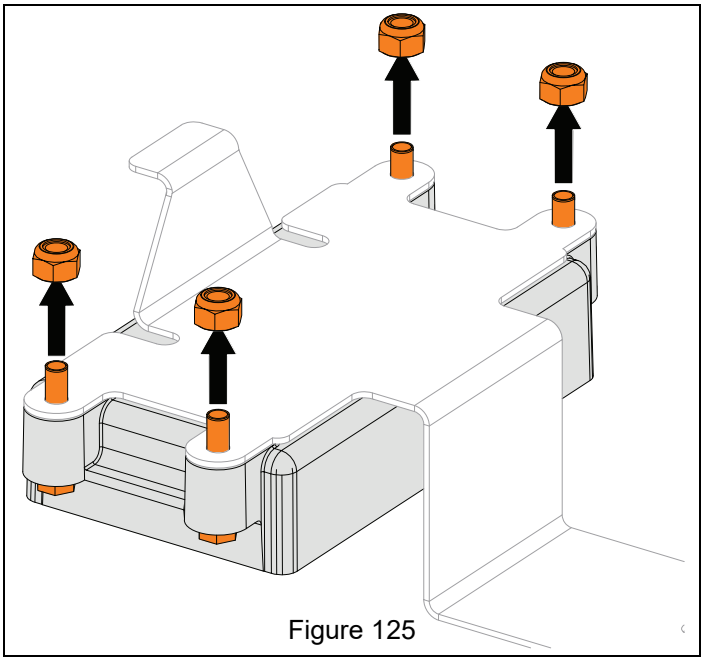


Figure 125

Install ECU

1. Secure ECU to bracket with original hardware. See Figure 125.
2. Secure ECU bracket to control panel with original hardware. See Figure 123.
3. Reconnect wire harnesses to ECU.
4. Reconnect spark plug wire.

GEARCASE REBUILD

Disassemble Gearcase

IMPORTANT: Save all parts for reassembly, unless otherwise specified.

1. Remove gearcase. See *Remove Gearcase Assembly* on page 29.
2. Remove any rust, if present, from auger and impeller shafts with sandpaper. Wipe clean with oil.
3. Remove drain plug and seal washer from gearcase. See Figure 126.

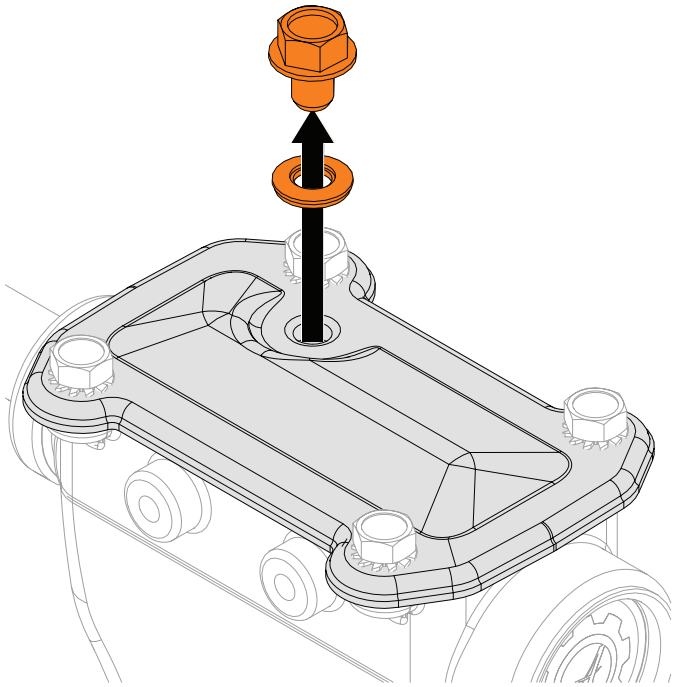


Figure 126

See Figure 127.

4. Remove hardware retaining gearcase cover and remove cover.
5. Remove gasket and drain gearcase.

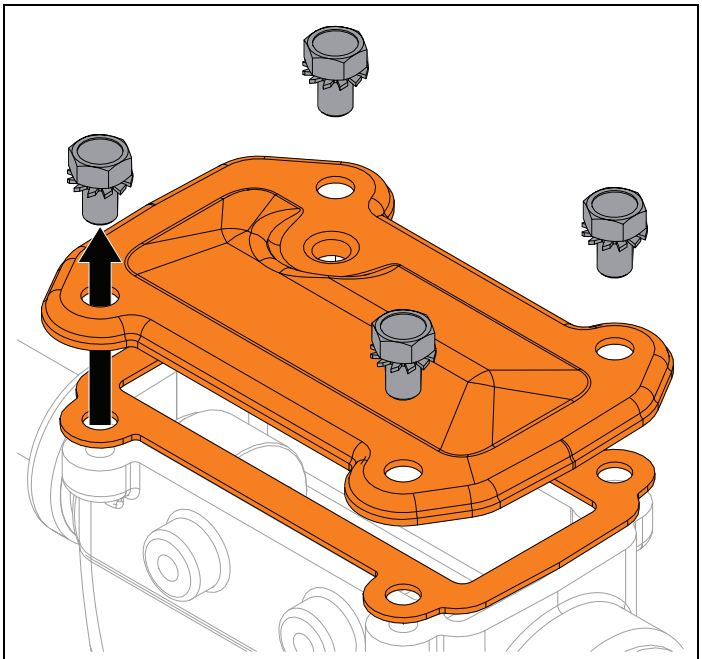


Figure 127

6. Remove bushing retainer from gearcase. See Figure 128.

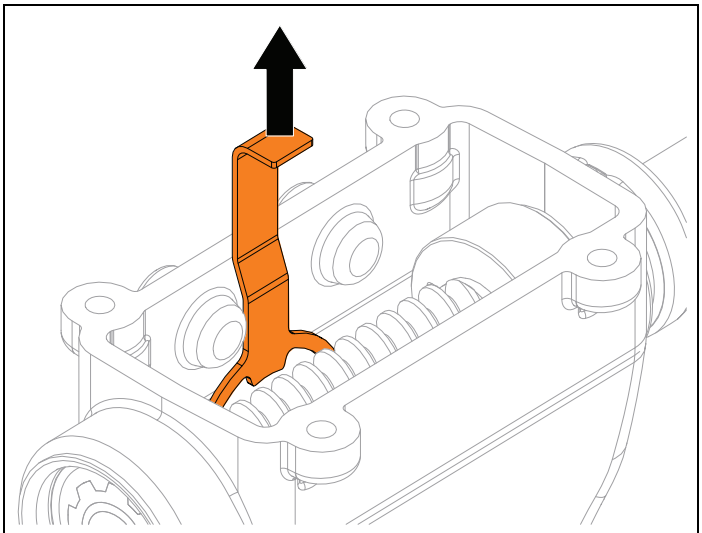


Figure 128

See Figure 129.

7. Press auger shaft through the right side of gearcase.

NOTICE: DO NOT strike auger shaft end; use a press.

8. Remove seal, bushing and washer from auger shaft.

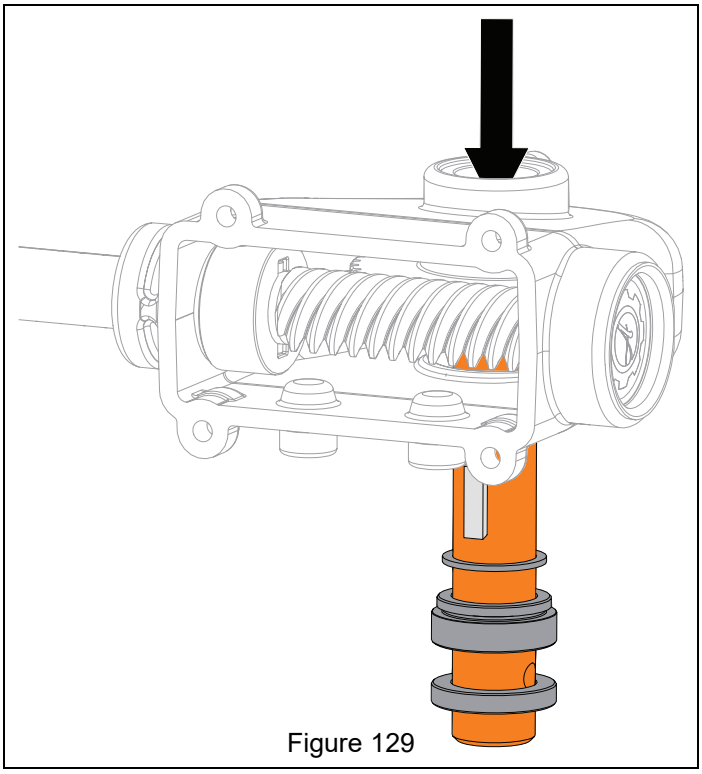


Figure 129

9. Using a flathead screwdriver or similar pry bar, remove front seal cover and discard. See Figure 130.

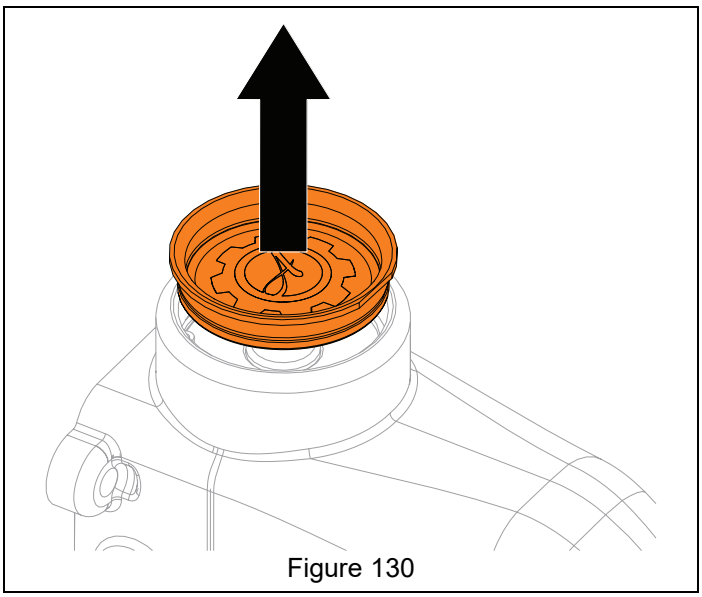


Figure 130

10. Using snap ring pliers, remove retaining ring. See Figure 131.

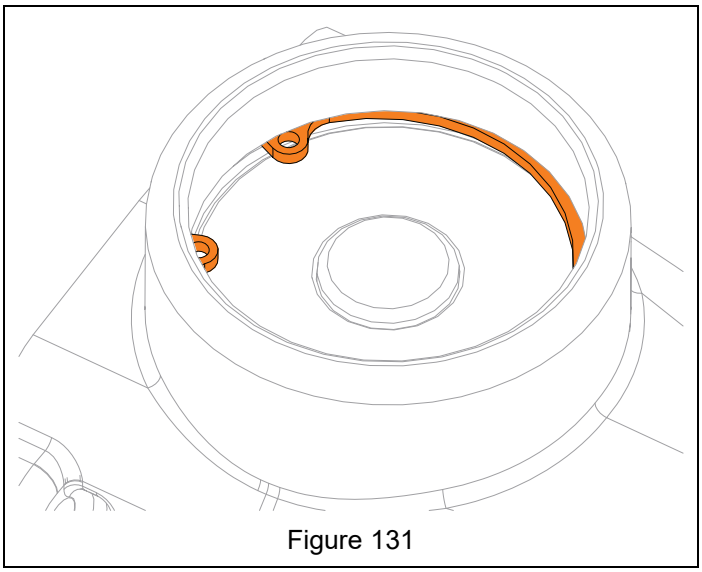


Figure 131

See Figure 132.

11. Using a suitable bearing press tool, press impeller shaft end until shaft is through front of gearcase.

NOTICE: DO NOT strike impeller shaft end.

12. Remove pin and bushing from impeller shaft.

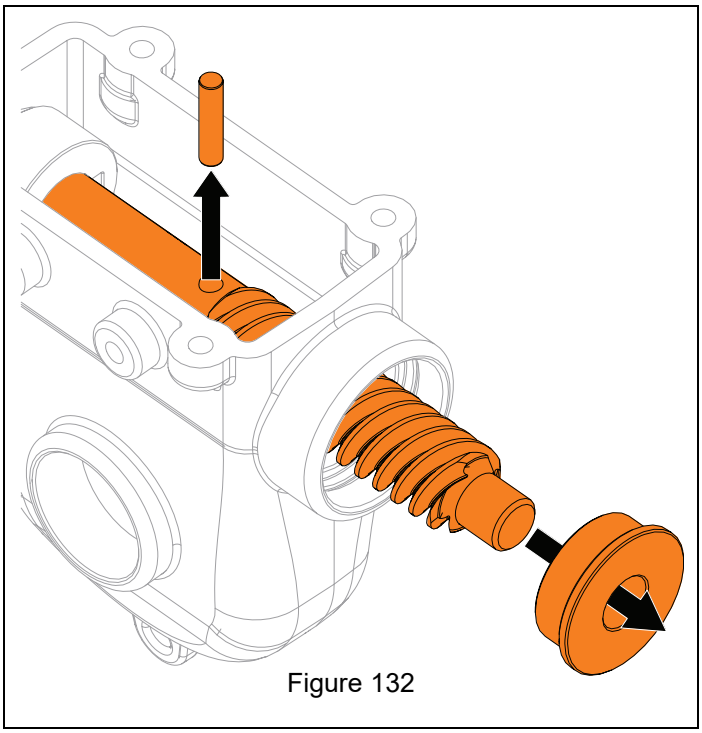


Figure 132

13. Remove impeller shaft from gearcase and remove all loose parts from inside gearcase.

14. Remove seals and flange bushings from gearcase. See Figure 133.

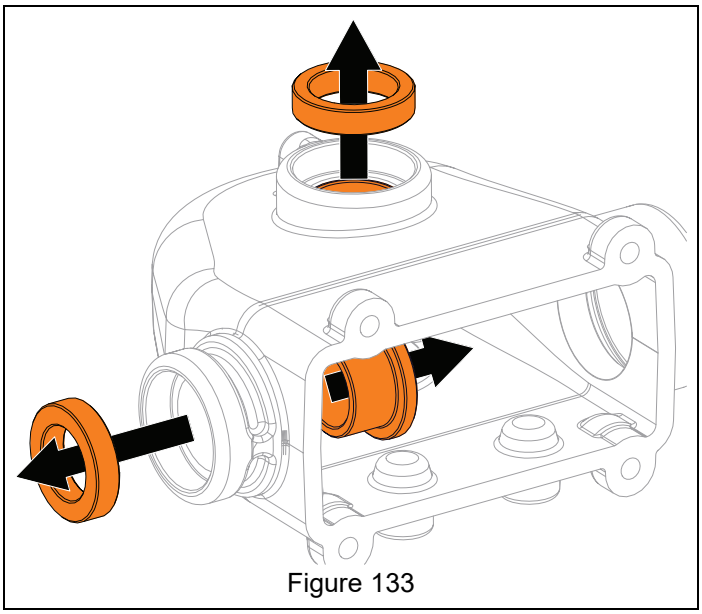


Figure 133

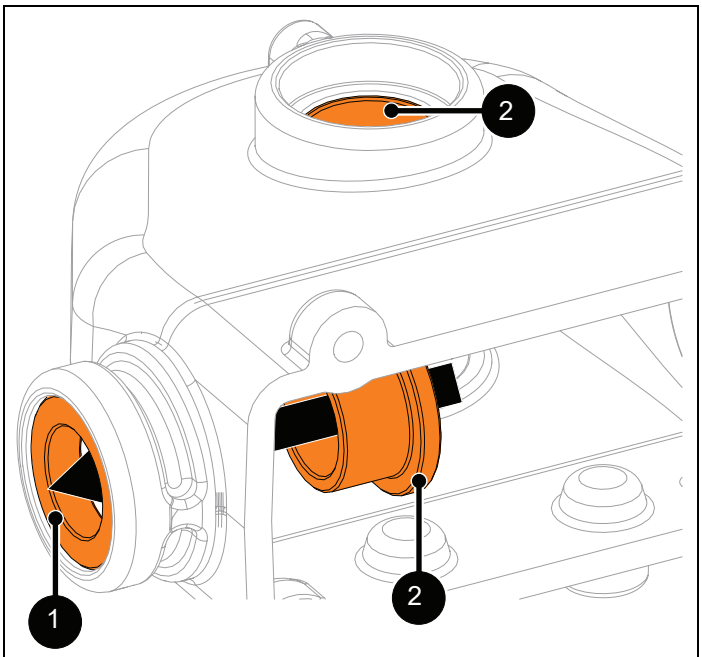
Assemble Gearcase

See Figure 134.

1. Press rear seal into gearcase until flush with gearcase exterior.

IMPORTANT: DO NOT press left seal into gearcase.

2. Reinstall left and rear flange bushings.



1. Seal
2. Flange Bushing

Figure 134

See Figure 135.

IMPORTANT: Gear is symmetrical and may be installed facing either direction.

3. Install gear into gearcase.

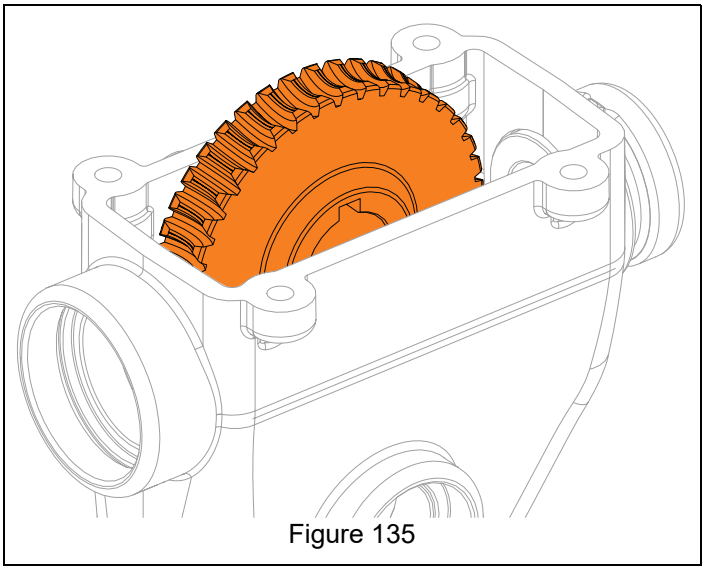
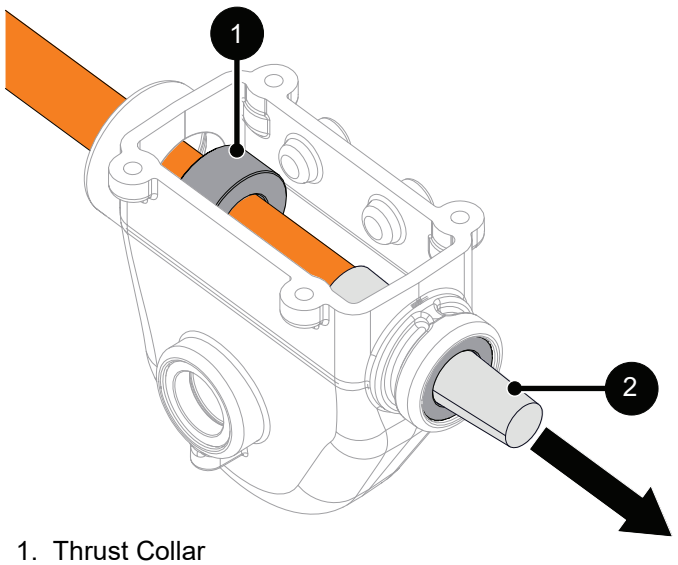


Figure 135

See Figure 136.

4. Reinstall impeller shaft through front of gearcase and reinstall thrust collar onto impeller shaft end.
5. Wrap a seal protector around impeller shaft end and insert shaft through gearcase seal. Remove seal protector.

NOTICE: Unprotected seals can be damaged when rough edges in shaft, such as holes, pass through seal.



1. Thrust Collar
2. Seal Protector

Figure 136

See Figure 137.

6. Reinstall pin into impeller shaft and turn shaft so pin is horizontal.
7. Align thrust collar with pin and install thrust collar over pin.
8. Move impeller shaft as far through gearcase rear as possible.

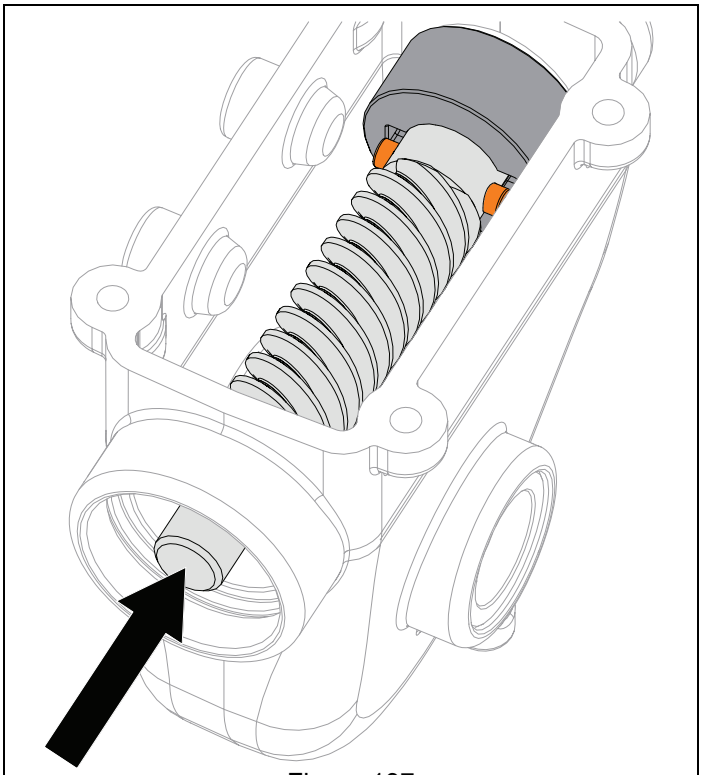


Figure 137

9. Reinstall flange bushing onto impeller shaft end. With a driver, strike bushing until positioned just below retaining ring groove. See Figure 138.

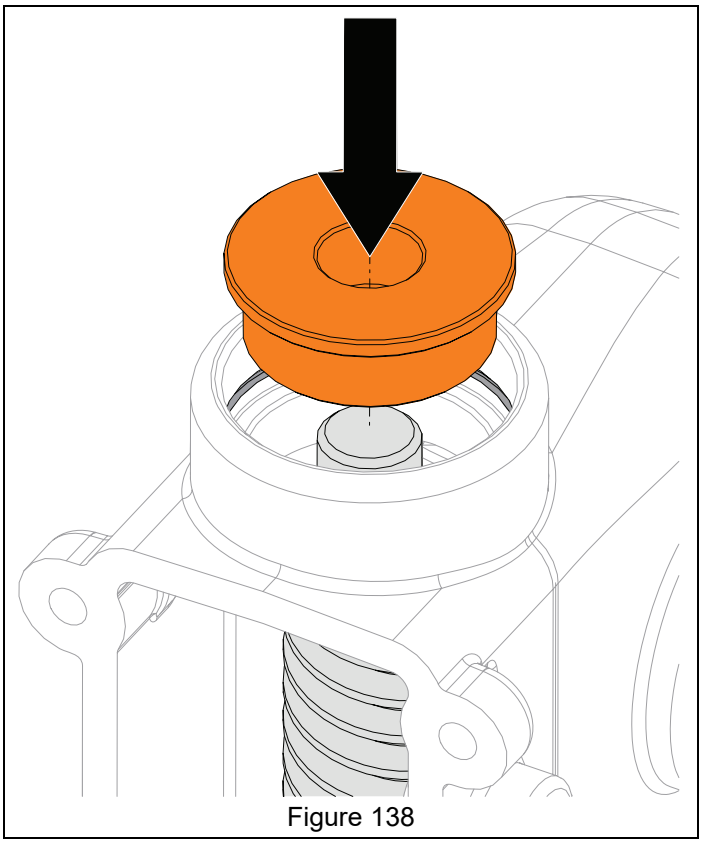


Figure 138

10. Reinstall retaining ring. See Figure 139.

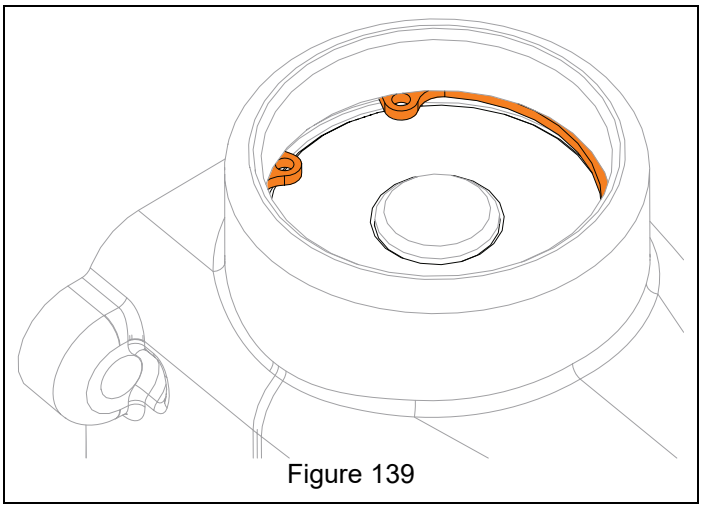


Figure 139

11. Turn impeller shaft by hand to ensure shaft rotates easily.

See Figure 140.

12. Reinstall one flat steel washer into left side of gearcase.
13. Align washer with gearcase hole and reinstall auger shaft through gear and washer.

IMPORTANT: Ensure auger shaft key aligns with gear keyway.

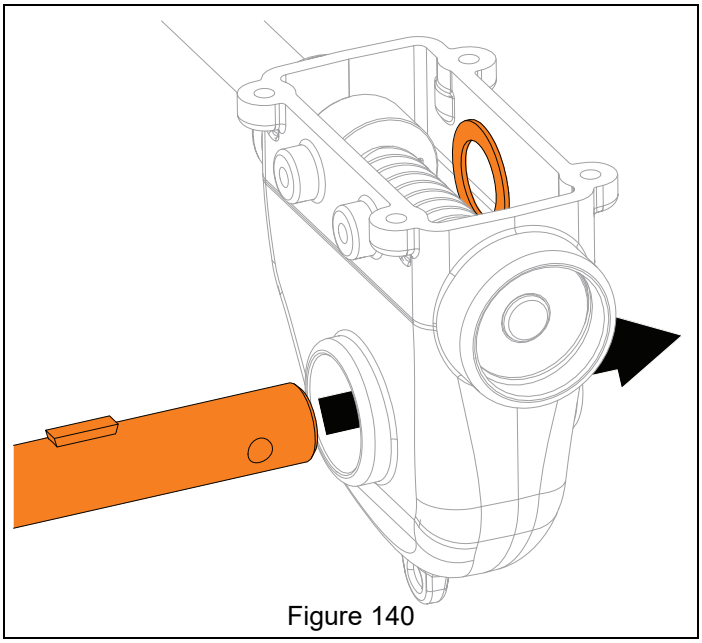


Figure 140

14. Reinstall one flat steel washer and bushing onto right auger shaft end. See Figure 141.

IMPORTANT: Stepped-down side of bushing MUST be positioned toward gearcase.

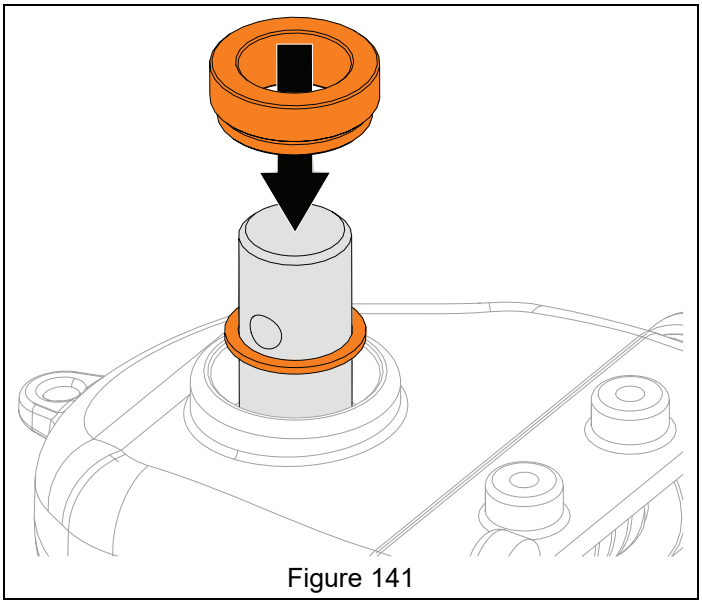


Figure 141

15. With a driver, such as a 1 1/4” deep-well socket, drive bushing into gearcase until groove is just beyond interior gearcase wall. See Figure 142.

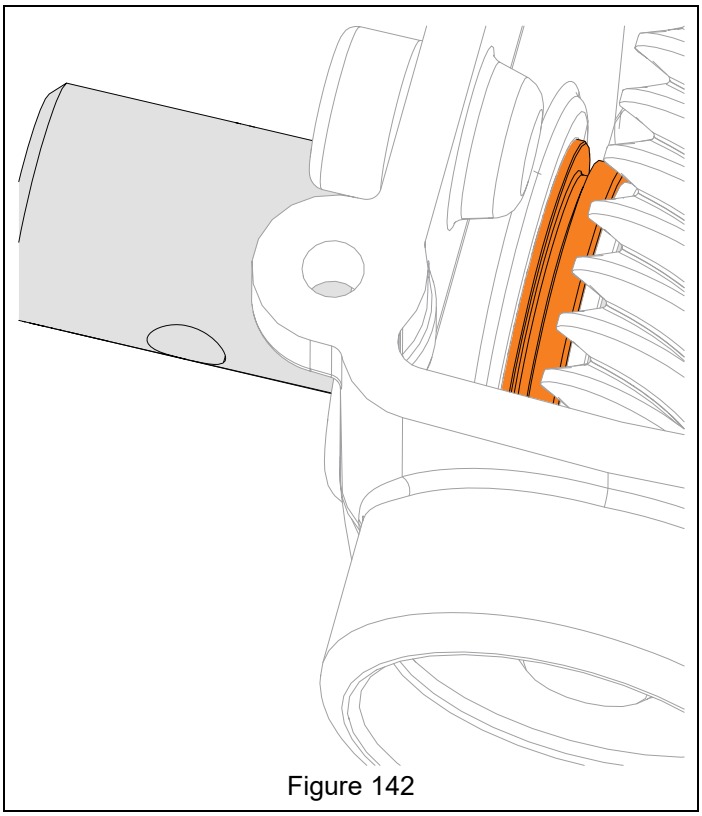


Figure 142

See Figure 143.

16. Wrap seal protector around each auger shaft end so holes in shaft are covered.

NOTICE: Unprotected seals can be damaged when installed over rough edges in shaft, such as holes.

17. Install gearcase seals over seal protectors and press into gearcase until each seal is flush with gearcase exterior.
18. Remove seal protectors.

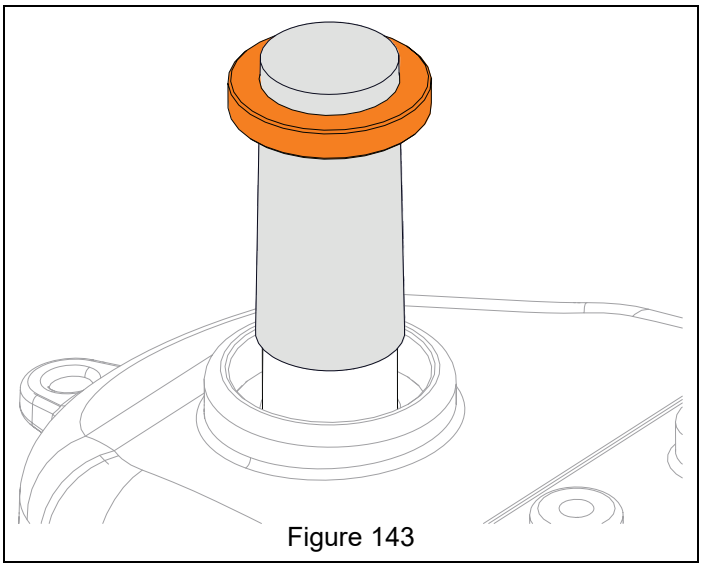


Figure 143

19. Turn impeller shaft by hand to ensure auger shaft rotates easily.
20. Reinstall bushing retainer into flange bushing groove. See Figure 144.

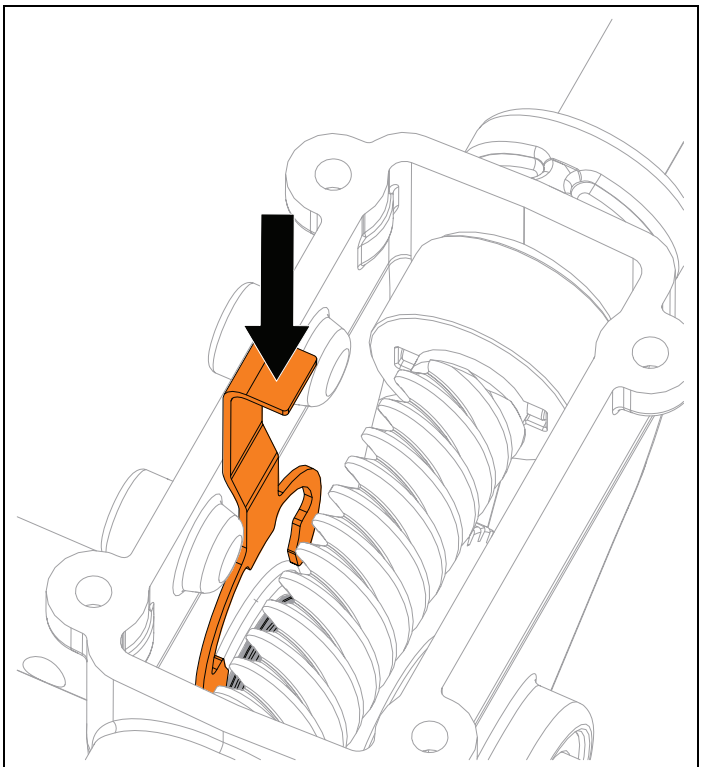


Figure 144

See Figure 145.

21. Reinstall gearcase gasket.
22. Secure cover to gearcase with four external tooth locking washer bolts.

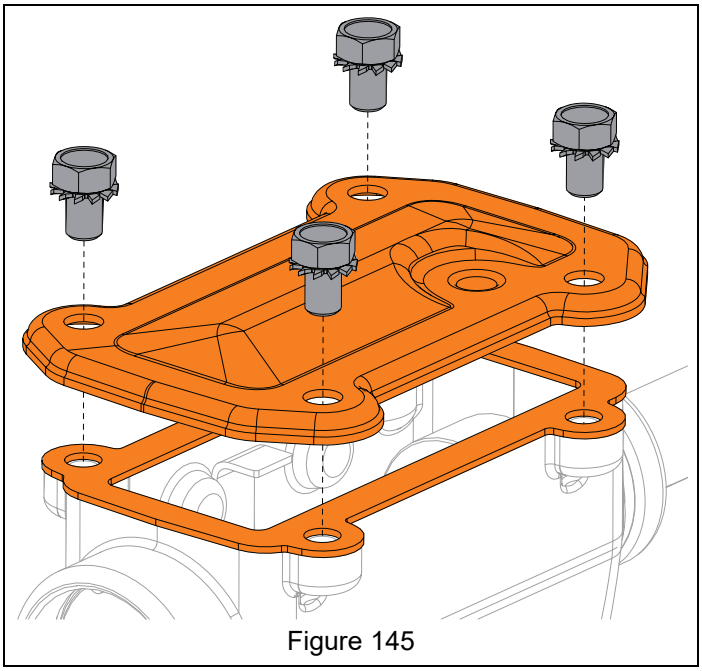


Figure 145

See Figure 146.

23. Press a new front cover into gearcase.
24. Add gearcase oil. Oil level MUST be 6.1 cm – 6.7 cm (2.4" – 2.6") from the flat surface of the gearcase cover.

IMPORTANT: Ariens recommends using only Ariens L3 synthetic severe duty gear lube. Using other lubricants will not automatically void unit warranty, but the warranty will not cover damage caused by using unauthorized lubricants. Refer to the parts manual for your unit for the service part numbers.

25. Reinstall seal washer (rubber side down) and oil fill plug. Torque to 11.3 – 14.7 N•m (100 – 130 lb-in). DO NOT over-torque.

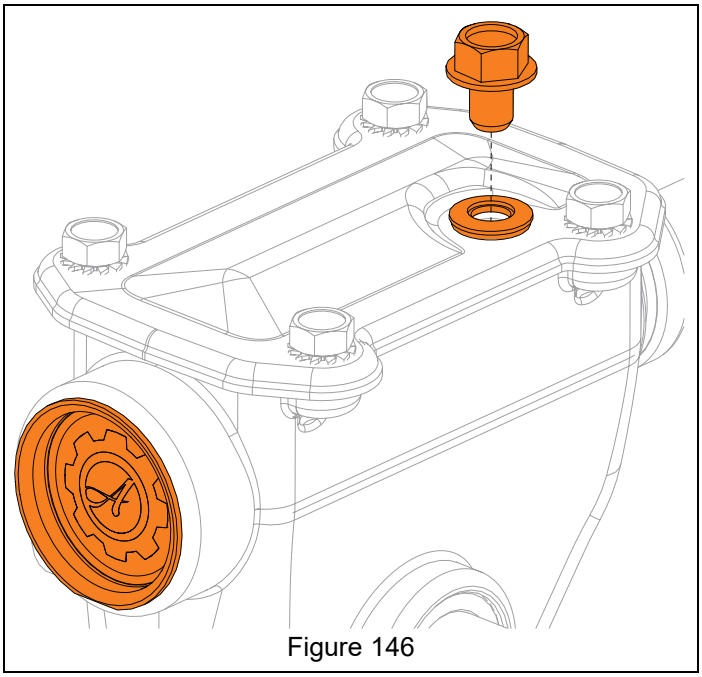


Figure 146

EFI TROUBLESHOOTING

EFI REPLACEMENT COMPONENTS

Model 921049

See Figure 147, Figure 148 and Figure 149.

Ariens recommends using only genuine Ariens replacement parts on this unit. Using unauthorized parts may adversely affect the performance, durability or safety of this unit and may void the warranty. Click the **Parts Diagrams by Parts Radar** link at www.ariens.com for replacement part numbers of the items listed below:

- ECU
  - Barometric Pressure Sensor
  - Air Temperature Sensor
- Throttle Body Assembly
  - Throttle Plate Servo Motor
  - Fuel Injector
  - Fuel Pressure Sensor
  - Engine Temperature Sensor
- Battery
- Fuel Pump
- Inline Fuel Filter

IMPORTANT: Replacement part sub components are not available as individual parts.

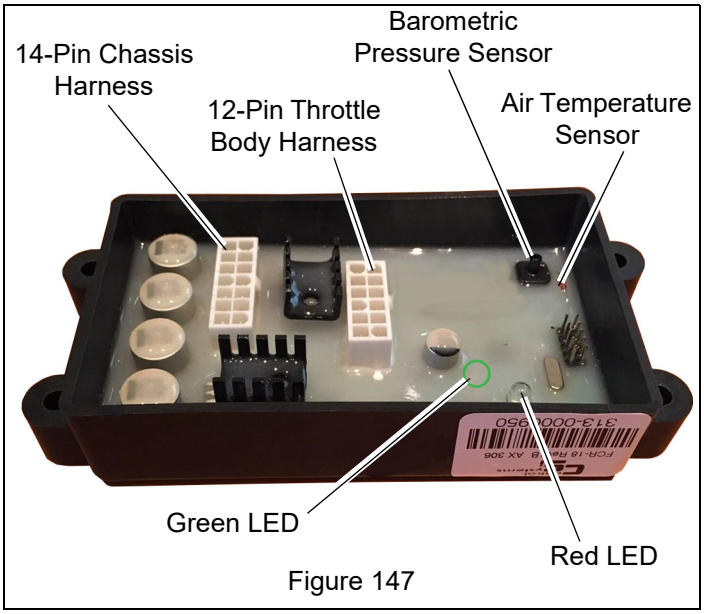
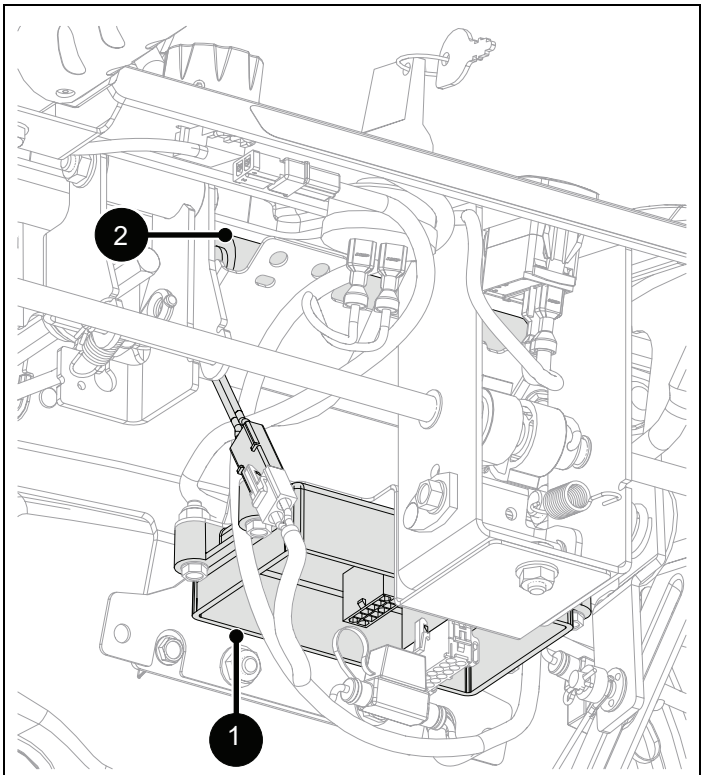


Figure 147



1. ECU
2. Battery

Figure 148

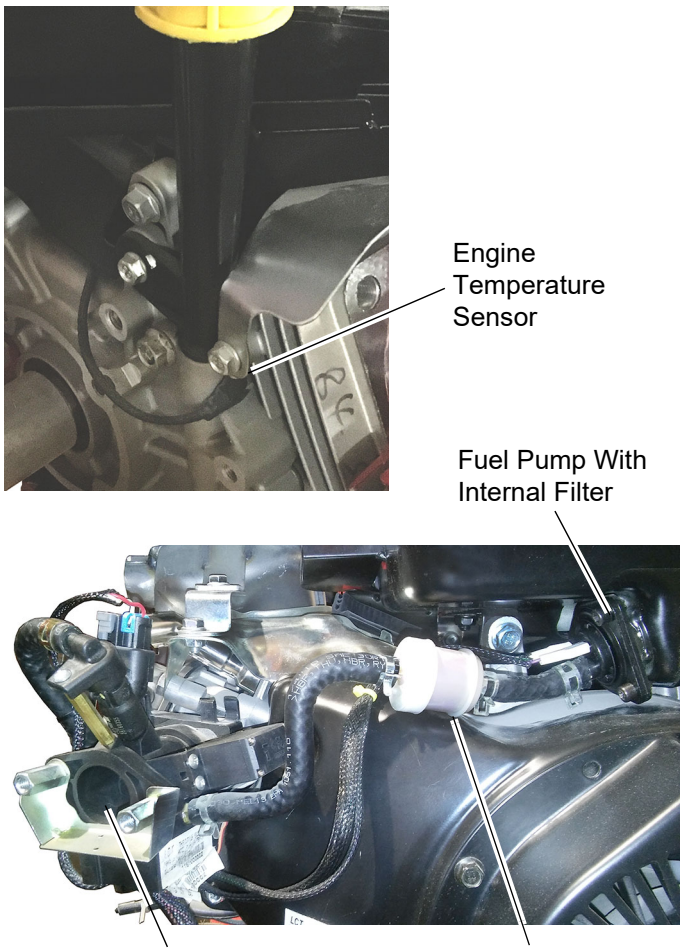


Figure 149

*Throttle body assembly consists of fuel injector, fuel pressure sensor and servo-operated throttle plate. See Figure 150.

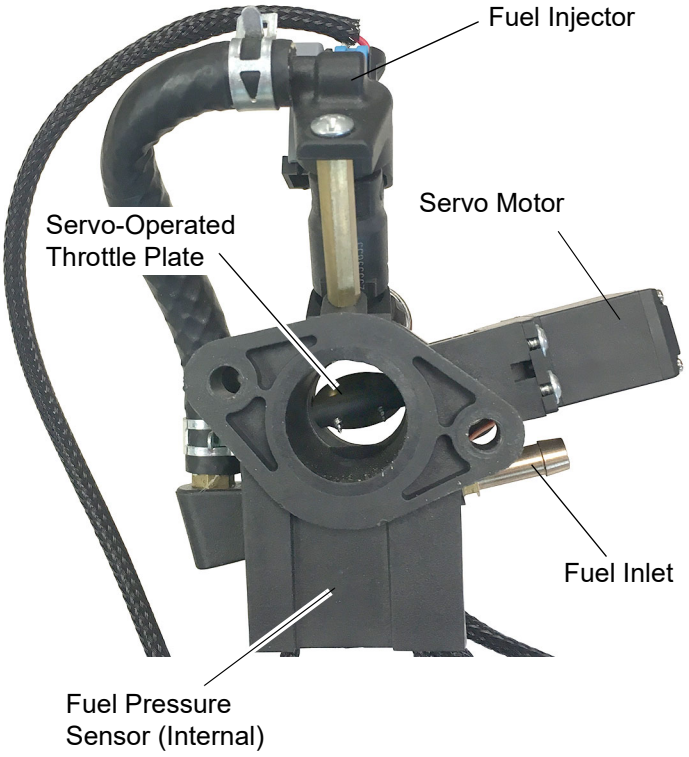


Figure 150

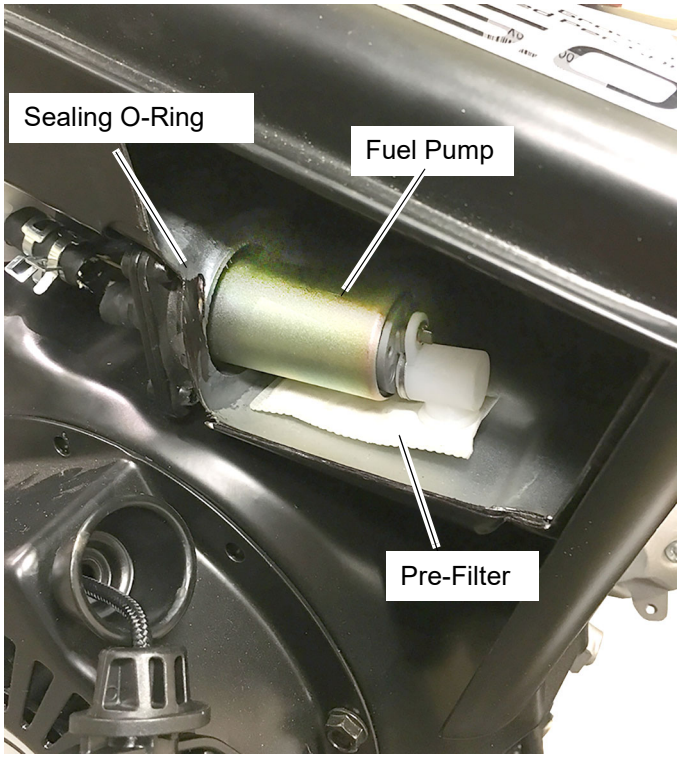


Figure 151

EFI TROUBLE CODE IDENTIFICATION

Trouble Code	Problem	Correction
16	Low Battery Voltage	Check charging system and battery.
21	Barometer Pressure Sensor Failure	Replace ECU.
22	Engine Temperature Sensor Failure	Check engine temperature sensor and wiring.
23	EFI System Cannot Sustain Desired RPM	Disconnect, reconnect and inspect wire harness connections from the engine to the ECU.
27	Low Fuel Pressure	Check fuel level.
28	High Battery Voltage	Check charging systems.
Green LED is Constant (not blinking)	Low Battery Voltage or Faulty ECU	Check battery voltage. If voltage is 7.2 V DC – 8.4 V DC, replace ECU. If battery measures lower than 7.2 V DC, charge battery.
LEDs are dim.	Low Battery Voltage	Check battery voltage and charging system. Battery should measure 7.2 V DC – 8.4 V DC.
No LEDs Illuminated	No Battery Voltage	Check battery voltage and charging system. Battery should measure 7.2 V DC – 8.4 V DC.

CHECKING TROUBLE CODES

The blinking red LED light on the ECU displays trouble codes. Its sequence indicates a particular system malfunction by blinking as many times as the first digit of a trouble code, pausing, and then blinking as many times as the second digit of a trouble code.

For example, the red LED will indicate low fuel pressure (27) by blinking twice, pausing, and blinking seven more times.

IMPORTANT: More than one trouble code may be present.

IMPORTANT: DO NOT mistake a constant red (non-blinking) LED for a trouble code. Red LED will illuminate when the ignition switch is turned to the “ON” position and the fuel pump is pressurizing, which may last for up to 30 seconds.

A blinking green LED indicates the ECU processor is operating correctly, even if a sub-component of the ECU (e.g.: barometric pressure sensor) has failed. A constant illuminated green (not blinking) LED indicates the ECU may be experiencing a low battery voltage condition or need replacement. See *EFI Trouble Code Identification* on page 64.

Visually inspect the red LED to verify trouble codes.

To read trouble codes more easily, place a mirror under the ECU to view LED reflection.

IMPORTANT: If no trouble code is present, but engine is not operating normally, See *Diagnostics for Non-Trouble Codes* on page 68.

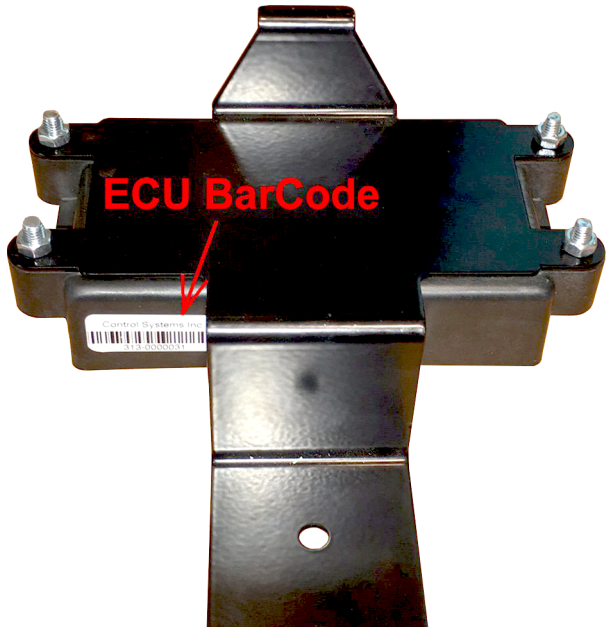


Figure 152

TROUBLE CODE DIAGNOSTICS

NOTICE: Before performing diagnostic tasks, be aware of the screw on the bottom of the throttle body that adjusts the servo offset. The servo offset calibrates the throttle body at the factory using a flow bench and should NEVER be touched. If it is tampered with, the engine will run poorly and void the warranty. See Figure 153.

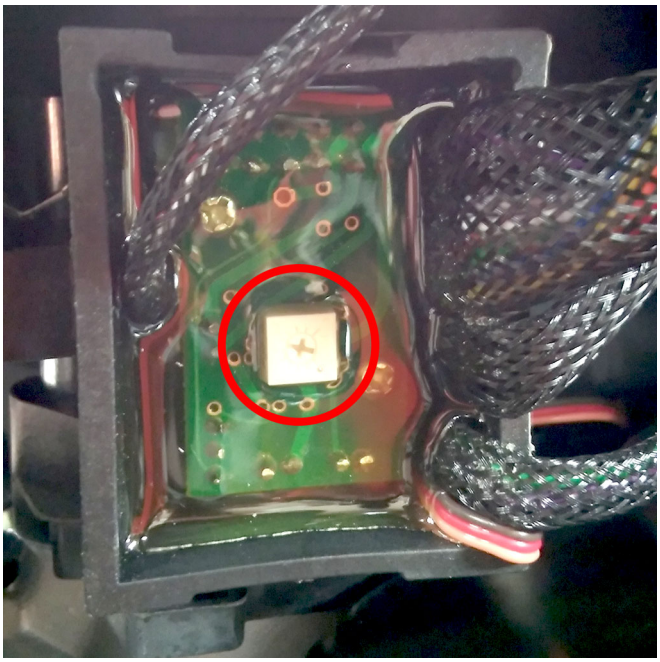


Figure 153

Code 16: Low Battery Voltage

1. Charge the battery. Refer to Operator's Manual.
2. Start the engine. Refer to Operator's Manual.
3. Check charging system at the battery.
   a. With a multi-meter set to volts DC, back probe the battery terminals. At full throttle (3600 RPM), the reading should be 7.5 V DC – 8.4 V DC.

If voltage measures less than 7.5 V DC, check charging system at the engine. Advance to step 5.

IMPORTANT: If the engine is cold, it is normal for the engine speed to be 100 RPM – 200 RPM higher until operating temperature is reached.

4. Stop the engine. Refer to Operator's Manual.
   b. Check the battery. With the engine off, the battery voltage should be 7.2 V DC – 8.4 V DC. See Figure 154.

If voltage measures less than 7.2 V DC after charging, replace battery.

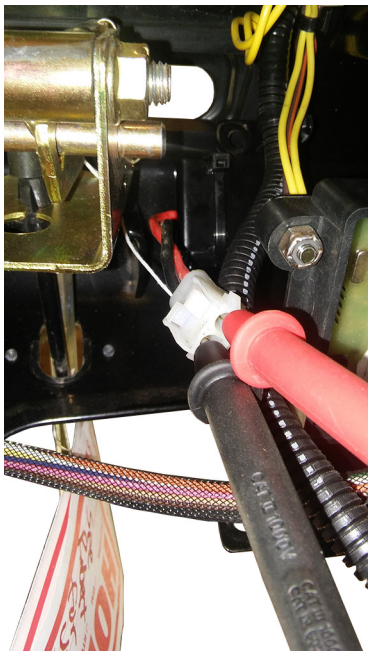


Figure 154

5. Back probe the engine stator output connector. See Figure 155.
   a. Start the engine. Refer to Operator's Manual.
   b. At full throttle (3600 RPM), the stator output MUST be 11.5 V AC – 14 V AC.

If AC voltage measure less than 11.5 V AC, remove flywheel and replace stator.

If stator output is within range and battery is not charging, check ECU wiring for damage. Replace ECU if necessary.

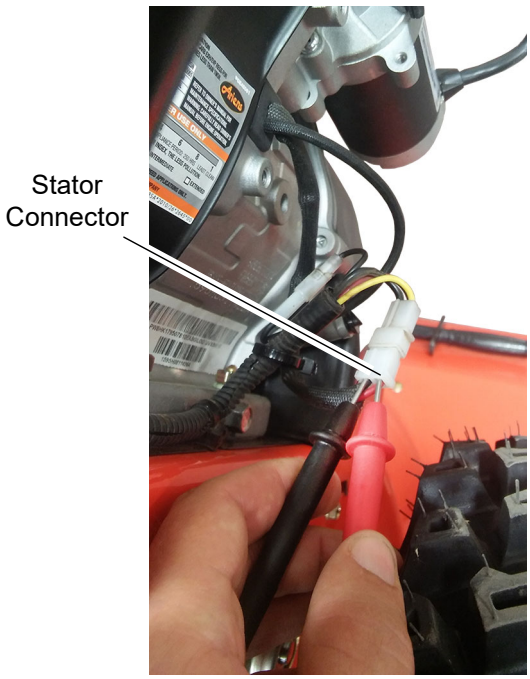


Figure 155

Code 21: Barometer Sensor

See Figure 147.

This trouble code indicates the barometric pressure sensor has failed. When the barometric sensor fails, the engine will not adjust to altitude changes, but will continue to operate at a default altitude of 800 feet above sea level.

Engine may continue to operate with a failed barometric pressure sensor, but may not operate at optimal performance. If barometric pressure sensor fails, replace ECU.

Code 22: Engine Temperature Sensor

See Figure 147.

If the sensor is damaged or has failed, the engine may not run smoothly because the ECU cannot adjust for engine temperature changes.

The temperature sensor and engine components can be visually inspected for engine temperature issues:

1. Check engine cooling fan and engine cooling fins for debris or damage.
2. Check the temperature sensor wiring from the throttle body to the mounting boss on the side of the cylinder. Make sure connection is secure. See Figure 156.

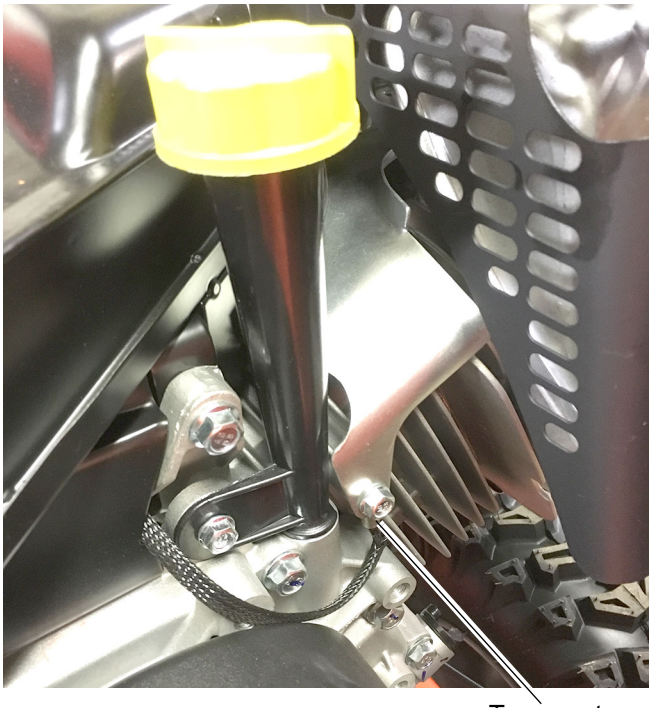


Figure 156

3. Check wiring and connection from the throttle body to the ECU for damage.

If no damage is visible, replace throttle body assembly.

Code 23: EFI System Cannot Sustain Desired RPM

The ECU reads the RPM through the alternator. If a faulty connection exists, the ECU will not read the RPM correctly.

1. Start engine.
2. Check AC voltage of the alternator by back probing the wire harness connector at the engine. Voltage should read 11.5 V AC – 14 V AC. If voltage is within specification record the voltage and move to step 3.
   a. If voltage is not to specification, inspect wires to connectors. If wires are disconnected, repair or replace wire harness.
   b. If connections are in good condition, disconnect and reconnect wire harness and recheck voltage. Voltage should read 11.5 V AC – 14 V AC.
   c. If low or no voltage exists, remove the flywheel and inspect the alternator ground wire contact. If ground wire is corroded, repair alternator. If ground contact is in good condition, replace alternator.
3. Check voltage of the black and gray wires to the 14-pin connector at the ECU. Record the voltage here and compare to reading from step 2.
   a. If voltage drop of 1 V AC or greater is observed, inspect wire connections for a disconnected or corroded connection. If wires are disconnected or corroded, repair or replace wire harness.
   b. If connections are in good condition, disconnect and reconnect harness and recheck for voltage drop. Voltage should read 11.5 V AC – 14 V AC.
   c. If voltage drop of 1.0 V AC or higher is still present, replace wire harness(es).
4. If voltage is within specification and less than 1 VDC voltage drop from alternator to ECU, and trouble code still appears or the engine is still not performing optimally, replace ECU.

Code 27: Low Fuel Pressure

Low fuel pressure is usually a result of an empty fuel tank, but could also be from a clogged fuel filter or faulty fuel pump.

Attempt engine start and check for trouble code re-occurrence after each of the following steps. Refer to Operator's Manual for engine starting instructions.

1. Check fuel level and fill fuel tank completely if not already full.
2. Check fuel lines to ensure there are no leaks or kinks.
3. Check inline fuel filter for debris and blockage. See Figure 157.

CAUTION: AVOID INJURY. Fuel lines are pressurized; wear safety glasses.

Figure 157

4. Check fuel pump wiring to ensure it is connected correctly. See Figure 158.

Figure 158

See Figure 159.

5. Remove the fuel pump wires, turn ignition key to the ON position and measure the fuel pump voltage. Voltage output should measure 7.2 V DC – 8.4 V DC.

NOTICE: Disconnecting wires from fuel pump incorrectly can cause damage to the fuel pump. To disconnect fuel pump wires, carefully compress the center tab of the connector and gently pull the connector away from the fuel pump.

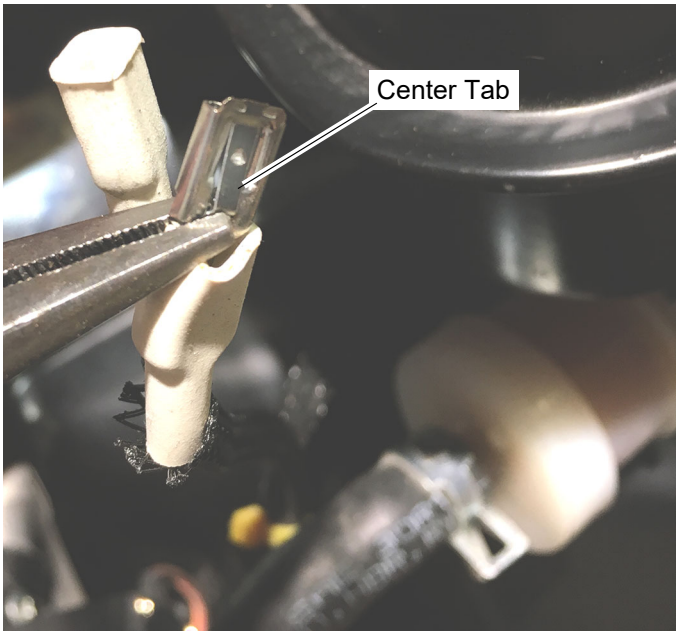


Figure 159

IMPORTANT: Fuel pump voltage MUST be measured within 30 seconds of the ignition switch being turned to the ON position. See Figure 160.

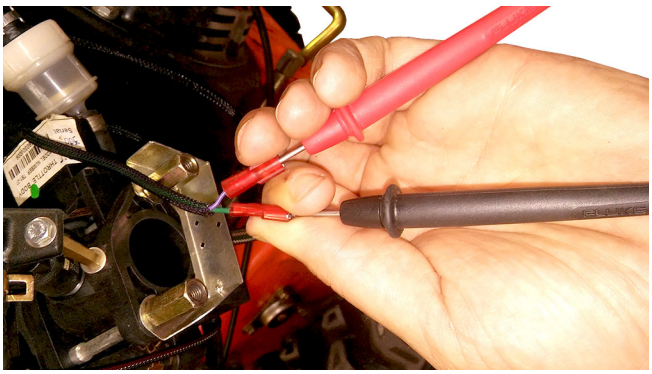


Figure 160

If voltage measures less than 7.2 V DC, check the battery voltage by probing the green wire on the ECU 12-pin connector. See Figure 161.

- If low voltage or no voltage is present, replace the ECU.
- If voltage is present, inspect the green wire between the 12-pin connector and throttle body for a pinched or broken wire. If the wire has no damage, replace the throttle body assembly.
- If voltage measures 7.2 V DC – 8.4 V DC, turn ignition key to OFF position, reconnect fuel pump wires and turn key back to ON position. Fuel pump should make a “humming” noise.

If fuel pump is silent, the pump may have failed. Check fuel pump:

1. Drain fuel from fuel system and tank. See *Draining Fuel System* on page 7.

2. Remove pump from tank.
3. Reconnect pump wires.
4. Turn the ignition key to the ON position and listen for a “humming” noise.

If fuel pump is silent, replace fuel pump.

If voltage is within range and fuel pump is operating normally, the fuel pressure sensor is defective. Replace the throttle body assembly. See Figure 166.

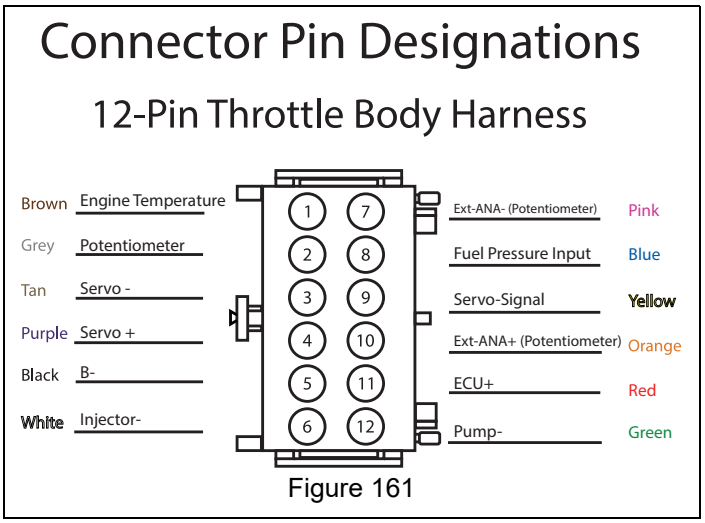


Figure 161

Code 28: High Battery Voltage

This trouble code will activate if ECU detects a higher voltage from the stator.

1. Start the engine. Refer to Operator’s Manual.
2. Set a multi-meter to V AC and probe the red and black stator connector wire. The output should be 11.5 V AC – 14 V AC at full throttle (3600 RPM).

If stator output measures over 14 V AC, replace stator. If output is within range, advance to step 3. See Figure 155.

IMPORTANT: If the engine is cold, it is normal for the engine speed to be 100 RPM – 200 RPM higher until operating temperature is reached.

3. Set a multi-meter to V DC and probe the battery connector at the battery terminals. With the engine running at full throttle (3600 RPM), the output should be 7.2 V DC – 8.4 V DC.

If DC output is higher than 8.4 V DC, replace ECU. See Figure 154.

If DC output is within range and red trouble code persists, replace ECU.

DIAGNOSTICS FOR NON-TROUBLE CODES

IMPORTANT: The following conditions and diagnostic procedures apply to EFI components only.

Engine Starts and Loses Power

If the engine starts and loses power immediately, this is usually an indication that the ECU does not detect an RPM signal. The RPM signal is generated by the stator, which also powers the hand warmers, headlight and charges the ECU battery.

Common causes for RPM signal failure may be due to a disconnected engine wire harness or a ground short in the AC output wire from the stator to the ECU. Other possible causes may include an ECU or engine-charging system failure.

1. Check wire harness connection to the ECU.
   a. With the ignition key in the off position, check the wire harness connections to the ECU. If connections are secure, disconnect the 12-pin and 14-pin connections to the ECU and inspect connectors for bad connections or burn marks.
   b. Check that all wire terminals are snug in their connectors. If connections appear to be good, reconnect wire harness and start engine to check if issue is still present. If bad connection is present, replace wire harness.
   c. If issue is still present, advance to next step.
2. Check the ECU.
   a. Disconnect wire harness from ECU and test with a new ECU to verify the original ECU is not cause for malfunction. If malfunction is not resolved with a new ECU, reconnect wire harness to original ECU and continue diagnostics.
3. Back probe the engine stator output connector. See Figure 155.
   a. Start the engine. Refer to Operator’s Manual.
   b. At full throttle (3600 RPM), the stator output MUST be 11.5 V AC – 14 V AC.

If AC voltage measures less than 11.5 V AC, remove flywheel and replace stator.

Engine No-Start Condition

If the engine does not start, check for system power.

1. Check EFI battery fuse.
2. Check spark plug.
   a. Stop engine, remove key and wait for all moving parts to stop and for hot parts to cool.
   b. Disconnect the spark plug wire and remove debris from the spark plug area.
   c. Remove spark plug.
   d. Inspect the spark plug. Spark plug gap MUST be 0.7 mm – 0.8 mm (0.027" – 0.030"). Replace if the electrodes are worn, fouled, or if the insulator is cracked or chipped.
   e. Position spark plug against engine block and pull

recoil starter handle to check for spark. If no spark is present, replace spark plug.

f. Reinstall spark plug and finger tighten. Turn an additional 1/4 turn after spark plug is seated.

g. Reinstall spark plug wire and make sure it is correctly positioned onto the spark plug.

3. Check the battery. Battery should have 7.2 V DC – 8.4 V DC, depending on when the battery was most recently charged. Extremely low voltage could prevent the ECU from triggering a trouble code and result in a no-start condition. If battery has low voltage, connect battery charger to battery. Also check the inline fuse on the battery cable.

If battery measures below specification after charging, replace battery.

4. Check wire harness connection to the ECU.

   a. With the ignition key in the off position, check the wire harness connections to the ECU. If connections are secure, disconnect the 12-pin and 14-pin connections to the ECU and inspect connectors for bad connections or burn marks.

   b. Check that all wire terminals are snug in their connectors. If connections appear to be good, reconnect wire harness and start engine to check if issue is still present. If bad connection is present, replace wire harness.

   c. If issue is still present, advance to next step.

5. Check the ECU.

   a. Disconnect wire harness from ECU and test with a new ECU to verify the original ECU is not cause for malfunction. If malfunction is not resolved with a new ECU, reconnect wire harness to original ECU and continue diagnostics.

6. Check the ECU status. With battery voltage between 7.2 V DC – 8.4 V DC, check if the green ECU status light is blinking at a consistent rate.

IMPORTANT: If battery measures below 7.2 V DC, ECU LEDs may appear dim or will not illuminate red or green LEDs. If green LED is constant, (not-blinking) see *EFI Trouble Code Identification* on page 64.

7. Check fuel pump output.

   a. Remove the heater box.

   b. Check voltage at fuel pump. See *Code 27: Low Fuel Pressure* on page 66 for voltage readings.

   c. Remove fuel hose from fuel pump outlet and attach a suitable length of fuel hose to the fuel pump outlet that can safely reach a clearly marked fuel container.

   d. With battery voltage between 7.2 V DC – 8.4 V DC, turn the key to the ON position for 10 seconds to pump fuel into the container. Fuel should measure approximately 160 mL (5 oz.).

If fuel amount measures less than 160 mL, remove the fuel pump and check the pre-filter for blockage. If filter is clean, replace fuel pump. See Figure 162.

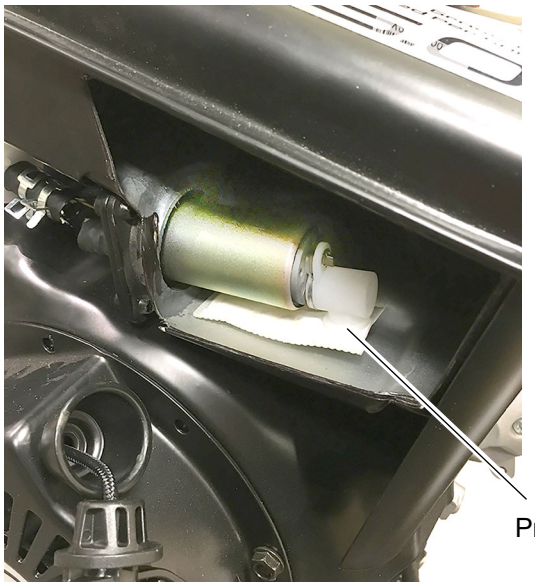


Figure 162

IMPORTANT: If replacing fuel pump, wet the fuel system:

   a. Fill fuel tank full.

   b. Cycle ignition key to the ON position, then to the OFF position. Repeat.

IMPORTANT: Cycling the ignition key multiple times may inject excessive amounts of fuel into the throttle body and "flood" the engine. A flooded engine may require more starting attempts than normal.

8. Remove connector to the injector.

   a. Move gray slide upward until it stops. Gently compress gray slide and remove connector. See Figure 163.

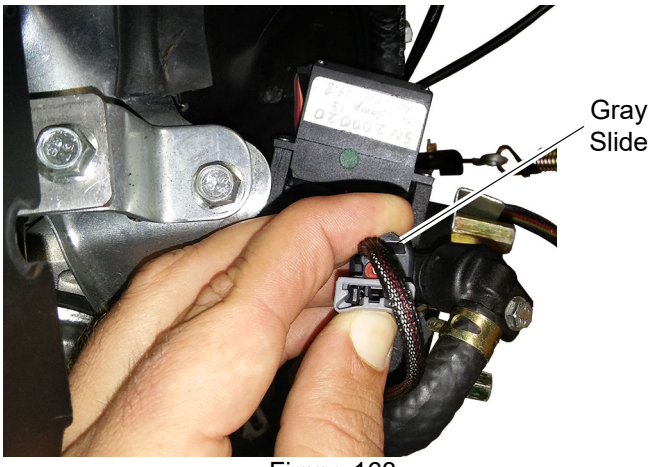


Figure 163

   b. Set a multi-meter to V DC and probe each terminal with the red probe and contact the black probe against the engine block. With the ignition key in the ON position, each terminal should measure 7.2 V DC – 8.4 V DC. See Figure 164.

If voltage is within range and the fuel injector is not operating correctly with the key in the ON position, replace throttle body assembly.

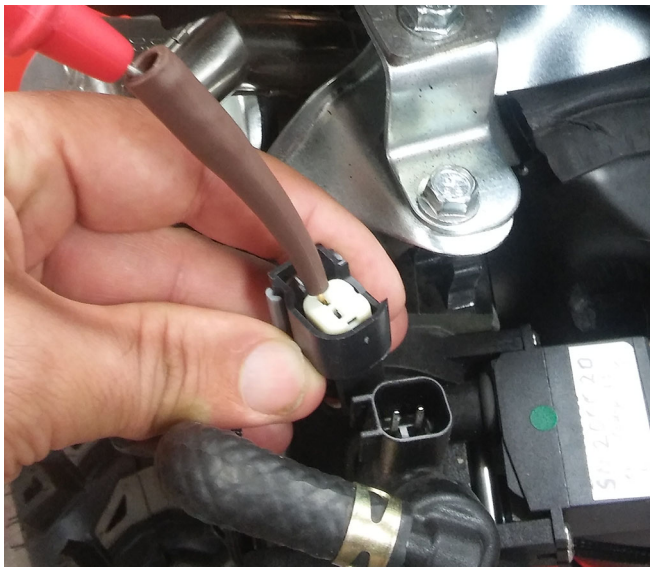


Figure 164

c. If no voltage is present at the injector, check battery voltage by probing the red and white wires on the
12-pin ECU connector with the red probe and contact the black probe against the engine block. With the ignition key in the ON position, each terminal should measure 7.2 V DC – 8.4 V DC. See Figure 165.

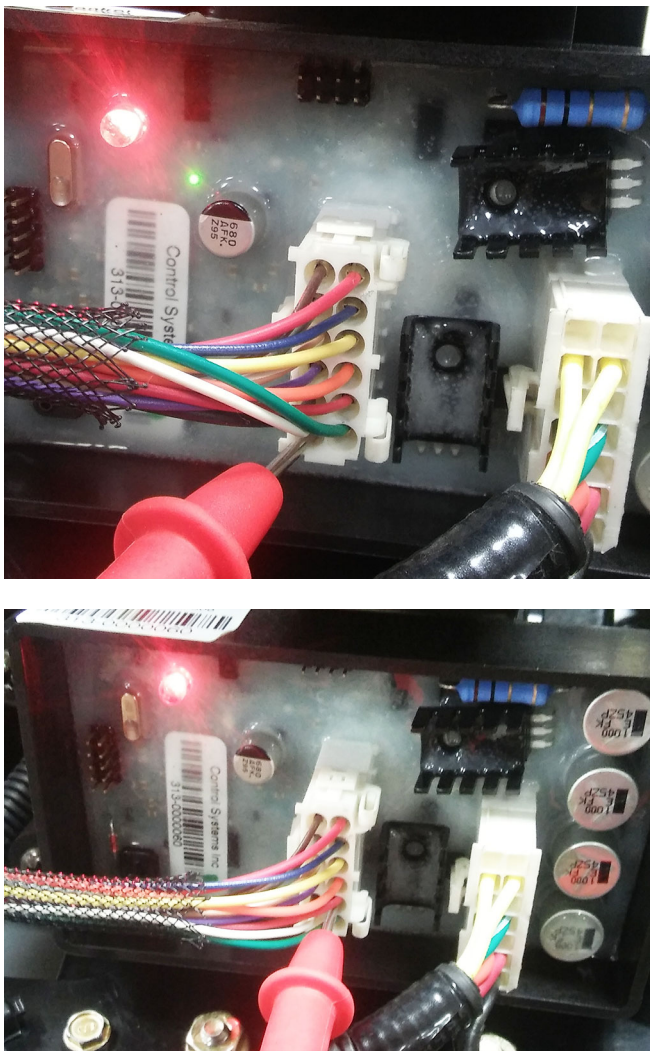


Figure 165

If no voltage is present at the ECU, replace ECU. If voltage is present at the ECU, check wires for kinks or damage. If damage is present repair wires if possible, or replace throttle body. See Figure 166.

Figure 166

Surging Run Condition

1. Check wire harness connection to the ECU.
   a. With the ignition key in the off position, check the wire harness connections to the ECU. If connections are secure, disconnect the 12-pin and 14-pin connections to the ECU and inspect connectors for bad connections or burn marks.
   b. Check that all wire terminals are snug in their connectors. If connections appear to be good, reconnect wire harness and start engine to check if issue is still present. If bad connection is present, replace wire harness.
   c. If issue is still present, advance to next step.
2. Check the ECU.
   a. Disconnect wire harness from ECU and test with a new ECU to verify the original ECU is not cause for malfunction. If malfunction is not resolved with a new ECU, reconnect wire harness to original ECU and continue diagnostics.

If the AC output wire from the engine charging system is damaged, it may cause an intermittent short. This will result in erratic running such as the engine over revving or “popping” through the exhaust.

3. Check the engine wiring and wiring under the handlebar to verify that it is not damaged.
4. With an inline spark tester, check ignition for intermittent spark.
5. Check fuel pump output.
   a. Remove the heater box.
   b. Check voltage at fuel pump. See *Code 27: Low Fuel Pressure* on page 66 for voltage readings.
   c. Remove fuel hose from fuel pump outlet and attach a suitable length of fuel hose to the fuel pump outlet that can safely reach a clearly marked fuel container.
   d. With battery voltage between 7.2 V DC – 8.4 V DC, turn the key to the ON position for 10 seconds to pump fuel into the container. Fuel should measure approximately 160 mL (5 oz.).

If fuel amount measures less than 160 mL, remove the fuel pump and check the pre-filter for blockage. If filter is clean, replace fuel pump. See Figure 162. If fuel pump output is to specification, replace the ignition coil.

Engine Speed Does Not Change

If engine speed does not change when using the potentiometer (throttle control), check the following:

1. Set a multi-meter to ohms (Ω) and measure the potentiometer resistance. See Figure 167 and Figure 168.
   a. Unplug the 14-pin connector from the ECU.
   b. Position the red probe on the terminal of the red wire at the potentiometer (Pin 5 in Figure 167) and the black probe on the terminal of the green / white wire.

The potentiometer output should measure approximately 0 Ω – 5000 Ω.

If ohm reading measures close to 0 Ω at full throttle and close to 5000 Ω at low-idle, potentiometer is operating normally. If ohm reading stays constant at either position, replace potentiometer.

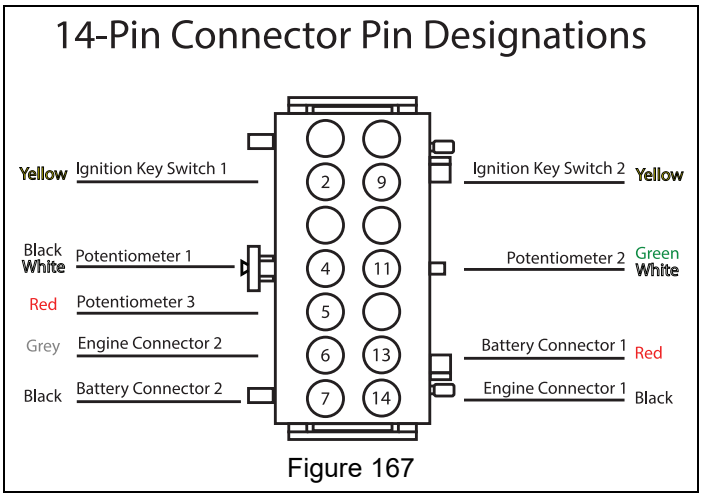


Figure 167

2. With a multi-meter, measure the V DC of the red wire.
   a. With engine off, reconnect the 14-pin connector to the ECU.
   b. Position the red probe on the terminal of the red wire at the potentiometer (Pin 5 in Figure 167).

Also see Figure 168.

c. Position the black probe on the engine block.
d. Turn ignition key to ON position.
e. Turn the potentiometer from low-idle to full throttle.

Voltage to the red wire should measure 4.90 V DC – 5.0 V DC at both low-idle and full throttle positions.

Verify system ground by moving black probe to blk/wht wire (pin 4) while key is on. Compare to previous voltage readings. Any drop in voltage is likely a ground issue.

If voltage measures less than 4.9 V DC, replace ECU.

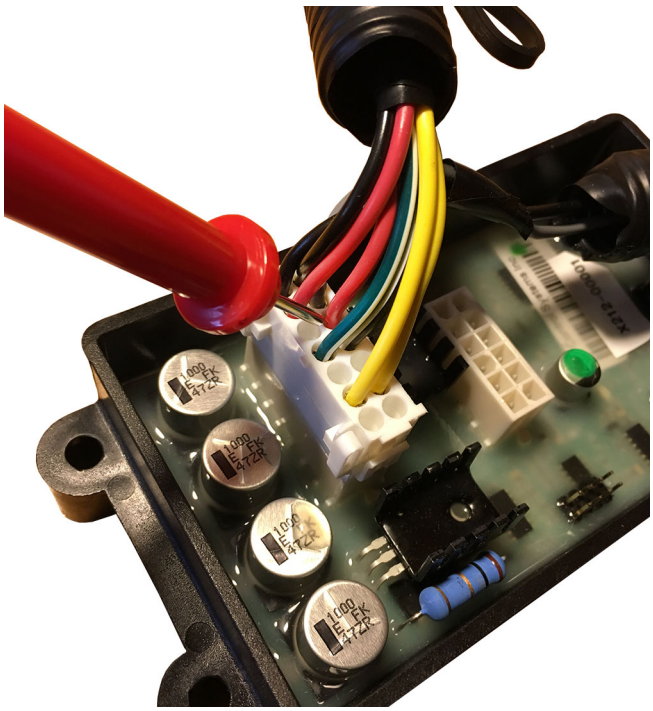


Figure 168

3. With a multi-meter, measure the V DC of the green / white wire. See Figure 169.
   a. With engine off, position the red probe on the terminal of the green / white wire.
   b. Position the black probe on the engine block.
   c. Turn ignition key to ON position.
   d. Turn the potentiometer from low-idle to full throttle.

Voltage to the green / white wire should measure close to 0.01 V DC at low-idle and close to 5.0 V DC at full throttle.

If voltage does not vary between low-idle and full throttle, there is an open connection in the harness. Replace the harness.

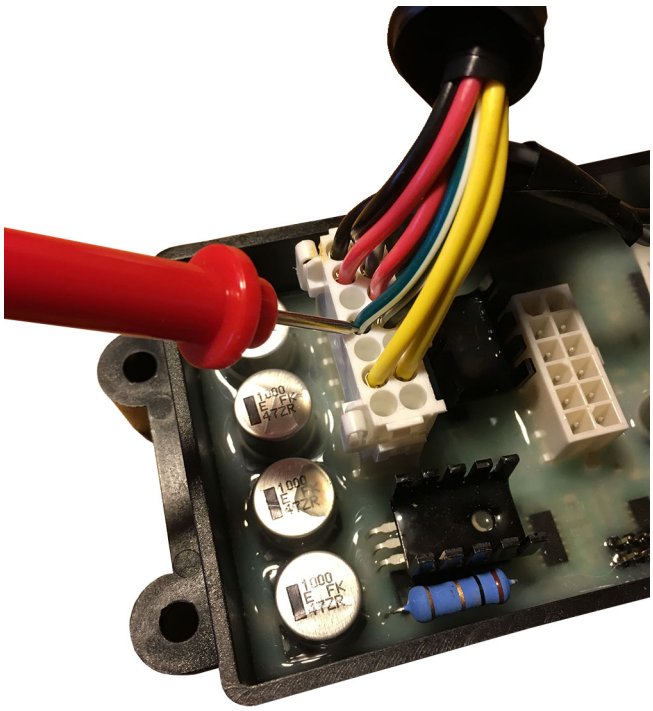


Figure 169

Fluttering Servo Motor

If the throttle plate in the throttle body flutters continuously when the key is in the ON position, check the following:

1. Wire harness connection to the ECU.
   a. With the ignition key in the off position, disconnect the wire harness from the ECU and inspect connection at the tan, purple and yellow wires on the 12-pin connector. See Figure 161. If connection is faulty, repair, if possible. If repair cannot be completed, replace the throttle body.
   b. If connection is good, a faulty connection exists in the throttle body or servo motor. Replace the throttle body.

SERVICE RECORD

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