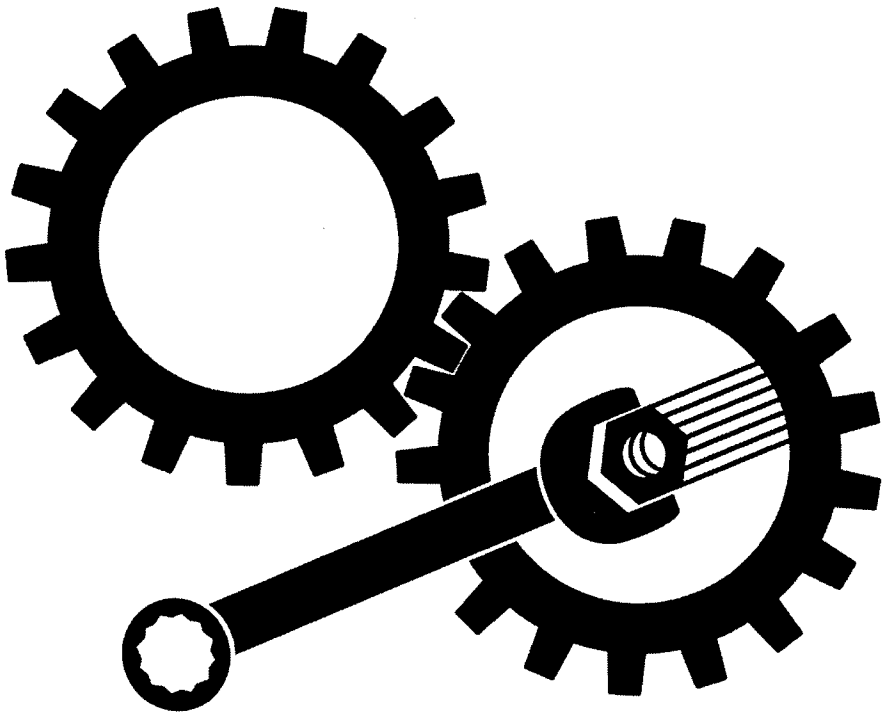
High Sierra

Service Manual

Models 934026, 027, 019, 020, 023, 025, 301



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SECTION 1 - INTRODUCTION

1.1 THE MANUAL

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

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

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

Operation

Before operation of the unit, carefully and completely read manuals supplied with the unit. The contents will provide you with an understanding of safety instructions and controls during normal operation and maintenance.

Safety Messages

For your safety and the safety of others always read, understand, and follow all DANGER, WARNING, and CAUTION messages found in manuals and on safety decals.

Directional Reference

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

1.2 SERVICE AND REPLACEMENT PARTS

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

Numbers are located on the product registration form in the unit literature package. They are printed on a serial number label, located on the frame of your unit. Some models may have the serial number near the rear wheel.

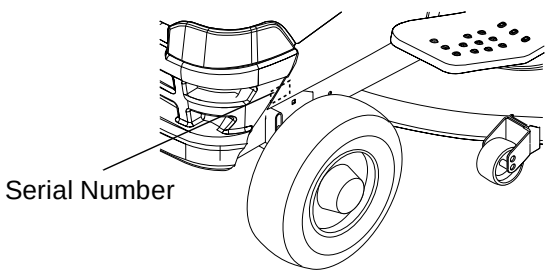


Figure 1

1.3 PRODUCT REGISTRATION

A warranty registration card must be filled out, signed, and returned at time of purchase. This card activates the warranty. Claims meeting requirements during limited warranty period will be honored.

1.4 UNAUTHORIZED REPLACEMENT PARTS

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

1.5 DISCLAIMER

Ariens reserves the right to discontinue, make changes to, and add improvements upon its products at any time without public notice or obligation. The descriptions and specifications contained in this manual were in effect at printing. Equipment described within this manual may be optional. Some illustrations may not be applicable to your unit.

1.6 TECHNICAL SERVICE COMMUNICATIONS

Ariens Technical Service communicates information to the field using Service Letters, Service Bulletins, Product Notices, and Campaigns. Each communication signifies a type of information and priority. The dealer is responsible to carry out the directive provided in the communication. The types of communication are:

Service Letter - General technical information for the dealer. Technical information on how to service the product and product improvements.

Service Bulletin - Notification to update products to resolve certain issues or a notification of a policy change.

Product Notices - Notification of limited product located in a certain region. This is a limited distribution to only those who received the product involved.

Campaigns - Notification of a safety related issue. All products must be updated and are tracked by the factory until all units are corrected.

1.7 PREPARATION

Before starting any removal of parts, proper preparation is very important for efficient work. A clean work area at the start of each job will allow you to perform service repairs easily and quickly.

To reduce the incidence of misplaced tools or parts, place removed components with all attaching hardware in the disassembly order on a clean work surface. Organization is a key part of proper reassembly.

Tools, instruments, and parts needed for the job should be gathered before work is started. Interrupting a job to locate tools or parts is a needless delay.

SECTION 2 - SAFETY

2.1 SAFETY ALERTS

Look for these symbols to point out important safety precautions. They mean:

Attention!

Personal Safety Is Involved!

Become Alert!

Obey The Message!

2.2 SIGNAL WORDS

The safety alert symbol is used in decals on the unit and with proper operation procedures in this manual. They alert you to the existence and relative degree of hazards.

Understand the safety message. It contains important information about personal safety on or near the unit.

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

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

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

2.3 NOTATIONS

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

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

2.4 PRACTICES AND LAWS

Practice usual and customary safe working precautions, for the benefit of yourself and others. Understand and follow all safety messages. Be alert to unsafe conditions and the possibility of minor, moderate, or serious injury or death. Learn applicable rules and laws in your area.

2.5 REQUIRED OPERATOR TRAINING

Original purchaser of this unit was instructed by the seller on safe and proper operation. If unit is to be used by someone other than original purchaser; loaned, rented or sold, ALWAYS provide the Operator's Manual and any needed safety training before operation.

2.6 PREPARATION

Before starting any removal of parts, proper preparation is very important for efficient work. A clean work area at the start of each job will allow you to perform service repairs easily and quickly.

To reduce the incidence of misplaced tools or parts, place removed components with all attaching hardware in the disassembly order on a clean work surface. Organization is a key part of proper reassembly.

Tools, instruments, and parts needed for the job should be gathered before work is started. Interrupting a job to locate tools or parts is a needless delay. A list of required special tools has been included in this manual.

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

2.7 SERVICE POSITION

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

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

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

2.8 CLEANING AND STORAGE

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

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

When taking unit out of extended storage:

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

2.9 SAFETY RULES

Walk Around Inspection

Complete a walk around inspection of unit and work area to understand:

- Work area.
- Your unit.
- All safety decals.

Work Area

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

ALWAYS keep hands and feet within the limits of the unit.

Keep children, people, and animals away. Keep children out of work area and under watchful care of a responsible adult.

Keep area of operation clear of all toys, pets, and debris. Objects can cause vehicle instability and injury.

Check for weak spots on dock, ramps or floors. Avoid uneven work areas and rough terrain. Stay alert for hidden hazards.

DO NOT run engine in an enclosed area. Always provide good ventilation.

Unit

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

Check Safety Interlock System for proper operation daily (see Operation section). Do not operate unless system operates properly.

Operation

Understand:

- How to operate all controls
- The functions of all controls
- How to STOP in an Emergency
- Speed ranges

Do not operate any of the control levers or power take-off unless both feet are resting on the platform.

DO NOT travel at too fast a rate. DO NOT change engine governor settings or over-speed engine.

Always back up slowly. Always look down and behind before and while backing.

Never leave a running unit unattended. ALWAYS shut off power take off, lower throttle setting, and stop engine before leaving unit. ALWAYS remove key to prevent unauthorized use.

Never carry passengers on any part of unit.

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

If tires lose traction, turn off power take off and proceed slowly straight down slope. Avoid wet surfaces.

Avoid parking on a slope. If necessary, use wheel chocks.

DO NOT leave unit unattended on a slope. ALWAYS use wheel chocks when leaving unit.

ALWAYS operate unit in good visibility and light.

Fuel is highly flammable and its vapors can explode.
Use ONLY approved fuel containers.
NO Smoking!
NO Sparks!
NO Flames!
Allow engine to cool before servicing.
NEVER fill fuel tank when engine is running, hot, or unit is indoors.

Abnormal Vibrations are a warning of trouble. Striking a foreign object can damage unit. Immediately stop unit and engine. Remove key and wait for all moving parts to stop. Remove wire from spark plug. Inspect unit and make any necessary repairs before restart.

Hazardous Slopes

DO NOT operate on steep slopes. Avoid operating on slopes. When you must operate on a slope, travel up and down the slope. Never operate across a slope. Never operate on a slope greater than 10 degrees.

Child Safety

NEVER allow children to operate or play on or near unit. Be alert and shut off unit if children enter area.

Personal Safety

Read and obey all warning, caution, and instructions on the unit and in provided manuals.

- Only trained adults may operate unit.
- Training includes actual operation.
- Clearly understand instructions.
- Be alert! Conditions can change.

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

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

DO NOT operate unit without wearing adequate outer garments. Wear adequate safety gear and protective gloves. Wear proper footwear to improve footing on slippery surfaces.

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

Avoid Sharp Edges. Sharp edges can cut. Moving parts can cut or amputate fingers or a hand. Wear gloves to service unit when handling sharp edges.

ALWAYS keep hands away from any pinch points.

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

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

Controls

Come to a complete stop before reversing.

Never jerk the control levers. Always use a steady even action to achieve smooth control.

Always be aware of obstructions that may cause injury to operator or damage to the unit.

Service Position

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

WARNING: ROTATING PARTS can amputate body parts. Keep hands and feet away. Loose clothing, long hair or scarves can get caught in rotating parts and cause death or serious injury.

Place unit on flat, level surface. ALWAYS stop engine and disengage clutches. Assure unit is secure and will not tip over. Strap and clamp onto lift, if used.

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

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

CAUTION: Remove enough fuel so that no spills will occur.

Maintenance

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

Check the conditions of the unit at the end of each day and repair any damage or defects.

ALWAYS block wheels and know all jack stands are strong and secure and will hold weight of unit during maintenance.

Keep nuts and bolts tight and keep equipment in safe operating conditions.

Before maintenance, adjustments, or service (except where specifically recommended), shut off engine.

Allow hot parts to cool.

Keep unit free of dirt, stones, and other debris. Clean up oil or fuel spills.

Storage

DO NOT store unit inside a building with fuel in the fuel tank where any ignition sources are present. Allow unit to cool completely.

ALWAYS clean unit before extended storage. See Engine Manual for proper storage.

Spark Arrester

This product is equipped with an internal combustion engine. DO NOT use on or near any unimproved, forest covered or brush covered land unless the 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 the operator.

Battery

Avoid Electric Shock. DO NOT reverse battery connections.

Explosive Gases! Poisonous battery fluid contains sulfuric acid and its contact with skin, eyes, or clothing can cause severe burns.

No flames. No sparks. No smoking near battery.

Always wear safety glasses and protective gear near battery.

DO NOT TIP battery beyond a 45^{o} angle in any direction.

ALWAYS KEEP BATTERIES OUT OF REACH of children.

Transport

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 with attachment in raised position.

Lower attachment when unit is parked or stored unless a positive mechanical lock is used.

Attachments and Accessories

Use only attachments or accessories designed for your unit.

2.10 CLEAN UNIT

Brush grass, dirt and debris off of unit with a soft brush. Clean packed grass out from under mower deck. Apply paint or oil to exposed, bare metal surfaces to prevent rust.

Inspect unit for visible signs of wear, breakage, or damage. Order any parts required and make necessary repairs to avoid delays when beginning use again.

IMPORTANT: Never spray unit with water or store unit outdoors. Water can seep into sealed bearings, which are sealed against dirt and debris only, causing reduced component life.

Clean seat regularly, using a vinyl cleaner (not solvent). Extreme temperatures can damage seat when left unprotected against weather. If seat should tear, apply vinyl repair tape to protect damaged area.

Transaxle cooling fins must be kept clean to prevent damage from overheating. Use a cloth or brush to remove grass, chaff and debris.

Unless there are indications of leakage, transaxle does not have to be checked for proper oil level. If leak occurs, have it repaired by your Ariens Dealer.

SECTION 3 - SPECIFICATIONS

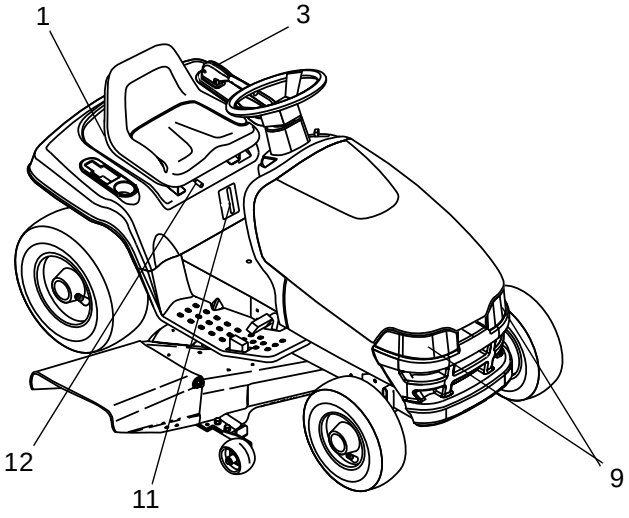
Model Number	934026	934027
Description	High Sierra 1848H	High Sierra 2248H
Battery	12 Volt 220 CCA.	12 Volt 220 CCA.
Hour Meter	Optional	Optional
Brakes	Disc	Disc
Steering	Gear	Gear
Turning Radius - in (cm)	26 (66.0)	26 (66.0)
Tire Size - Front Rear	15x6.00-6 23x10.5-12	15x6.00-6 23x10.5-12
Engine	18.0 HP V-Twin	22.0 HP V-Twin
Manufacture	Briggs & Stratton	Briggs & Stratton
Width of Cut - in (cm)	48 (121.9)	48 (121.9)
Fuel and Capacity-gal (L)	Unleaded 3 (11.3)	Unleaded 3 (11.3)
Idle RPM.	1800 Max.	1800 Max.
Governed RPM (No Load)	3250 ± 100	3200 ± 150
Crank Case Capacity-oz (L) (Oil Filter)	56 (1.65) (Yes)	64 (1.89) (Yes)
Air Cleaner	Dual Element	Dual Element
Charging Capacity	9 AMP Regulated	16 AMP Regulated
Fuel Filter	60 Micron 2 1/2 GPA Capacity	60 Micron 2 1/2 GPA Capacity
Engine Oil	5W30 Below 40^{o}F 30W Above 40^{o}F	5W30 Below 40^{o}F 30W Above 40^{o}F
Spark Plug Gap	.030 Champion RC12YC	.030 Champion RC12YC
Speed - Forward Max. -mph (kph) Reverse Max.	0 -5.9 (0-9.5) 0 - 2.9 (0-4.7)	
Transmission Lube	20W50 Oil	20W50 Oil
Drive Clutch	Belt Clutched	Belt Clutched
Axle Capacity	260 Ft. Lb.	260 Ft. Lb.
Allowable Added Weight - lbs (kg)	500 (227)	500 (227)
Rear Axle Maximum Load - lbs (kg)	700 (3l7.8)	700 (317.8)
Tire Pressure with Loads Front/ Rear - Light & Medium Heavy (Sno-Thro)	10 PSI/10 PSI 14 PSI/10 PSI	10 PSI/10 PSI 14 PSI/10 PSI
Lift System	Manual	Manual
Power Take Off	Electric	Electric

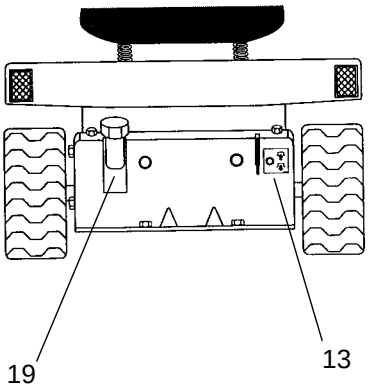
Model Number	934019	934020	934023
Description	HT 6 HP Gas	HT 18 HP Gas	High Sierra 1848
Battery	290 CCA	290 CCA	12 Volt 290 CCA
Hour Meter	Optional	Optional	Optional (736008)
Brakes	Dual Disc in Axle	Dual Disc in Axle	High
Steering	Manual	Manual	Disc
Turning Radius - in (cm)	27 (67)	27 (67)	Gear
Tire Size - Front Rear	15x6.00-6 23x10.5-12	15x6.00-6 23x10.5-12	30
Engine	18 HP	18 HP	15x6.00-6 23x10.50-12
Manufacture	Kohler Magnum	Kohler Magnum	18 HP
Width of Cut - in (cm)			Briggs & Stratton
Fuel and Capacity-gal (L)	Unleaded 3.7 (14)	Unleaded 3.7 (14)	
Idle RPM.	1200	1200	Unleaded 3 (11.3)
Governed RPM (No Load)	3250	3250	2100
Crank Case Capacity-oz (L) (Oil Filter)	1.5 qts (1.4)	1.5 qts(1.4)	3250
Air Cleaner	Dual Element	Dual Element	56 oz. (Yes)
Charging Capacity	Regulated 20 AMP Flywheel Alt.	Regulated 20 AMP Flywheel Alt	Dual Element
Fuel Filter			16 AMP Regulated
Engine Oil	SAE 30 Above 32^{o}F SAE 10W30 Below 32^{o}F	SAE 30 Above 32^{o}F SAE 10W30 Below 32^{o}F	120 Micron 2 1/2 GPA Capacity
Spark Plug Gap	.020 RV15YS	.020 RV15YS	5W30 Below 40^{o}F 30W Above 40^{o}F
Speed - Forward Max. -mph (kph) Reverse Max.	6.0 (9.7) 2.5 (4.0)	6.0 (9.7) 2.5 (4.0)	.030 Champion RN-4C
Transmission Lube	SAE 20W2	SAE 20W20	0.0-5.5 (0-8.8) 0-2.75 (0-4.4)
Drive Clutch	Neutralizing Hydro Transmission	Neutralizing Hydro Transmission	20W20 Oil
Axle Capacity	900	900	Belt Clutched
Allowable Added Weight - lbs (kg)	575	575	325 Ft. Lb.
Rear Axle Maximum Load - lbs (kg)	900	900	500 (266.7)
Tire Pressure with Loads Front/ Rear - Light & Medium Heavy (Sno-Thro)	12 PSI/8 PSI 12 PSI/10 PSI	12 PSI/8 PSI 12 PSI/10 PSI	900 (408.2)
Lift System	Electric	Electric	10 PSI/10 PSI 14 PSI/10 PSI
Power Take Off	Electric	Electric	Manual

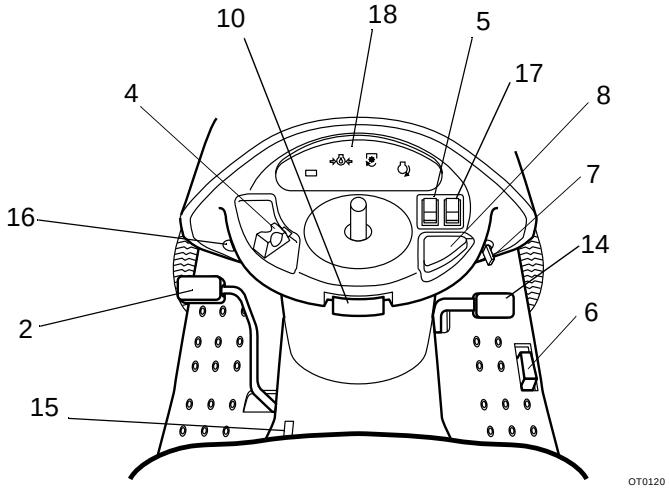
Model Number	934025	934026	934301
Description	High Sierra 1848	High Sierra 1848H	High Sierra 1848
Battery	12 Volt 290 CCA	12 Volt 220 CCA.	12 Volt 290 CCA
Hour Meter	Optional (736008)	Optional	Optional (736008)
Seat	High	Disc	High
Brakes	Disc	Gear	Disc
Steering	Gear	26 (66.0)	Gear
Turning Radius - in (cm)	30	15x6.00-6 23x10.5-12	30
Tire Size - Front Rear	15x6.00-6 23x10.50-12	18.0 HP V-Twin	15x6.00-6 23x10.50-12
Engine	18 HP V-Twin	Briggs & Stratton	18 HP
Manufacture	Briggs & Stratton	48 (121.9)	Briggs & Stratton
Width of Cut - in (cm)		Unleaded 3 (11.3)	
Fuel and Capacity-gal (L)	Unleaded 3 (11.3)	1800 Max.	Unleaded 3 (11.3)
Idle RPM.	2100	3250 ± 100	1800
Governed RPM (No Load)	3250	56 (1.65) (Yes)	3250
Crank Case Capacity (Oil Filter)	56 oz.	Dual Element	56 oz. (Yes)
Air Cleaner	Dual Element	9 AMP Regulated	Dual Element
Charging Capacity	16 AMP Regulated	60 Micron 2 1/2 GPA Capacity	16 AMP Regulated
Fuel Filter	120 Micron 2 1/2 GPA Capacity	5W30 Below 40°F 30W Above 40°F	120 Micron 2 1/2 GPA Capacity
Engine Oil	5W30 Below 40°F 30W Above 40°F	.030 Champion RC12YC	5W30 Below 40°F 30W Above 40°F
Spark Plug Gap	.030 Champion RN-4C	0 -5.9 (0-9.5) 0 - 2.9 (0-4.7)	.030 Champion RC12YC
Speed - Forward Max. -mph (kph) Reverse Max.	0.0-5.5 (0-8.8) 0-2.75 (0-4.4)	20W50 Oil	0.0-5.5 (0-8.8) 0-2.75 (0-4.4)
Transmission Lube	20W20 Oil	Belt Clutched	20W20 Oil
Drive Clutch	Belt Clutched	260 Ft. Lb.	Belt Clutched
Axle Capacity	325 Ft. Lb.	500 (227)	325 Ft. Lb.
Allowable Added Weight - lbs (kg)	500 (266.7)	700 (3l7.8)	500 (266.7)
Rear Axle Maximum Load - lbs (kg)	900 (408.2)	10 PSI/10 PSI 14 PSI/10 PSI	900 (408.2)
Tire Pressure with Loads Front/ Rear - Light & Medium Heavy (Sno-Thro)	10 PSI/10 PSI 14 PSI/10 PSI	Manual	10 PSI/10 PSI 14 PSI/10 PSI
Lift System	Manual	Electric	Manual
Power Take Off	Electric		Electric
Mower Pan	48		48
Bagger 3 Bucket/1 Bag	N/A		N/A
Sno-Thro	834033		834033
Dozer Blade	834034		834034

SECTION 4 - GENERAL MAINTENANCE & ADJUSTMENTS

4.1 CONTROLS AND FEATURES







1. Fuel Tank Fill
2. Clutch/Brake Pedal
3. Attachment Lift Lever
4. Throttle/Clutch Lever
5. Head Light Switch
6. Reverse Pedal
7. Ignition /Key Switch
8. Implement Power Switch
9. Headlights
10. Parking Brake Control
11. Fuel Level Indicator
12. Seat Position or Adjustment
13. Transmission Disconnect Control
14. Forward Pedal
15. Mower Height Indicator
16. Choke Control (16 HP B&S Twin Only)
17. Cruise Control Switch
18. Indicator Lights
19. Oil Reserve

Figure 2

4.2 FILLING THE FUEL TANK

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

Add fuel to the fuel tank as needed. See your engine manual for the correct type and grade of fuel to be used.

Put the unit in an open and well ventilated area prior to refueling.

Stop the engine and set the parking brake.

Move the seat forward and clean the fuel cap and in the area around the fuel cap. Remove the cap from the fuel tank.

Fill the fuel tank with the proper grade of fuel recommended by the engine manufacturer. Be careful not to spill any fuel.

Install fuel cap on the fuel tank and tighten.

4.3 GENERAL LUBRICATION

The steering system, front axle and wheels, brake/ clutch shaft support and pivot points should be lubricated every 50 hours of operation, or every 3 months, whichever occurs first.

Grease fitting locations. Oil pivot points on brake, clutch and mower deck linkage as needed.

IMPORTANT: Wipe each fitting clean before and after lubrication.

Apply Sten Mix Hi-Temp Grease or equivalent to the lube fittings. Order P/N: 00036800 - Three pack of 3 oz. cartridges or 00036700 - ten pack of 14 oz. cartridges.

Apply grease at lubrication points shown below.

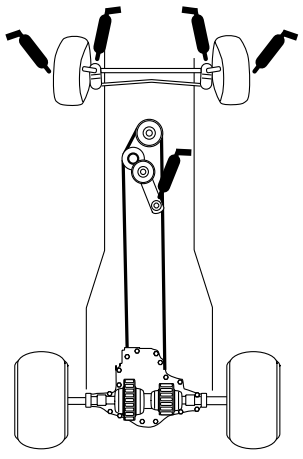


Figure 3

Rotary mower should be lubricated at beginning of season and every 25 operating hours. Grease points are shown below.

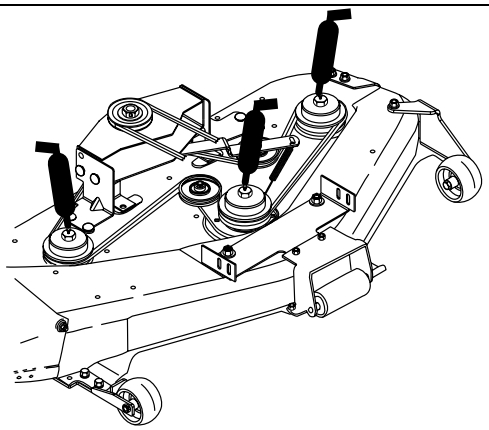


Figure 4

Apply motor oil to all pin connections, pivots points and areas where sliding occurs every 25 hours.

4.4 CHECKING FASTENERS

Each day before operating the unit, check all nuts, bolts and other fasteners. Replace fasteners that are missing or damaged.

Tighten all nuts and bolts to the torque listed in the torque table unless noted differently.

4.5 CHECK ENGINE OIL LEVEL

Refer to the Engine Manual for oil type and viscosity. The engine crankcase oil should be checked daily or every 5 hours of operation.

1. To check oil, park tractor on a flat, level surface.
2. Stop engine, raise hood and wipe all debris from around dipstick cap.
3. Turn cap, remove dipstick from engine and wipe oil off dipstick.
4. Insert dipstick into filler tube and turn slowly until cap bottoms firmly.
5. Remove dipstick and observe oil level. If low, add clean, fresh oil (of same type and viscosity as is in engine) to bring oil level to full (F) mark.
6. Replace dipstick and tighten cap firmly.

IMPORTANT: DO NOT over-fill. Level must not exceed full (F) mark. Oil level MUST be maintained in safe operating range on dipstick at all times or engine damage will result.

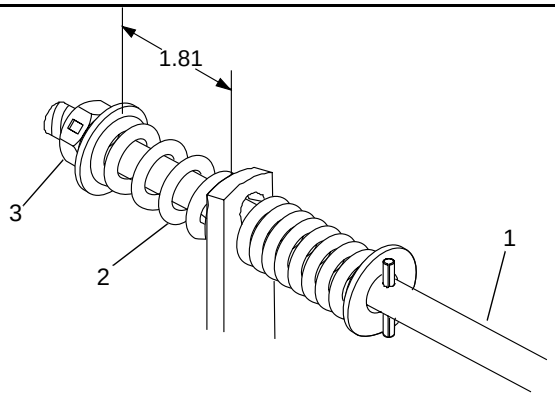
4.6 ADJUSTMENTS

Ariens recommends that you have adjustments made by your Ariens dealer. They have the knowledge and tools to properly perform adjustments which may be required to keep your equipment operating at peak

efficiency. Should you decide to make adjustments yourself. Ariens recommends that you call your dealer for answers to any questions that arise.

4.7 PARKING BRAKE SPRING

Compress the spring to the length indicated with the brake on (Park Brake Set). Turn the locknut to adjust.



1. Brake Rod
2. Compression Spring
3. Lock Nut

Figure 5

OT0351

4.8 STEERING

If steering system seems loose, check hardware for tightness. Check friction points for excessive wear. (replace as needed.) If gear mesh adjustment is needed, refer to section on Steering and Controls.

Proper front wheel toe-in assures proper steering and reduced tire wear. For proper toe-in, front of wheels are 1/16" to 1/8" closer together than rear of wheels (measured at horizontal center line of rim flange).

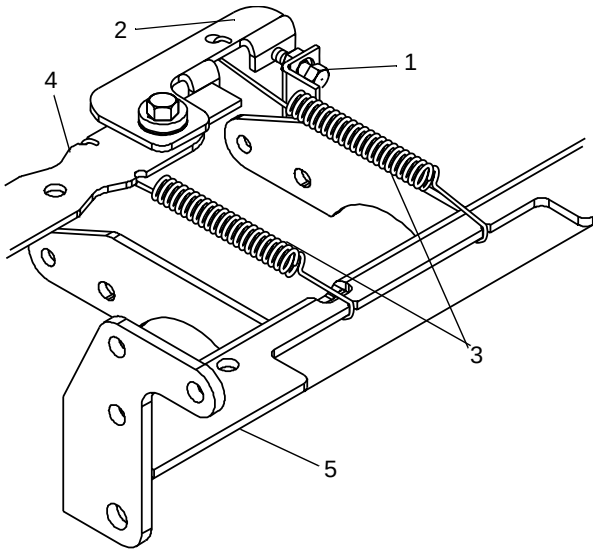
If tractor wanders or excessive tire wear develops, check toe-in.

To adjust toe-in:

1. Loosen jam nuts at tie rod ends.
2. Turn tie rod clockwise to decrease or counterclockwise to increase toe-in.
3. Tighten jam nuts.

4.9 NEUTRAL ADJUSTMENT

With right rear wheel off ground, turn neutral adjustment bolt in or out to stop the wheel from rotating.

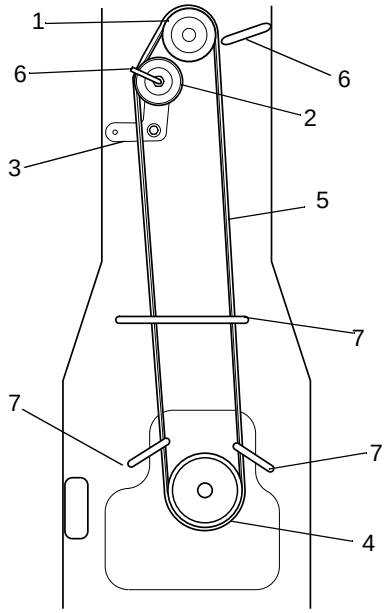


1. Neutral Adjustment Bolt
2. Neutral Arm
3. Spring
4. Control Arm
5. Torque Mount

Figure 6

OT0360

4.10 TRACTION DRIVE BELT



1. Engine Sheave
2. Vee Idler
3. Clutch Idler Arm
4. Transaxle Pulley
5. Traction Drive Belt
6. Belt Finger (2)
7. Belt Guide (3)

Figure 7

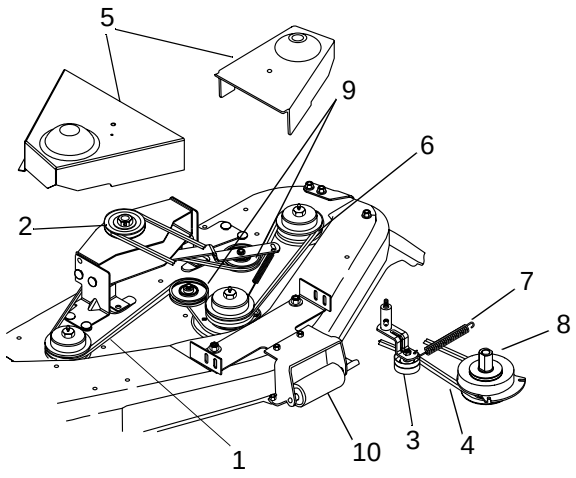
OT0061

WARNING: Stop engine, remove key and remove wires from both spark plugs before attempting to replace belts.

1. Loosen hardware securing belt fingers at idler and pulleys.
2. Depress clutch/brake pedal and remove belt from idler, engine sheave, and pulleys.
3. Install new belt in reverse order.
4. Secure belt finger hardware with 1/16" to 1/8" clearance between belt fingers and belt.
5. Tighten the 5/16" belt finger hardware to 109 in lbs. and the 3/8" hardware to 179 in-lbs (20.2 Nm).

4.11 MOWER DRIVE BELT

The mower belt idler system is designed to provide constant tension on the belt.To maintain proper belt tension, the idler spring must be extended as shown. If the spring is extended less than 4", replace the belt.



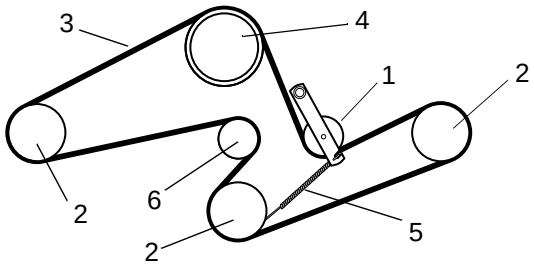
1. Rotary Mower Belt
2. Drive Pulley
3. Idler
4. Rotary Mower Drive Belt
5. Belt Cover (2)
6. Mower Idler Spring
7. Main Idler Spring
8. Electric Clutch
9. Mower Idler Pulleys
10. Front Skid Roller

Figure 8

OT0331

1. Disconnect main idler spring from frame. Remove belt from electric clutch and mower pan.
2. Install new belt in reverse order check belt alignment and clearance.

CAUTION: Stored energy in spring can cause injury.



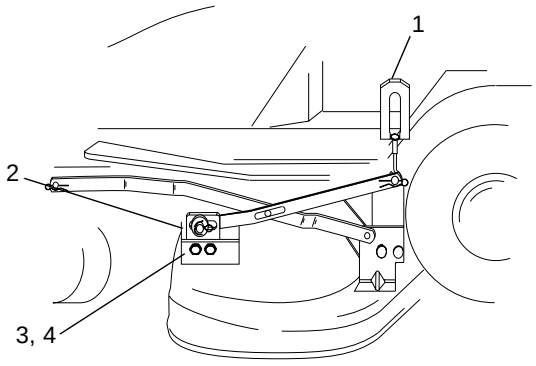
1. Idler
2. Mower Pulley
3. Mower Belt
4. Jackshaft Pulley
5. Idler Spring
6. Mower Idler Pulley

Figure 9

OT0931

4.12 MOWER LEVEL (SIDE TO SIDE)

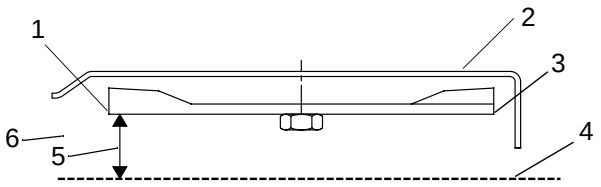
NOTE: A wood block (about 1" square by 5" long) may be used under pan for blade measurement. Wrap block with masking tape. Mark tape with cutting edge of blade and measure distance from end of block to mark(s). This method avoids errors by having to read measurements under deck.



1. Height Adjuster
2. Adjusting Tab
3. Carriage Bolt
4. Nylon Lock Nut

Figure 10

OT0370

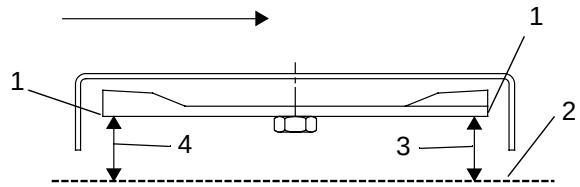


1. Cutting Tip
2. Mower Deck
3. Blade
4. Ground Level
5. Cutting Height
6. Discharge Chute

Figure 11

With tractor positioned on a flat, level surface and tire pressure properly set, perform the following procedures:

1. With blade(s) positioned side to side, measure distance of blade(s) tips to floor at right and left side of mower deck. Rotate blade(s) 180 degrees and check again. The measurement should be equal within 1/8" side to side.
2. To correct for difference in height of blade tips from side to side, loosen nut on height adjuster. Turn height adjuster clockwise on low side of mower deck to raise low side one half the difference in height. Turn height adjuster counterclockwise on high side to lower high side the other half of the height difference.



1. Blade Cutting Edges
2. Ground Level
3. Front Blade Height
4. Rear Blade Height

Figure 12

4.13 MOWER PITCH AND HEIGHT

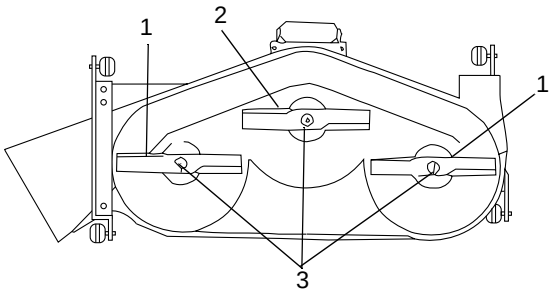
For proper blade pitch, blade tip (measured from surface) is 1/8" to 1/4" lower at front of mower deck than when same tip is at rear of mower pan.

To adjust pitch, loosen nylon lock nuts and slide adjusting tabs up or down.

Height adjuster hooks raise or lower mower deck and change cutting height. To adjust:

1. Remove hair pins and height adjusters.
2. Turn equally clockwise to lower or counterclockwise to raise rear of rotary mower.
3. With mower attachment lift in highest position, front blade height should measure 4" from ground level.
4. Secure height adjusters in position with hair pins.

4.14 SHARPEN BLADES



1. Outer Blades
2. Center Blade
3. Mounting Lock Washers and Nuts

Figure 13

OT0320

CAUTION: Stored energy in spring can cause injury.

To sharpen blade:

1. Block blade to prevent rotation. Remove nut, lock washer and blade from shaft.
2. Sharpen both ends of blade at original angle (25 degrees), removing equal amounts of material from each end to maintain proper blade balance. New blades are balanced to within 1.3 inch ounces at factory. DO NOT grind around corner at top of blade. If cutting edge of blade cannot be sharpened to a square corner to within 1/8" of its end, replace blade with Ariens replacement blade only. Blades are available through your Ariens Dealer.
3. Install blade and lock washer. Tighten nut until lock washer is fully compressed (requires 50-60 ft. lbs. of torque on nuts).

4.15 CHECK TIRES

NOTE: Keep tires properly inflated at all times. For proper tire inflation when working under various conditions, refer to chart below. Use a low pressure tire gauge for accurate pressure readings.

Loading	Light & Medium	Heavy (Sno-Thro)
Front	10 psi	14 psi
Back	10 psi	

Check tire pressure at least once a month. Over-inflation may cause operator discomfort and excessive tire tracks on lawns or soft surfaces. Under-inflation causes short tire life.

NOTE: After checking and/or inflating, replace and tighten valve caps to prevent air loss.

SECTION 5 - ENGINE

5.1 ENGINE TROUBLESHOOTING

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

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

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)	CORRECTIVE ACTION
Black Exhaust	1, 20, 22, 25, 29, 31, 32, 33	repair or replace
Blue/White Exhaust	4, 20, 25, 31, 33, 34	repair or replace
Difficult Starting	1, 5, 7, 8, 9, 10, 20, 21, 22, 29, 31, 32, 33	repair or replace
Erratic Running	1, 7, 8, 9, 10, 20, 21, 23, 26, 29, 33, 59, 62	repair or replace
Excessive Fuel Consumption	1, 20, 22, 23, 25, 29, 31, 32, 33	repair or replace
Excessive Crankcase Pressure	25, 31, 33, 34, 45, 55	
High Oil Pressure	4, 41	repair or replace
Knocking	22, 26, 29, 31, 33, 36, 46, 59	repair or replace
Loss of Power or System	1, 8, 10, 20, 21, 22, 23, 25, 26, 31, 32, 33	repair or replace
Low Cranking Power	2, 3, 4, 11	repair or replace
Low Oil Pressure	4, 36, 37, 39	repair or replace
Misfiring	10, 20, 25, 26, 28, 29, 32	repair or replace
Overheating	1, 19, 25,	repair or replace
Poor Compression	25, 28, 29, 31, 32, 33, 34,59,	repair or replace
Starts and Stops	1, 6, 10, 62	repair or replace see electrical systems see engine service manual
Vibration	20, 23, 25, 26, 29, 33, 45, 49	repair or replace
Will Not Crank	2, 11, 45	charge battery or replace
Will Not Start	1, 10, 62	repair or replace see electrical systems see engine service manual

TROUBLESHOOTING KEY

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

5.2 CHECKING ENGINE OIL

Check the engine oil daily prior to use.

IMPORTANT: Never operate the engine with the oil below the low mark on the dipstick.

See the engine manual for oil specifications and oil filter service instructions.

To check oil level:

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

5.3 CHANGING OIL

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

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

1. Engine oil should be changed after the first five hours of operation and every 25 hours there after.
2. Move the unit to a level and well ventilated area and set the parking brake.
3. If the engine is cold, let the unit run for five minutes.

Figure 14

4. When the engine is warm, stop the engine.
5. Clean the area around the dipstick and (drain hose).
6. Put an open container that will hold one gallon of oil under the drain hose.
7. Open the drain valve.
8. Allow the engine oil to drain completely into the one gallon container. Remove container and contents for future recycling as required.
9. Close the oil drain valve.
10. If used; remove the oil filter.
11. Clean the oil filter port and install a new oil filter according to the instructions on the oil filter. Fill with new oil to the "full" mark on the dipstick.
12. Start and run the engine for one minute. Stop the engine and recheck the oil level and add as necessary.
13. Check for leakage at the drain plug and oil filter if used. Tighten the fittings as necessary if leakage occurs.

Figure 15

14. Release the parking brake.
15. Return the unit into service.

5.4 CHECKING ENGINE COOLING

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

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

5.5 CLEANING THE AIR CLEANER

1. Check the air cleaner element every day.

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

5.6 CHANGING THE AIR CLEANER ELEMENT

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

5.7 INSPECT MUFFLER/SPARK ARRESTER

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

5.8 REPLACE SPARK PLUGS

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

5.9 ENGINE REMOVAL

1. Remove the hood from the units engine.
2. Remove the negative cable from the battery.
3. Remove the main drive belt from the engine sheave by releasing the idler tension spring.
4. Remove the jackshaft drive belt from the engine sheave by releasing the tension spring from the right side of the transaxle sub frame.
5. Remove the throttle and choke control from the engine.
6. Remove the electrical wiring from the engine (charge lead, fuel solenoid lead, and magneto kill wire).
7. Remove fuel line from engine first. Drain fuel from line back into fuel tank.
8. Remove the exhaust system from under the frame. Disconnect at the exhaust port on the engine.
9. Remove the engine bolts.
10. Lift engine out of the unit and off the frame with a hoist (engine).
11. Service, overhaul, or replace engine as required.
12. If replacing engine with a new engine, the following items will have to be removed (if used) from old engine. These items will not be included with a new engine.

    Engine sheave and key, mounting hardware, and engine wiring harness.

5.10 ENGINE INSTALLATION

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

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

9. Check the fluid levels as follows:

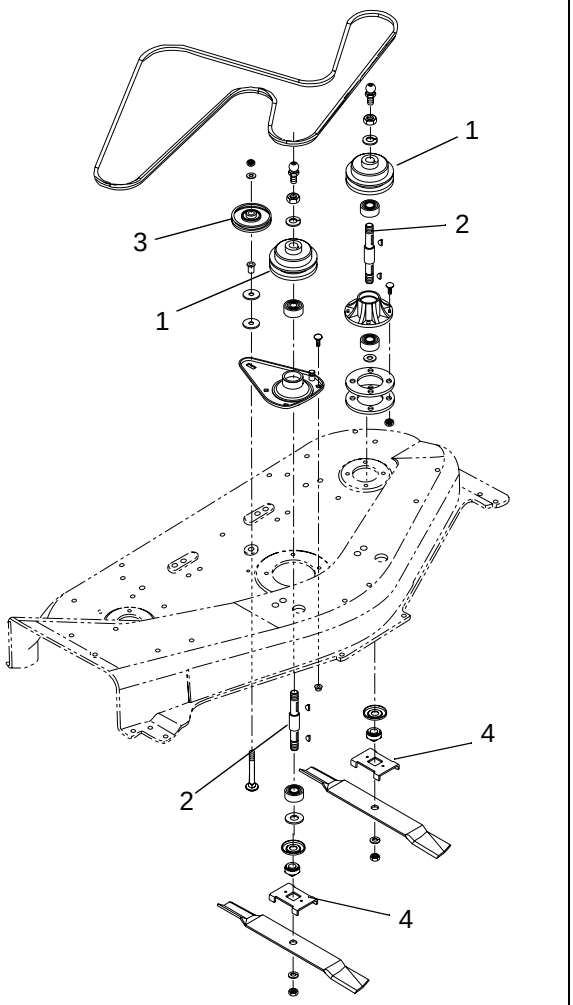
   a) Start the engine and allow it to heat to operating temperature. DO NOT operate engine for more than two minutes.

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

6.1 MOWER SPINDLE REMOVAL

With the mower deck removed from the unit the disassembly of the mower may be completed.

1. Remove the right and left side mower spindle cover.



1. Sheave
2. Spindle Shaft w/Zerk
3. Plastic Idler
4. Blade Tray

Figure 16

PT0192

2. Remove the mower deck blades hardware, mower deck blades, blade trays retainer hub, spindle key and bearing slinger.
3. Remove the mower deck spindle drive belt from the spindle sheaves.
4. Remove the spindle sheaves from the shaft assemblies.
5. Remove the mower spindle housings from the mower deck stamping.

Spindle Repair

When the spindle housing has been removed from the mower deck, the spindle shaft and bearings may be removed from the housing.

Use a press to remove the bearings and spindle shaft from the housing.

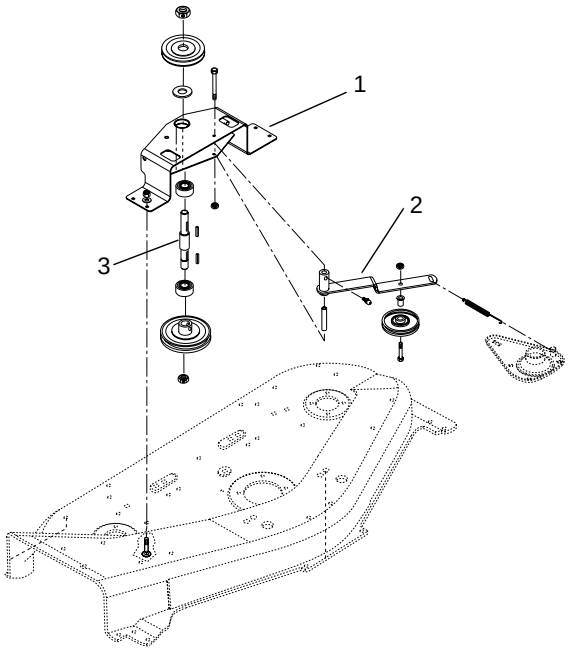
If the housing has been damaged replace the spindle shaft, bearings and housings.

Press new bearings into the spindle housing. Make sure to insert the spindle shaft into the housing before pressing the second bearing into place.

Spindle Installation

1. Place the spindle housings into the mower deck stamping and attach with new hardware.
2. Insert spindle shaft and sheave assemblies into the spindle housings with spacer washer under sheaves.
3. Reattach the right side mower support arms to the mower deck stamping.
4. Reattach the mower deck spindle drive belt.
5. Reinstall the bearing slinger, spindle key, retainer hub, blade trays, and mower deck blades with hardware removed earlier.
6. Check mower deck blades for clearance inside of the mower deck stamping and mounting flatness.

6.2 JACKSHAFT REMOVAL AND REPAIR



1. Jackshaft Housing
2. Idler Arm
3. Jackshaft

Figure 17 PT0203

1. Remove the mower deck idler tension spring from the spring anchor.
2. Remove the mower deck drive belt from the jackshaft assembly.
3. Remove the hardware holding the jackshaft assembly to the mower deck stamping. Remove the assembly.
4. Remove the nylock nut on the top of the spindle assembly and remove the double pulley assembly.
5. Check the bearings, and spindle shaft for wear and replace the damaged parts.

Bearings need to be removed with a bearing puller and replaced with a bearing driver in a press.

NOTE: The bearings should have a light press fit to the bore of the pulley assembly, too tight of a press fit will preload the bearing and cause premature bearing failure.

6. Check idler arm pivot bushings for wear and movement. Check the idler for run out and interferences.
7. Reassemble the double pulley assembly with the bearing spacer tube inside the assembly.
8. Place the double pulley assembly onto the spindle shaft and hold in place with a flat washer and nylock lock nut.
9. Reattach assembled housing to mower deck. Reroute the belt and attach idler tension spring.

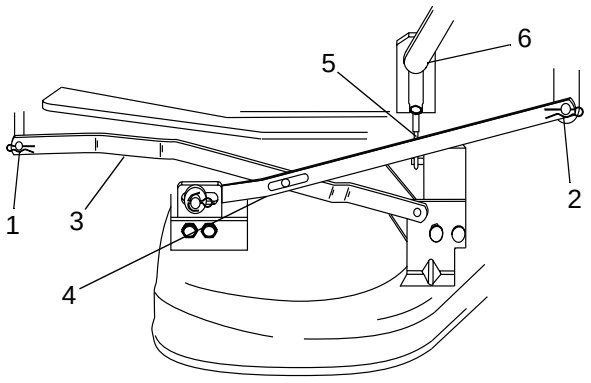
WARNING: Stop engine, remove key and remove wires from both spark plugs before attempting to replace belts.

6.3 ROTARY MOWER INSTALLATION

1. Turn the front wheels all the way to the left and slide mower under unit. Place two supports approximately 1- 1/2" high (the thickness of a 2" x 4") under each side of the deck.
2. Connect the mower front lift arms to the jackshaft housing and secure with hair pins.
3. Connect the mower rear lift arms to the deck adjusters and secure with washer and cotter pins.
4. Put the attachment lift lever in its lowest position. Connect the height adjusters to the center lift lever and secure with washers and hair pins.
5. Remove the supports from under the deck.
6. Install the mower drive belt onto the electric clutch pulley. Position the belt around idler.
7. Attach spring from idler arm to jackshaft housing.

6.4 ROTARY MOWER REMOVAL

1. Place (2) supports approximately 1-1/2 inches high (the thickness of a 2" x 4") under the right and left sides of the mower deck.
2. Lower the mower deck onto the supports. This relieves all the mower decks weight from the tractors lift system.
3. Disconnect the mower rear hangers by pulling the hair pins out of the rear lift arm pins.
4. Slide the mower deck forward just enough to remove the front pin and front lift arms from the tractor front hooks.
5. Unhook idler tension spring from frame.
6. Remove the mower height adjusters from the tractor lift lever hooks.
7. Remove the mower belt from the electric clutch.
8. Turn the front tires all the way to the left (opposite the mower discharge side).
9. Remove the supports from underneath the mower deck.
10. Remove the mower deck by sliding it out between the tractor's right front and rear tires.
11. Rotary mower drive belt can be inspected and replaced if necessary at this time.



1. Front Pin
2. Hair Pin
3. Front Lift Arm
4. Rear Lift Arm
5. Height Adjuster
6. Center Lift Lever

Figure 18

OT0301

6.5 ROTARY MOWER BELT REPLACEMENT

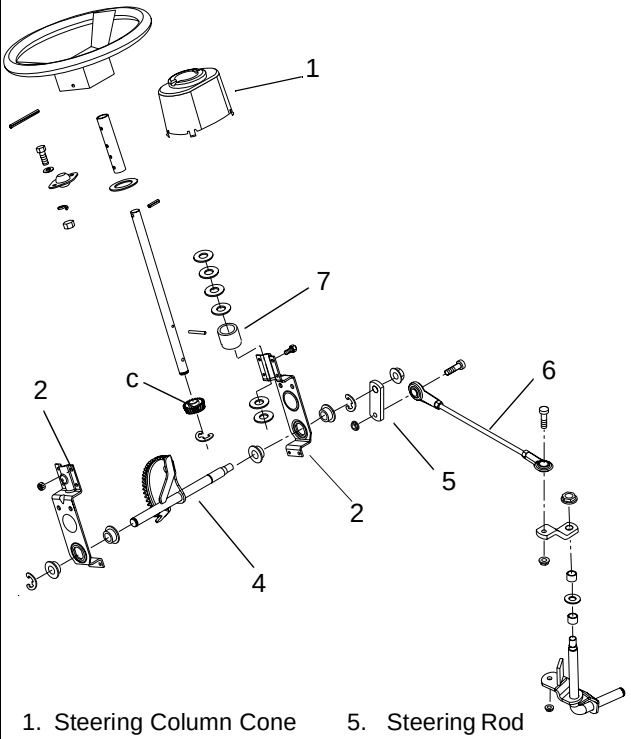
1. Place (2) supports approximately 1-1/2" high under the right and left side of the mower deck.
2. Lower the mower deck on to the supports. This relieves all the mower decks weight from the tractors lift system.
3. Disconnect the mower rear hangers by pulling the hair pins out of the rear lift arm pins.
4. Slide the mower deck forward just enough to remove the front pin and front lift arms from the tractor front hooks.
5. Unhook idler tension spring from frame.

CAUTION: Stored energy in spring can cause injury.

6. Remove both belt covers. Disconnect the idler spring from the spring mount post welded to the mower deck.
7. The mower belt idler system is designed to provide constant tension on the belt. To maintain proper belt tension, the idler spring must be extended as shown below. If the spring is extended less than 4", replace the belt on 48" mower.
8. Loosen hardware for left side of jackshaft housing. Remove hardware from right side of jackshaft housing.
9. Remove the old belt from the mower deck and install the new belt in reverse order. Be sure that the belt is seated in all pulley grooves. Tighten the 4 5/16" nuts, etc.
10. Reinstall rotary mower deck.

7.1 STEERING UNIT REMOVAL

1. Open and remove the hood from the unit.
2. Remove the battery by first removing the negative battery cable and then the positive battery cable. Release the battery hold down strap and remove the battery.
3. Remove the indicator lights from the dash, remove the wiring plugs from all the switches and hour meter if installed.
4. Remove the steering wheel and steering column cone from the top of the dash assembly. Remove the knob from the throttle control, and remove the throttle control from the dash support. Remove the screws that hold the side panels to the dash support.
5. Remove the remaining screws around the base of the dash assembly from the tractor frame and lift the dash assembly off the tractor.
6. Remove the upper dash support and steering shaft bearing.
7. Remove the electrical components from the right side of the top dash support and remove the upper dash support from the tractor.



1. Steering Column Cone
2. Steering Gear Bracket
3. Steering Pinion Gear
4. Steering Gear
5. Steering Rod Arm
6. Drag Link
7. Bushing

Figure 19

8. Remove the steering rod arm from the left side of the tractor. Remove the two snap rings from the ends of the shaft and rack assembly.
9. Remove the flange bushings from the side of the lower dash support and move the steering gear assembly to the left and rotate out of the right side of the dash support.
10. Disassemble the pinion gear support bracket and check for wear on the rack or pinion gear. Replace the parts as needed.

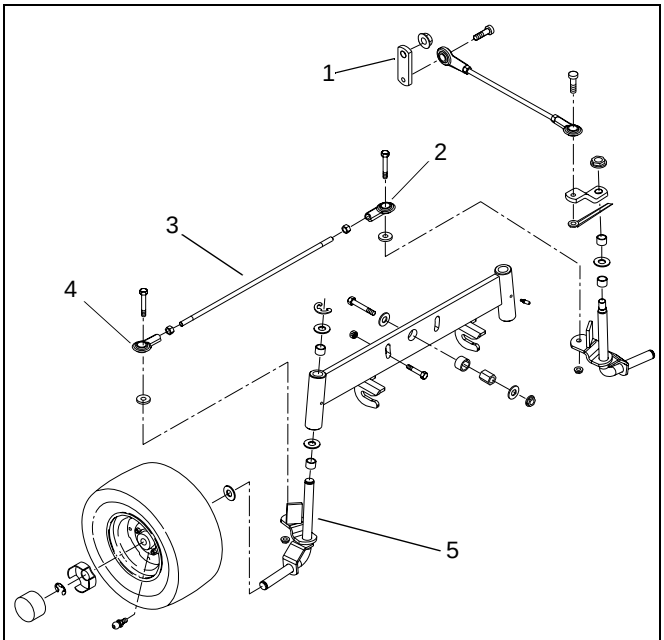
7.2 STEERING UNIT ASSEMBLY

1. Reassemble the steering pinion support and shim for correct back lash.
2. Insert the steering assembly through the lower dash support and add the flange bushings and snap rings to hold the unit in place.
3. Rotate the steering shaft up and install the upper dash support with the steering shaft bearing.
4. Reinstall the electrical components on the right side of the upper dash support.

5. Install the dash assembly and secure to the tractor frame with the screws removed earlier.
6. Secure the side panels to the dash assembly and reattach the wiring and indicating lights if used.
7. Reattach the steering wheel and the steering column cone to the top of the dash assembly.

7.3 TIE ROD ADJUSTMENT

With the pinion gear in the center of the rack assembly the steering rod arm should be on the end of the rack shaft in the vertically down position.



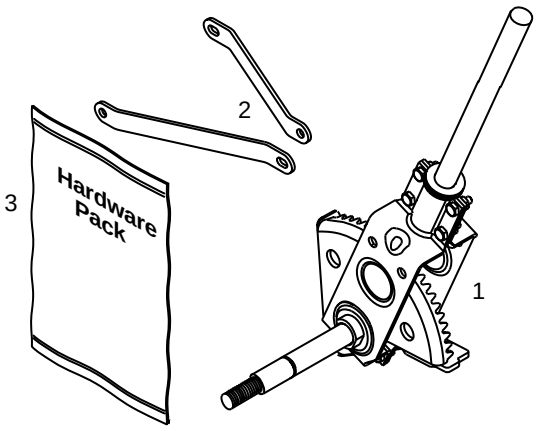
1. Steering Rod Arm
2. End Rod
3. Tie Rod
4. End Rod
5. Right Hand Spindle

Figure 20

The front wheels should be toed in 1/8 of a inch in the front of the wheel compared to the rear of the front wheels (measured at horizontal center line of rim flange). Adjust tie rod and ball joints to hold this dimension.

With the front wheels pointed straight forward attach the tie rod from the top of the left front wheel to the steering arm which should be positioned in the vertically down position. This will give you the maximum steering rotation right and left.

7.4 STEERING SERVICE KIT



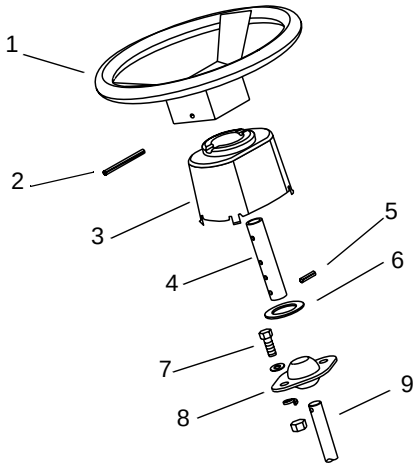
1. Steering Assembly
2. Braces
3. Hardware

Figure 21

IT0660

Installation

1. Remove hood from tractor.
2. Remove battery from tractor (negative cable first).
3. Remove upper roll pin and steering wheel from steering column. See Figure 22.

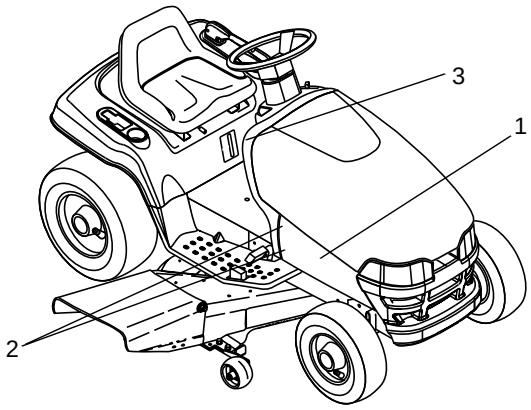


1. Steering Wheel
2. Upper Roll Pin
3. Steering Column Cone
4. Tube
5. Lower Roll Pin
6. Washer
7. Flange Bearing Bolts
8. Flange Bearing
9. Steering Column

Figure 22

IT0630

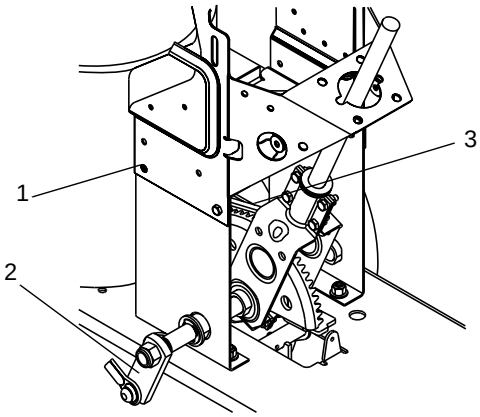
4. Remove steering column cone.
5. Remove lower roll pin and tube.
6. Remove washer.



1. Side Panel
2. Side Panel Screws
3. Dash

Figure 23

OT0160

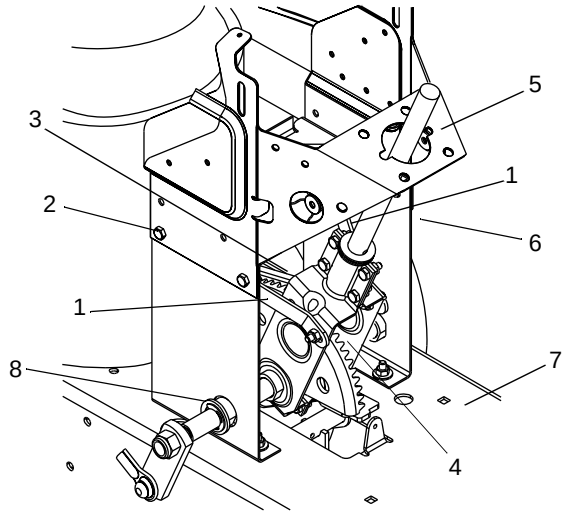


1. Redrill Holes
2. Existing Brace
3. Steering Rod Arm

Figure 24

IT0640

7. Loosen (4) screws holding side panels to dash (2 each side). See Figure 23.
8. Remove (3) screws holding dash to frame.
9. Disconnect throttle, choke cable, and electrical connections under dash.
10. Remove dash.
11. Remove 2 bolts from flange bearing and remove the bearing.
12. Remove steering rod arm. Mark rod arm to align splines during reinstallation.
13. Remove snap rings on shaft ends and bushings.
14. Loosen (do not remove) (4) nuts holding dash support base to frame.
15. Remove and discard front (2) self-tapping screws holding dash support to dash support base.
16. Remove and discard old steering assembly.
17. Redrill 2 holes in top front of existing dash support base and cross brace to 11/32" diameter.
18. Insert new steering assembly into dash support base.
19. Install existing brace and new top braces with new hardware supplied.
20. Tighten nuts holding dash support base to frame.
21. Reinstall snap rings on ends of shaft and bushings.
22. Reinstall steering rod arm. Use marks to align splines.
23. Reinstall flange bearing and secure with 2 bolts.
24. Reinstall dash.



1. New Top Braces
2. New Brace Hardware
3. Existing Brace
4. Steering Assembly
5. Dash Support
6. Dash Support Base
7. Frame
8. Snap Rings/Rod Ends

Figure 25

IT0650

25. Reconnect throttle, choke cable, and electrical connections under dash.
26. Reinstall (3) screws holding dash to frame.
27. Slide side panels into place and tighten screws.
28. Reinstall washer.
29. Reinstall tube with lower roll pin.
30. Reinstall steering column cone.
31. Reinstall steering wheel and upper roll pin.
32. Reinstall battery. Connect positive terminal first.
33. Reinstall hood.

8.1 TRANSMISSION TROUBLESHOOTING

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

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

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)	CORRECTIVE ACTION
Axles Will Not Turn	1, 7, 8, 12, 16, 18, 28, 32, 38, 42, 46	repair or replace
Difficult Starting	1, 6, 7, 8, 12, 16, 25, 26, 28, 38, 42, 46	repair or replace
Erratic Running	1, 4, 6, 7, 8, 12, 18, 25, 26, 28, 42, 46, 55	repair or replace
Jerky When Starting	1, 4, 7, 8, 12, 18, 28, 38, 46	
Jumps Out of Gear	N/A	repair or replace
Knocking	4, 8, 12, 18, 28, 37, 42	repair or replace
Loss of Power or System	4, 12, 18, 28, 37, 42, 46	
Noisy	4, 12, 18, 26, 28, 32, 37, 42	repair or replace
Oil Leakage	4, 22, 51, 16	repair or replace
Operates Hot	4, 16, 28, 32, 35, 42	
Operates in One Direction Only	1, 8, 12, 30, 46	
Pump Failure	4, 12, 37	repair or replace
Speed Loss Under Load	1, 6, 11, 28, 37, 46, 51	repair or replace
Speed Loss Under Load	1, 4, 7, 12, 18, 28, 26	repair or replace
Will Not Drive	1, 7, 8, 18, 28, 37, 38, 46, 48	
Will Not Shift		repair or replace

TROUBLESHOOTING KEY

1	Inspect control linkage	22	Inspect hoses and lines for wear	43	Burrs on gearing
2	Inspect acceleration valves	23	Inspect implement relief valve	44	Gears improperly installed
3	Inspect charge check valves	24	Inspect charge pump	45	Forks & rod assembly incorrectly installed
4	Incorrect grade of lubricating oil	25	Bad transmission pump	46	Shifting keys broken or damaged
5	Low cranking speed	26	Overheating	47	Shifting washer in backwards
6	Controls not in correct operation position	27	Cold running	48	Shifter/Brake shaft keyways damaged
7	Belts are missing, to tight, loose or glazed	28	Bad transmission motor	49	Unit clutch not disengaging
8	Overload of vehicle	29	Check system pressure	50	Shifter stop assembled backwards
9	Replacement parts damaged	30	Shift rod grooves worn	51	Improper fit of case to cover
10	Replacement parts improperly installed	31	Reverse chain broken	52	Dowel pins not installed
11	Improperly torqued attaching screws	32	Damaged cooling fan	53	Differential bevel gears broken
12	Air in hydraulic system	33	Inspect auxiliary relief valve	54	Spring in shifter weak or broken
13	Broken shifter stop	34	Inspect cooling fan	55	Worn or stripped gear teeth
14	Inspect charge check valves	35	Inspect transmission cooling fins	56	
15	Inspect acceleration valves	36	Worn or damaged bearings	57	
16	Check oil level-gear box sump or reservoir	37	Metallic pieces or foreign objects in unit	58	
17	Inspect heat exchanger	38	Inspect for loosely mounted components	59	
18	Inspect by-pass valve	39	Steering column loose or binding	60	
19	Inspect charge pressure	40	Pressure relief valve sticking open	61	
20	Inspect inlet filter	41	Pressure relief sticking closed	62	
21	Inspect charge relief valve	42	Broken relief valve spring		

8.2 CHECKING THE TRANSMISSION FLUID

The transaxle is filled and tested at the factory and should not require fluid when the unit is put into service. Inspect the transaxle for leaks or damage to the housing . If leakage is observed, do not operate until the leak is fixed.

Check the oil level and fill to the correct level if needed. The oil should be to the top of the elbow in the back of the frame of the tractor. It may be checked by removing the transmission filler plug with the engine running. Typically, an API 20W20 engine oil is used.

8.3 TRANSMISSION FILTER

IMPORTANT: Be very careful to prevent dirt and foreign materials from entering reservoir or oil filter when changing oil and filter.

Be sure breather is not clogged. Wipe clean with a rag and solvent.

To change transmission oil filter, position tractor on a flat level surface.

> **CAUTION:** Before changing filter, place speed selector in Park/Start, turn ignition OFF, remove key, and set parking brake.

Place a container under filter to catch oil spillage as filter is removed. Use an oil filter removal tool to unscrew filter. Discard old filter.

To saturate element, fill new filter with fresh clean same type oil used in transmission.

NOTE: Some oil may spill out of filter as it is rotated from vertical to horizontal position as you are installing it. Keep container in place to catch spilled oil.

Lubricate gasket with oil and spin filter on threaded adapter to gasket contact. Hand tighten additional 1/2 to 3/4 turn. DO NOT overtighten.

8.4 FILLING THE TRANSMISSION

The following is suggested for the filling sequences for new or repaired transmissions to assure proper operating performance.

Locate the unit on a flat level surface to limit the chance of the unit rolling while performing the following procedures.

Fill reservoir to proper level with fresh oil.

Start engine and remove transmission filler cap. Run engine and add fresh clean oil to bring oil level to top of filler elbow. Replace and tighten filter cap.

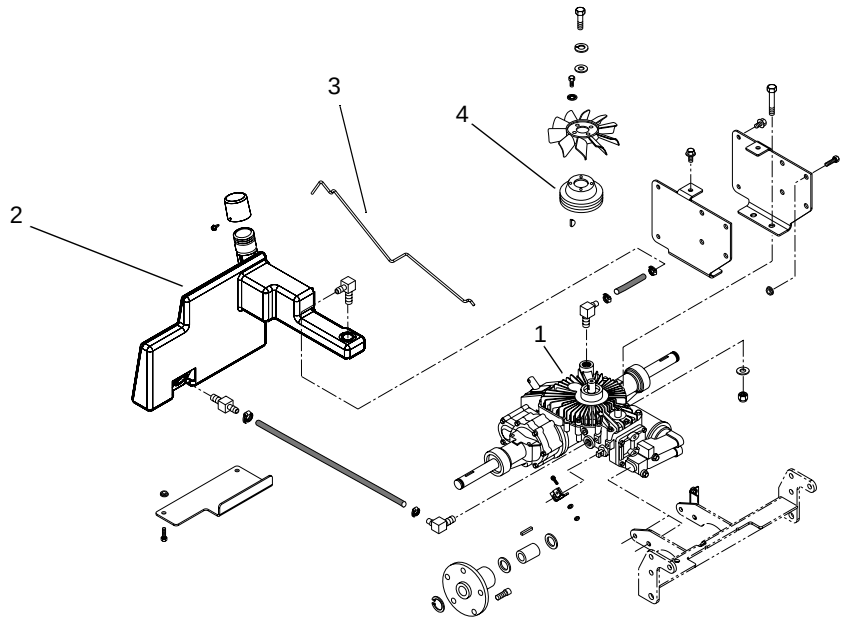
8.5 TRANSMISSION REMOVAL

NOTE: Remove rear deck with seat.

NOTE: Remove transaxle and jackshaft belt.

NOTE: For ease of access to drive components, remove front or center mounted attachment per instructions in Attachment Section.

NOTE: Disconnect brake from transaxle.



1. Eaton Hydro Transaxle
2. Oil Reservoir
3. Dump Valve Rod
4. Transaxle Sheave

Figure 26

PT0150

1. Remove cap screw and center lock nut from dump valve arm. Remove arm from dump valve.
2. Disconnect extension spring from cam.
3. Remove cap screw, lock washer, washer, and woodruff key securing control arm to transaxle. Carefully remove control arm from transaxle and neutral arm.
4. Disconnect hoses from transaxle, drain oil, cap fittings, and hoses to keep dirt and foreign material from entering system.
5. Remove cap screw, lock washer, and washer securing fan and transaxle pulley to transaxle. Remove fan and pulley from transaxle.

CAUTION: When raising tractor, block securely under running boards with jackstands.

CAUTION: Use sturdy gloves or padding to protect hands when working with axles.

6. Raise and block rear of tractor with tires off floor.
7. Disconnect wiring from neutral switch. To prevent damage to transaxle, support transaxle with floor jack.
8. Remove four cap screws and lock washers securing transaxle to transaxle mount. Remove nuts, lock washers, and cap screws securing transaxle mounting bracket to tractor frame. Remove transaxle from tractor.

NOTE: Clean outside surfaces of transaxle thoroughly and place on a clean working surface before proceeding to disassemble it.

8.6 TRANSAXLE SERIES EATON 851

The following repair information applies to the Eaton 851 series hydrostatic transaxles.

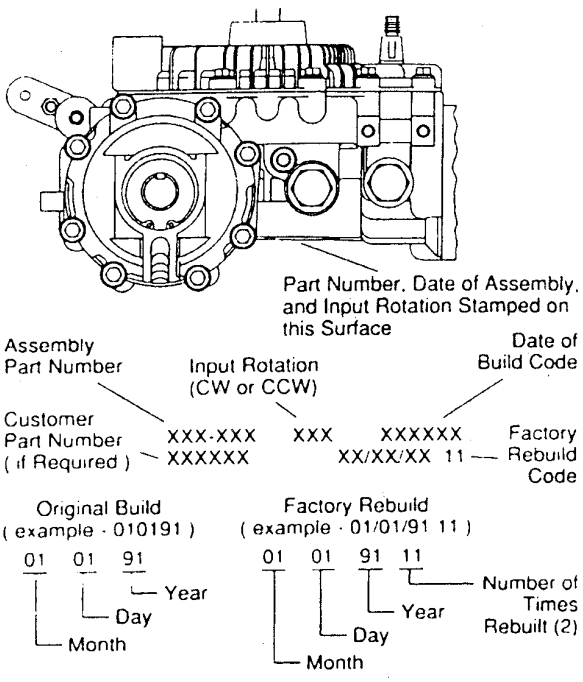


Figure 27

The transaxle identification information is located opposite the input shaft, on the back of the housing assembly.

The build code of the transaxles identifies the month, day and year of the transaxle manufacture. This information is found in the same area as the identification code.

When ordering replacement parts for a transaxle, the part(s) order must include the part name, part number, quantity of parts and also the transaxle model number, input rotation and date code.

The following procedures describe complete disassembly and reassembly of the transaxle.

The level of cleanliness maintained while servicing the transaxle could affect its performance. Work in a clean area. After disassembly, wash all parts with clean solvent and blow the parts dry with air. Inspect all mating surfaces. Replace any damaged parts that could cause internal leakage. Do not use grit paper, files or grinders on finished parts.

NOTE: Whenever a transaxle is disassembled, our recommendation is to replace all seals. Lubricate the new seals with petroleum jelly before installation. Use only clean, recommended hydraulic fluid on the finished surfaces at reassembly.

The following tools are required for disassembly and reassembly of the transaxle.

- 3/8 in. Socket or End Wrench.
- 1 in. Socket or End Wrench
- Ratchet Wrench
- Torque Wrench 300 lb-in (34 Nm)
- 5/32 Hex Wrench
- Small screwdriver 94 in (102 mm) to 6 in. (150 mm) long
- No. 5 or 7 Internal Retaining Ring Pliers
- No. 4 or 5 External Retaining Ring Pliers
- 6 in. (150 mm) or 8 in. (200 mm) C-Clamp
- Piece of Pipe or Hydraulic Tubing, 1-1/8 in. (29 mm) O.D. x 6 in. (150 mm) long
- Small Arbor or Hydraulic Press
- 3 or 4 Large Rubber Bands
- Light Petroleum Jelly (such as Vaseline)

Seal all open ports before cleaning. Thoroughly clean the transaxle exterior.

TRANSAXLE WITH CHARGE PUMP - After draining the transaxle, use your hand or a filter wrench to remove the filter from the filter base.

NOTE: It is best to drain the transaxle through the case drain port with the input shaft in the down position.

1. Using a 3/8 inch socket or end wrench, remove the cap screws from filter base.
2. Remove gasket.

NOTE: This gasket may be on the part just removed or on the housing assembly.

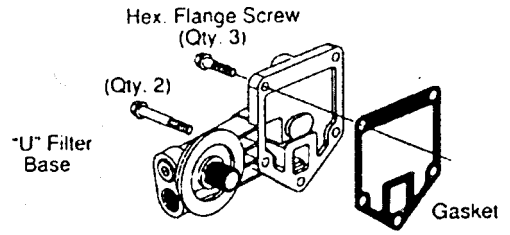


Figure 28

3. Position transaxle with this gasket surface toward the bench. Place a clean towel between the transaxle and the bench. This towel protects the sealing surface from possible damage during repositioning.
4. Use a 6 inch (150 mm) to 8 inch (200 mm) C-clamp to secure the transaxle to a suitable work surface. Be careful not overtighten the C-clamp when securing the transaxle.

8.7 AXLE HOUSING DISASSEMBLY

1. With the transaxle secure, use a 3/8 inch socket or end wrench to remove the flange screws from one (A-side or B-side) axle housing assembly.
2. After removing the flange screws, carefully remove the axle housing assembly from the housing assembly.

CAUTION: Retain the planetary assemblies in the axle housing assembly during removal.

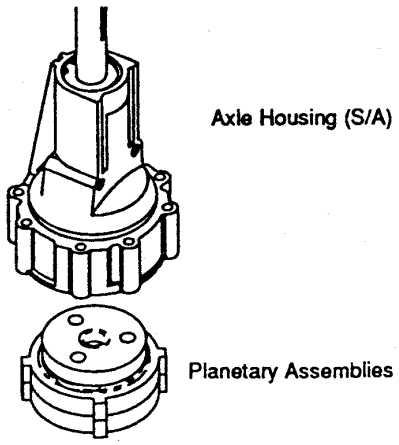


Figure 29

3. To disassemble the axle housing assembly, carefully position the axle housing assembly on a clean flat surface, then separate axle housing from the planetary assemblies.

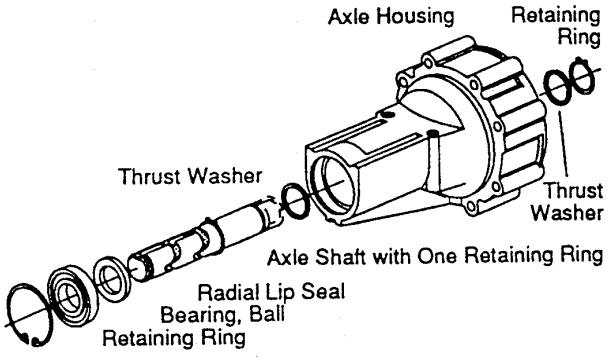


Figure 30

4. Position the axle housing assembly with the output end of the axle shaft in the up position. Using a No. 5 or 7 internal retaining ring pliers, remove the retaining ring from the axle shaft.
5. Reposition the axle housing with the splined end of the axle in the up position. Using a No. 4 or 5 external retaining ring pliers, remove the retaining ring and thrust washer from the axle shaft.

6. Remove the axle from the axle housing by using a small press or by tapping the splined end of the axle shaft with a plastic head hammer. This will dislodge the seal and bearing from the axle housing.
7. After separating the axle shaft from the axle housing, remove the ball bearing, seal and thrust washer from the axle shaft. The thrust washer may be in the axle housing.

NOTE: The retaining ring remaining on the axle shaft need not be removed.

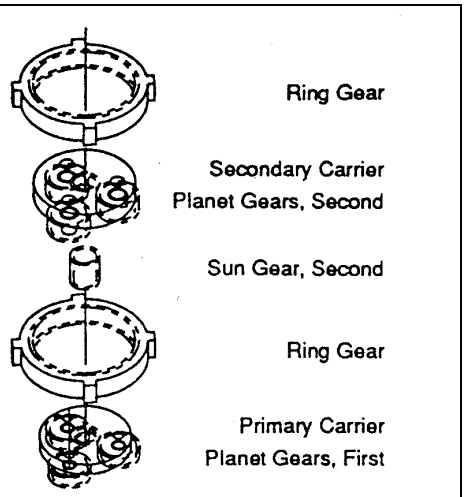


Figure 31

8. To disassemble the planetary assemblies for inspection and cleaning, first remove the ring gear from the secondary carrier/planet gears).
9. Next, putting a slight squeeze on the secondary carrier planet gears, remove the three secondary planet gears and carrier.
10. Turn the assembly over to remove the secondary planet gears for inspection and cleaning.
11. Remove the sun gear and remaining ring gear.
12. Again, putting a slight squeeze on the remaining carrier planet gears, remove planet gears, and carrier from the backup plate.
13. Shown above are both the primary and secondary carrier assemblies. The planet gears may be removed for inspection and cleaning.
14. Next, remove the reaction plate from the primary sun gear.
15. Remove the primary sun gear from the motor rotor assembly.
16. Remove the small friction brake pad assembly from its recessed pocket located in the axle housing.

NOTE: Shown in previous drawing are the three major parts used in the Eaton transaxle wet brake assembly, the friction pad assembly, reaction plate and backup plate. When the brake is applied, the rotating reaction plate is squeezed between the stationary friction pad and the backup plate.

17. Remove the axle housing assembly gasket.

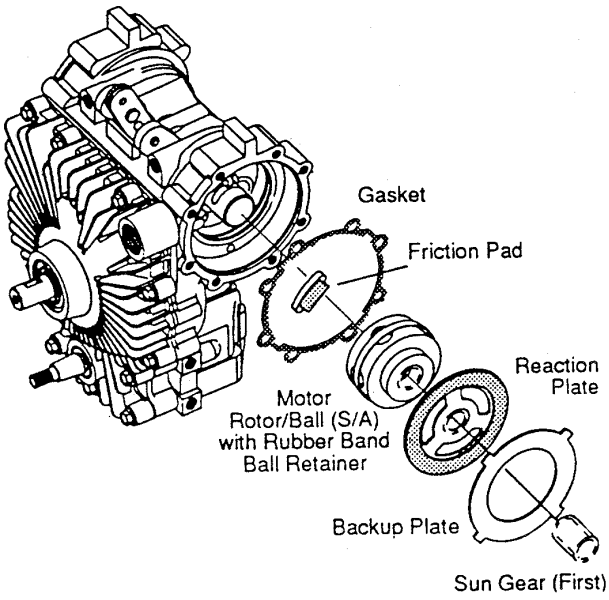


Figure 32

NOTE: This gasket may have remained on the axle housing.

Normally any further disassembly of the brake levers, push rods and etc. is not necessary nor recommended. The brake lever shims located between the two brake levers are used to adjust the brake lever movement. This adjustment was made during the initial transaxle assembly.

NOTE: Standard single handle brake arrangement shown.

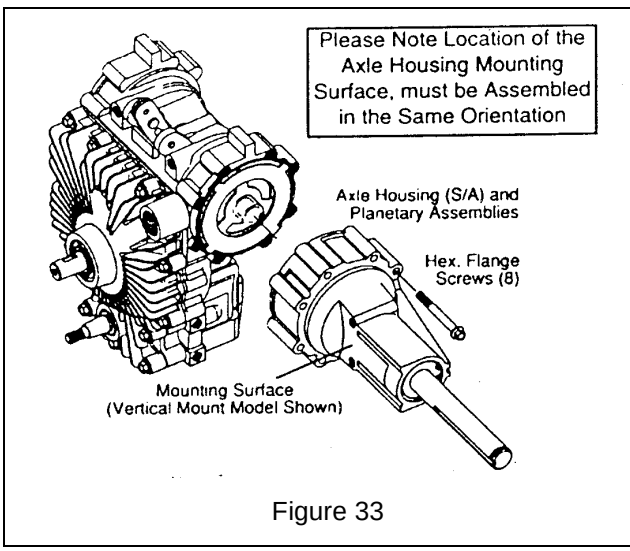


Figure 33

8.8 MOTOR ROTOR DISASSEMBLY

IMPORTANT: Be extremely careful when removing the motor rotor assembly. The ball pistons are spring loaded in the bores and must remain intact because each ball piston is matched to its respective bore.

1. The best way to remove the motor rotor assembly is to place a separate motor race on top of the existing motor race in the housing assembly.
2. Hold the separate race securely in position.
3. Then carefully pull the motor rotor assembly outward until the ball pistons are fully engaged in the grove located in the center of the separate race.
4. Carefully remove the rotor assembly and race together as a set, handling the motor rotor assembly only.

NOTE: If a separate motor race is not available, work a wide rubber band around the outside of the motor rotor to hold the ball pistons in their bores.

It is essential that the ball pistons be retained in their bores during handling. This is especially true for the motor rotor(s), as the motor ball pistons are spring loaded in the bores.

NOTE: The remaining transaxle axle housing assembly, if applicable, can be serviced at this time.

5. Reposition the housing assembly, Using a 3/8 inch socket or end wrench, remove the self tap screws from the cover assembly.

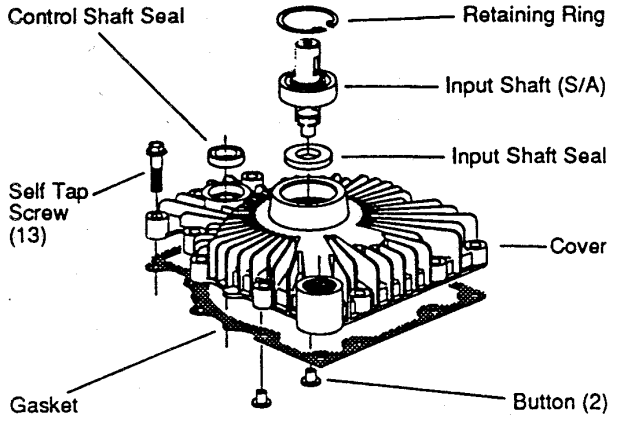


Figure 34

NOTE: One self tap screw is located in the case drain port.

6. With all self tap screws removed (13), carefully separate and remove the cover from the housing assembly.
7. Turn the cover assembly over and remove the two buttons.
8. These two buttons may have dropped out into the housing assembly during removal of the cover. Turn the cover assembly back over and using a No. 5 or 7 internal retaining ring pliers, remove the input shaft retaining ring.
9. Reposition and support the cover allowing room for shaft removal. With the input shaft in the down position, use a plastic head hammer or press to remove the input shaft assembly from the cover.

No further disassembly of the shaft and bearing assembly is required as they are serviced as an assembly.

10. Using a screwdriver or similar tool, drive the input shaft seal from the cover.
11. To remove the control shaft seal, reposition the cover. Using a small screwdriver or similar tool, pry the control shaft seal from the cover.
12. Remove the cover gasket from the housing.

NOTE: The gasket may have remained on the cover.

13. Remove the drive from the pump rotor assembly.
14. Remove the charge pressure relief valve spring from the housing (see Figure 30).

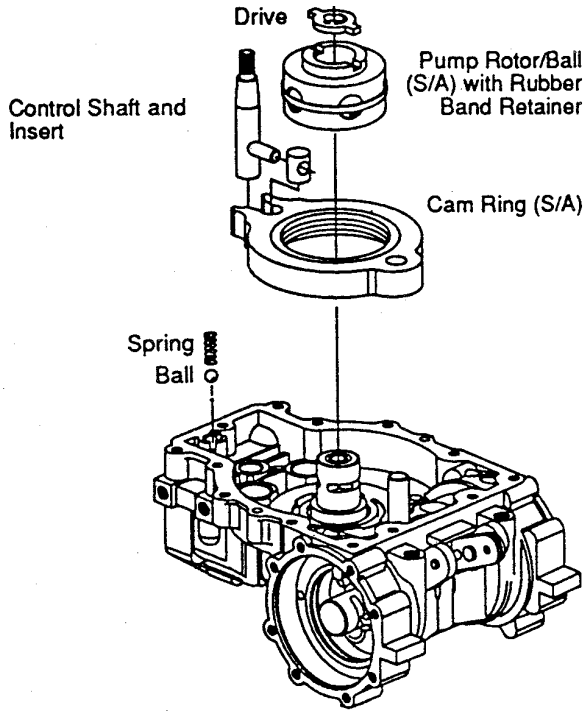


Figure 35

15. Using a pencil, magnet, or similar tool, remove the charge pressure relief ball from its seat in the housing.
16. Remove the control shaft and insert from the housing and cam ring assembly.
17. Remove the cam ring insert from the control shaft.
18. Remove the cam ring assembly from the housing.

19. Carefully remove the pump rotor assembly from the housing, making sure the ball pistons are not dislodged from their bores.

IMPORTANT: It is essential that the pump rotor assembly remain intact during handling as each ball piston is matched to its respective bore.

20. Install a wide rubber band around the pump rotor to retain the ball pistons in their bores (see Figure 31).

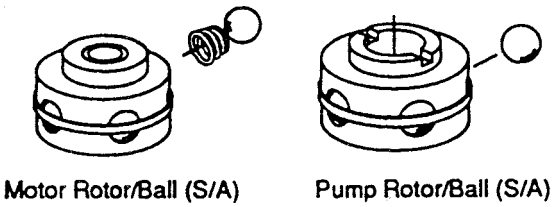


Figure 36

8.9 PUMP AND MOTOR ROTOR INSPECTION

Disassemble and inspect the rotor assembly as follows:

1. Remove the piston balls from the rotor, one at a time, working clockwise from the letter stamped in the rotor face.
2. Place the piston balls in a prepared container. Use a container such as an egg carton or ice cube tray to hold the balls.

NOTE: The balls must be placed in the same bores from which they were removed because they are all select fit.

3. Check for broken or collapsed springs in the motor rotor. When broken or collapsed springs are found with no other irregularities, the springs may be replaced individually without replacing the complete motor rotor assembly.
4. Inspect the piston balls. They must be smooth and completely free of any irregularities.
5. Inspect the rotor bores, rotor bushing, and pintle journals for irregularities or excessive clearance. the ball piston to rotor bore clearance is select fit electronically from 0.0002" (0.005 mm) to 0.0006" (0.015 mm). When irregularities are noted, replace the complete rotor assembly.
6. Install the ball pistons in their matching bores. Hold them in place with a rubber band or separate race.
7. To inspect the charge pump assembly, use a 5/32 hex key to remove the cap screws from the charge pump plate (see Figure 32).

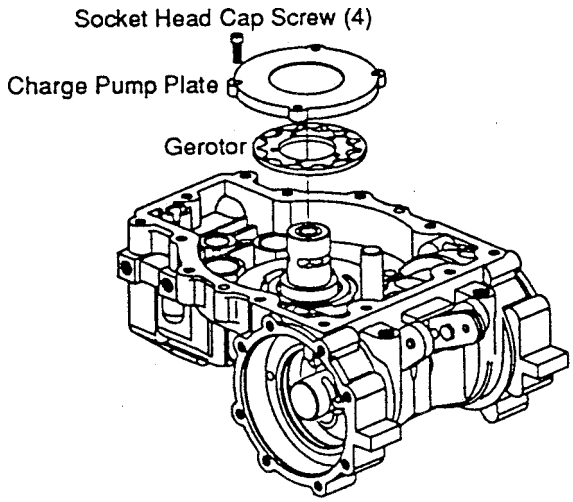


Figure 37

8. Remove the charge pump plate from the housing.
9. Remove the charge pump gerotor from the housing.

The pump and motor journals and cam ring dowel cannot be removed once they have been installed in the housing.

NOTE: Inspect the pump and motor journals for any irregularities. If any are found, the housing must be replaced.

In most cases, we do not recommend removal of the dampening pistons for inspection and cleaning. Normal flushing should be all that is required for cleaning.

10. To remove the dump valve assembly, first use a 1" socket or end wrench to remove the dump valve nut from the housing (see Figure 33).

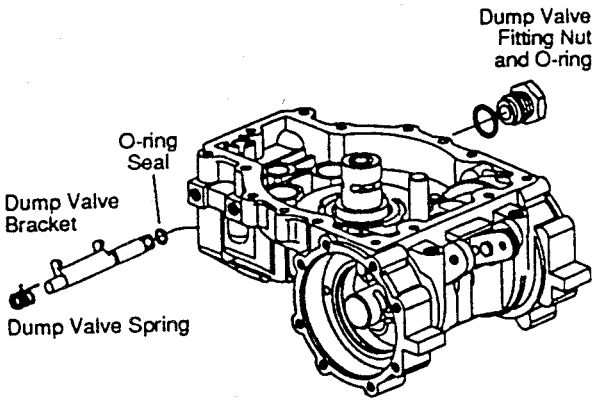


Figure 38

11. Remove the O-ring from the dump valve nut.
12. After removing the dump valve nut, remove the dump valve bracket and spring from the housing by sliding them over and lifting upward.
13. Remove the spring from the dump valve bracket.
14. Remove the O-ring from the dump valve bracket.

We do not recommend removal of the dampening pistons for inspection and cleaning. Normal flushing should be all that is required for cleaning.

8.10 TRANSAXLE REASSEMBLY

Before reassembling the transaxle, clean all parts and assemblies with clean solvent and blow them dry with compressed air. Inspect and replace all scratched or damaged parts. Replace all gaskets, seals and seal rings. Lubricate all seals with petroleum jelly (Vaseline) for retention during assembly. Freely lubricate all bearings and finished part surfaces with clean hydraulic fluid to provide lubrication at start-up.

8.11 TRANSAXLE WITH DUMP VALVE

1. To reassemble the dump valve, first lubricate and install the o-ring in the groove located in the dump valve bracket.
2. Install the spring on the dump valve bracket. It should be installed with the right angle bend of the spring pointing inward, as shown in Figure 33.
3. Install the spring and dump valve bracket in the housing.

The spring is properly positioned when the longest leg points toward the check valve assembly.

4. Lubricate and install the o-ring around the dump valve nut.
5. Install the nut over the dump valve bracket, into the housing.

NOTE: Make sure you do not damage the dump valve o-ring during installation.

6. Using a 1 inch socket or end wrench, torque the dump valve nut to 150 lb-in [15 Nm].

8.12 TRANSAXLE WITH CHARGE PUMP

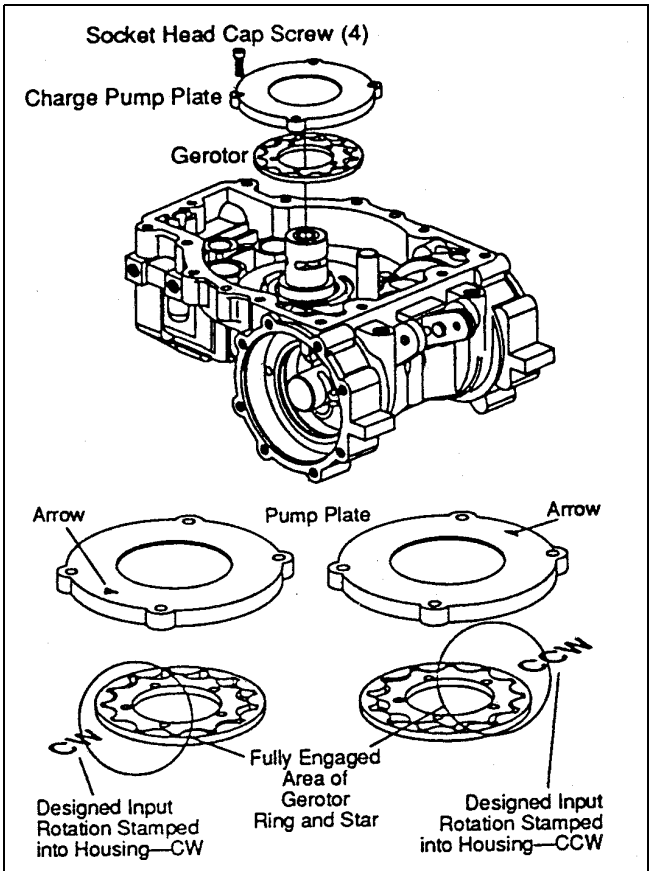


Figure 39

1. Install the generator on the housing.

NOTE: the generator ring and star have been marked with a dot on each, the ring and star can be placed with these marks up or down but both marks should be on the same side.

2. For easier assembly, rotate the generator outer ring to fully engage with the inner star. The fully engaged side of the generator should point towards the designed input rotation (CW or CCW as noted on the housing).

NOTE: The designed input rotation is stamped on the back side of the housing and also next to the generator on the inside.

3. Freely lubricate the generator with clean hydraulic fluid to provide lubrication at start-up.
4. The charge pump plate has a small arrow cast into the outer face of the plate.
5. At assembly, this arrow must face toward the input rotation designated in the housing.

NOTE: All applications are clockwise rotation (CW).

NOTE: High pressure charge pump - generator and plate is a matched set and is not sold separately. Class II generator and plate are not a matched set.

6. Aligning the rotation arrow with the input rotation, install the pump plate over the generator.
7. Install the four cap screws in the pump plate finger tight.
8. The bottom side of the pump rotor assembly incorporates five drive pins. At assembly, these pins must be engaged with the inner star of the charge pump generator.
9. Lubricate and install the pump rotor assembly on the pump journal, engaging the drive pins with the inner star of the generator.
10. Rotate the pump rotor assembly several times to center the pump plate on the generator.
11. While continuing to rotate the pump rotor assembly, alternately tighten the charge pump plate cap screws to 49 lb-in [6 Nm].
12. Remove the rubber band from the pump rotor assembly. Install the cam ring assembly in the housing with the flush side of the cam ring facing outward.
13. Install the cam ring insert on the control shaft pivot dowel.
14. Install the control shaft assembly, first aligning the cam ring insert with the cam ring assembly and then with the housing.

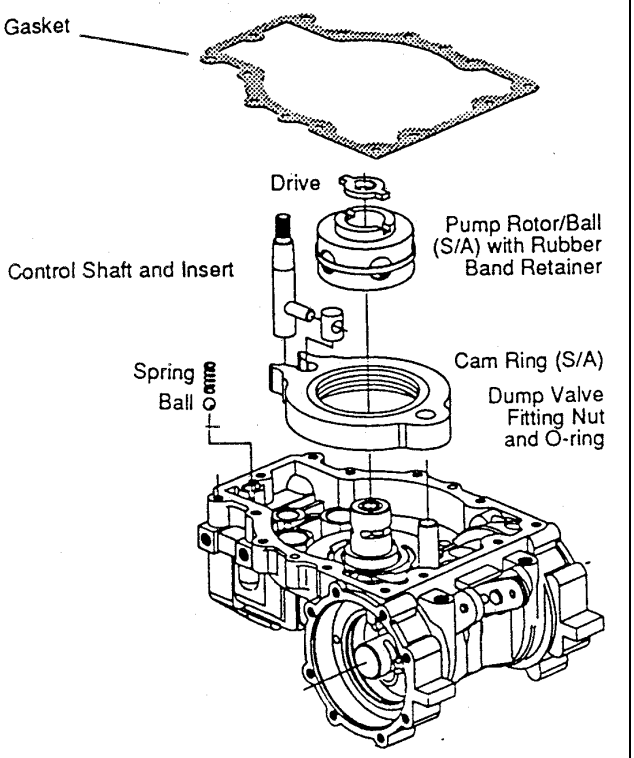


Figure 40

TRANSAXLE WITH CHARGE PUMP - Drop the charge pressure relief valve ball in its bore.

15. Install the charge pressure relief valve spring in its bore.
16. Install the drive in the pump rotor assembly.
17. Install the cover gasket on the housing assembly.

8.13 COVER REASSEMBLY

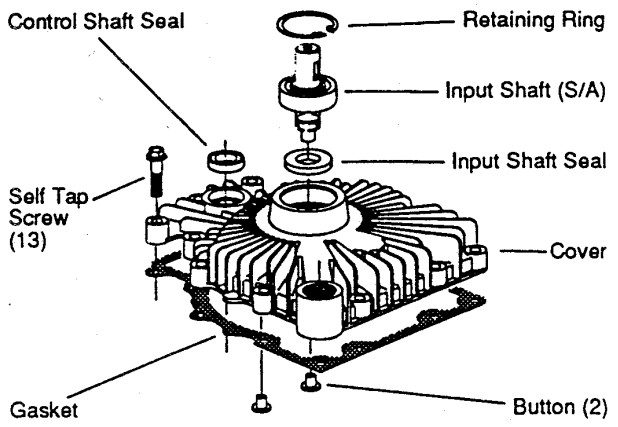


Figure 41

1. Lubricate and install the control shaft oil seal with the seal lip pointing inward. Press or drive the seal into the seal counterbore.
2. Lubricate and install the input shaft seal with the seal lip pointing inward. Press or drive the seal into the counterbore.
3. Press or drive the input shaft assembly into the cover.
4. Install the input shaft assembly retaining ring, making sure it is firmly seated in the retaining ring groove.
5. To help retain the buttons during assembly, apply a small amount of petroleum jelly to them. Install the buttons in the holes located in the cover assembly.
6. Install the cover assembly by carefully aligning it with the control shaft, cam ring pivot dowel and pump rotor drive.

CAUTION: TRANSAXLE WITH CHARGE PUMP - During installation of the cover assembly, be careful not to dislodge the charge pressure relief valve from its bore.

NOTE: Two axle housing flange screws may be used to help retain the cover, gasket and housing in position during assembly.

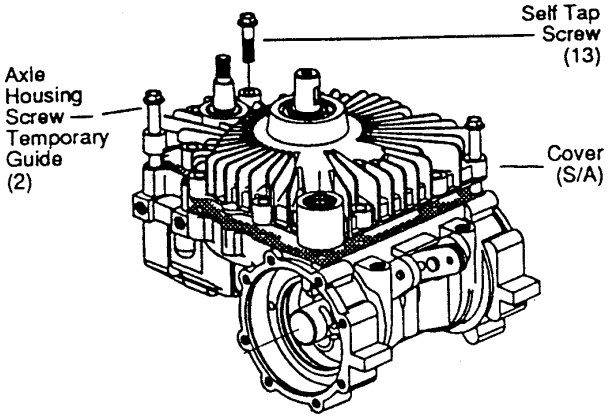


Figure 42

7. After engaging the control shaft and pivot dowel in the cover assembly, carefully rotate the input shaft to engage the pump rotor drive. When all mating parts are aligned and engaged, the cover assembly should fall into position on the housing assembly.
8. With the cover assembly in the proper position, remove the two alignment flange screws (if used) and install the self tap screws (13), and alternately tighten to 125 lb-in [14 Nm]. Torque each screw a second time to compensate for gasket compression set.

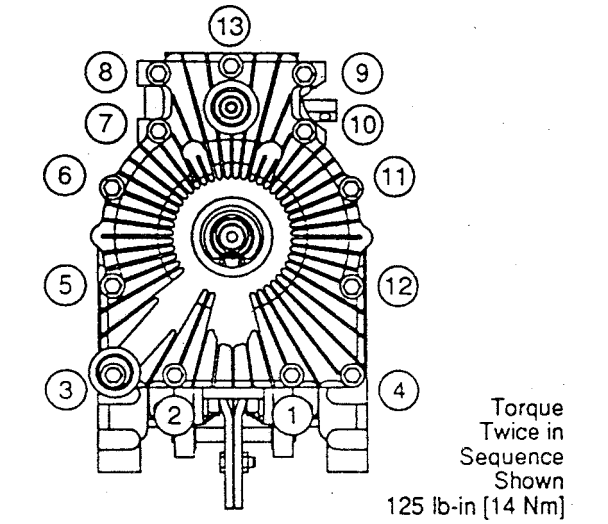


Figure 43

8.14 AXLE HOUSING REASSEMBLY

(One axle housing or two, use the same procedure for each).

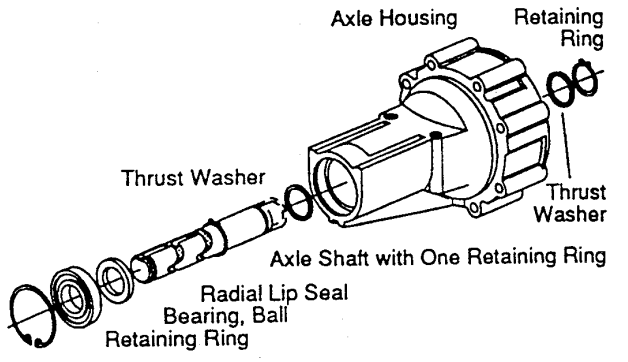


Figure 44

1. Lubricate and install the thrust washer in the axle housing.
2. Lubricate and install the axle shaft into the axle housing.
3. Reposition the axle housing with the output end of axle pointing downward. Install the inner thrust washer and axle shaft retaining ring.

IMPORTANT: The round-cornered side or die-rolled side of the retaining ring must point toward the axle housing.

4. Reposition the axle housing with the output end pointing upward. Protecting the lip of the axle seal from the retaining ring groove and keyway, lubricate and install the seal with the lip pointing inward towards the axle housing.
5. Using a piece of pipe or hydraulic tubing (1.5 inch [38 mm] O.D. x 6 inch [150 mm] long), press the ball bearing over the axle shaft and into the axle housing.
6. Again, using a piece of pipe or hydraulic tubing (1.125 inch [29 mm] O.D. x 6 inch [150 mm] long, press the ball bearing over the axle shaft and into the axle housing.
7. Using a pair of No. 5 or 7 internal retaining ring pliers, install the ball bearing retaining ring in the axle housing.
8. Lubricate and assemble the three planetary gears on the secondary carrier assembly.
9. Aligning the splines, install the secondary carrier assembly on the splined end of the axle shaft located in the housing assembly.
10. Please note that one side of each ring gear has a bevel on one side. This bevel side of the ring gear must be toward the output end of the axle shaft.
11. Install one of the two ring gears into the axle housing. Install by aligning the ears on the outside of the ring gear with the notches in the housing assembly.
12. Rotate the secondary carrier assembly planet gears to align with the ring gear teeth.
13. When they are all in alignment, the ring gear will fall into place.
14. Shown here are the first and second sun gears for 23:1 Gear ratios.
15. Install the sun gear (second) into the secondary Planetary assembly.
16. Lubricate and assemble the three planetary gears on the primary carrier assembly.
17. Aligning the splines, install the primary carrier assembly on the sun gear (second).
18. Install the next ring gear into the axle housing. Install by again aligning the ears on the outside of the ring gear with notches in the housing assembly.

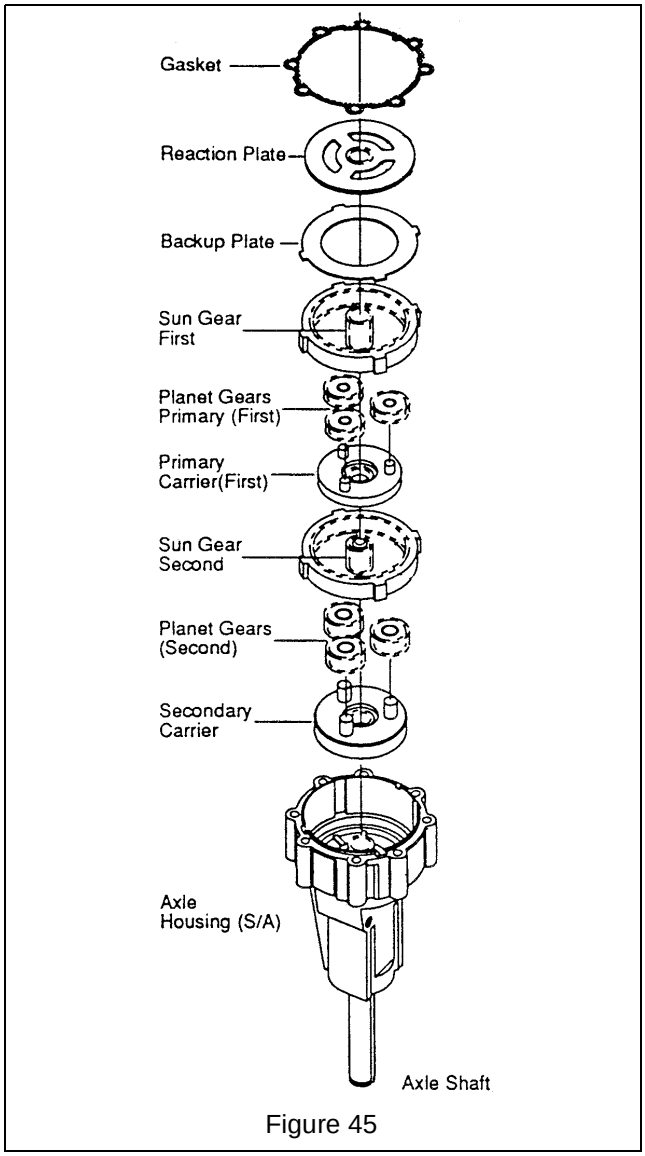


Figure 45

NOTE: Rotate the primary carrier assembly and the ring gear will fall into position.

19. Install the primary sun gear (first) into the primary planetary assembly.

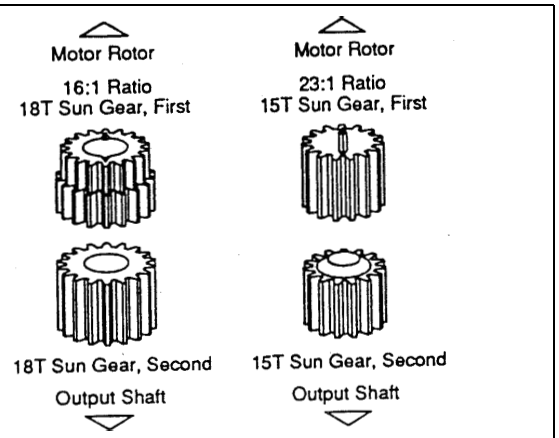


Figure 46

20. Lubricate and install the backup plate in the axle housing assembly. Install by aligning the ears with the notches in the axle housing.
21. Aligning the splines, install the reaction plate on the primary sun gear (friction material must be toward backup plate).
22. Aligning the screw holes and notches, install the axle housing gasket on the axle housing assembly.
23. Reposition and clamp the housing assembly to the bench. Install the motor rotor assembly.
24. Install the friction brake pad into its recess located in the housing assembly.
25. Carefully retain the planetary assemblies in position, install the axle housing assembly on the housing assembly.
26. Install the axle housing flange screws and torque to 125 lb-in [14 Nm].

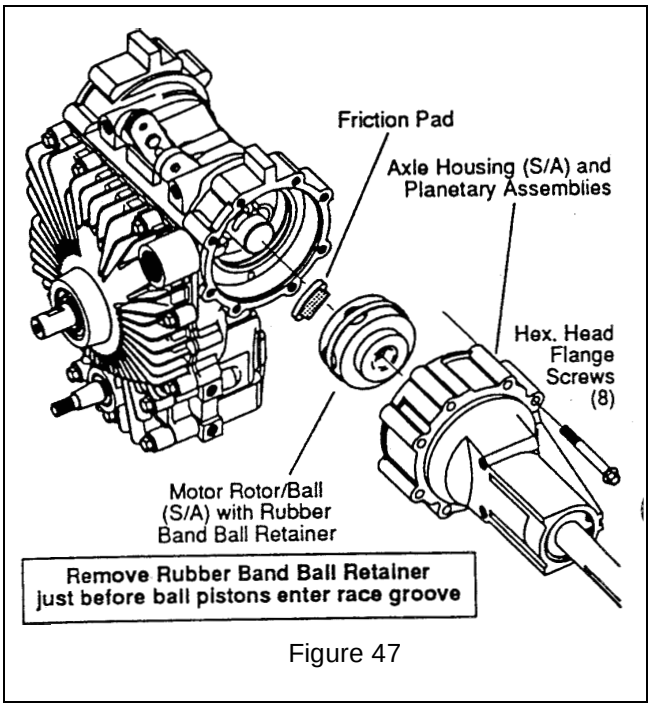


Figure 47

27. Reposition the transaxle and install the gasket and (one of the following):
- filter base
- internal filter and valve cover (position metal side of filter toward housing and gasket).
- port plate

28. Aligning the screw holes, install 5 flange screws.
29. Cross torque screws to 125 in-lb (14 Nm).
30. Fill transaxle with an approved hydraulic fluid. The transaxle is now ready for test and installation.

TRANSAXLE WITH CHARGE PUMP AND SPIN-ON FILTER - Lubricate the filter seal, install filter, hand tight (3/4 to 1 full turn after gasket/base contact).

8.15 FLUID RECOMMENDATIONS

Premium hydraulic oil having a viscosity equivalent to SAE 20W20, SAE 30 or SAE 40.

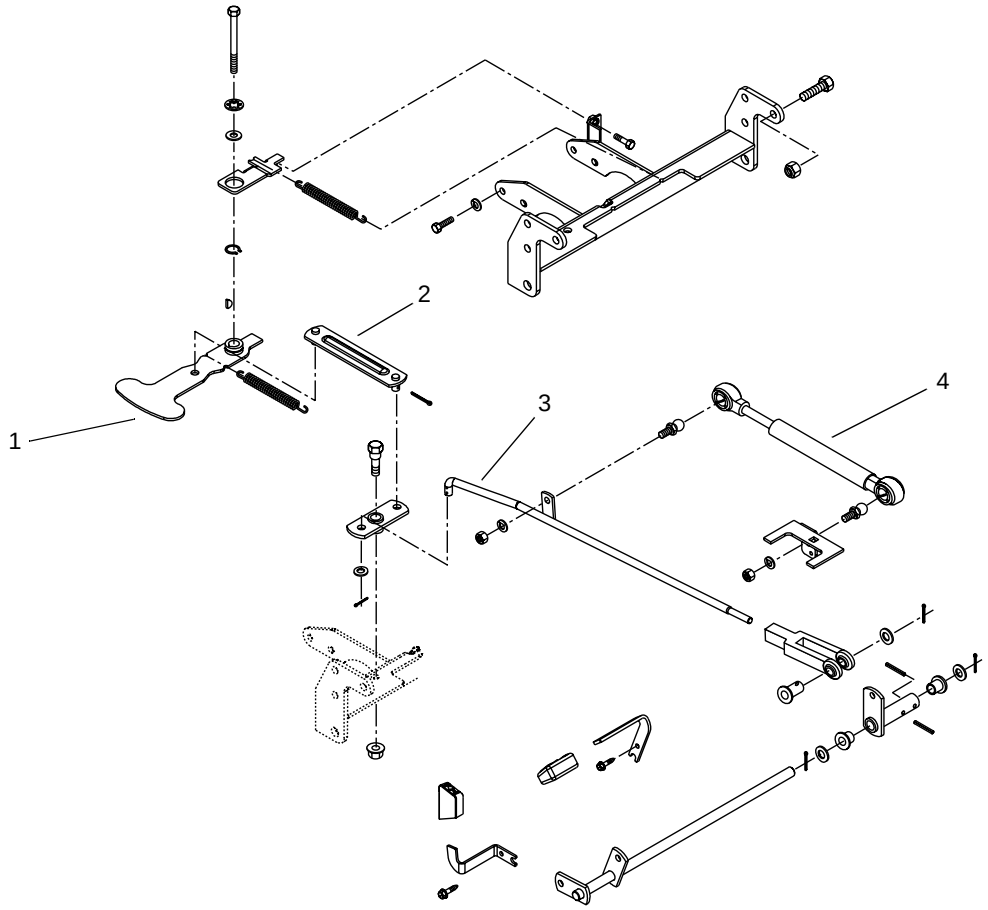
A reputable supplier can help you make the best selection of the hydraulic fluid for use in your Eaton transaxle.

8.16 TRANSAXLE INSTALLATION

Refer to transaxle removal. Installation is performed in reverse order.

8.17 SHIFT LINKAGE

Before connecting the shift linkage to the transaxle, check parts for wear and replace as needed. Lubricate all the bushings. Check the hydraulic damper for case of movement. Resistance is needed to maintain set travel speeds.



1. Control Arm
2. Shift Link
3. Shift Rod
4. Hydraulic Damper

Figure 48

PT0161

9.1 HYDRO-TRANSMISSION TROUBLESHOOTING

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

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

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)	CORRECTIVE ACTION
Axles Will Not Turn	1, 7, 8, 12, 16, 18, 28, 32, 38, 42, 46	repair or replace
Difficult Starting	1, 6, 7, 8, 12, 16, 25, 26, 28, 38, 42, 46	repair or replace
Erratic Running	1, 4, 6, 7, 8, 12, 18, 25, 26, 28, 42, 46, 55	repair or replace
Jerky When Starting	1, 4, 7, 8, 12, 18, 28, 38, 46	
Jumps Out of Gear	N/A	repair or replace
Knocking	4, 8, 12, 18, 28, 37, 42	repair or replace
Loss of Power or System	4, 12, 18, 28, 37, 42, 46	
Noisy	4, 12, 18, 26, 28, 32, 37, 42	repair or replace
Oil Leakage	4, 22, 51, 16	repair or replace
Operates Hot	4, 16, 28, 32, 35, 42	
Operates in One Direction Only	1, 8, 12, 30, 46	
Pump Failure	4, 12, 37	repair or replace
Speed Loss Under Load	1, 6, 11, 28, 37, 46, 51	repair or replace
Speed Loss Under Load	1, 4, 7, 12, 18, 28, 26	repair or replace
Will Not Drive	1, 7, 8, 18, 28, 37, 38, 46, 48	
Will Not Shift		repair or replace

TROUBLESHOOTING KEY

1	Inspect control linkage	22	Inspect hoses and lines for wear	43	Burrs on gearing
2	Inspect acceleration valves	23	Inspect implement relief valve	44	Gears improperly installed
3	Inspect charge check valves	24	Inspect charge pump	45	Forks & rod assembly incorrectly installed
4	Incorrect grade of lubricating oil	25	Bad transmission pump	46	Shifting keys broken or damaged
5	Low cranking speed	26	Overheating	47	Shifting washer in backwards
6	Controls not in correct operation position	27	Cold running	48	Shifter/Brake shaft keyways damaged
7	Belts are missing, to tight, loose or glazed	28	Bad transmission motor	49	Unit clutch not disengaging
8	Overload of vehicle	29	Check system pressure	50	Shifter stop assembled backwards
9	Replacement parts damaged	30	Shift rod grooves worn	51	Improper fit of case to cover
10	Replacement parts improperly installed	31	Reverse chain broken	52	Dowel pins not installed
11	Improperly torqued attaching screws	32	Damaged cooling fan	53	Differential bevel gears broken
12	Air in hydraulic system	33	Inspect auxiliary relief valve	54	Spring in shifter weak or broken
13	Broken shifter stop	34	Inspect cooling fan	55	Worn or stripped gear teeth
14	Inspect charge check valves	35	Inspect transmission cooling fins	56	
15	Inspect acceleration valves	36	Worn or damaged bearings	57	
16	Check oil level-gear box sump or reservoir	37	Metallic pieces or foreign objects in unit	58	
17	Inspect heat exchanger	38	Inspect for loosely mounted components	59	
18	Inspect by-pass valve	39	Steering column loose or binding	60	
19	Inspect charge pressure	40	Pressure relief valve sticking open	61	
20	Inspect inlet filter	41	Pressure relief sticking closed	62	
21	Inspect charge relief valve	42	Broken relief valve spring		

9.2 PRODUCT IDENTIFICATION

The model and configuration of the Hydro transmission can be determined from the label shown in Figure 44.

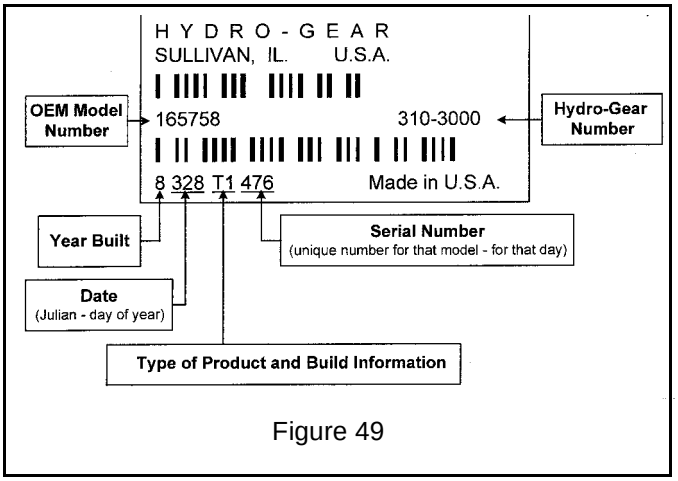


Figure 49

NOTE: Any servicing dealer attempting a warranty repair must have prior approval before conducting maintenance of a Hydro-Gear product unless the servicing dealer is a current Authorized Hydro-Gear Service Center.

9.3 GENERAL INSTRUCTIONS

Cleanliness is a primary means of assuring satisfactory life on repaired units. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning of all parts by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals.

Protect all exposed sealing surfaces and open cavities from damage and foreign material. The external surfaces should be cleaned before beginning any repairs.

Upon removal, it is recommended that all seals O-rings, and gaskets be replaced. During installation lightly lubricate all seals, O-rings, gaskets with a clean petroleum jelly prior to assembly. Also protect the inner diameter of seals by covering the shaft with a cellophane (plastic wrap, etc.).

Parts requiring replacement must be replaced with manufacturer recommended parts.

9.4 TORQUE SPECIFICATIONS

Torque specifications for fasteners used on the Hydro Transmission are provided inTable 1.

9.5 TRANSAXLE REMOVAL

It is necessary to remove the transaxle from the vehicle before performing the repair procedures presented in this section. Use the following procedure to prepare the unit for removal from the vehicle.

1. With the vehicle wheels on the ground, loosen the nut, retaining the hub on the control side of the transaxle only. Use an air impact wrench and a 1-1/8" socket to loosen the hub.
2. Lift the vehicle wheels from the ground and remove the nut completely.
3. Remove the wheel from the hub.
4. Using a wheel or gear puller, remove the hub from the shaft.

CAUTION: Use care in removing the hub to prevent cracking.

9.6 LIMITED DISASSEMBLY

The following procedures are presented in the order in which they must be performed to completely disassemble the unit. Do not disassemble the unit any farther than is necessary to accomplish the required repairs. Each disassembly procedure is followed by a corresponding assembly procedure, and the disassembly process can be halted after any given procedure.

9.7 HOW TO USE THIS MANUAL

Many of the parts and subassemblies of this transaxle can be removed and serviced independently of other components. The disassembly, inspection, and assembly portions of this manual are therefore laid out in subsections. Each assembly is treated as a unit, and the disassembly, inspection, and assembly procedures follow one another.

Where some components and assemblies must be removed before a given assembly can be serviced, that information is given at the beginning of the disassembly instructions.

Subassemblies removed to reach another component or feature need not be fully disassembled. They may be reassembled intact following the necessary repairs.

Table 1 - Torque Specifications

Operation	Torque	Item # Part	Description
Center Section Screws (Item #4)	525-700 in-lbs (59.3-79 Nm)	44	Screw
Lower Housing Screws (Item #50)	135-185 in-lbs (15.2-20.9 Nm)	50	Screw
Charge Pump Cover Screws (Item #29)	87-108 in-lbs (9.8-12.2 Nm)	29	M6 x 1-22
Axle Shaft Jam Nut (Item #73)	660-800 in-lbs (74.5-90.3 Nm)	73	5/16-18
Right Hand Housing Screws (Item #80)	230-290 in-lbs (25.9-32.7 Nm)	80	5/16-18
Axle Hub Nut (Item #119)	200-295 ft-lbs (271-400 Nm)	119	3/4-16
Pulley Nut (Item #115)	360-520 ft-lbs (488-705 Nm)	115	Jam Nut
Fan Screws (Item #107)	35-50 in-lbs (4.0-5.6 Nm)	107	Screw
Bypass Screw (Item #138)	42-62 in-lbs (4.7-7.0 Nm)	138	10-32 x 1/2
Torque Bracket Nut (Item #142)	160-210 in-lbs (18.1-23.7 Nm)	142	5/16-18
Control Arm Stud (Item #36)	50-120 in-lbs (5.6-13.5 Nm)	36	5/16-24
Trunnion Shaft Nut (Item #95)	180-240 in-lbs (20.3-27.1 Nm)	95	5/16-24
Control Bearing Screw (Item #92)	190-240 in-lbs (21.4-27.1 Nm)	92	Screw
Control Arm Nut (Item #95)	85-120 in-lbs (9.6-13.5 Nm)	95	5/16-24
Adjusting Puck Screw (Item #88)	250-320 in-lbs (28.2-36.1 Nm)	88	5/16-24 x 1-3/4
Brake Nuts (Item #127)	80-120 in-lbs (9.0-13.5Nm)	127	1/4-20

9.8 FLUIDS

The fluids used in Hydro-Gear products have been carefully selected, and only equivalent, or better products should be substituted.

Typically, an engine oil with a minimum rating of 55 SUS at 210^{O}F and an API classification of SH/CD is recommended. A 20W-50 engine oil has been selected for use by the factory and is recommended for normal operating temperatures.

Fluid Volume

The transmission holds 0.95 gals. (3.6 L) of 20W-50 engine oil.

Fluid Level

Certain situations may require additional fluid to be added or even replaced. Refer to Figure 45 for proper fill port and fluid level port locations. Fill the unit until fluid flows out of the fluid level port. Recheck the fluid level once the unit has been operated for approximately 1 minute. Purging may be required. Refer to the *Purging Procedures*.

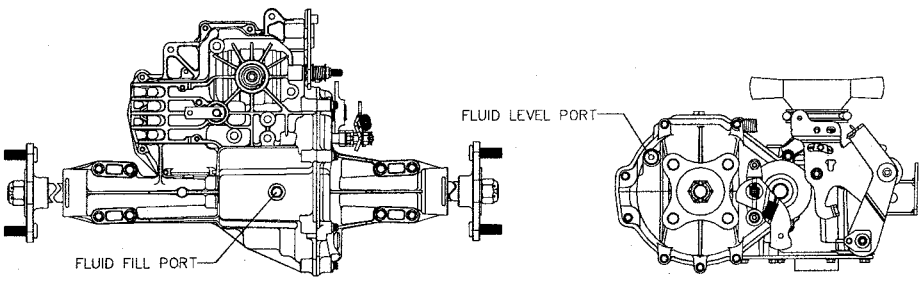


Figure 50

Fluid Change

This transaxle is factory filled and does not require regular oil change. In the event of oil contamination or degradation an oil change may improve performance.

Using transaxle removal procedure, remove transaxle and drain oil from top fluid fill port. Fill unit per Table 3, reinstall transaxle and perform purging procedures.

In the event fluid change and filter inspection is required, refer to *Disassembly/Assembly* instructions.

> **CAUTION:** DO NOT OVERFILL. If you overfill the transaxle while the unit is "cold", it may overflow as it reaches normal operating temperatures. The oil level should not be above the manufacturer's suggestions outlined in this manual. This will allow the space needed for the oil to expand as it warms up.

9.9 BRAKE MAINTENANCE

Brake Setting

1. Remove the brake arm bias spring, and then the cotter pin securing the brake castle nut.
2. Insert a 0.015" feeler gage between the brake disc and top brake puck, and then set the brake by tightening or loosing the castle nut.
3. Adjust brake gap to 0.015" clearance.
4. Install the cotter pin to secure the castel nut, and then install the brake arm blast spring.

9.10 RETURN TO NEUTRAL SETTING

(Optional Feature)

The return to neutral mechanism on the transmission is designed to set the directional control into the neutral position. An optional feature, it is available in two versions. One version provides hand control, and the other, foot control.

> **WARNING:** POTENTIAL FOR SERIOUS INJURY. Certain procedures require the vehicle engine to be operated and the vehicle to be raised off of the ground. To prevent possible injury to the servicing technician and/or bystanders, insure the vehicle is properly secured.

9.11 RETURN TO NEUTRAL SETTING HAND CONTROL

The return to neutral mechanism on the transmission is designed to set the directional control into a neutral position when the vehicle parking brake is engaged.

Follow the procedures below to properly adjust the return to neutral mechanism on the transaxle.

1. Confirm the transaxle is in the operating mode (bypass disengaged). Raise the vehicle's drive tires off the ground to allow free rotation.

NOTE: It may be necessary to remove the drive tire from the axle hub to access the linkage control and the transaxle control arm.

2. Remove the Original Equipment Manufacturer's (OEM's) control linkage at the control arm. Refer to Figure 46.
3. Remove the cotter pin and washer securing the brake pull rod to the return actuating arm. Remove the brake pull rod from the return actuating arm. Refer to Figure 46.

> **WARNING:** Do not attempt any adjustments with the engine running. Use extreme caution while inspecting all vehicle linkage! Follow all safety procedures outlined in the vehicle Owner's Manual!

4. Apply the vehicle brake, start the engine and increase the throttle to full engine rpm.
5. Check for axle rotation. If the axles do not rotate, go to step 6. If the axles rotate, go to Step 7.
6. Stop the vehicle engine. Adjust the OEM linkage according to the OEM manual. Recheck according to step 4 and 5. Stop the vehicle engine. Replace the brake pull rod onto the return actuating arm. Install the washer and a new cotter pin securing the brake pull rod to the actuating arm. Refer to Figure 46.
7. Note the axle directional movement. Stop the vehicle's engine. Loosen the adjusting puck screw until the puck can be rotated. Rotate the adjusting puck the opposite direction of the wheel rotation on the control linkage side in 5 degree increments. Tighten the adjusting puck screw. Refer to Table 1, *Required Torque Values*. Recheck according to step 4 and 5. Stop the vehicle engine. Adjust the OEM linkage according to the OEM manual. Recheck according to Step 4 and 5. Stop the vehicle engine. Replace the brake pull rod onto the return actuating arm. Install the washer and a new cotter pin securing the brake pull rod to the actuating arm. Refer to Figure 46.

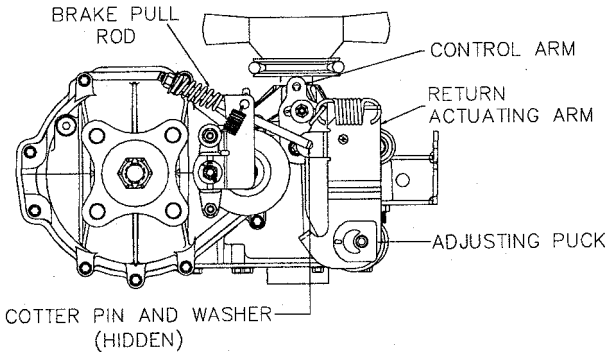


Figure 51

9.12 RETURN TO NEUTRAL SETTING FOOT CONTROL

The return to neutral mechanism on the transmission is designed to set the directional control into a neutral position when the operator removes their foot from the foot control. Follow the procedures below to properly adjust the return to neutral mechanism on the transaxle:

1. Confirm the transaxle is in the operating mode (bypass disengaged). Raise the vehicle's drive tires off the ground to allow free rotation.

NOTE: It may be necessary to remove the drive tire from the axle hub to access the linkage control and the transaxle control arm.

2. Remove the Original Equipment Manufacturer's (OEM's) control linkage at the control arm. Refer to Figure 47.
3. Start the engine and increase the throttle to full engine rpm.
4. Check for axle rotation. If the axles do not rotate, go to Step 5. If the axles rotate, go to Step 6.
5. Stop the vehicle's engine. Adjust the OEM linkage according to the OEM manual. Recheck according to Step 3 and 4. Stop the vehicle engine. Refer to Figure 47.
6. Note the axle directional movement. Stop the vehicle engine. Loosen the adjusting puck screw until the puck can be rotated. Rotate the adjusting puck the opposite direction of the wheel rotation on the control linkage side in 5 degree increments. Tighten the adjusting puck screw. Refer to *Required Torque Values*. Recheck according to Step 3 and 4. Stop the vehicle engine. Adjust the OEM linkage according to the OEM manual. Recheck according to Step 3 and 4. Refer to Figure 47.

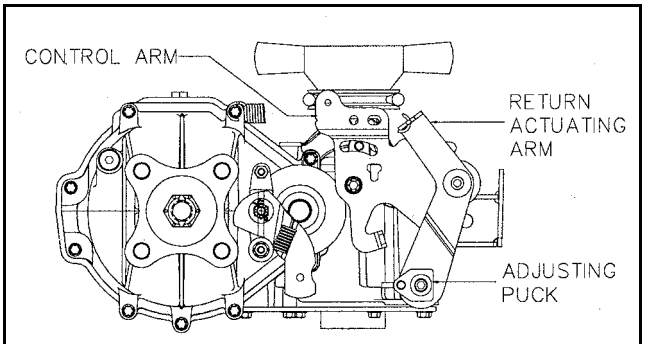


Figure 52

9.13 PURGING PROCEDURES

Due to the effects air has on efficiency in hydrostatic drive applications, it is critical that it be purged from the system.

These purge procedures should be implemented any time a hydrostatic system has been opened to facilitate maintenance or any additional oil has been added to the system.

Air creates inefficiency because its compression and expansion rate is higher than that of the oil normally approved for use in hydrostatic drive systems.

The resulting symptoms in hydrostatic systems may be:

1. Noisy operation.
2. Lack of power or drive after short term operation.
3. HIgh operation temperature and excessive expansion of "oil", in the latter case, oil may overflow.

Before starting, make sure the transaxle/transmission is at the proper oil level. If it is not, fill to the manufacturers suggestions outlined in the vehicle owners manual.

The following procedures should be performed with the vehicle drive wheels off the ground, then repeated under normal operating conditions.

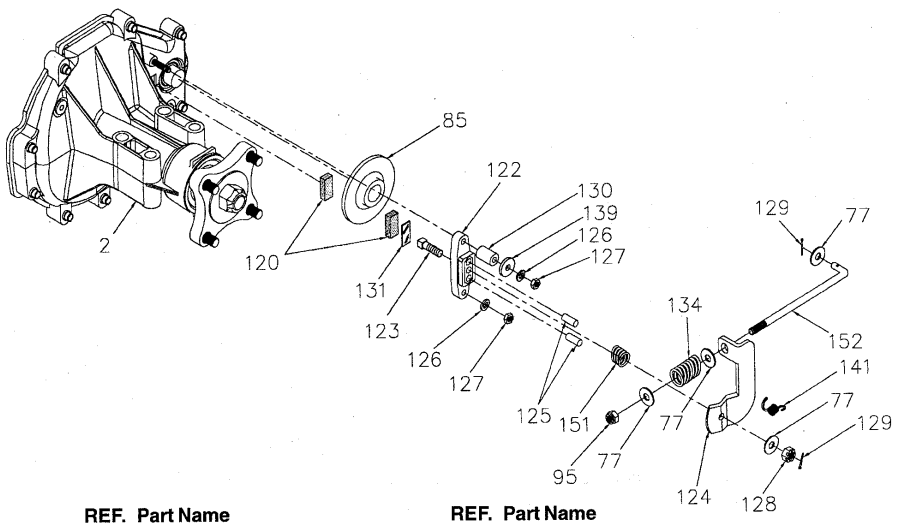
1. With the bypass valve open and the engine running slowly move the directional control in both forward and reverse directions 5 to 6 times, as air is purged from the unit, the oil level will drop and bubbles may appear in the oil. After stopping the engine, add oil, as necessary. Fill to the level outlined in Figure 45.
2. With the bypass valve closed and the engine running, slowly move the directional control in both forward and reverse directions (5 to 6 times). Check the oil level, and add oil as required after stopping engine.
3. It may be necessary to repeat Steps 1 and 2 until all the air is completely purged from the system.

When the transaxle moves forward and reverse, purging is complete.

CAUTION: DO NOT OVERFILL. If you overfill the transaxle while the unit is "cold", it may overflow as it reaches normal operating temperatures. The oil level should not be above the level shown in Figure 45. This will allow the space needed for the oil to expand as it warms up.

9.14 BRAKE DISASSEMBLY & ASSEMBLY

Refer to Figures 48 and 49.



REF.	Part Name
2	Right Hand Housing Assembly
77	Washer
85	Brake Disk
95	Lock Nut
120	Brake Puck
122	Brake Yoke Assembly
123	Square Head Bolt
124	Brake Arm
125	Brake Pin
126	Lock Washer

REF.	Part Name
127	Nut
128	Castle Nut
129	Cotter Pin
130	Spacer
131	Puck Plate
134	Brake Spring
139	Washer
141	Brake Arm Bias Spring
151	Anti-Drag Compression Spring
152	Brake Pull Rod

Figure 53

Disassembly

The following procedure is for model 324-3000. Reference microfiche for other models.

1. Remove lock nut (95), washer (77), brake spring (134), and washer (77) from brake pull rod (152).
2. Remove cotter pin (129), and washer (77) from brake pull rod (152).
3. Remove brake pull rod (152) and set aside.
4. Remove the cotter pin (129), castle nut (128), and washer (77).
5. Remove brake arm (124), and brake arm bias spring (141).
6. Remove brake anti-drag compression spring (151), and two brake pins (125).
7. Remove upper nut (127), lock washer (126), washer (139), and spacer (130) which secure brake yoke assembly (122).
8. Remove lower nut (127), and lock washer (126) securing brake yoke assembly (122).
9. Remove brake yoke assembly (122), puck plate (131), and outer brake puck (120).
10. Remove brake disc (85), and inner brake puck (120).

9.15 INSPECTION

1. Inspect the brake pucks (120) for excessive wear.
2. Replace with new if necessary.

9.16 ASSEMBLY

1. Install inner brake puck (120), and brake disc (85).
2. Assemble the brake yoke assembly, by installing puck plate (131), outer brake puck (120) into brake yoke (122).
3. Install the brake yoke assembly onto two mounting studs on housing assembly (2). Use of a feeler gage (0.015") may be helpful in retaining the brake yoke assembly at this step.
4. Install at upper bolt spacer (130), washer (139), lock washer (126), and nut (127).
5. Install at lower bolt lock washer (126), and nut (127) to secure the brake yoke assembly.
6. Install brake anti-drag compression spring (151), and two brake pins (125).
7. Install brake arm (124) onto brake yoke assembly.
8. Install washer (77), and castle nut (128).
9. Insert a (0.015") feeler gage between brake disc (85) and top brake puck (120). Adjust the brake by turning castle nut (128) until it is snug but not tight against the feeler gage. (The brake gap must be adjusted to a (0.015") clearance.
10. Install cotter pin (129) to secure castle nut (128).
11. Install brake arm bias spring (141) to brake arm (124) and top brake arm bolt.
12. Install brake pull rod (152) into brake arm (124) and actuating arm (35).
13. Secure brake rod (152) to actuating arm (35) by installing washer (77) and cotter pin (129).
14. Secure brake pull rod (152) to brake arm by installing washer (77), brake spring (134), washer (77), and lock nut (95). Set to the dimension shown in Figure 49.

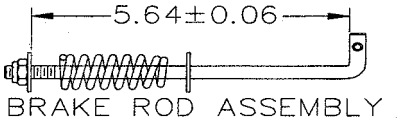


Figure 54

9.17 BYPASS ASSEMBLY

Refer to Figure 50.

Disassembly

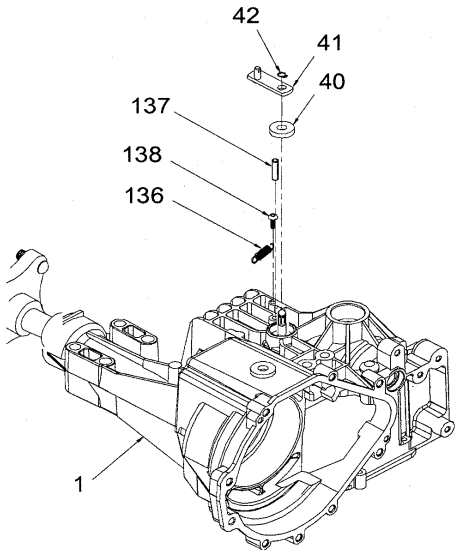
1. Remove self tapping screw (138), and extension spring (136).
2. Remove snap ring (42), and bypass arm (41).
3. Remove bypass lip seal (40).

Inspection

1. Inspect spring pin (137) for damage.

Assembly

1. If necessary, install new spring pin (137).
2. Install bypass lip seal (40).
3. Install bypass arm (41), and snap ring (42).
4. Install self tapping screw (138), and extension spring (136).



REF.	Part Name
1	Main Housing
40	Lip Seal
41	Bypass Arm
42	Retaining Ring
136	Spring
137	Spring Pin
138	Screw

Figure 55

9.18 CONTROL ARM ASSEMBLY

Refer to Figure 51.

Disassembly

Neutral Assembly

NOTE: The brake pull rod (152), washer (77), and cotter pin (129) must be removed before disassembling the Neutral Assembly (refer to Brake Assembly).

1. Remove bolt (88) and adjusting puck (48).

2. Remove neutral spring (46), actuating arm (35), return arm (34), and washer (87).

Control Arm Assembly

1. Remove upper lock nut (95), washer (77), spring (93), spacer (94), washer (77), and friction puck (37).
2. Remove lower lock nut (95), and trunnion spacer (106), from the trunnion arm (31).
3. Remove control arm (26).
4. Remove friction puck (37), and stud (36), if necessary.

Inspection

1. Inspect bearing (89), and replace if necessary. Remove bearing by removing countersink screw (92), and washer (90).
2. Inspect trunnion arm lip seal (33), and replace if necessary.

Assembly

Control Arm Assembly

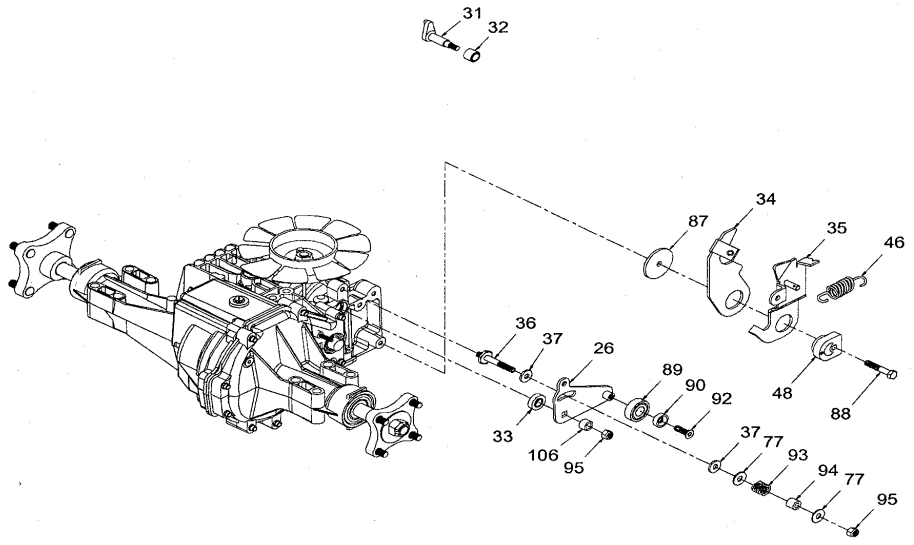
1. Install trunnion arm lip seal (33), into main housing (1).
2. Install stud (36), per Table 1, and friction puck (37).
3. Install control arm (26), onto trunnion arm (31), and stud (36), with washer (77) and nut (95) per Table 1.

NOTE: If bearing (89) must be replaced, install bearing (89), washer (90), and countersink screw (92).

4. Install friction puck (37), washer (77), spring (93), spacer (94), washer (77), and lock nut (95). tighten locknut to (120 in. lbs.), then back off (1) full turn.

Neutral Assembly

1. Install washer (87), return arm (34), actuating arm (35), and neutral spring (46).
2. Install adjusting puck (48), and bolt (88).
3. Adjust neutral settings.



REF.	Part Name
26	Control Arm
31	Trunnion Arm
32	Trunnion Bushing
33	Trunnion Arm Lip Seal
34	Return Arm
35	Actuating Arm
36	Stud
37	Friction Puck
46	Spring
48	Adjusting Puck

REF.	Part Name
77	Washer
87	Washer
88	Screw
89	Bearing
90	Locating Spacer
92	Countersink Screw
93	Spring
94	Spacer
95	Locknut
106	Trunnion Spacer

Figure 56

9.19 TORQUE BRACKET ASSEMBLY

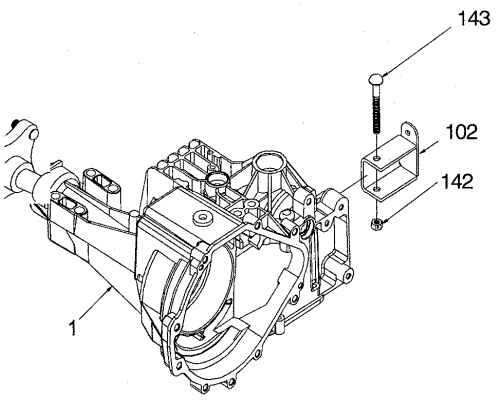
Refer to Figure 52.

Disassembly

1. Remove lock nut (142), and bolt (143), from torque bracket (102).
2. Remove torque bracket (102), from main housing (1).

Assembly

1. Install torque bracket (102), onto main housing (1).
2. Install lock nut (142), and bolt (143), to secure torque bracket (102 to main housing (1). Reference Table 1 for torque values.



REF.	Part Name
1	Main Housing
102	Torque Bracket
142	Lock Nut
143	Bolt

Figure 57

9.20 FAN AND PULLEY ASSEMBLY

Refer to Figure 53.

Disassembly

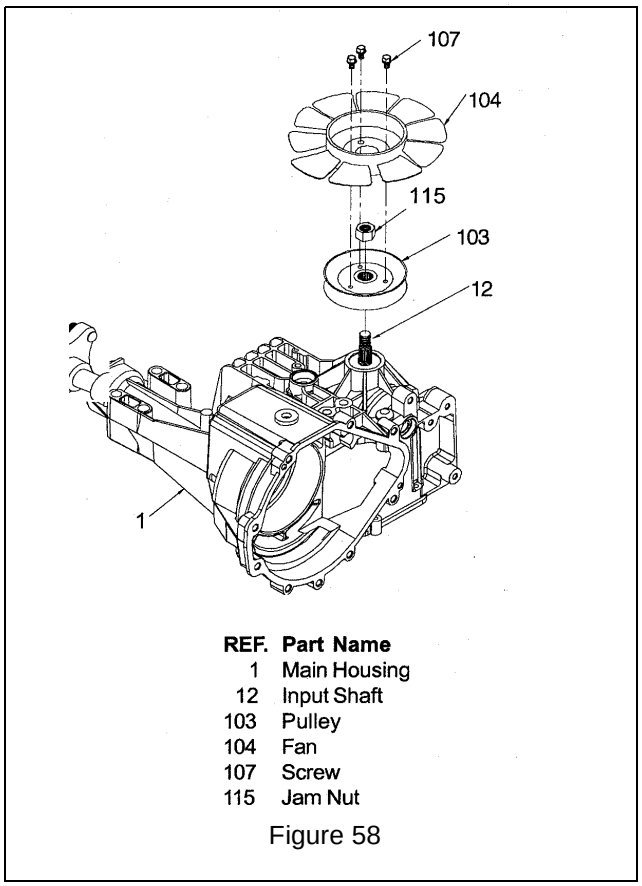
1. Remove jam nut (115) from input shaft (12).
2. Remove fan/pulley assembly (104), (103), (107).

Inspection

1. Inspect fan (104) for broken and/or damaged blades. If necessary to replace fan (104), remove screws (107), and fan (104), from pulley (103).

Assembly

1. Install fan/pulley assembly (104), (103), (107), onto input shaft (12).
2. Secure fan/pulley assembly (104), (103), (107) onto shaft (12) by installing jam nut (115), per Table 1.



REF.	Part Name
1	Main Housing
12	Input Shaft
103	Pulley
104	Fan
107	Screw
115	Jam Nut

Figure 58

9.21 INPUT SHAFT ASSEMBLY

Refer to Figure 54.

Disassembly

1. Drain the oil from the transaxle.
2. Remove snap ring (7), input shaft tip seal (5), and spacer (4).
3. Remove input shaft assembly (12), (8), (6).
4. Remove washer (13) from cavity.

Inspection

1. Inspect bearing (8) for damage and, if necessary replace bearing, remove wire retaining ring (6) and bearing (8) from input shaft (12).

Assembly

1. Carefully install washer (13) onto top of spring in cavity.
2. Press bearing (8) onto input shaft (12) and secure by installing wire retaining ring (6).
3. Install input shaft assembly (12), spacer (4), and lip seal (5) into input bearing bore of main housing (1).
4. Secure input shaft assembly (12) by installing retaining ring (7).

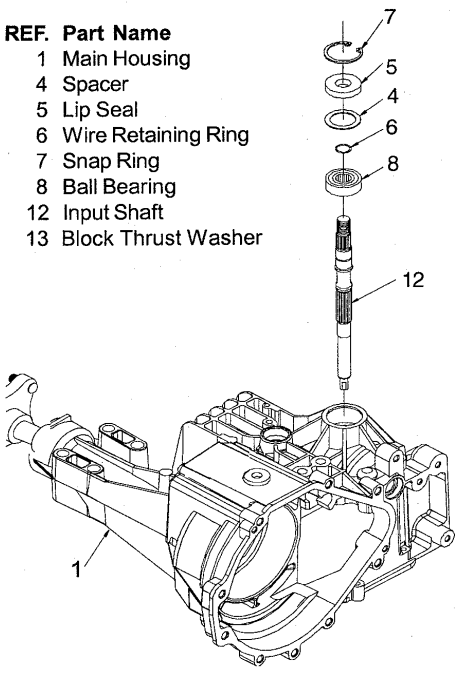


Figure 59

9.22 CHARGE PUMP ASSEMBLY

Refer to Figure 55.

Disassembly

NOTE: Before disassembling, note the orientation of the charge pump cover (54). Scribe or mark the charge pump cover (54) for correct orientation during assembly.

1. Remove two screws (29) from the charge pump cover (54), and remove charge pump cover (54).
2. Remove O-ring (53) and gerotor assembly (52).

Inspection

1. Inspect gerotor assembly (52), cavity of charge pump cover (54), plate on which cover is mounted for damage or excessive wear.

Assembly

1. Install gerotor assembly (52) onto input shaft (12) (not shown).
2. Install new O-ring (53) into charge pump cover (54).
3. Install charge pump cover (54), making sure it is properly oriented.
4. Secure charge pump cover (54) by installing two screws (29), per Table 1.

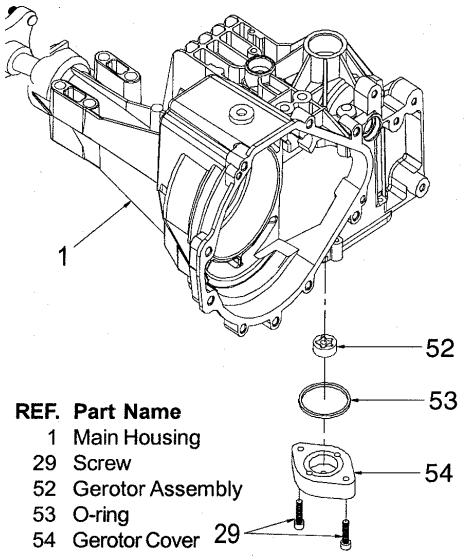


Figure 60

9.23 LOWER HOUSING-FILTER-MANIFOLD ASSEMBLY

Refer to Figure 56.

NOTE: Charge pump assembly must be removed before the following steps can be performed.

Disassembly

1. Remove the eleven housing screws (50) and lower cover (51), and remove sealant.
2. Remove screw O-rings (157).
3. Remove spring (145) and ball (146).
4. Remove filter (55) and charge manifold (56).
5. Remove O-ring (144).

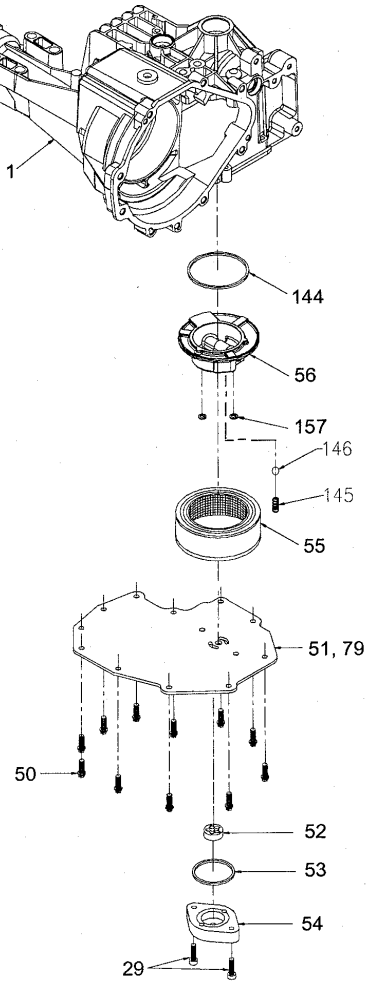
Inspection

1. Inspect filter (55) and manifold (56), replace if necessary.
2. Inspect O-ring (144) and screw O-rings (157).

Assembly

1. Install O-ring (144) onto center section assembly (3), refer to Figure 59.
2. Install filter (55) and charge manifold (56).
3. Install spring (145) and ball (146).
4. Install screw O-rings (157).
5. Dry fit lower cover (51) on housing, using screws (29) to align cover and manifold (56).
6. Remove screws (29) and cover (51). Apply sealant (79) to lip of main housing (1).
7. Reinstall cover (51) and screws (29), reference Table 1.

8. Secure lower cover (51) to main housing (1) by installing the eleven housing screws (50), reference Table 1.



REF.	Part Name	REF.	Part Name
1	Main Housing	55	Filter
29	Capscrew	56	Charge Manifold
49	Not Used	144	O-Ring
50	Screws	145	Spring
51	Lower Cover	146	Ball
52	Gerotor Assembly	156	Manifold O-Ring
53	O-Ring	157	Screw O-Ring
54	Gerotor Cover		

Figure 61

9.24 PLANETARY DIFFERENTIAL ASSEMBLY

Refer to Figure 57.

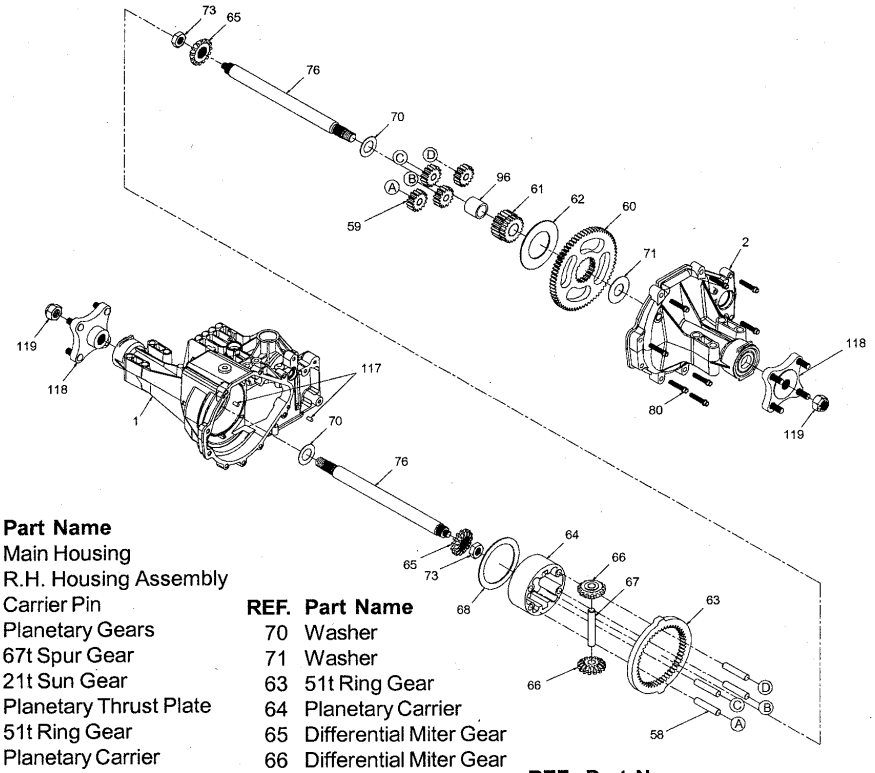
NOTE: Brake assembly, and optional return to neutral have to be removed before the following steps can be performed.

Disassembly

1. Remove the axle hub assembly (118) on control side by removing nuts (119), and hub assemblies (118).
2. Remove the eight torx head screws (80) that secure the R.H. housing assembly (2).
3. Remove R.H. housing assembly (2), while holding axle shaft (76) in place.
4. Remove the two housing pins (117).
5. Remove washer (71) from axle shaft (76).
6. Remove spur gear (60), and thrust plate (62).
7. Remove 21T sun gear (61), and sleeve bearing (96).
8. Remove the planetary gears (59).
9. Remove washer (70), and axle shaft (76).
10. Remove the four carrier pins (58) from planetary carrier (64).
11. Remove 51T ring gear (63) from main housing (1).
12. Remove the two miter gears (66), and differential shaft (67).
13. Remove planetary carrier (64) and differential thrust plate (68).
14. If necessary, remove the second axle shaft assembly (76) from main housing (1).
15. Remove the seal from the shaft, if necessary.

Inspection

1. Inspect all gears for excessive wear or damage and replace if necessary.
2. Remove all sealant from both housings and inspect seal lands for damage when cleaning.
3. If miter gear (65) needs replacement, remove jam nut (73) from axle shaft (76).



REF.	Part Name
1	Main Housing
2	R.H. Housing Assembly
58	Carrier Pin
59	Planetary Gears
60	67t Spur Gear
61	21t Sun Gear
62	Planetary Thrust Plate
63	51t Ring Gear
64	Planetary Carrier
65	Differential Miter Gear
66	Differential Miter Gear
67	Differential Shaft
68	Differential Thrust Plate

REF.	Part Name
70	Washer
71	Washer
63	51t Ring Gear
64	Planetary Carrier
65	Differential Miter Gear
66	Differential Miter Gear
73	Hex Jam Nut
76	Axle Shaft
80	Torx Head Screws
96	Bearing Sleeve

REF.	Part Name
117	Housing Pin
118	Axle Hub Assembly
119	Hex Nut

Figure 62

Assembly

1. If necessary, install L.H. axle shaft assembly (76) into main housing (1). If necessary, reassemble axle shaft assembly (76) by installing washer (70), miter gear (65), and jam nut (73) onto axle shaft (76).
2. Install differential thrust plate (68) into main housing (1).
3. Install planetary carrier (64) into main housing (1).
4. Reassemble the two miter gears (66) onto differential shaft (67), and install assembly into planetary carrier (64).
5. Install 51T ring gear (63) into main housing (1).
6. Install the four carrier pins (58) into planetary carrier (64).
7. If necessary, reassemble axle shaft assembly (76) by installing washer (70), miter gear (65), and jam nut (73) onto axle shaft (76).
8. Install R.H. axle shaft assembly (76) partway into assembled differential components.

NOTE: It will be necessary to support the RH axle shaft in the partially installed position while steps 9 through 16 are completed.

9. Assemble sleeve bearing (96) and sun gear (61), sliding them onto R.H. axle shaft. The smaller diameter on the sun gear OD should be "IN".
10. Install the four 15T planetary gears (59) on pins (80). Make sure the planetary gears are properly aligned with the sun gear. Mate the bevel gear on the end of the RH axle shaft with the bevel gears in the differential assembly. Continue to support the RH axle shaft.
11. Install the planetary thrust plate (62).
12. Install the 67T spur gear (60) onto the 21T sun gear (61).
13. Slide washer (71) onto axle shaft (76).
14. Install the two housing pins (117) into the main housing (1).
15. Apply a bead of sealant to the R.H. housing (2).
16. Install R.H. housing (2) by sliding it down the axle shaft (76), over motor shaft assembly (24, Figure 57) and onto main housing (1).
17. Secure housings by installing the eight housing screws (80), per Table 1.
18. After the transaxle has been installed in the vehicle, install the axle hub assemblies (118), according to the instructions in *Transaxle Installation*.

9.25 MOTOR/CENTER SECTION/PUMP ASSEMBLY

Refer to Figures 58 and 59.

NOTE: Brake assembly, input assembly, charge pump assembly, and lower housing/filter/manifold assembly have to be removed before the following steps can be performed.

Disassembly

1. Remove washer (82), snap ring (83), washer (82), 16T pinion gear (28), spacer (27), and shaft (28).
2. Remove motor thrust bearing retainer (57).
3. Remove motor thrust bearing (25), and 21cc motor cylinder block assembly (21).
4. Remove each piston (23), spring (18), and piston seat (22) from the 21cc motor cylinder block assembly.
5. Remove bypass plate (38) from center section assembly (3).
6. Remove the three screws (44) from center section assembly (3).
7. Lift center section assembly (3) out of main housing (1).
8. Remove the two center section assembly pins (43).
9. Remove bypass actuator (39) from the center section (3).
10. Remove 10cc pump cylinder block assembly (15).
11. Remove each piston (17), spring (18), piston seat (16) from the 10cc pump cylinder block assembly (21).
12. Remove block spring (14), and block thrust washer (13) from shaft (12), Figure 59.

Inspection

1. Inspect running surface of thrust bearing (25) for excessive wear (grooving or smearing).
2. Inspect each piston (23), spring (18), and piston seat (22) in the motor cylinder block assembly.
3. Inspect seal lands of the 21cc motor cylinder block assembly (21) for excessive wear (grooving or smearing).
4. Inspect the two running surfaces of center section assembly (3) for excessive wear (grooving or smearing). Abnormal wear patterns will usually be visible. Any wear detectable when a fingernail is dragged across the surface is cause for rejection.
5. Inspect each piston (17), spring (18), piston seat (16).
6. Inspect seal lands of 10cc pump cylinder block assembly (15) for excessive wear (grooving or smearing).

Assembly

1. Install pump cylinder block thrust washer (13) and spring (14) onto input shaft assembly (12).
2. Install piston washers (18), springs (17), and pistons (18) in cylinder block (15).
3. Install pump cylinder block assembly (15). Be sure spring tension is even around the entire block.
4. Install the two center section assembly pins (43).
5. Install center section assembly (3) into main housing (1). Make sure center section seats fully on its mating surface.
6. Secure center assembly section (3) by installing three screws (44) reference Table 1. Apply a few drops of loctite on screws when installing.
7. Install bypass plate (38) into center section assembly (3).

NOTE: To hold bypass plate (38) in position, apply a small drop of grease to its slot before installing.

8. Install spacer (27), 16T pinion gear (28), washer (82), snap ring (83), and washer (82) onto motor shaft (24).
9. Insert the motor shaft assembly far enough to seat the motor cylinder block (21).
10. Install piston washers (18) springs (17), and pistons (16) in cylinder block (21).
11. If not already available, make an assembly tool from 28 ga. sheet metal as shown in Figure 58. The assembly tool must be free of burrs and rough edges.
12. Using the assembly tool to compress pistons (22), install cylinder block assembly (21). Be careful not to dislodge bypass plate (38) when installing the cylinder block assembly.
13. Again using the assembly tool to compress pistons (22), slide thrust bearing (25), behind the tool, into its cavity in front of the cylinder block (21) and assembled pistons.

NOTE: The thick race of thrust bearing (25) must face the pistons.

14. While holding the cylinder block assembly (21) and the thrust bearing (25) in place, withdraw the assembly tool from between the thrust bearing and the pistons.
15. Install motor thrust bearing retainer (57).
16. Reassemble the planetary differential assembly and install removed components as directed in their respective assembly procedures.

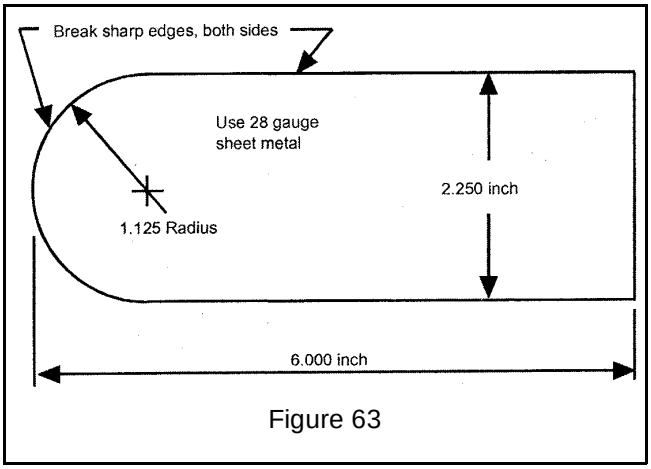
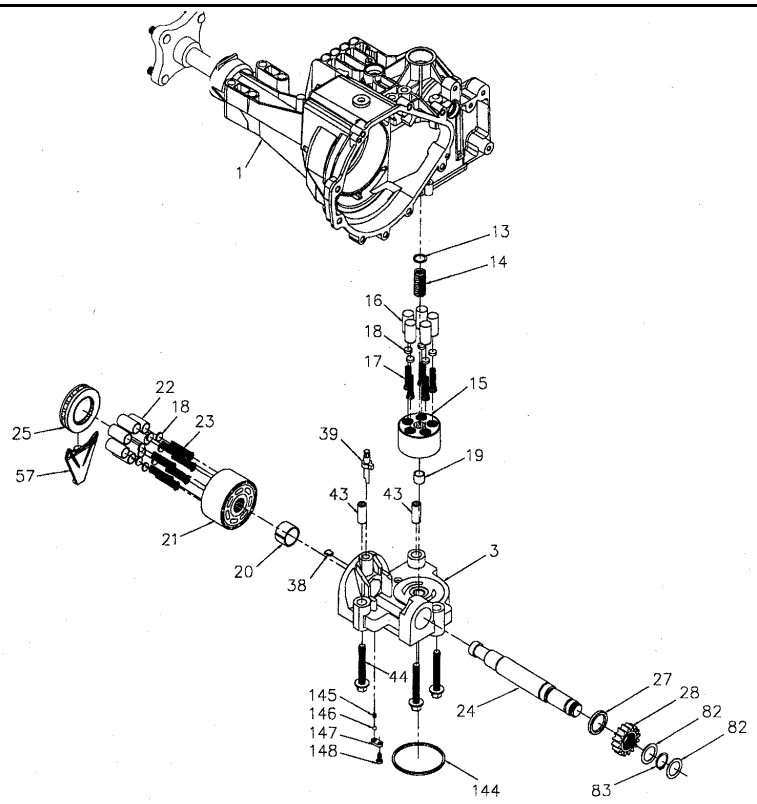


Figure 63



REF.	Part Name
1	Main Housing
3	Center Section Assembly
13	Block Insert Washer
14	Block Spring
15	10cc Cylinder Block
16	Pistons
17	Springs
18	Piston Washers
19	Block Spring

REF.	Part Name
20	Bushing
21	21cc Cylinder Block
22	Pistons
23	Springs
24	Motor Shaft
25	Thrust Bearing
27	Spacer
28	16t Pinnion Gear

REF.	Part Name
38	Bypass Plate
43	Pin
44	Screws
53	O-Ring
57	Bearing Retainer
82	Washer
83	Retaining Ring
144	O-ring

Figure 64

9.26 DIRECTIONAL CONTROL ASSEMBLY

Refer to Figure 60.

NOTE: The motor/center section/pump assembly must be disassembled before this procedure can be completed.

Disassembly

1. Remove swashplate assembly (10). Disassemble swashplate assembly by removing thrust bearing (11) from swashplate (10). The thick race of thrust bearing must face pistons.
2. Remove slot guide (30).

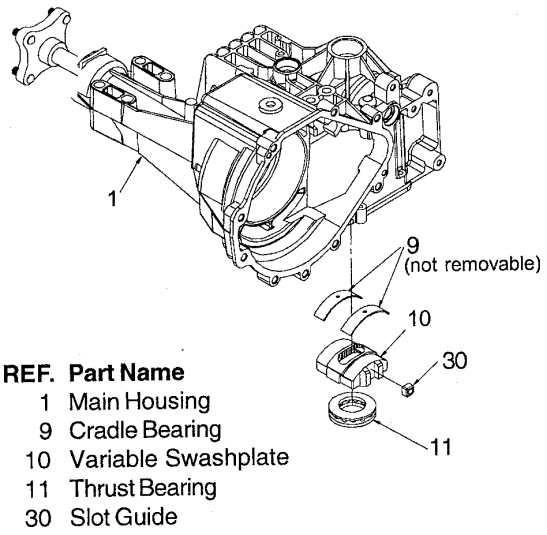
Inspection

1. Visually inspect (in place) the two cradle bearings (9), which are staked in upper housing. Do not remove the cradle bearings (9) from housing (1).
2. Assemble swashplate assembly (10) by installing thrust bearing (11) into swashplate (10).

NOTE: Assemble thrust bearing with thick race facing pistons.

3. Install swashplate assembly (10) into main housing (1). The swashplate (10) will couple with slot guide (30).

NOTE: When installing swashplate assembly (10), use flat head screwdriver to hold slot guide (30) in place.



REF.	Part Name
1	Main Housing
9	Cradle Bearing
10	Variable Swashplate
11	Thrust Bearing
30	Slot Guide

Figure 65

9.27 TRANSAXLE INSTALLATION

Use the following procedure to complete installation of the transaxle on the vehicle.

1. Install and secure the transaxle on the vehicle according to instructions in the vehicle owner's manual.
2. Install the hub assembly (118), Figure 57 on the shaft. Install hex nut (119).
3. With the vehicle raised, install the wheel on the hub, and retain with the wheel lug nuts.
4. Lower the vehicle wheels to the ground, and torque the nut retaining the hub to 290 to 295 ft-lbs (393 to 400 Nm), using an air impact wrench.
5. Tighten the wheel lug nuts.

9.28 ASSEMBLY AFTER A COMPLETE TEAR-DOWN

If the unit has been torn down completely, the following summary identifies the assembly procedures necessary to completely assemble the unit, in order they must be completed. Each assembly procedure is located by a page reference.

The part reference numbers provided in each assembly procedure are keyed to the individual exploded views and are also keyed to the complete unit exploded view, Figure 61.

1. Assemble the directional control assembly.
2. Assemble the motor/center section/pump assembly.
3. Assemble the planetary differential assembly.
4. Assemble the lower housing/filter/manifold assembly.
5. Assemble the charge pump assembly.
6. Assemble the input shaft assembly.
7. Assemble the fan and pulley assembly.
8. Assemble the torque bracket assembly.
9. Assemble the control arm assembly.
10. Assemble the bypass assembly.
11. Assemble the brake assembly.

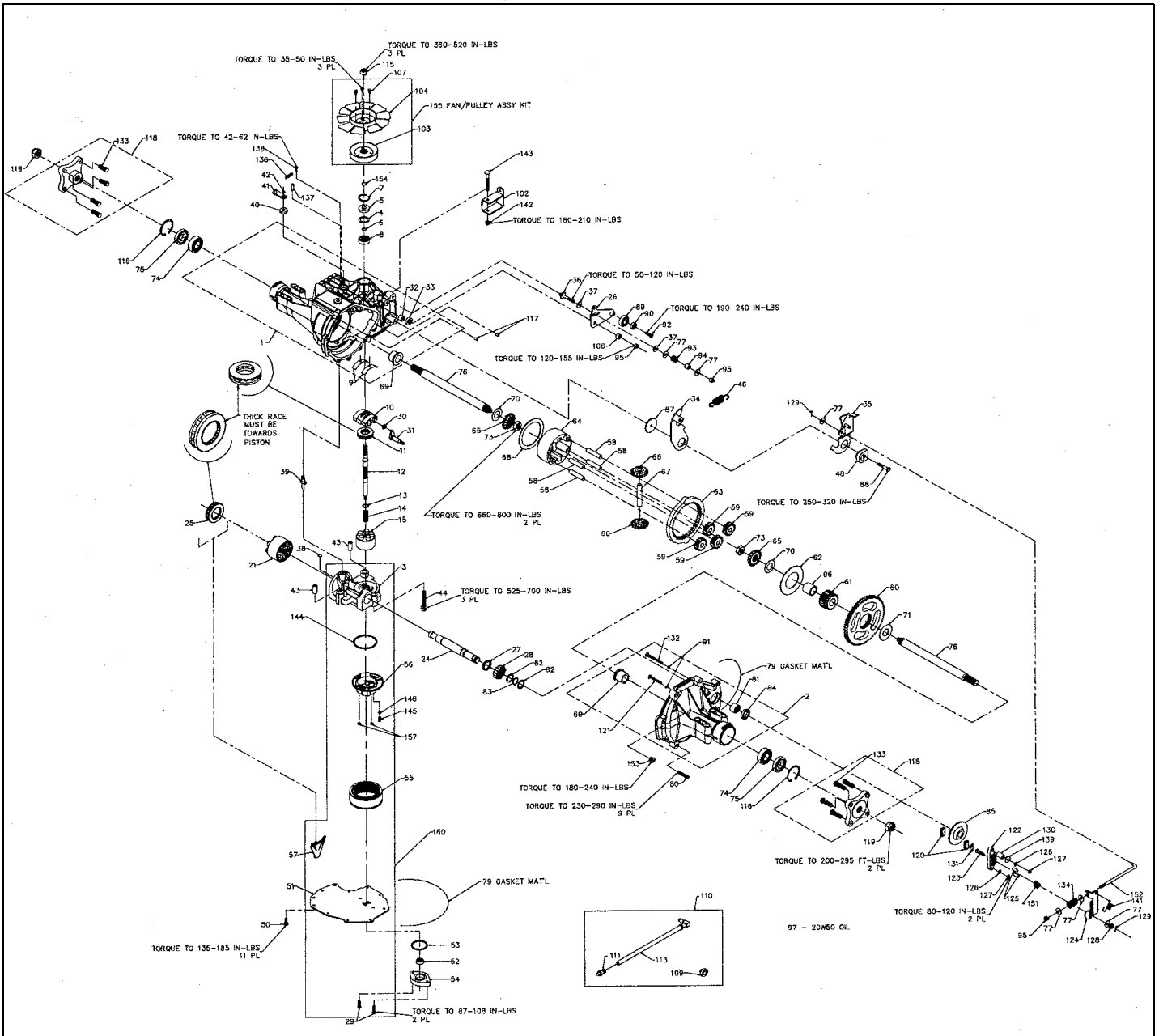
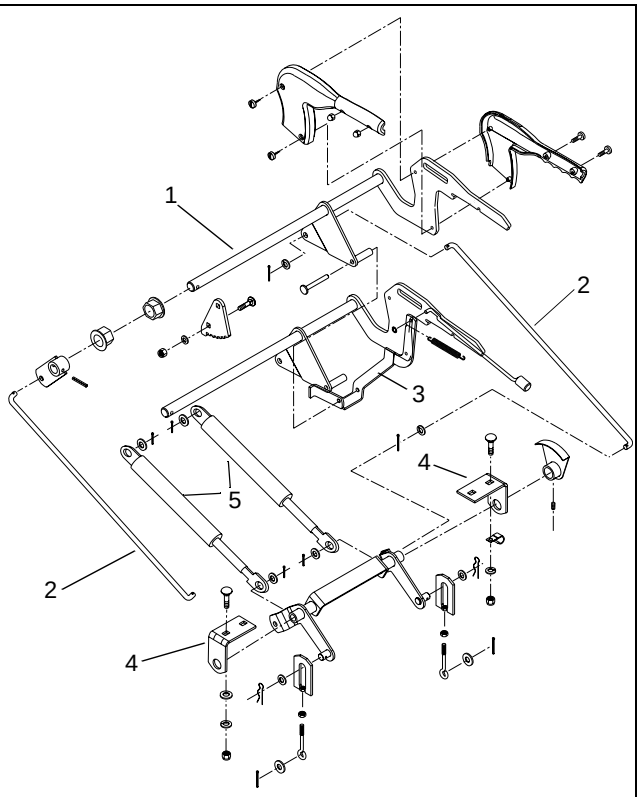

TORQUE TO 380-520 IN-LBS
3 PL
TORQUE TO 35-50 IN-LBS
3 PL
155 FAN/PULLEY ASSY KIT
TORQUE TO 42-62 IN-LBS
TORQUE TO 160-210 IN-LBS
TORQUE TO 50-120 IN-LBS
TORQUE TO 190-240 IN-LBS
TORQUE TO 120-155 IN-LBS
THICK RACE MUST BE TOWARDS PISTON
TORQUE TO 660-800 IN-LBS
2 PL
TORQUE TO 250-320 IN-LBS
TORQUE TO 525-700 IN-LBS
3 PL
79 GASKET MAT'L
TORQUE TO 180-240 IN-LBS
TORQUE TO 230-290 IN-LBS
9 PL
TORQUE TO 200-295 FT-LBS
2 PL
TORQUE TO 80-120 IN-LBS
2 PL
97 - 20W50 OIL
TORQUE TO 135-185 IN-LBS
11 PL
TORQUE TO 87-108 IN-LBS
2 PL

Figure 66

10.1 LIFT SYSTEM OVERVIEW

The lift system used on the High Sierra tractor uses a gas cylinder assisted system to take the weight of the attachment away from the operator.



1. Lift Lever
2. Lift Link
3. Detent Lever
4. Center Lift Bracket
5. Gas Compression Spring

Figure 67

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10.2 LIFT SYSTEM REMOVAL

With the mower attachment removed from the tractor the lift handle should be left in the up position.

1. Remove the cotter pins on the mower lift link.
2. Remove the left side, center lift bracket support. Support the lift assembly and remove the left bracket. Remove the spring assembly from the unit.
3. For removal of the upper lift lever and handle the rear deck of the tractor will need to be removed.
4. Move the fuel tank forward to allow access to the mounting hardware.
5. Remove the plastic handle covering on the lift handle.
6. Release and remove the detent lever tension spring.
7. Remove the pivot pin from the lift linkage and remove detent lever from the linkage.
8. Remove the external retaining ring from the ends of the lift lever pivot and remove the washers and bushings.
9. Remove the carriage bolts and nuts holding the pivot rod to the rear deck supports.

10.3 LIFT SYSTEM INSTALLATION

1. Insert the cross shaft and coil assembly into the support bracket still in the tractor and mount the left with the hardware removed with it.
2. Insert the fuel line and wire harness into the "J" clamp and bend closed.
3. Insert the lift rod into the lift arm cross shaft and secure with washers and cotter pin.
4. Reassemble the upper lift assembly into the rear deck support and secure with the hardware removed earlier.
5. Install the bushings and washers onto the rod ends and secure with the external retaining rings.

SECTION 11 - FUEL SYSTEM

11.1 FUEL SYSTEM TROUBLESHOOTING

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

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

TROUBLE	POSSIBLE CAUSES (Refer to Key Below)	CORRECTIVE ACTION
Hard Starting	1, 3, 4, 6, 11, 12, 14, 16, 17, 18	clean, repair or replace
Fuel Leak at Carburetor	5, 7, 17	repair or replace
Engine Floods	5, 15, 17	repair or replace
Will not idle	1, 2, 3, 6	repair or replace
Rich idle	1, 6, 14	repair or replace
idles with Needle Closed	14	repair or replace
Hunts Erratic Idle	2, 3, 6, 7, 12, 13, 14, 15, 18	repair or replace
Idles Fast Lean	2, 3, 7	repair or replace
Will Not Accelerate	1, 6, 11, 12, 14, 15, 16	repair or replace
Over Rich Acceleration	1, 15	repair or replace
Hesitates	2, 6, 11, 12, 16	repair or replace
Will Not Run at High Speed	1, 11, 12, 14, 16	repair or replace
Low Power	1, 3, 11, 14, 15, 16, 17, 18	repair or replace
Hunts at High Speed	3, 6, 7, 12, 14, 15, 16, 18	repair or replace
Runs With Needle Closed	14	repair or replace
Engine Overspeeds	2, 3, 7, 14	repair or replace

TROUBLESHOOTING KEY	
1	Plugged Air Filter
2	Leaky Carburetor Gasket
3	Throttle or Choke Shaft Worn
4	Choke Not Functioning Properly
5	Plugged Atmospheric Vent
6	Air Bleed Restricted
7	Damaged or Leaky "O" Rings
8	Damaged Diaphragm
9	Stuck or Dirty Ball Check
10	Diaphragm Upside Down
11	Plugged Tank or Vent
12	Fuel Pick-up Restricted
13	Idler Port Restricted
14	Damaged Adjustment Needle and Seat
15	Incorrect Float Height
16	Main Nozzle Restricted
17	Dirty, Stuck Needle and Seat
18	Fuel Inlet Plugged

11.2 FUEL PUMP

The impulse style fuel pump is the most commonly used fuel pump. Impulse fuel pumps may either be mounted externally onto the carburetor fuel inlet or remotely mounted. These pumps are connected in the fuel line between the fuel supply and the carburetor or directly to the fuel inlet.

Impulse fuel pumps are operated by crankcase impulses created by the up and down movement of the piston. A hose called a pulse line connects the fuel pump diaphragm chamber and transmits the impulses to the pump diaphragm. The impulses actuate the diaphragm and the flap valves to lift the fuel from the fuel tank to the carburetor.

11.3 FUEL SYSTEM CONTAMINATION

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

11.4 FUEL TANK

The fuel tank is made of composite material for long life without breaking down from the additive used in today’s blended fuels.

SECTION 12 - ELECTRICAL

12.1 TOOLS

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

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

Diagonal cutters - used to cut wires or trim connections.

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

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

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

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

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

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

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

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

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

12.2 ELECTRICAL MEASUREMENTS

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

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

Multimeter

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

Analog Meters

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

Digital Meters

Digital Meters do not have a movement and are therefore more rugged. The reading shows up directly on a display window of some type. Since they read direct, no skill in reading the scale is required, nor is it necessary to set the range. The meter switches the ranges automatically. One has only to select the function DC Volts, AC Ampere, Ohms, etc.,) connect the test leads, and the reading is shown on the display. Because of the internal circuitry and the lack of a movement, these meters are not likely to be damaged by overloads.

In the discussions that follow, either type of meter may be used. Test procedures are the same. It is best to learn proper procedures, even though some meters may be more forgiving of mistakes. Where differences in use may occur, they will be covered in the discussion.

Voltage Measurement

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

Current Measurement

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

Resistance Measurement

An ohmmeter is used to make resistance measurements and to check continuity through wires and electrical components.
There is one rule to keep in mind when using an ohmmeter. The ohmmeter has a self contained battery and requires no electrical power. Using the ohmmeter on a circuit that has power applied may result in damage to the meter.

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

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

12.3 BATTERY

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

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

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

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

POISONOUS BATTERY FLUID contains sulfuric acid and its contact with skin, eyes or clothing can cause severe chemical burns. ALWAYS wear safety glasses and protective gear near battery.
DO NOT TIP any battery beyond 45 degree angle in any direction.
ALWAYS KEEP BATTERIES OUT OF REACH of children.

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

Set-Up

The new battery is dry charged. The dealer or customer must add electrolyte (sulfuric acid and water).

1. Remove the battery from the unit.
2. Remove all the vent caps from the battery and set the caps to one side.
3. Take the electrolyte which should be 1.265 specific gravity at 80^{o}F, and fill each cell so that the electrolyte is level with the bottom of the fill ring.
4. The battery should stand for 1/2 hour. Now check electrolyte level in each cell again. If necessary add more electrolyte to bring the level up to the bottom of the ring.
5. Charge until all cells are gassing freely, and the specific gravity is constant over three successive readings taken at 30 minute intervals.
6. Immediately after charging check level of electrolyte. If the level is low add distilled water to bring it up to the required level.
7. Replace the vent caps. It is not necessary to tighten more than finger tight.
8. Wash off the battery to remove electrolyte which may have spilled.

Battery Electrolyte First Aid

External contact: Flush with water.

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

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

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

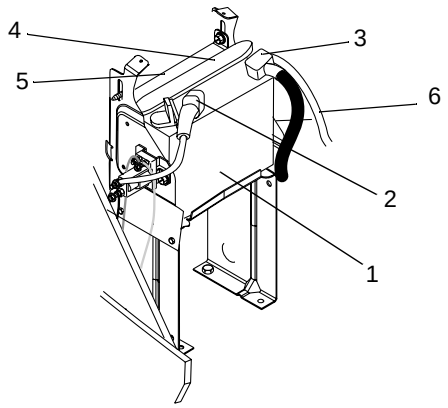
Clean Battery

Corrosion and dirt on the battery and terminals can cause the battery to "leak" power.

- Remove battery. (See *Battery Removal and Installation*)
- Rinse the battery with plain water and dry.
- Clean terminals and battery cable ends with wire brush until bright.
- Coat terminals with grease or petroleum jelly.
- Reinstall battery.

Battery Removal and Installation

Remove battery before service.



1. Battery
2. Positive Terminal (+)
3. Negative Terminal (-)
4. Battery Cover
5. Battery Strap

Figure 68

OT0271

To remove the battery from the unit:

1. Remove the two self-tapping screws at the top of the front panel.
2. Remove the two hex screws from the lift lever access plate and remove the plate.
3. Unscrew the knob from the parking brake lever.
4. Lift the front panel off the unit by lifting it up and out of slots in frame, clearing the lift lever.
5. Remove wing nut from the battery rod and remove the rod.
6. Disconnect the negative (-) cable first.
7. Disconnect the positive cable (+) second.
8. Lift the battery out of the unit and place battery on a bench or other well ventilated area where an acid spill will not create damage.
9. When service is finished, reinstall battery into unit and connect positive (+) cable first, then negative (-) cable.
10. Reinstall front panel, making sure tabs fit securely into slots in frame. Secure with hardware.
11. Reinstall the lift lever access plate and the knob on the parking brake lever.

Inspection, Cleaning, Drying, and Maintenance

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

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

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

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

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

Electrolyte Level

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

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

Charging

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

Place unit on a level surface, shut off engine and open battery compartment to gain access to battery.

Disconnect negative (-) cable first, then positive (+) cable.

To charge battery:

1. Loosen strap and remove battery from unit.
2. Place battery on bench or other well ventilated place where electrolyte spill will not create damage.

3. Remove caps and fill each cell to level indicated with electrolyte at 1.230 specific gravity and 80°F (27°C).
4. Let battery stand for one half hour.
5. Check electrolyte level and add more if necessary.
6. Connect positive (+) lead of charger to positive (+) terminal, and negative (-) lead to negative (-) terminal.
7. Charge the battery at two and a half amps for ten hours or until all cells are gassing freely and the specific gravity is constant over three 30 minute intervals.

Specific Gravity Check

The specific gravity should be checked with a hydrometer.

NOTE: The specific gravity should be checked in each cell and should be the same for all cells. A variation in a cell reading could be an indication of a problem. Subtract .004 from 1.265 for each 10°F below 80°F (27°C) or add .004 to 1.265 for each 10°F above 80°F (27°C).

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

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

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

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

If using an automatic tapering 12 volt charger, choosing a good quality 5 to 10 amps 15VDC minimum output charger and charge for 3 to 12 hours according to the battery state of charge (see table above) or until the specific gravity in each cell reaches 1.255 - 1.265 specific gravity at 80°F (27°C).

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

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

Battery Charger

Under normal conditions the engine alternator will keep the battery charged. When unit has set for an extended period of time without operation and the battery has been completely discharged, a battery charger will be required for recharging.

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

Jump Starting

Jump starting, battery charging, or replacement is required when the starter motor will not crank the engine.

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

WARNING: FROZEN BATTERIES CAN EXPLODE and result in death or serious injury. DO NOT charge a frozen battery. Let the battery thaw out before putting on a charger.
UNIT MOVEMENT can result in death or serious injury. NEVER jump start unit directly to the starter or starter solenoid. Unit can move forward or backward and injure the person jump starting unit.

To jump start the battery:

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

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

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

Storage

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

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

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

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

12.4 SWITCHES

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

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

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

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

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

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

Normally Open Switch

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

Variation from test results described indicates a defective switch.

Normally Closed Switch

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

Variation from test results described indicates a defective switch.

Ignition Switch

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

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

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

RUN Position - Should be continuity between contacts B and A. These connections supply power to the rest of

the wiring harness. Connections G and M open to each other.

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

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

12.5 SOLENOID AND RELAYS

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

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

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

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

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

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

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

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

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

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

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

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

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

12.6 LIGHTING CIRCUITS

Lighting circuits are simple circuits and easiest to trouble shoot in most equipment. They consist of the lights connected in parallel; a normally open switch, a protective fuse and a source of power (battery or engine alternator).

If only one light is out, check the connector, then check the bulb for continuity (high resistance indicates a defective or burned out bulb).

If all the lights are out, check the fuse for continuity (high resistance indicates a defective or blown fuse). If the fuse is blown, check for a short in the wiring and correct before replacing the fuse.

If the fuse and lamps are good, check the circuit with an AC/DC voltmeter.

12.7 FUSES

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

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

Electrical testing of these devices is simple. Since the device either conducts current (and is therefore functioning) or the device is open and is therefore defective. Use an ohmmeter to check for continuity.

12.8 DIODES AND RECTIFIERS

Diodes are solid state, semiconductor devices. They contain no moving parts and conduct current better in one direction than the other.

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

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

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

Rectifiers

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

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

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

12.9 ELECTRIC CLUTCH

The electric clutch is used to turn on and off the attachment used on the unit by use of a switch. The clutch is also designed so that a brake is applied to the output shaft when the clutch is disengaged (off).

The field coil is mounted to a bearing support and does not rotate. The rotor is attached to the power output shaft and rotates around the field assembly. The armature is attached to the output pulley. The armature assembly is held close to the rotor by the brake assembly. The clutch is engaged by applying current to the coil connection. This results in a current flowing through the coil, magnetizing the coil pulling the armature onto the rotor with sufficient force to hold the two pieces together, effectively connecting the output and the input shafts together. Pulling the armature against the rotor pulls it away from the brake, releasing the brake.

Engine Electrical Components

Engine servicing and repair should be referred to local engine manufactures service centers that have the service information and parts available to properly service the engine. Ariens dealers should be able to test engines and engine components to pinpoint troubles and narrow them down to properly advise the engine serviceman.

12.10 CHECKING THE PTO CLUTCH

Measure Clutch Coil Resistance

1. Turn engine and PTO switch off.
2. Disconnect clutch wire connections.
3. Select meter to check ohms.

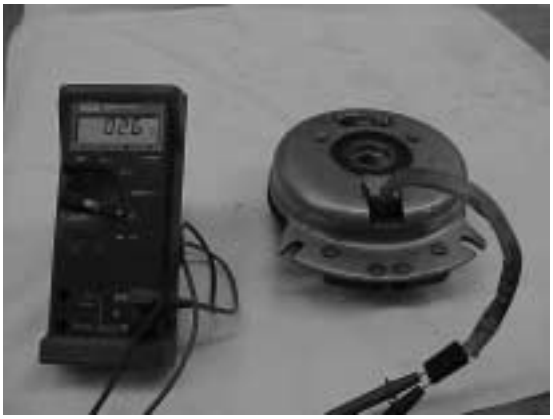


Figure 69

4. Connect meter leads wires in clutch connector.
5. If meter reads below 2.50 ohms or above 3.50 ohms, then the clutch has failed and needs to be replaced.
6. If meter reads between 2.50 to 3.50 ohms, proceed to Measure Clutch Current Draw.

Measure Clutch Current Draw

1. Turn engine off.
2. Disconnect clutch wire connections. Remove 30 amp fuse.
3. Select meter to check amps (10 amp scale).

4. Place meter leads into fuse holder.
5. Sit on the seat to make seat switch connections.
6. Turn the ignition switch to RUN and the PTO switch to ON.
7. If the meter reads below 4.5 amps, the problem is in the electrical system leading to the clutch (Battery, relay, switch wiring).

If you find after measuring clutch coil resistance and clutch current draw that:

1. The resistance falls between 2.50 and 3.50 ohms.
2. The amp draw is 4.50 or above.
3. The electric clutch is within factory specifications and is not the source of the problem.

12.11 HIGH SIERRA ELECTRICAL

Initial check out: Make sure that all switches are in their proper position for starting: (A) PTO off, (B) transaxle in neutral position, (C) operator on the seat, (D) the parking brake pedal pushed, (E) cruise control in the off position. If power is not available to start the engine use the following steps:

STEP 1

Check out the battery. Using a hydrometer on all the battery cells to see if one or more is bad. Also use a voltmeter to check for proper voltage. Replace the battery if necessary and/or charge to proper level.

STEP 2

Use a voltmeter to make sure you have battery voltage to terminal (B) on the back side of the ignition switch in the off position. If you don't have battery voltage to terminal (B) check the battery connection and the fuse in the red lead.

STEP 3

With the ignition switch in the "run" position, check to see if power is being transferred from terminal (B) to terminal (A). Terminal (A) on the ignition switch supplies battery voltage to the back of the PTO switch on the purple lead and on to the brake switches on the brown/yellow lead to terminal S2 on the ignition switch and to terminal 86 on solenoid #2. Terminal (A) also supplies battery voltage to terminal 30 and 86 on solenoid #1 and on to the hour meter. When the operator is in the seat, battery voltage will transfer from terminal 30 to terminal 87 and on to the front terminal of the PTO switch and on to terminal 86 on solenoid #2 in the yellow/red lead. Battery voltage is supplied to the fuel shut off solenoid from terminal 86 on solenoid #2.

STEP 4

With ignition switch in the start position, battery voltage is transferred from terminal S2 to S1. Terminal S1 Transfers battery voltage to the one small terminal on the starter solenoid and goes to ground through the base of the starter solenoid.

PTO clutch check out: Remove the wiring harness PTO clutch leads from the clutch. With a multimeter check the clutch coil for resistance to see if the coil is good (3.0-3.9). If the resistance is 0 or higher the coil is bad.

Ignition switch check out: Battery voltage check in the "off" position, check for voltage at terminal "B". It should not be present on terminals A, S1, S2.

With the ignition switch in the "run" position, check for battery voltage at terminal B, A, S2. It should not be present at terminal S1.

With the ignition switch in the "start" position, check for battery voltage at terminals B, A, S2, S1.

PTO switch check out: The PTO switch is a push/pull switch with normal open and closed contacts. Power transfer should be checked with a voltmeter. The switch contacts should be checked with an ohm meter with the wire harness plug removed. The light switch is similar to the PTO switch with only one set of contacts.

Diode check out: Diodes are checked with an ohm meter set on the diode check, and should only pass voltage in one direction. If it passes voltage in both directions or not at all the diode is bad and needs to be replaced.

.

Check Points for DC Voltage Readings

Key Switch	Off	Run	Start
B	11.50-13.00	11.50-13.00	11.50-13.00
A		11.50-13.00	11.50-13.00
S-1			11.50-13.00
S-2		11.50-13.00	11.50-13.00

Contact resistance is 0.1-0.3 ohms when correct.

Seat Switch	Off	Run	Start
Pink		11.50-13.00	11.50-13.00
Black	Connected to Ground		

Normally open contacts manually activated. contact resistance is 0.1-0.3 ohms when correct.

PTO Switch	Off	Run	Start
Yellow/Red (2)		11.50-13.00	11.50-13.00
Purple/white (2)	Connected to PTO Clutch		
Purple		11.50-13.00	11.50-13.00
Brown/Yellow		11.50-13.00	11.50-13.00

2 sets of contacts, one normally open, one normally closed. Contact resistance is 0.1-0.3 ohms when correct.

Normally open contacts (big terminals) coil resistance 3.0-5.0 ohms. Contact resistance is 0.1-0.3 ohms when correct. Electrically activated.

PTO Clutch	Off	Run	Start
Purple/white			
Black	Connected To Ground		

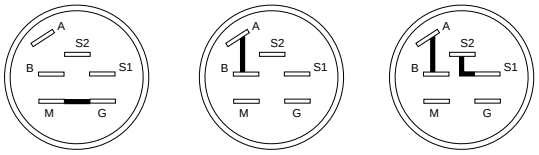
Coil Resistance check clutch specifications.

12.12 CONTINUITY DIAGRAMS

Models 934026, 934027

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

Key Switch
(03602300)



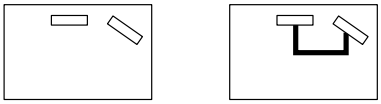
OFF RUN START

Seat Switch
(03654200)

OPERATOR OFF SEAT

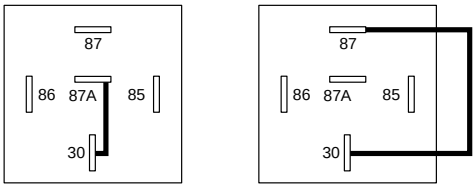
OPERATOR ON SEAT

Light Switch
(03656800)



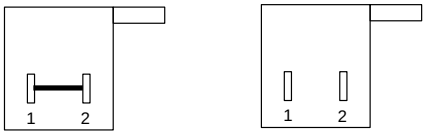
OFF ON

Relay
(03042800)



NOT ENERGIZED ENERGIZED

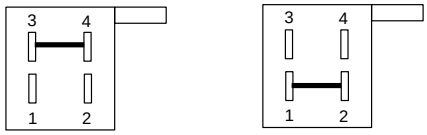
Clutch/Brake Switch
(03657100)



ENGAGED (button in)

DISENGAGED (button out)

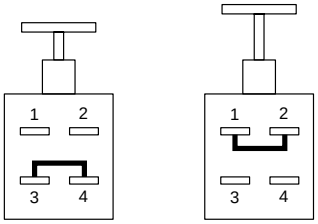
Safety Switch
(08828100)



ENGAGED (button out)

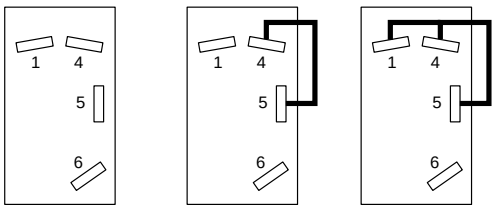
DISENGAGED (button in)

PTO Switch
(53603800)



DISENGAGED ENGAGED

Cruise Control Switch
(03656900)

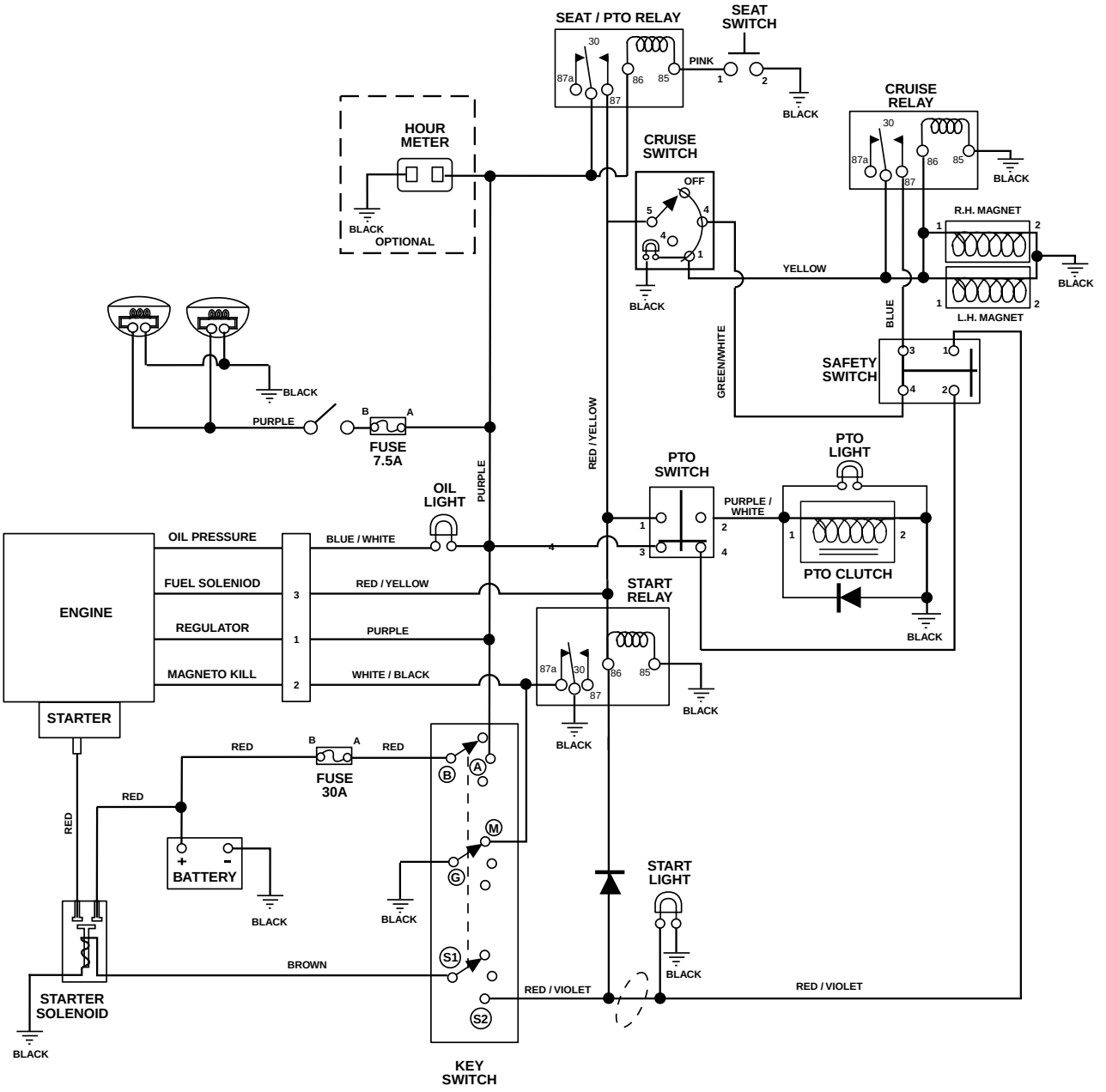


OFF CRUISE ON SET

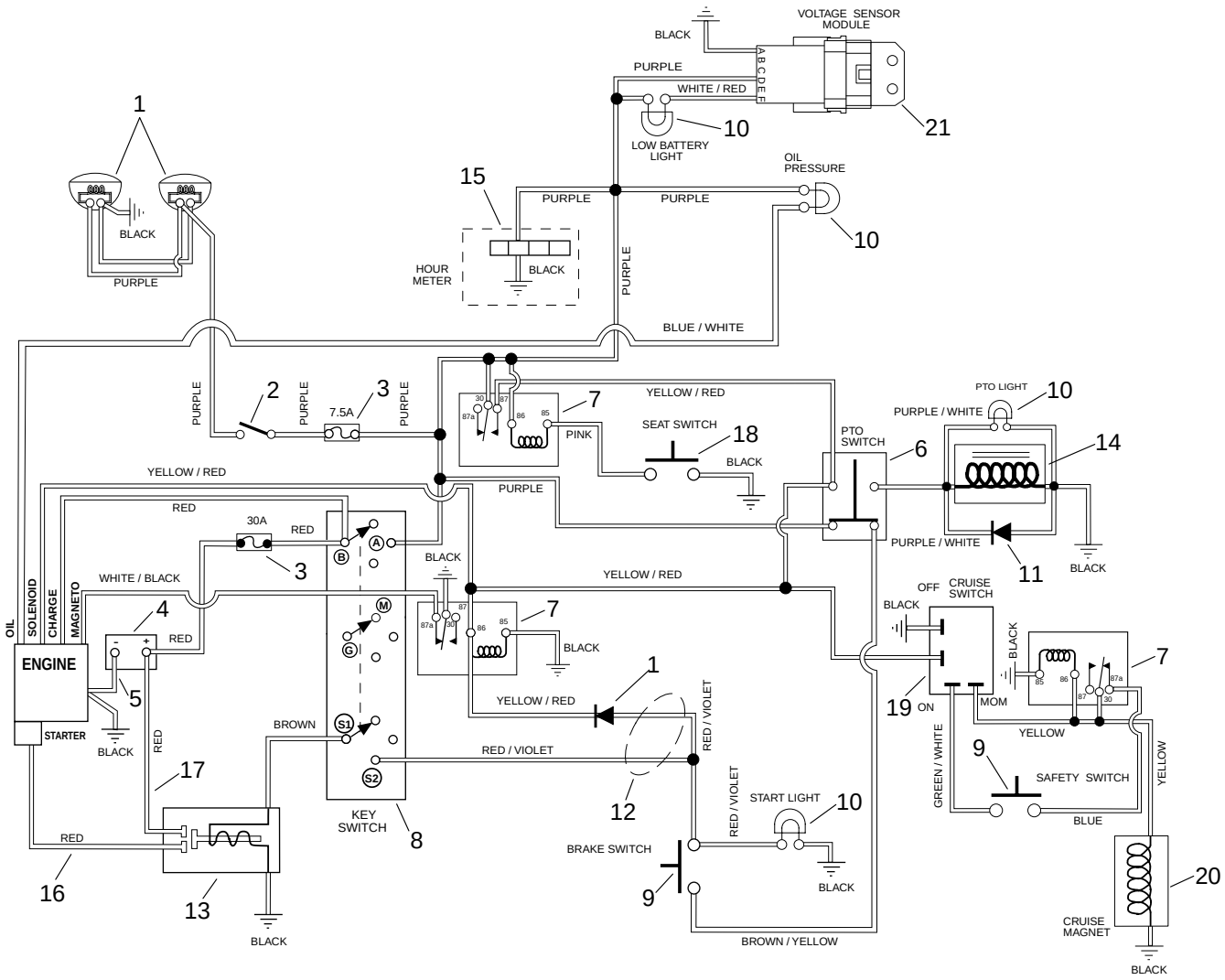
PT0860

12.13 WIRING DIAGRAMS

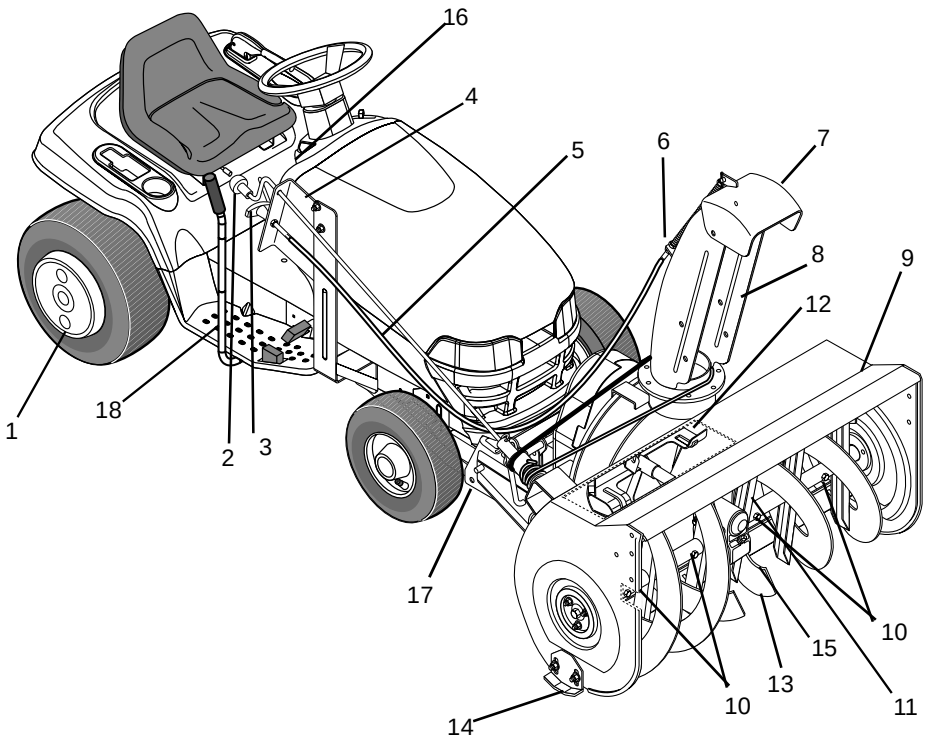
Models 934026, 934027



Models 934023, 301



13.1 CONTROLS & FEATURES



1. Wheel Weight
2. Chute Control Crank
3. Deflector Cable
4. Control Bracket
5. Control Cable
6. Chute Tab
7. Chute Deflector
8. Discharge Chute
9. Auger Impeller Housing
10. Shear Bolt(s)
11. Auger Gear Case
12. Impeller
13. Auger
14. Runners
15. Scraper Blade
16. PTO Switch
17. Pivot Plate
18. Lift Lever

Figure 70

OTt0521

13.2 INSTALLATION

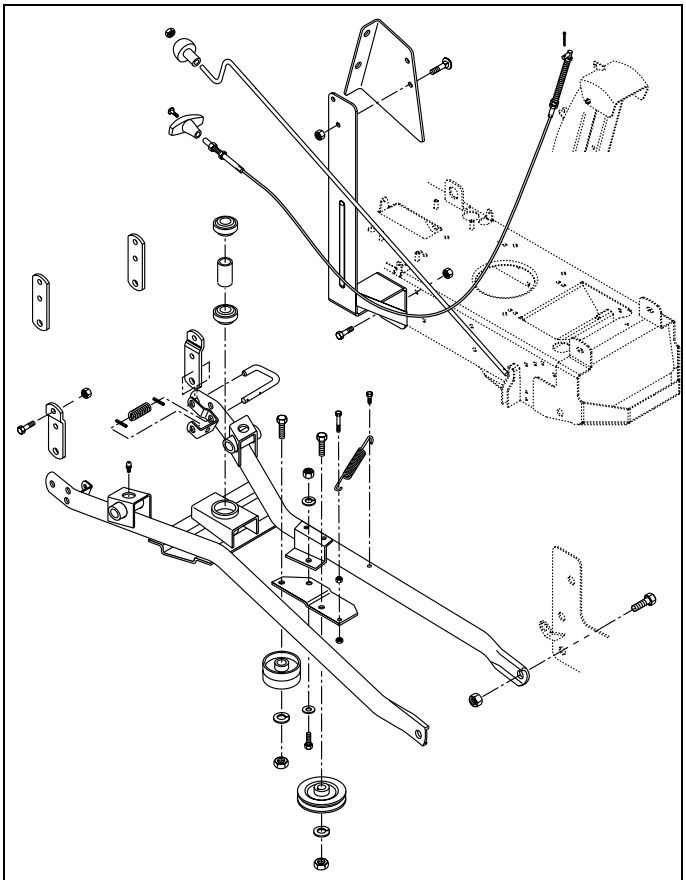


Figure 71

1. With the housing and push frame assembly positioned on a flat level surface, roll tractor into position over push frame with the front of the tractor over the pivot support.
2. Lift pivot support into position on the front of the tractor frame and install upper mounting latch pin into tractor frame.
3. Raise the rear of the push frame and secure to the tractor with the latch pin on each side of the frame.
4. With the PTO in the off position connect the PTO drive belt from the PTO clutch to the top drive spindle on the push frame.
5. Manually lift the front of the auger/impeller housing and block it 3 or 4 inches from the floor. Insert gas cylinder onto the anchor arm and insert the hairpins.
6. Connect the lift link on the housing to the lift bell crank, install a washer and secure with a hair pin.
7. Connect the lift arm to the lift bell crank and secure with a clevis pin.
8. Secure the chute crank support to the right side of the tractor frame with capscrews and lock nuts.
9. Attach the lift arm to the lift lever with clevis pin and hair pin.
10. Remove the blocking from under the snow head. The attachment may now be raised or lowered with the attachment lift lever on the blower push frame.
11. Secure the discharge chute crank to the spool with a hair pin.

13.3 SHEAR BOLT REPLACEMENT

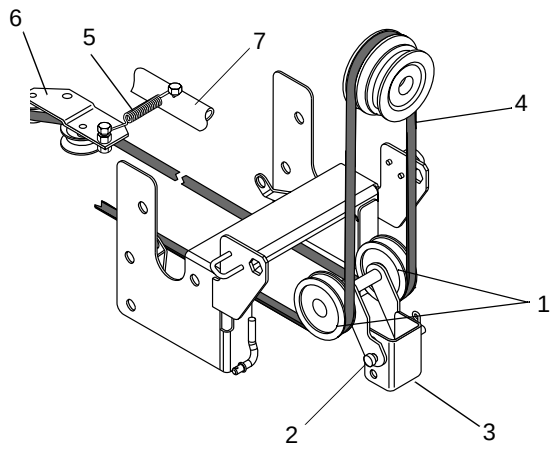
WARNING: Stop engine, lower attachment, remove key, and wait for moving parts to stop before leaving operators position and attempting to maintain or inspect auger.

Occasionally an object may enter auger/impeller housing and jam auger, breaking shear bolts which secure auger to shaft. This allows auger to turn freely on shaft preventing damage to gear drive.

IMPORTANT: Use only Ariens shear bolts for replacement. Use of any other type of shear bolt may result in severe damage to unit.

To replace shear bolt, slide auger outward against roll pin and align hole in shaft with hole in auger (holes in shaft for roll pins and shear bolts line up). Drive shear bolt through hole; (if shear bolt was broken this will drive remaining part from shaft and secure with nut).

13.4 MULE DRIVE BELTS



1. Double Idlers
2. Clevis Pin
3. Mounting Bracket
4. Mule Drive Belt
5. Idler Spring
6. Idler Arm
7. Carriage Frame

Figure 72

OTt0610

1. Remove belt guard hardware and guard from housing.
2. Release tension on flat idler and remove belt from "V" and flat idler on push frame.
3. Remove lower mounting rod and stabilizer strap from pivot support (to free mule drive belt from double idler).
4. Remove belt from drive spindle pulley and housing double pulley. Replace mule drive belt in reverse order; be sure belt seats properly in housing pulley, idlers, over low mounting pin, around bottom groove in drive spindle pulley, and around two idlers on idler bracket - (flat idler rides against back of "V" groove and "V" groove idler against front).

Power Take Off (PTO) Belt

Release tension on push frame idlers and remove mule drive belt from drive spindle pulley.

Remove PTO belt from PTO and drive spindle pulley.

Replace PTO belt in reverse order and adjust accordingly.

Auger/Impeller Drive Belt

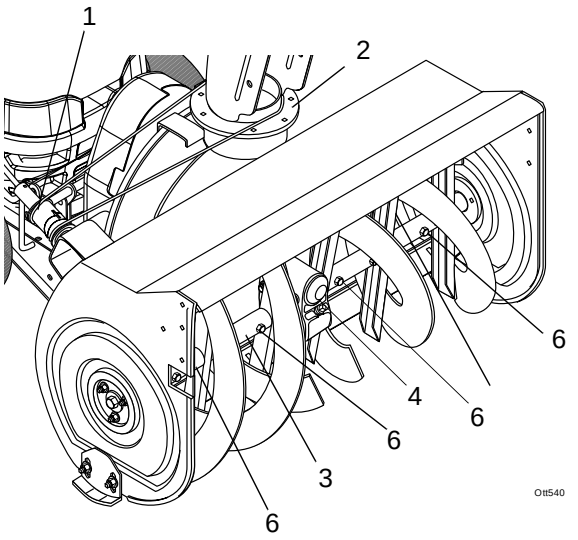
Remove belt guard hardware and guard from housing. Release tension on flat idler and remove mule drive from "V" and flat idler on push frame, and double pulley on auger/impeller housing.

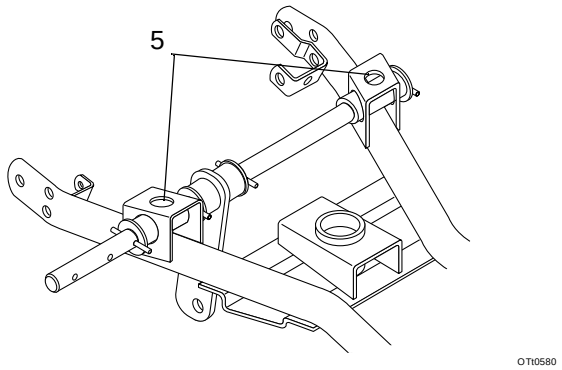
Pull spring loaded idler away from drive belt, remove belt from large lower pulley and top double pulley.

13.5 OIL AND GREASE LOCATIONS

CAUTION: DO NOT touch Sno-Thro drive parts which are hot from operation. Allow such parts to cool before servicing unit.

IMPORTANT: Wipe each fitting clean before and after lubrication.





1. Chute Spool (Grease)
2. Discharge Chute Base (Oil)
3. Auger Shaft
4. Gear Case (L-2 Gear Lubricant)
5. Carriage Frame (Grease)
6. Shear Bolts (Grease)

Figure 73

NOTE: Use Ariens Multi-Purpose Grease (Part Number 000150) or good grade of general purpose grease at zerk fittings and oil at lubrications points. Sno-Thro should be lubricated at beginning of season and every 25 operating hours. Refer to illustration for grease and oiling points.

13.6 SCRAPER BLADE

IMPORTANT: If scraper blade wears too far auger/impeller housing may be damaged.

To adjust scraper blade, raise and block Sno-Thro securely. With runners adjusted to their full position, loosen lock nuts retaining scraper blade, reposition it down, (flush with runners) and tighten lock nuts.

13.7 RUNNERS

CAUTION: Adjust auger/impeller housing height to provide clearance over gravel or crushed rock surfaces to avoid throwing these objects.

Runners should be adjusted as conditions require. Raising or lowering runners controls distance scraper blade is held above surface to be cleared. When operating unit on gravel surface, lower runners so that housing will not pick up gravel. On concrete, blacktopped, or packed snow surfaces raise runners so that scraper blade scrapes clean. To reduce tendency of housing to ride up over heavy, wet, or hardpacked snow, remove runners and install in their narrow edge down position.

To adjust runners, place unit on a flat level surface and insert a spacer under center of scraper blade that will provide desired clearance, loosen runner hardware, raise or lower runners to surface unit is resting upon, and tighten hardware.

NOTE: Uneven rear tire pressure or runner adjustment will result in uneven clearing.

13.8 DISCHARGE CHUTE CABLE

To adjust discharge chute cable, loosen clamp, rotate discharge chute in desired direction (to stop), and reposition cable. Tighten clamp and replace guard.

13.9 AUGER/IMPELLER, GEAR CASE REMOVAL

1. Remove taptite, washer, cap screw, washer, and lock washer securing belt guard to housing and remove belt guard.
2. Remove belt from pulley.
3. Remove set screws securing pulley to worm shaft and remove pulley and woodruff key.
4. Remove three nuts securing flange bearing to housing and remove bearing.
5. Remove cap screw, lock washer, washer, and flange bushing from ends of auger shaft. Remove rib neck bolts and flange whiz lock nuts securing bearing supports to housing and remove supports.
6. Pull auger/impeller and gear case from housing.
7. Remove two way lock nuts and shear bolts securing augers to auger shaft and remove augers.
8. Drive roll pins securing impeller to worm shaft and remove impeller.

13.10 GEAR CASE

1. Remove four bolts from bearing flange.
2. Remove flange and gasket.

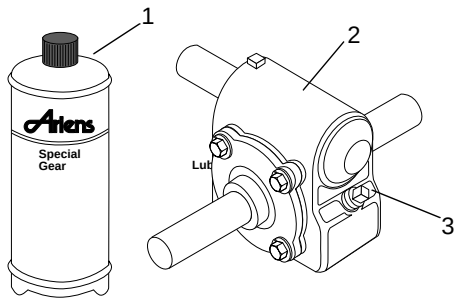
NOTE: At this point bronze gear cannot be removed.

3. Using bearing adjustment wrench remove adjustment plug.
4. While holding input shaft in one hand and using a mallet, strike case until bearing cone pops out of the case.
5. Bronze gear can then be removed from case.
6. After bronze gear is removed, input shaft can be removed.

NOTE: It is not necessary to remove the end cap from case.

7. To remove worm gear and bearings, simply remove bolt and washer form end of shaft.
8. Check all parts for wear or damage and replace as necessary.
9. Assembly is done by inserting bronze and worm gear at same time.
10. Using adjustment wrench, tighten down on adjustment plug until input shaft is snug.
11. Replace side cover using a sealant on threads of two bottom bolts.

Gear Case Lubrication



1. Gear Lube L-2 #80
2. Auger Gear Case
3. Lube Fill

Figure 74

OTI0560

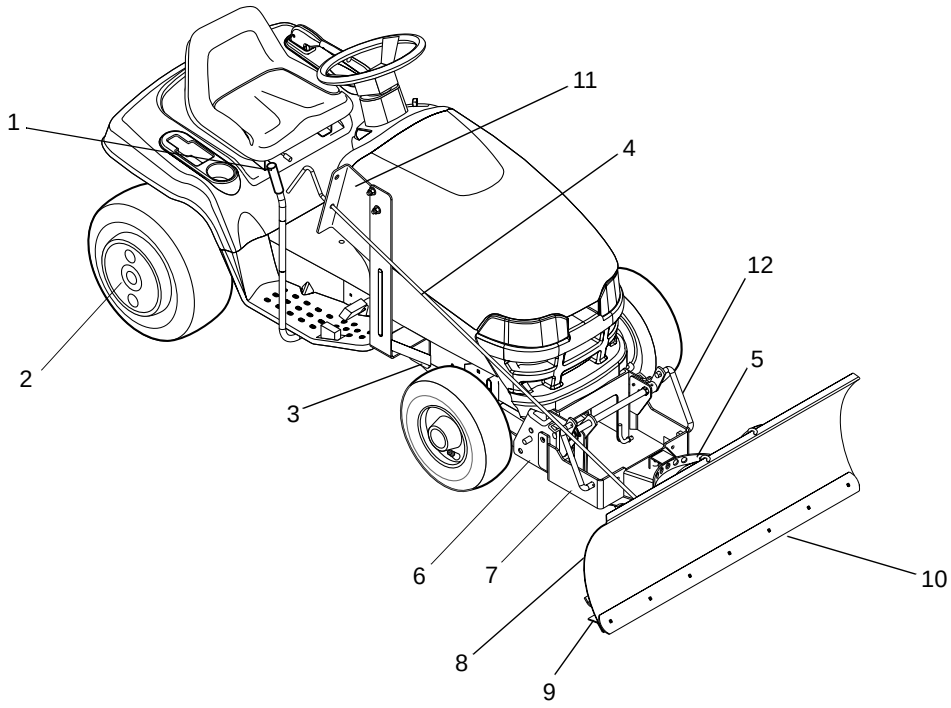
Fill gear case with Ariens Special L-2 Gear Lubricant (Part No. 00008000) until lever reaches bottom of threads in filler hole.

Check auger gear case lubricant level every 25 hours of operation.

To check, place unit in a warm location over night to allow lubricant to flow to level. Remove filler plug. Lubricant must be at least up to bottom of filler hole with unit resting on a level surface (extra lubricant will not damage gear case).

SECTION 14 - FRONT BLADE

14.1 CONTROLS AND FEATURES



1. Attachment Lift Lever
2. Wheel Weight
3. Carriage Frame
4. Control Rod
5. Support for Blade Adjustment
6. Pivot Frame
7. Push Frame
8. Front Blade
9. Skid Shoe
10. Scraper Blade
11. Control Bracket
12. Link

Figure 75

OTt1201

Control Rod

The front blade can be rotated left or right to one of five positions. to turn the blade:

1. Turn and hold the control rod to the right to release the latch pin.
2. Push (blade left) or pull (blade right) the control rod to turn the blade to the desired position.
3. Release the control rod to set the latch pin in the desired position.

Attachment Lift Lever

For plowing, lower the blade to the float position by moving the attachment lift lever forward until the blade meets the ground.

For transport, raise the blade by pulling back on the attachment lift lever until the blade locks into the transport position.

Skid Shoes

Skid shoes should be adjusted as conditions require. Raising or lowering skid shoes controls clearance between working surface and blade.

When moving snow on smooth surfaces such as concrete or asphalt, skid shoes may be raised. When operating on rough terrain, skid shoes should be lowered to prevent blade from striking rigid objects.

To adjust skid shoes, loosen nuts and lock washers. Raise or lower as needed making sure to adjust both shoes evenly.

NOTE: Uneven rear tire pressure or runner adjustment will result in uneven clearing.

Scraper Blade

Scraper blade is reversible for double life. If edge becomes excessively worn from continued use, remove mounting hardware and reverse blade.

14.2 LUBRICATION

Once a year, grease the two lube fittings located where the attachment lift lever passes through the carriage frame.

Clean fittings before attaching grease gun.

Use Stens Mix Hi-Temp Grease or equivalent. Order P/N 00036800 - Three pack of 3 oz. cartridges or P/N 00036700 - 10 pack of 14 oz. cartridges.

If using Stens Mix Hi-Temp Grease for the first time, all components should be thoroughly cleaned prior to lubricating.

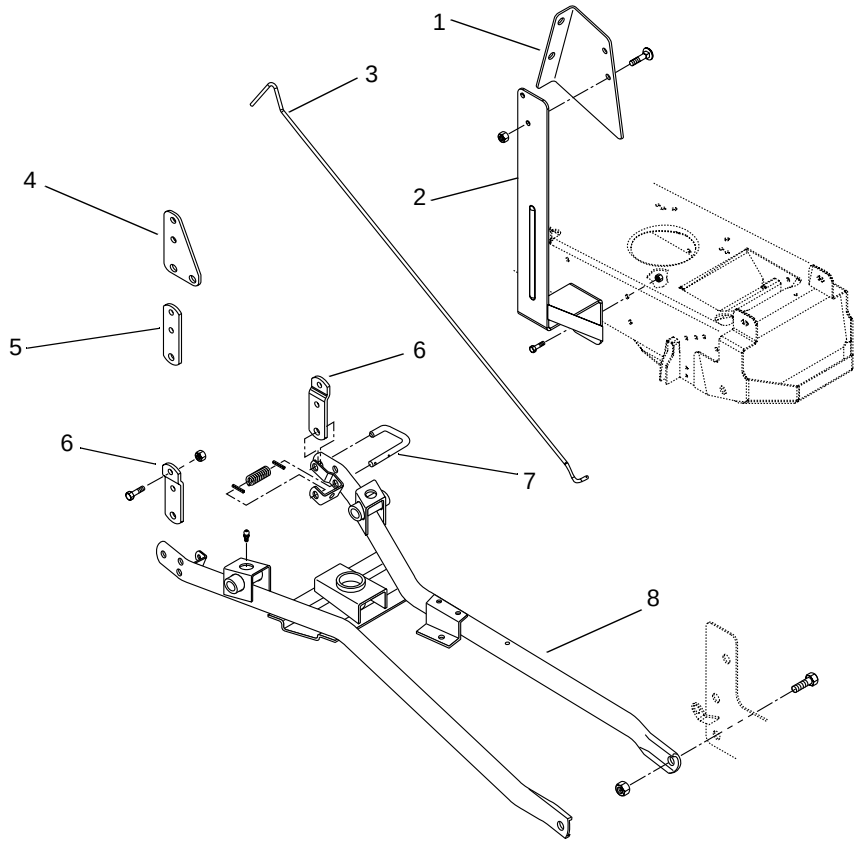
14.3 INSTALLATION AND REMOVAL

1. Remove other attachments such as mower, Sno Thro, bagger, etc. from the unit following removal instructions found in the Owners/Operator Manuals provided with the attachment and unit.
2. Install the control bracket and support assembly onto the right side of the unit frame with the two hex bolts and lock nuts.
3. Lift the front of the unit and slide the carriage and pivot frame assembly under the unit.
4. Use the latch pins on the rear arms of the carriage frame to secure the carriage frame to the hanger brackets.
5. Use the latch pins on the pivot frame to secure the pivot frame to the unit frame.
6. Attach the push frame and blade assembly to the pivot frame using the rod, washers, and hair pins.
7. Put the links into the holes in the pivot frame and push frame and secure with the washers and cotter pins.

NOTE: On High Sierra models, use the black links.

8. Put the control rod through the lower hole on the control bracket and then fasten the end into the block joint with a cotter pin.

NOTE: On removal, place all hardware in their respective positions, so that they will be readily available for the next installation.



1. Control Bracket
2. Control Bracket Support
3. Control Rod
4. Hanger Bracket (YT Only)
5. Hanger Bracket (Sierra Only)
6. Hanger Bracket (Hi Sierra Only)
7. Latch Pin
8. Carriage Frame

Figure 76

Ott1212

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