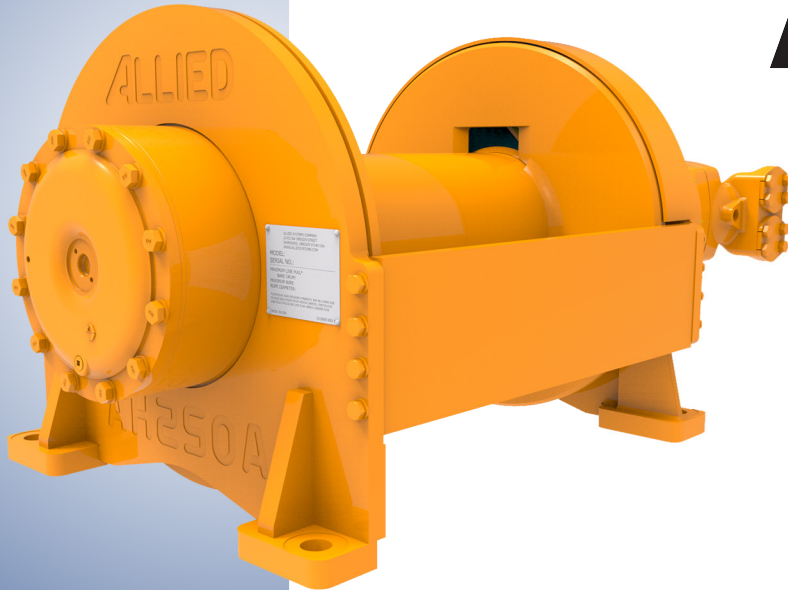




Service Manual



Allied AH250A

Hydraulic Winch

Please check the Allied Systems website
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CUSTOMER EDITION

A PRODUCT OF

Allied Systems
COMPANY

SHERWOOD, OREGON USA

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04/17/2017

Safety Precautions

Read, understand and observe the precautions on the following pages to prevent injury to personnel and damage to equipment.

Winch serial number _____

Date put into service _____

**NOTE: This publication may be translated to different languages for sole purpose of easy reference in non-English speaking locations.
Should there be differences in interpretations to the text, please refer to the English language edition published by Allied Systems Company as the controlling document.**

Safety Summary

General Safety Notices

The following pages contain general safety warnings which supplement specific warnings and cautions appearing elsewhere in this manual. All electrical and hydraulic equipment is dangerous. You must thoroughly review and understand the Safety Summary before attempting to operate, troubleshoot or service this winch.

The following symbols and terms are used to emphasize safety precautions and notices in this manual:

DANGER

The “DANGER” symbol indicates a hazardous situation which, if not avoided, will result in serious injury or death. Carefully read the message that follows to prevent serious injury or death.

WARNING

The “WARNING” symbol appears wherever incorrect operating procedures or practices could cause serious injury or death. Carefully read the message that follows to prevent serious injury or death.

CAUTION

The “CAUTION” symbol appears where a hazardous situation which, if not avoided, could result in minor to moderate injury and equipment damage.

NOTICE

This signal word alerts to a situation that is not related to personal injury but may cause equipment damage.

NOTE: ...

The term “NOTE” highlights operating procedures or practices that may improve equipment reliability and/or personnel performance.

NOTE: All possible safety hazards cannot be foreseen so as to be included in this manual. Therefore, you must always be alert to potential hazards that could endanger personnel and/or damage the equipment.

Safety Regulations

Each country has its own safety legislation. It is in the operator’s own interest to be conversant with these regulations and to comply with them in full. This also applies to local bylaws and regulations in force on a particular worksite.

Should the recommendations in this manual deviate from those in the user’s country, the national regulations should be followed.

Operation, Inspection, and Maintenance Warnings

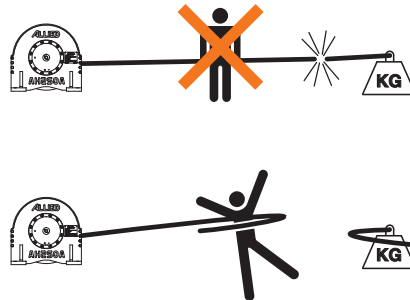
WARNING

Obey the following cautions and warnings before using your winch to avoid equipment damage, personal injury or death.

- Do not operate the winch unless you are authorized and trained to do so.
- Do not operate the winch unless the machine is equipped with a screen to protect the operator if the wire rope breaks.
- Read, understand, and follow the operating, inspection, and maintenance instructions in this manual.
- Do not use the control levers for hand holds when entering or leaving the machine.
- Do not permit other people near the control area when you inspect or repair a machine.
- Never inspect, repair, or perform maintenance on a machine that is in motion.
- Inspect the winch before each use:
 - » Make sure that the controls and instruments operate correctly.
 - » Report the need for repairs immediately.
 - » Do not work with a damaged or worn wire rope.
 - » Do not use a winch that needs repairs.

- » Should the wire rope be removed from the drum, make sure the end of the wire rope is controlled when released. The end of the wire rope can suddenly move from the drum like a compressed spring when released, and cause an injury.
- Stay in the operator's seat when operating the winch.
- Do not stand on the machine when operating the winch.
- Avoid winch operation near people or other machines.
- Never stand nor permit others to stand in the bight (loop) of a wire rope.
- Do not stand nor permit others to be near the winch or wire rope when there is tension on the wire rope.
- Observe jobsite rules.
- Be in complete control at all times.
- Do not use the control levers as hangers for clothes, water bags, grease guns, lunch pails, etc.
- Do not leave the machine when the winch wire rope is under tension.
- Do not permit riders on the machine or load.
- Do not use the winch as an anchor for a double or two-part line.
- Do not pull the hook through the throat or over the drum, which will cause damage.
- When the winch is not in use, make sure the control lever is in **BRAKE-ON** position and the winch brake is applied.
- Do not use winch as a hoist.

- Always inspect wire rope, tail chain and other rigging components for wear, damage, broken strands or abuse before use.
- Never use wire rope, tail chain or other rigging that is worn-out, damaged or abused.
- Never overload wire rope, tail chain or rigging.
- Wire rope and tail chain will fail if worn-out, overloaded, misused, damaged, improperly maintained or abused. Wire rope or tail chain failure may cause serious injury or death!



- Do not terminate wire rope to tail chain by the use of a knot.
- Do not handle wire rope if the hook end is not free. A load could break away, suddenly tensioning the wire rope, resulting in serious injury or death.
- Stay clear of wire rope entry areas.
- Make sure ground personnel are in plain view of the operator, and at a distance of at least 1½ times the working length of the wire rope.
- Make sure that any hand signals used by ground personnel are clearly defined and understood by everyone involved.
- Do not attempt to “jerk” or “shock” a load free. Doing so can cause loads in excess of the rated capacity of the wire rope, winch, or mounting hardware.
- Replace any parts only with genuine Allied Winch parts. Refer to Parts Manual 599065W.

- Maintain a **minimum of three (3) complete wraps of wire rope** on the drum for normal operation. It may help to paint the last five wraps of wire rope a contrasting color, to serve as a visual indicator.
- Do not handle wire rope with bare hands. Wear leather gloves at all times.
- Align the machine with the load to prevent side loading the winch, and to maintain even spooling of the wire rope.
- If applying tension to the wire rope manually during spooling:
 - » ensure that the operator is winching in slowly,
 - » keep your hands and clothing well clear of any rollers or the winch drum,
 - » do not maintain tension by letting the wire rope to slip through your hands,
 - » use a hand-over-hand technique to maintain tension.
- Be aware of the ground conditions, and make sure the ground and machine are stable enough to pull the intended load.
- Do not attempt to pull loads in excess of the rated capacity of the winch.
- Keep yourself informed of any applicable codes, regulations and standards for the job.
- This winch is neither intended, designed, nor rated for any application involved in the lifting or moving of personnel.
- Use only the lubricants listed in the Recommended Oil List. See page 1-4.
- Do not weld on any part of the winch. Contact Allied Systems if weld repairs are needed.
- The hydraulic system must be kept clean and free of contamination at all times.
- Be aware of the hazards of pressurized hydraulics:
 - » Wear personal protective equipment, such as gloves and safety glasses, whenever servicing or checking a hydraulic system.
 - » Assume that all hydraulic hoses and components are pressurized. Relieve all hydraulic pressure before disconnecting any hydraulic line.
 - » Never try to stop or check for a hydraulic leak with any part of your body; use a piece of cardboard to check for hydraulic leaks.
 - » Small hydraulic hose leaks are extremely dangerous, and can inject hydraulic oil under the skin, even through gloves.
 - » Infection and gangrene are possible when hydraulic oil penetrates the skin. See a doctor immediately to prevent loss of limb or death.



Ordering Parts:

When ordering replacement parts, give the unit serial number,
part number, name of part and quantity required.

For any further information on parts, service or ordering, consult your local winch dealer, or contact Allied Systems Company:

Allied Systems Company
21433 SW Oregon Street
Sherwood, OR 97140 USA

Phone: 503-625-2560
Fax: 503-625-5132
E-Mail: parts@alliedsystems.com

Also see our website, www.alliedsystems.com, where the most current copy of this manual is always available.

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General

Introduction

This service manual is for the AH250A winch. The following information is included in this manual:

Section 1. General includes operation descriptions of systems and components as an aid for troubleshooting and repair.

Section 2. Troubleshooting lists common problems and the possible causes and corrections.

Section 3. Maintenance provides a guide for periodic maintenance, checks and adjustments.

Section 4. Repairs describes the removal, disassembly, assembly, and installation of the winch.

Description

The AH250A is a hydraulic winch with a maximum line pull of 24,445 lbs (11,088 kg) on the first layer of wire rope. See Figure 1-11 for line pull and line speed in various conditions. All values are based on hydraulic flow at 160 gpm (606 lpm), and hydraulic pressure at 5,000 psi (345 bar). The winch is powered by a hydraulic motor utilizing externally supplied hydraulic flow.

The winch has two speeds for **LINE-IN**, and a single high speed **LINE-OUT** for quick pay-out of wire rope.

For **LINE-IN** low speed operation, motor torque is transmitted through two planetary reducers. The holding brake is bypassed by means of a sprag brake.

For **LINE-IN** high speed operation, hydraulic pressure engages the two speed clutch, which eliminates one of the two planetary reducers. Motor torque is transmitted through a single reducer. The holding brake is bypassed by means of a sprag brake.

For **LINE-OUT** operation, hydraulic pressure releases the holding brake. Sprag clutches eliminate one of the two planetary reducers. Motor torque is transmitted through a single reducer.

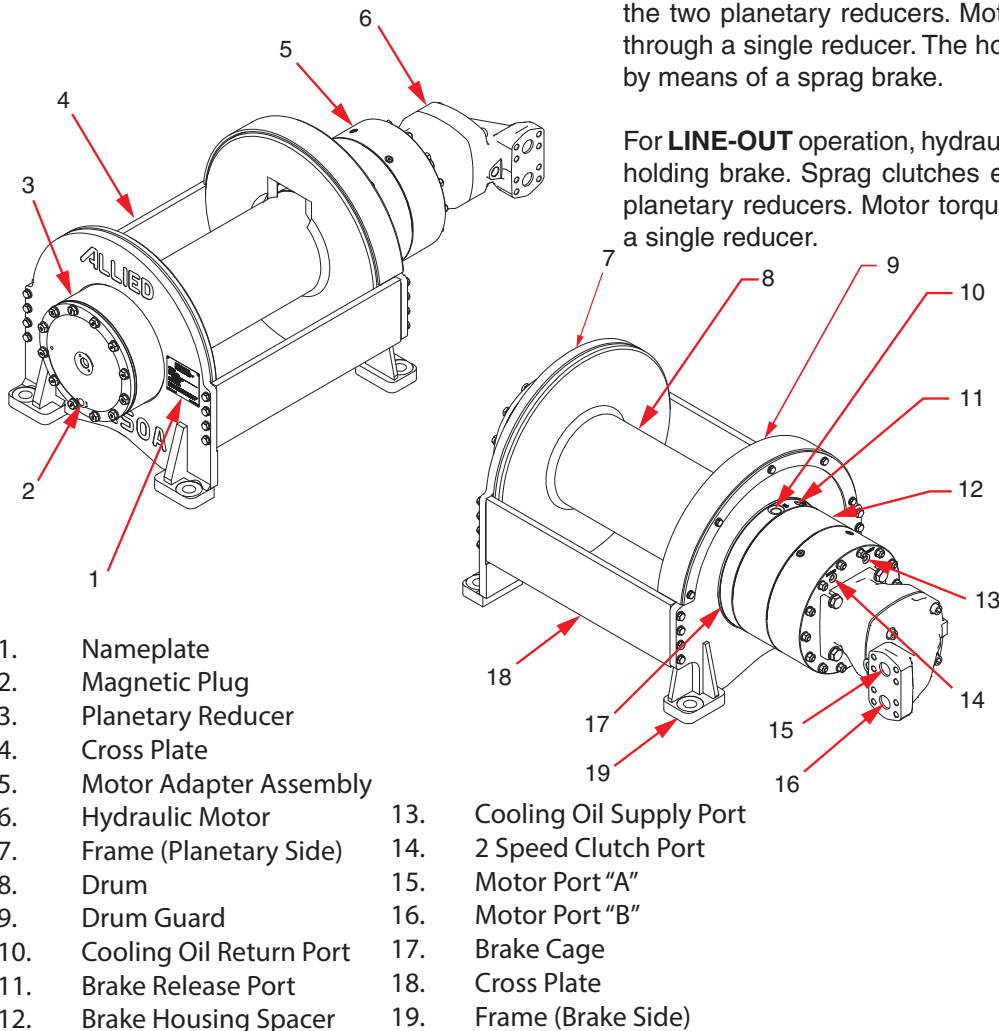
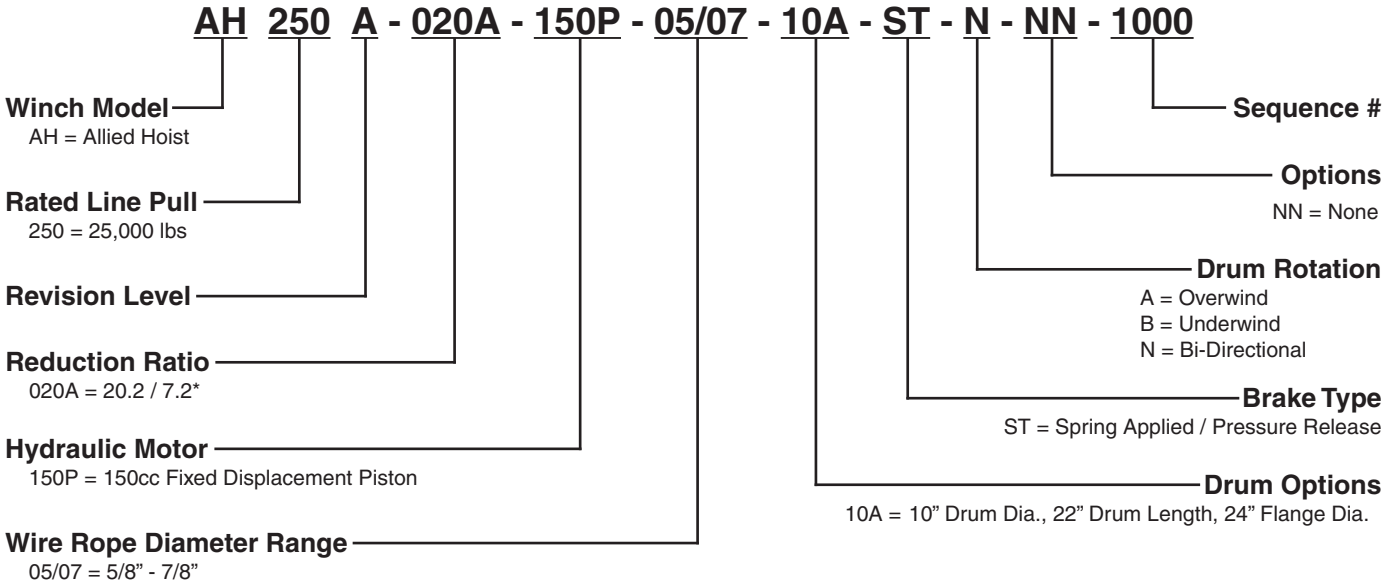


Figure 1-1 AH250A Winch

Serial Number Codes



Serial Number Codes

The serial number codes are described above. The nameplate with the serial number code is found on the planetary side of the winch case. The serial number code is also stamped on the top of the planetary side of the winch frame.

Nameplate

Each winch is shipped from the factory with a nameplate as shown in Figure 1. The nameplate is stamped with:

- winch model
- winch serial number
- maximum bare drum line pull
- maximum wire rope diameter

DO NOT operate the winch with larger diameter wire rope than is specified by Allied. If the nameplate is missing, DO NOT operate the winch until its capacity is known.

The serial number for the winch is also stamped into the winch frame.

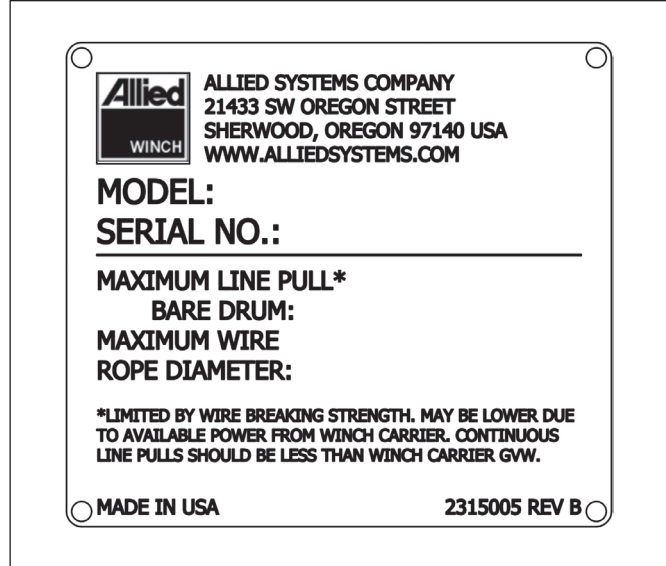


Figure 1-2 Nameplate

Specifications

Drum Wire Rope Capacities (Drum: 10 Inch Diameter)

Wire Rope Diameter	Wire Rope Capacities
5/8" (16 mm)	1,589 ft (484 m)
3/4" (19 mm)	1,121 ft (342 m)
7/8" (22 mm)	806 ft (246 m)

Notes: 1. Wire Rope: IWRC 6 X 19, extra improved plow steel.
2. Loosely or unevenly spooled wire rope will change capacities. Use flexible wire rope with independent wire rope center.

Figure 1-3 Drum Wire Rope Capacities

Oil Specifications

NOTICE

Failure to use the recommended oil during the warranty period may void warranty (expressed or implied) on related hydraulic components, if inspection indicates lubrication related cause. Oil samples will be required with submission of all hydraulic components for warranty consideration.

WARNING

Only the oils listed are tested and approved by Allied Systems. Any substitutions made are done so at your own risk.

CAUTION

The oil entering the winch should never exceed the maximum operating temperature of 180°F (82°C), as overheating will cause winch damage.

Oil Capacity

The oil capacity for the AH250A winch is 5 gallons (19 liters).

Note: All lubrication and cooling fluids come from the carrier. Refer to the specifications in the carrier technical manual.

Recommended Oils* - General Conditions			
Manufacturer	Oil Type	Ambient Temperature Range	
		°F	°C
ExxonMobil	Mobil Fluid 424 (Factory fill)	-13 to 105	-25 to 43
John Deere	Hy-Gard™	-13 to 122	-25 to 50
Chevron	1000 THF	-13 to 105	-25 to 43
Caterpillar	Multipurpose Tractor Oil (MTO)	-13 to 104	-25 to 40
Case	Hy-Tran Ultra	-20 to 122	-30 to 50

Recommended Oils* - Low Temperature Conditions			
Manufacturer	Oil Type	Ambient Temperature Range	
		°F	°C
ExxonMobil	Mobil Fluid LT	-40 to 86	-40 to 30
John Deere	Low Viscosity Hy-Gard	-40 to 86	-40 to 30
Chevron	THF W	-40 to 86	-40 to 30

* Note: Use of non-recommended oils may void warranty.

Figure 1-4 Oil Specification

Torque Specifications

ITEM	TORQUE VALUES (lubricated)			
	ft-lbs	in-lbs	N-m	kg-m
Retainer Seal Plate to Drum (M6 X 1 X 16 Gr. 12.9)	--	135	15	2
External Planetary Capscrews (M14 X 2 X 140 mm, Gr. 10.9)	135	--	185	19
Internal Planetary Capscrews (5/16 UNC X 2.5, Gr. 8)	23	--	31	3
Motor Mounting (M20 X 2.5 X 50 mm, Gr. 10.9)	405	--	550	56
Frame Cross-Plate Capscrews (M12 X 1.75 X 45 mm, Gr. 10.9)	84	--	115	12
Drum Guard Weldment (M10 X 1.5 X 25 mm, Gr. 10.9)	48	--	65	7
Drum Hub Capscrews (M12 X 1.75 X 30 mm, Gr. 12.9)	95	--	130	13
Motor Adapter Nuts (M12 X 1.75, Gr. 10.9)	84	--	115	12
Winch to Carrier Mounting Capscrews*	1,640	--	2,224	227

*Recommended bolt size is 1-1/4 Gr. 8. Torque listed is for UNC lubricated capscrew. Refer to the machine technical manual to check for more information.

Figure 1-5 Torque Specifications

Gear Train (See Fig. 1-6)

Externally supplied hydraulic flow drives the winch hydraulic motor. Torque from the motor is transmitted through two planetary reducers (one internal and one external) to the drum. The external planetary reducer is connected to the winch frame. In high speed line-in, the clutch is engaged which locks the ring and sun gears of the internal planetary reducer, negating its reducing affect. The holding brake is bypassed by means of a sprag clutch. In line-out, the ring and sun gears of the internal planetary reducer are locked as one by means of the sprag clutches, negating their reducing affect. Motor torque is transmitted through the holding brake to the external reducer and to the drum.

Motor 150cc piston, fixed displacement
 Brake Wet, multi-disc, spring applied
 Clutch Wet, multi-disc, pressure applied, spring released

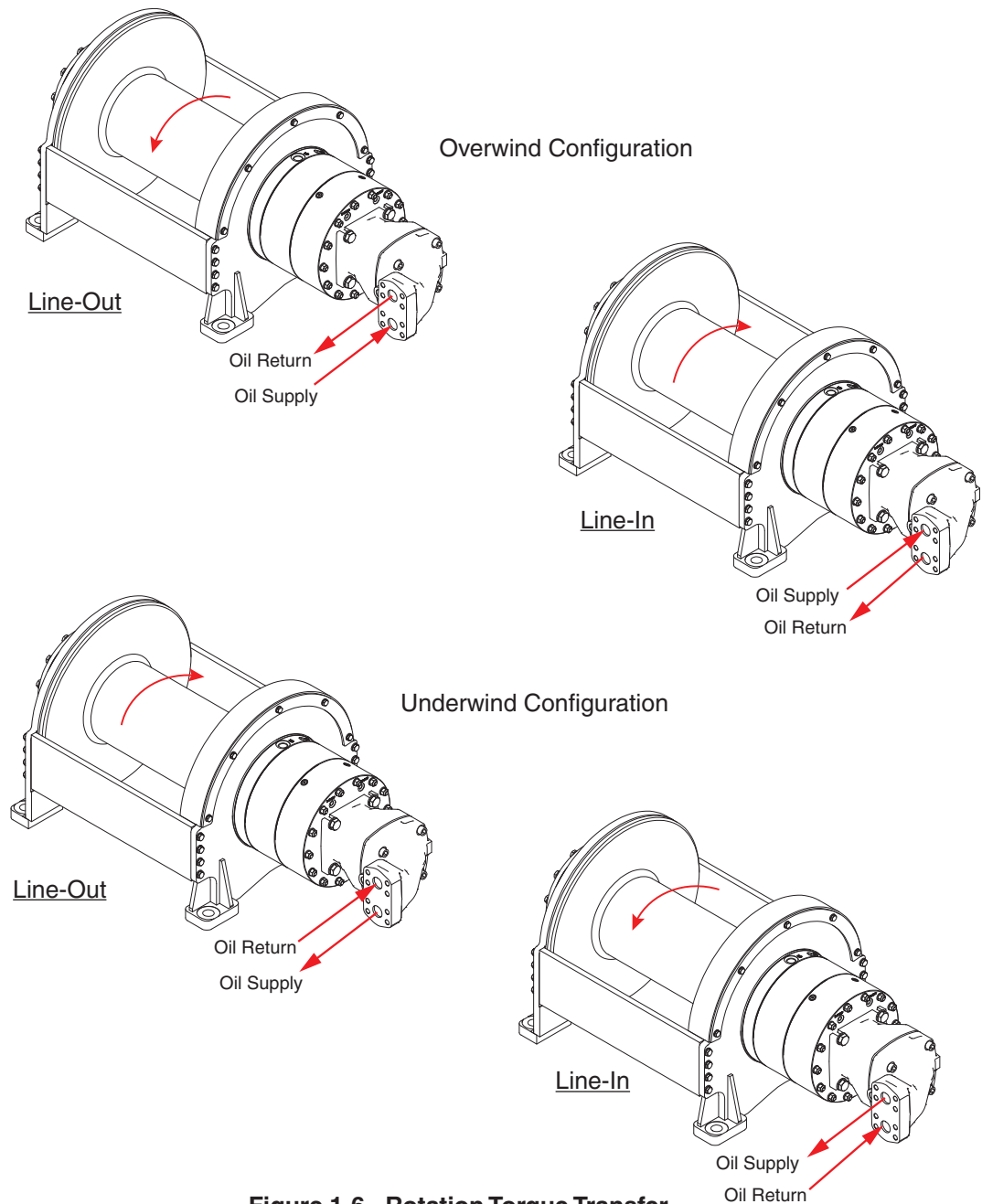
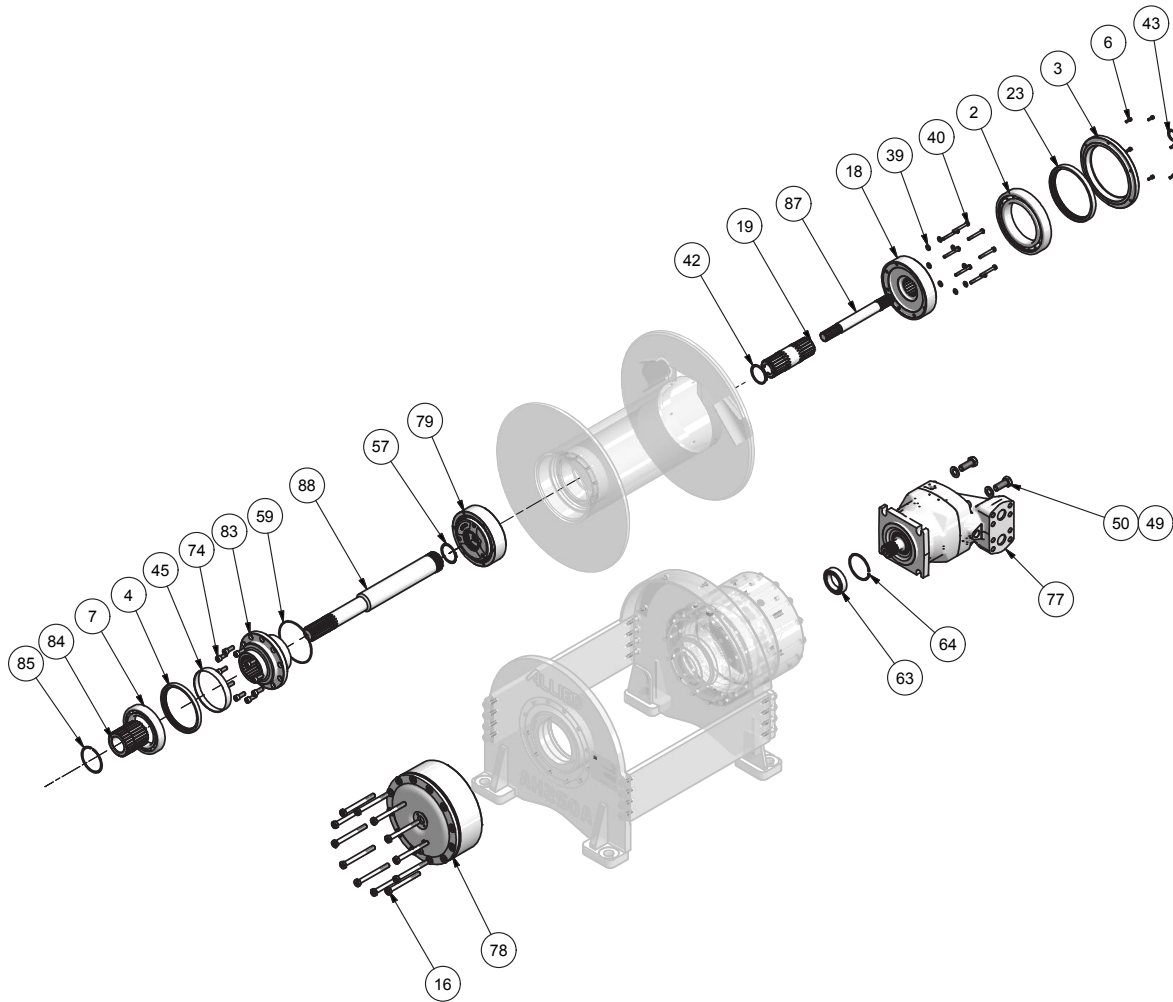


Figure 1-6 Rotation Torque Transfer



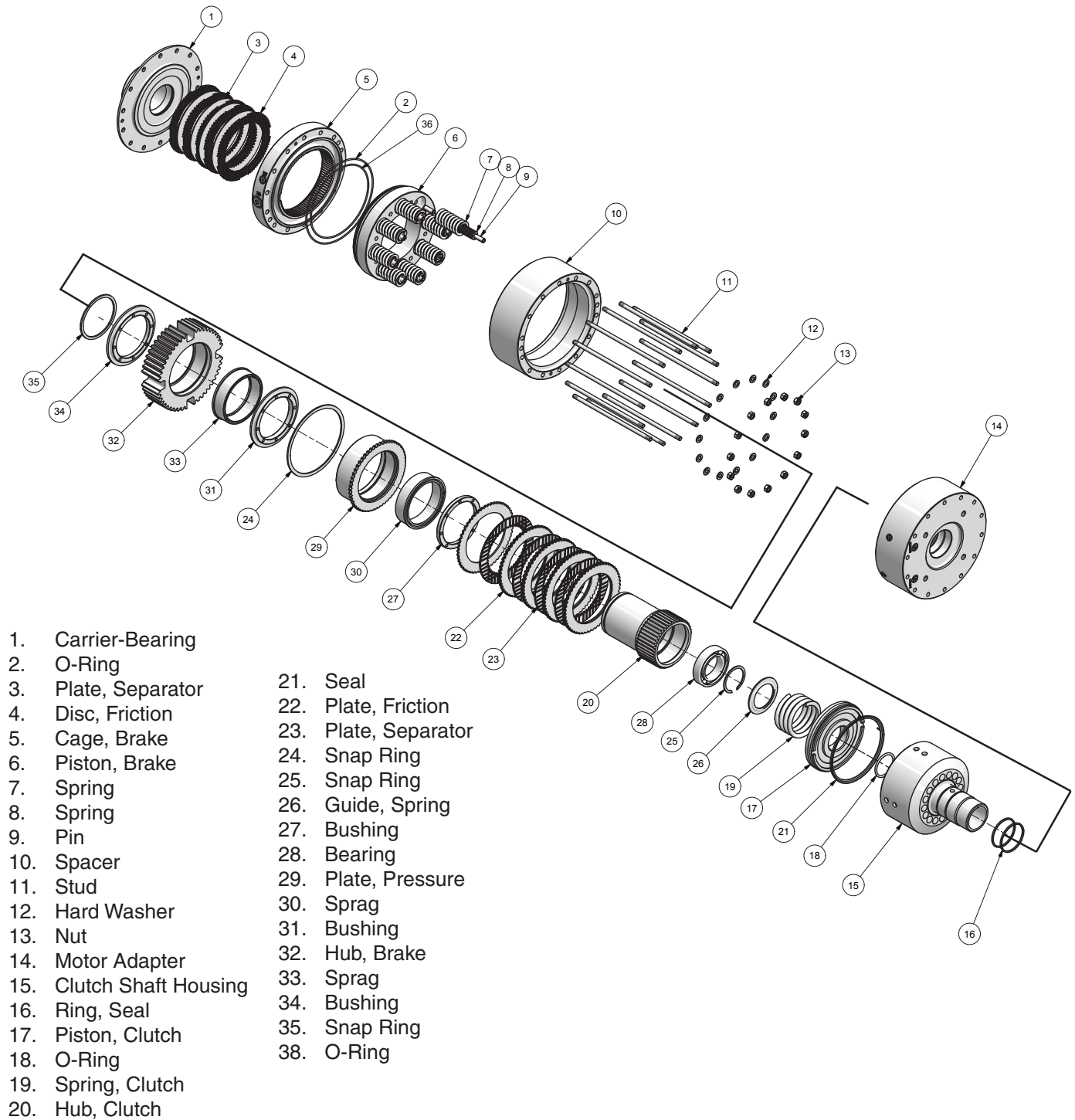
- | | |
|-----------------------------------|----------------------------------|
| 1. Snap Ring | 18. Bearing |
| 2. Shaft, Hub Drum | 19. Oil Seal |
| 3. Wear Sleeve | 20. Seal Retainer |
| 4. Bearing | 21. Capscrew |
| 5. Oil Seal | 22. Snap Ring |
| 6. Capscrew | 23. Washer |
| 7. Hub Drum | 24. Capscrew |
| 8. O-Ring | 25. Hydraulic Motor |
| 9. Input Shaft, External Reducer | 26. Motor O-Ring |
| 10. Snap Ring | 27. Snap Ring |
| 11. Planetary Reducer - Internal | 28. Bearing |
| 12. Snap Ring | 29. Planetary Reducer - External |
| 13. Brake Shaft | 30. Hard Washer |
| 14. Input Shaft, Internal Reducer | 31. Capscrew |
| 15. Planetary Hub | |
| 16. Washer | |
| 17. Capscrew | |

Figure 1-7 Winch Drive Components

Hydraulic System

Motor (See Fig. 1-7, item 26)

The hydraulic motor is a fixed displacement piston motor.



- 1. Carrier-Bearing
- 2. O-Ring
- 3. Plate, Separator
- 4. Disc, Friction
- 5. Cage, Brake
- 6. Piston, Brake
- 7. Spring
- 8. Spring
- 9. Pin
- 10. Spacer
- 11. Stud
- 12. Hard Washer
- 13. Nut
- 14. Motor Adapter
- 15. Clutch Shaft Housing
- 16. Ring, Seal
- 17. Piston, Clutch
- 18. O-Ring
- 19. Spring, Clutch
- 20. Hub, Clutch

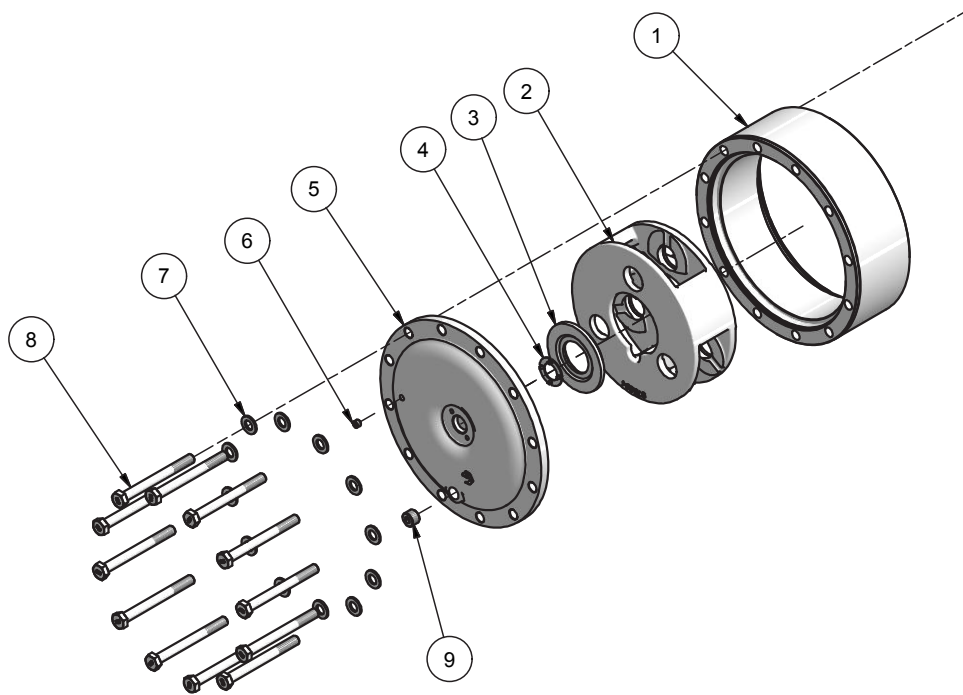
- 21. Seal
- 22. Plate, Friction
- 23. Plate, Separator
- 24. Snap Ring
- 25. Snap Ring
- 26. Guide, Spring
- 27. Bushing
- 28. Bearing
- 29. Plate, Pressure
- 30. Sprag
- 31. Bushing
- 32. Hub, Brake
- 33. Sprag
- 34. Bushing
- 35. Snap Ring
- 38. O-Ring

Figure 1-8 Brake/Clutch Assembly

Brake (See Fig. 1-8)

The brake is a wet multi-disc spring applied design. The springs push against a piston that applies force to the friction discs and separator plates. When pressure is applied to the brake port, the piston pushes back on the

brake springs to release the brake. The friction discs have teeth that engage the splines inside the brake housing and are held stationary. Teeth in the separator plates engage the splines on the brake hub and rotate with the motor shaft.

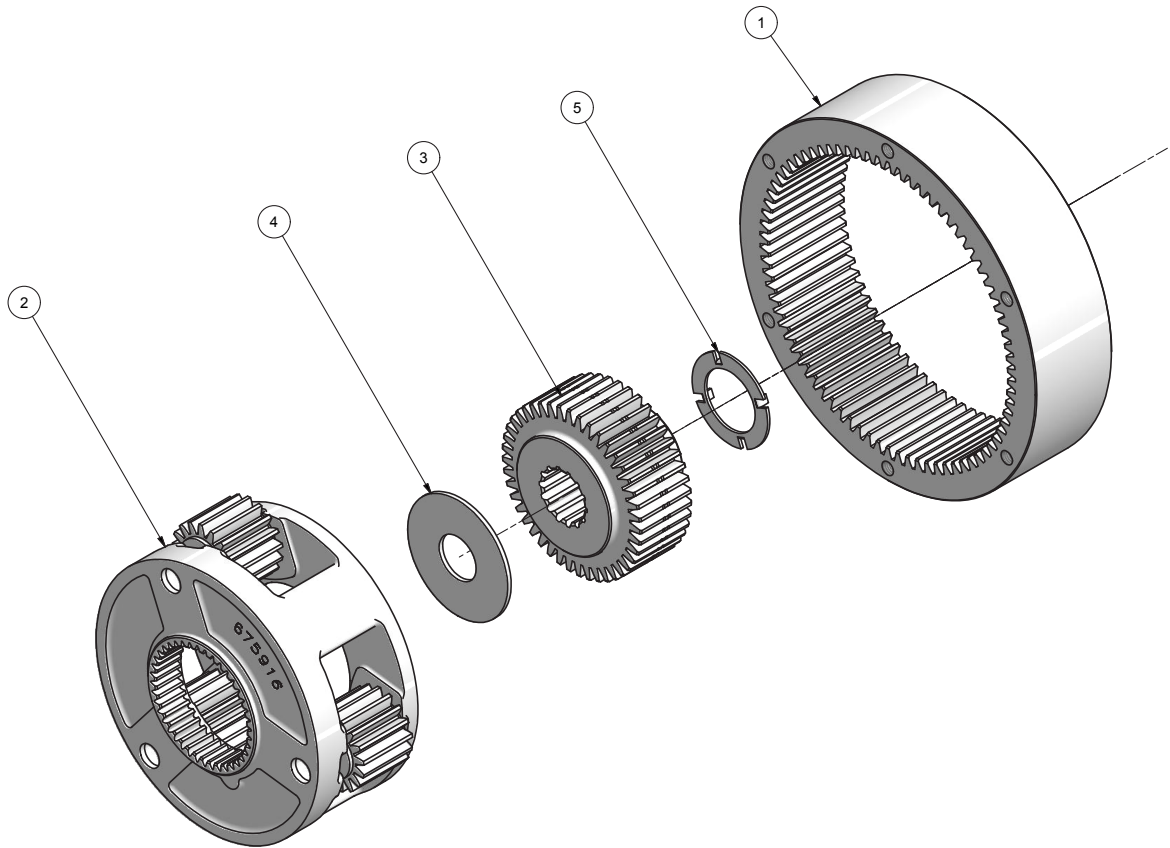


1. Ring Gear
2. Planetary Carrier Assembly
3. Spacer
4. Thrust Washer
5. Cover
6. Plug
7. Washer
8. Capscrew
9. Plug

Figure 1-9 External Planetary Reducer

Planetary Reducer (See Fig. 1-9)

The planetary speed reducer is the second gear reduction between the motor and drum. Oil in this housing is common to the gear side of the winch and output rotation is the same as input shaft rotation at a reduced speed.



1. Ring Gear
2. Planetary Carrier Assembly
3. Sun Gear
4. Thrust Washer
5. Thrust Washer

Figure 1-10 Internal Planetary Reducer

SPECIFICATIONS

MODEL NO.: AH250A

DESCRIPTION: WINCH, YARDER, HYDRAULIC, 2-SPEED

MOTOR

Displacement: 150 cc
 Max Pressure: 5000 psi (345 bar)
 Max Flow: 160 gpm (606 lpm)

ESTIMATED PERFORMANCE

Based on 160 gpm (606 lpm) and 5000psi (345 bar)

Bare Drum				Full Drum			
Lo-Speed		Hi-Speed		Lo-Speed		Hi-Speed	
Line Pull	Line Speed	Line Pull	Line Speed	Line Pull	Line Speed	Line Pull	Line Speed
24,445 lb 11,088 kg	545 fpm 166 mpm	9,030 lb 4,096 kg	1,525 fpm 465 mpm	11,560 lb 5,244 kg	1,155 fpm 352 mpm	4,270 lb 1,937 kg	3,225 fpm 983 mpm

Max Brake Pressure: 1000 psi (69 bar)
 Max 2-Speed Clutch Pressure: 275 psi (19 bar)
 Recommended Cooling Flow: 5 to 6 gpm (19 to 23 lpm)

SCHEMATIC

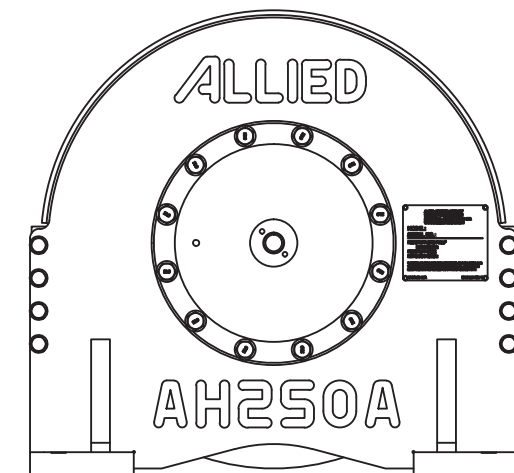
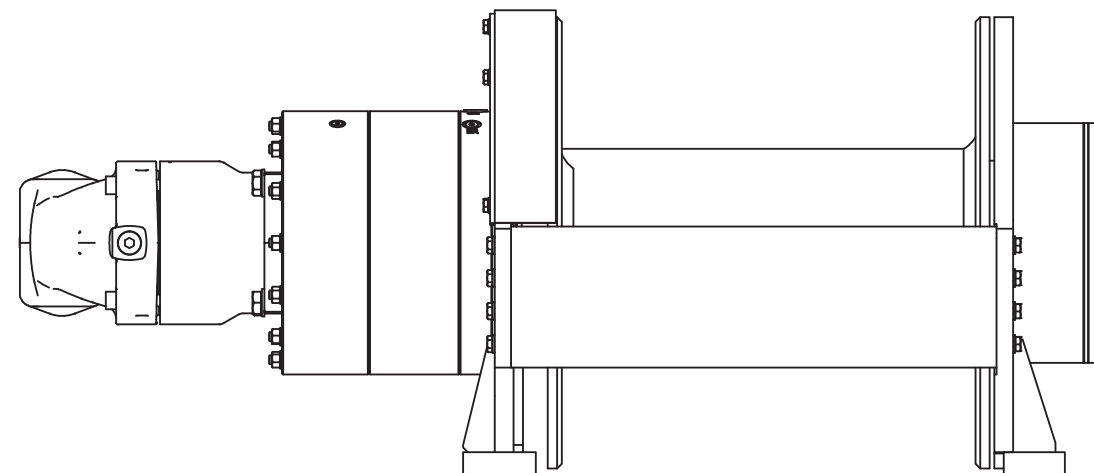
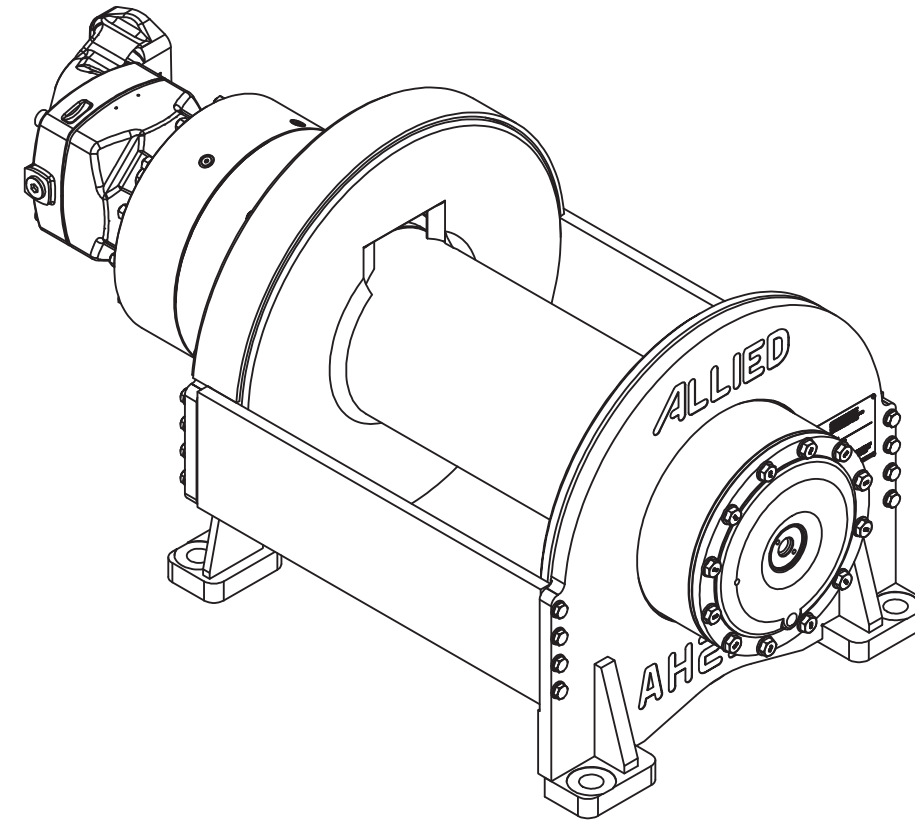
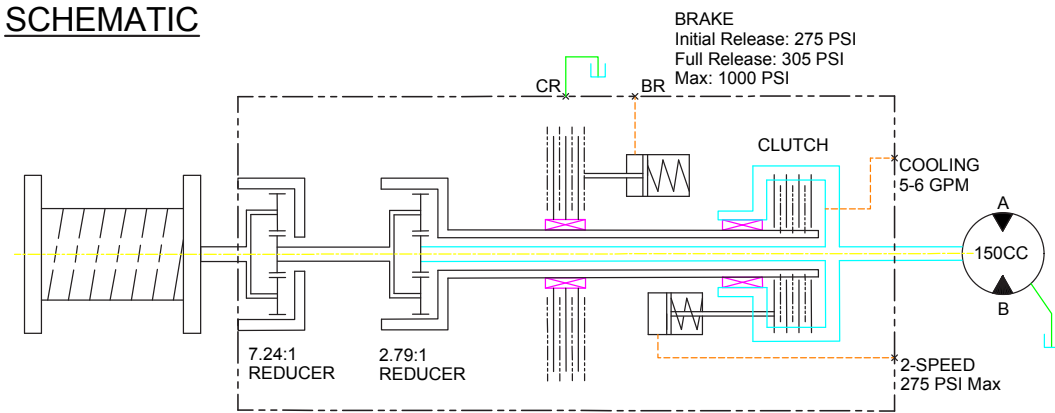


Figure 1-11 Hydraulic Schematic, AH250A

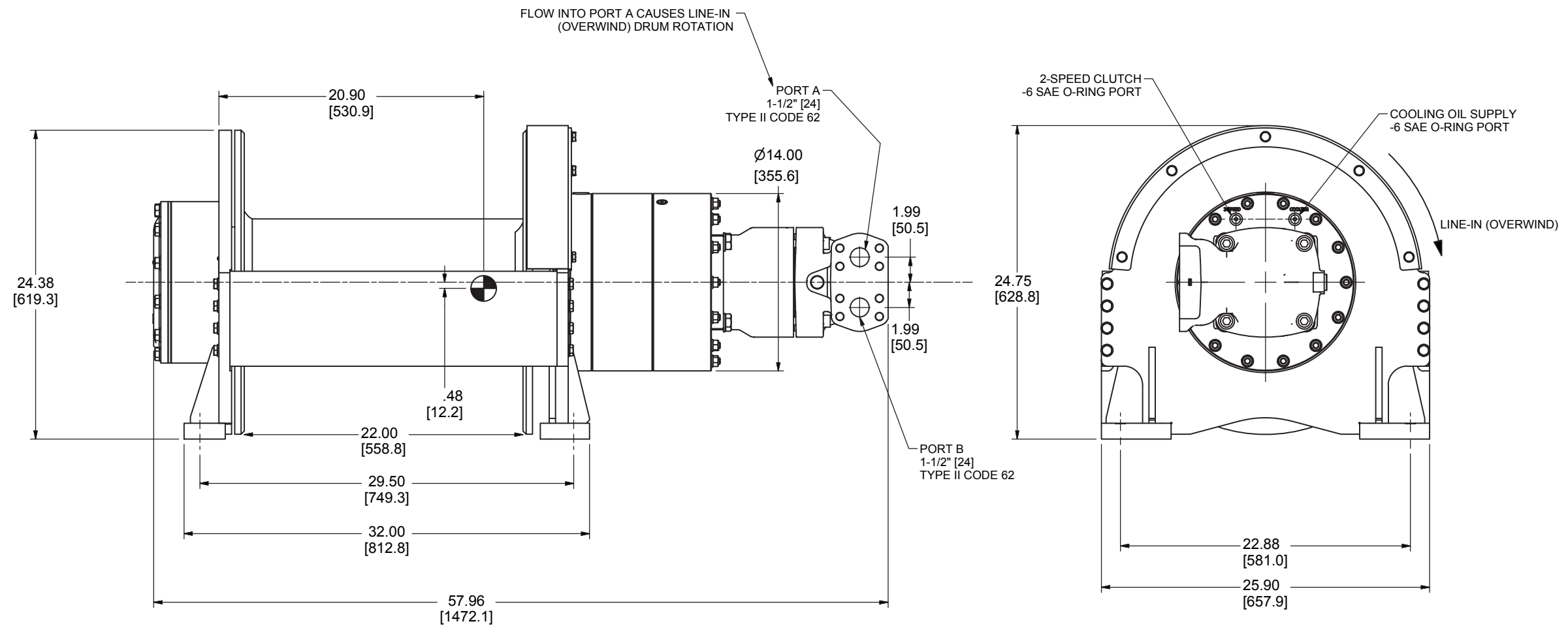
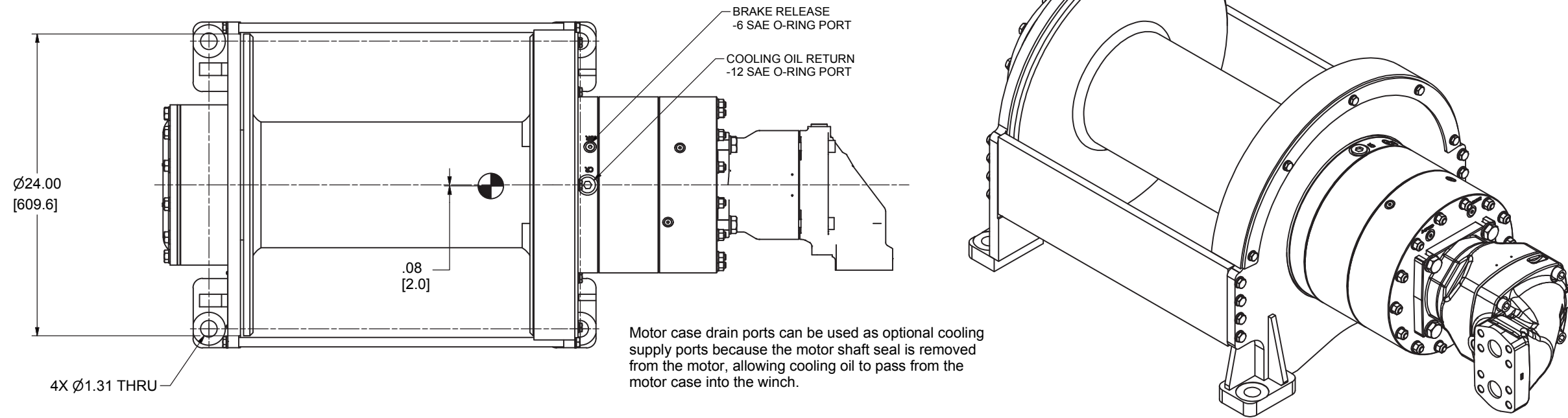


Figure 1-12 Dimensional Drawing, AH250A

Troubleshooting

General

Winch problems generally fall into one of two categories: hydraulic or mechanical. Follow the troubleshooting steps below to isolate the probable location of the malfunction.

1. Check the oil level and type. Ensure the operating temperature range for the oil is suitable for the conditions.
2. Check winch hydraulic pressures. Start with control pressures, then check main system pressures.
3. Inspect the winch gear train for problems.



CAUTION

For best operation and life, the winch oil operating temperature should not exceed 180°F (82°C). Oil reservoir temperature is monitored at the machine.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Insufficient line pull	Insufficient motor pressure	Check machine pump and relief settings
	Winch is in high speed	Take out of high speed
	Load is too heavy	Reduce load
	Worn brake	Replace friction discs in brake
	Trapped pressure in brake piston	Clear path for oil to return to tank
	Damaged or worn motor	Repair or replace motor
Winch will not line-out	Brake piston seals damaged	Replace seals
	Insufficient brake pressure	Brake requires 300 psi to release
Winch will not shift into high speed	Seal rings on clutch shaft damaged	Replace seals
	Clutch piston seal damaged	Replace seal
	Clutch friction discs worn	Replace discs
Leaking drum seals	Worn or damaged seals	Replace seals
	Worn or damaged seal sleeves	Replace sleeves
	Excessive back pressure in case	Reduce cooling flow
Brake not holding	Worn friction discs	Replace discs
	Trapped pressure in brake piston	Clear path for oil to return to tank
Operation is rough	Low oil	Add oil
	Wire rope jumps layers on drum	Spool wire rope more evenly
Operation is noisy	Motor damaged	Inspect and repair or replace as needed
	Bearings damaged or worn	Inspect and replace as needed

Service

General

This section provides the instructions for performing maintenance and making checks and adjustments. Standard shop tools are used in doing the work described in this section.

Maintenance

The Maintenance Schedule is a program that includes periodic inspection and lubrication. Use the operating time on the hour meter of the machine to determine the maintenance time for the winch.

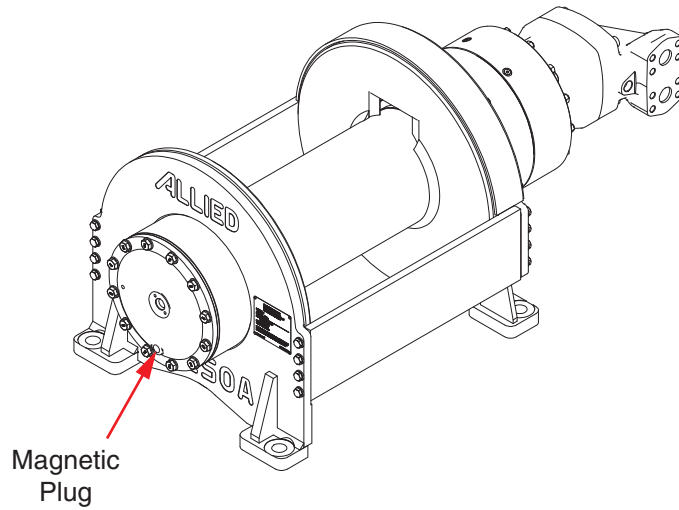


Figure 3-1 AH250A Winch Magnetic Plug

INTERVAL	PROCEDURE OR QUANTITY	SPECIFICATION
250 hours or monthly	Clean magnetic plug	Remove magnetic plug and clean
2000 hours or yearly	Disassemble winch and clean interior components	Inspect wear parts, and replace as necessary. Consult Section 4 of the service manual.

Figure 3-2 AH250A Winch Maintenance Schedule

Checks Before Operation

Check that the wire rope and hook are not worn or damaged. Check that the periodic inspection and maintenance have been done at the recommended operating hours. See the Maintenance Schedule.

Checks During Operation

The Troubleshooting Charts in Section 2 can be used by the operator to identify a problem with the winch operation. A trained service person is needed for additional troubleshooting and repair that requires disassembly of parts of the winch.

Hydraulic System Pressure Checks

The hydraulic oil and filter(s) should be maintained as indicated in the machine service manual. If any problems are found, they should be corrected before operating the winch.

Preparation At Initial Start-up After Service or Install

1. These tests should be performed with a bare drum (no wire rope) since the drum will rotate during the tests.

WARNING

Machine engine must be shut OFF before disconnecting drum wire rope. Be careful when you remove the wire rope from the drum. The end of the wire rope can move like a compressed spring, causing an injury when the wire rope wedge is released from the drum.

WARNING

Always wear gloves when handling wire ropes.

2. Warm up the hydraulic oil according to the machine's operator manual. The oil temperature in the winch or machine reservoir must be at least 70°F (20°C).
3. Remove any dirt from the winch.
4. Stabilize engine speed at idle RPM for all tests.
5. Leave test plugs securely installed unless testing that port.

6. After completing all pressure checks and making the necessary adjustments ensure that all plugs and hoses are securely installed.

Pressure gauges

Three calibrated pressure test gauges are required to perform the hydraulic pressure checks: one 1000 psi (6895 kPa), one 2000 psi (13790 kPa), and one 5000 psi (34474 kPa) test gauges.

Motor Supply Pressure Check

With the engine shut off, connect a 5000 psi pressure gauge to motor. Disconnect and plug the hose going to the brake release port. This will lock the winch brake to build pressure in the motor. Start the machine and operate in **LINE-OUT**. Motor pressure should see full winch system pressure (see machine service manual). Pressure should not exceed 5000 psi.

Brake Pressure Check

With the engine shut off, tee in a 2000 psi pressure gauge and reconnect the brake release hose. Start the engine and operate the winch in **LINE-OUT**. Brake pressure should be between 300 and 1000 psi. Low pressure will result in premature wear of the friction discs and added heat generation.

2-Speed Pressure Check

With the engine shut off, tee in a 1000 psi pressure gauge to the 2-speed hose. Start the engine and operate the winch in high speed **LINE-IN**. Pressure should be between 200 and 300 psi to shift the clutch.

Repairs

General

This section includes the removal and disassembly of all major assemblies, inspection of components, and reassembly and installation. The wear points detailed in Figure 4-1 should be inspected at the time of disassembly so that worn parts may be ordered and replaced prior to reassembly. If the winch is to be completely overhauled, perform the removal, disassembly, inspection and reassembly procedures in the sequence of the following paragraphs.

NOTE: Using the troubleshooting guide in Section 2, can help direct you to the cause of the malfunction before performing major overhaul.

Allied Systems Company offers a complete rebuild program for our equipment, call 503.625.2560 or email parts@alliedsystems.com.

Review and perform any adjustments that may be the cause of a malfunction (refer to Section 3).

Use new seals, gaskets and O-rings when installing components.

CAUTION

Cleanliness is of extreme importance in the repair and overhaul of any hydraulic unit. Before attempting any repairs, the exterior of the winch must be thoroughly cleaned to prevent the possibility of contamination.

Winch Removal

1. Remove the wire rope from the drum. Clean the outside of the winch and the area where the winch contacts the machine.

WARNING

Be careful when you remove the wire rope from the drum. The end of the wire rope can move like a compressed spring, causing an injury when it is released from the drum.

2. Disconnect hydraulic hoses from winch. Cap hose ends to prevent contamination and tag for reassembly.
3. Connect slings and a crane or lifting device to the winch.

WARNING

The slings and crane used to lift the winch must have a minimum lifting capacity of 1750 lbs (800 kg).

4. Remove the mounting hardware securing winch to machine.

Winch Disassembly

The procedures in this section describe a complete unit overhaul with the winch removed from the machine.

All components should be inspected for wear or damage as they are removed. Refer to Figure 4-1, Visual Inspection. All seals that were removed should be replaced during assembly. Any component that indicates excessive wear or damage should be replaced. The following reassembly and installation sequence assumes a complete winch overhaul.

NOTE: Allied Systems Company offers a complete rebuild program for our equipment, call 503.625.2560 or email parts@alliedsystems.com.

Repairs



ITEM	INSPECTION	ACTION
Motor Adapter Assembly	Make sure oil passages are clean.	Clean oil passages with a small brush. Blow passages clear with compressed air.
	Check sealing surfaces for grooves.	Replace excessively worn or grooved seal sleeve.
	Inspect the bearing for wear or damage.	Replace worn or damaged bearings.
Clutch Assembly	Make sure oil passages are clean.	Clean oil passages with a small brush. Blow passages clear with compressed air.
	Check the friction discs for wear, distortion or damage. Minimum thickness of wear surface per side: 0.5mm (.010 in). Maximum thickness of friction disc: 2.13mm (.084 in).	Replace friction discs if the oil grooves are worn away or the discs are burned, damaged, or warped. If the discs are being replaced due to overheating, the clutch return spring should also be replaced.
	Check the separator plates are flat, free of large blue areas (caused by overheating) or damaged surfaces.	Replace damaged separator plates.
	Inspect the piston housing and piston for cracks and damage. Make sure that the O-ring grooves and sealing surfaces are in good condition.	Replace a damaged piston or piston housing.
	Inspect the clutch shaft bearing for wear or damage.	Replace worn or damaged bearings.
	Check retainer bushings for wear. Bushings should not have more than .25mm (.010 in) play with their mating components.	Replace worn or damaged bushings.
	Check sprag clutch for wear or damage	Replace worn or damaged sprags.
	Brake	Carefully inspect friction discs for facing wear, distortion and damaged teeth. Minimum thickness of wear surface per side: 0.33 mm (.013 in). Maximum thickness of friction disc: 3.28 mm (.129 in).
Carefully inspect separator plates to verify that surfaces are free of large blue areas (caused by overheating) and/or not worn excessively or unevenly.		Replace separator plates if surfaces are warped or scored.
Inspect piston for cracks and damage. Ensure O-ring grooves and sealing surfaces are undamaged.		Replace piston if damaged. Always replace piston seals (O-rings) when brake is repaired.
Inspect brake housing for wear, scoring, burrs and cracks.		Replace housing if splines are notched or cage is cracked.
Make sure oil passages are clean.		Clean oil passages with a small brush. Blow passages clear with compressed air.

Figure 4-1 Visual Inspection

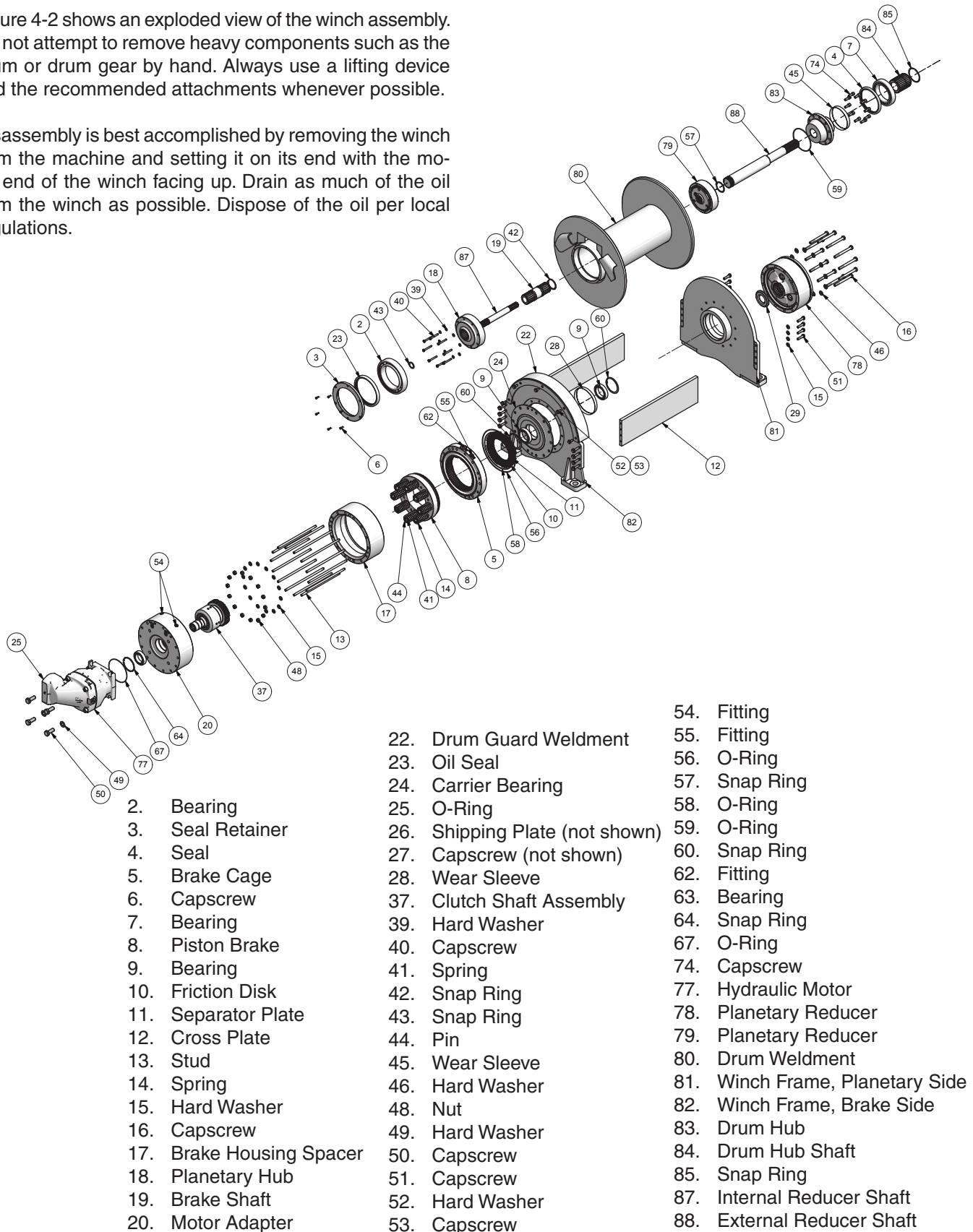
ITEM	INSPECTION	ACTION
Bearings	Inspect exposed external surfaces for fretting corrosion.	If not severe, use fine wet and dry abrasive paper to remove. If not removable, replace bearing.
	Inspect bearing rings for cracks	If found, replace bearing
	Rotate bearings, bearing should rotate freely with no resistance.	If bearing appears to be adequately lubricated and still has resistance then bearing is damaged and needs to be replaced.
Bearing Retainer	Check for scratches or scoring on bearing surfaces.	Dress surfaces or replace retainer if excessively worn.
	Check for scratches or scoring on wear sleeve surface.	Replace wear sleeve if worn.
Internal (2-speed) Planetary Reducer	Inspect gears for damage or wear. Sun gear should spin freely in carrier assembly.	Replace assembly if worn.
Drum Shaft	Inspect gear teeth for damage or wear.	Replace shaft if excessively worn.
External Planetary Reducer	Inspect gears for damage or wear. Drum shaft should spin freely in carrier assembly.	Replace assembly if worn.
Drum Hub	Check for scratches or scoring on bearing surfaces.	Dress surfaces or replace retainer if excessively worn.
	Check for scratches or scoring on wear sleeve surface.	Replace wear sleeve if worn.
	Check O-ring grooves and sealing surfaces.	Dress grooves or replace hub if severely worn.
Planetary side frame	Check for scratches or scoring on bearing surfaces.	Dress surfaces or replace retainer if excessively worn.
Drum	Check for scratches or scoring on bearing surfaces.	Dress surfaces or replace retainer if excessively worn.
	Inspect for cracks in weld joints.	Repair or replace as necessary.

Figure 4-1 Visual Inspection

Winch Disassembly

Figure 4-2 shows an exploded view of the winch assembly. Do not attempt to remove heavy components such as the drum or drum gear by hand. Always use a lifting device and the recommended attachments whenever possible.

Disassembly is best accomplished by removing the winch from the machine and setting it on its end with the motor end of the winch facing up. Drain as much of the oil from the winch as possible. Dispose of the oil per local regulations.



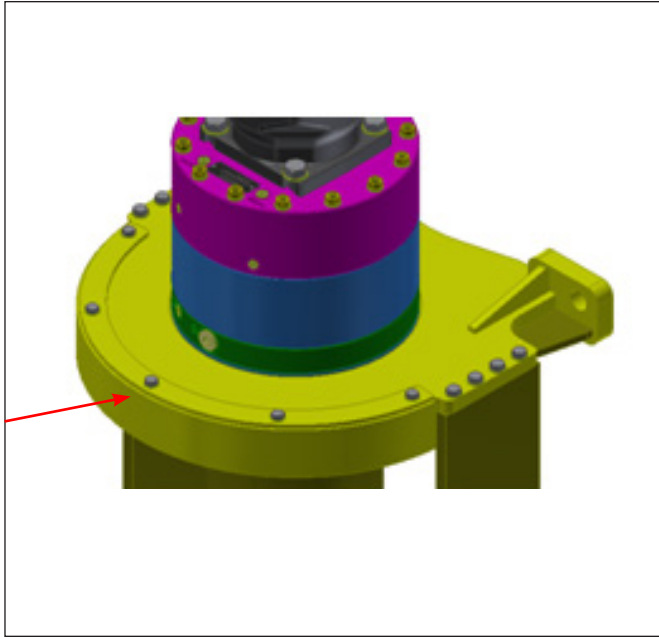
- | | | |
|--------------------------|--------------------------------|---------------------------------|
| 2. Bearing | 22. Drum Guard Weldment | 54. Fitting |
| 3. Seal Retainer | 23. Oil Seal | 55. Fitting |
| 4. Seal | 24. Carrier Bearing | 56. O-Ring |
| 5. Brake Cage | 25. O-Ring | 57. Snap Ring |
| 6. Capscrew | 26. Shipping Plate (not shown) | 58. O-Ring |
| 7. Bearing | 27. Capscrew (not shown) | 59. O-Ring |
| 8. Piston Brake | 28. Wear Sleeve | 60. Snap Ring |
| 9. Bearing | 29. Clutch Shaft Assembly | 62. Fitting |
| 10. Friction Disk | 30. Hard Washer | 63. Bearing |
| 11. Separator Plate | 31. Capscrew | 64. Snap Ring |
| 12. Cross Plate | 32. Spring | 67. O-Ring |
| 13. Stud | 33. Snap Ring | 74. Capscrew |
| 14. Spring | 34. Pin | 77. Hydraulic Motor |
| 15. Hard Washer | 35. Wear Sleeve | 78. Planetary Reducer |
| 16. Capscrew | 36. Hard Washer | 79. Planetary Reducer |
| 17. Brake Housing Spacer | 37. Nut | 80. Drum Weldment |
| 18. Planetary Hub | 38. Hard Washer | 81. Winch Frame, Planetary Side |
| 19. Brake Shaft | 39. Capscrew | 82. Winch Frame, Brake Side |
| 20. Motor Adapter | 40. Capscrew | 83. Drum Hub |
| | 41. Spring | 84. Drum Hub Shaft |
| | 42. Snap Ring | 85. Snap Ring |
| | 43. Snap Ring | 87. Internal Reducer Shaft |
| | 44. Pin | 88. External Reducer Shaft |
| | 45. Wear Sleeve | |
| | 46. Hard Washer | |
| | 48. Nut | |
| | 49. Hard Washer | |
| | 50. Capscrew | |
| | 51. Capscrew | |
| | 52. Hard Washer | |
| | 53. Capscrew | |

Figure 4-2 Winch - Exploded View

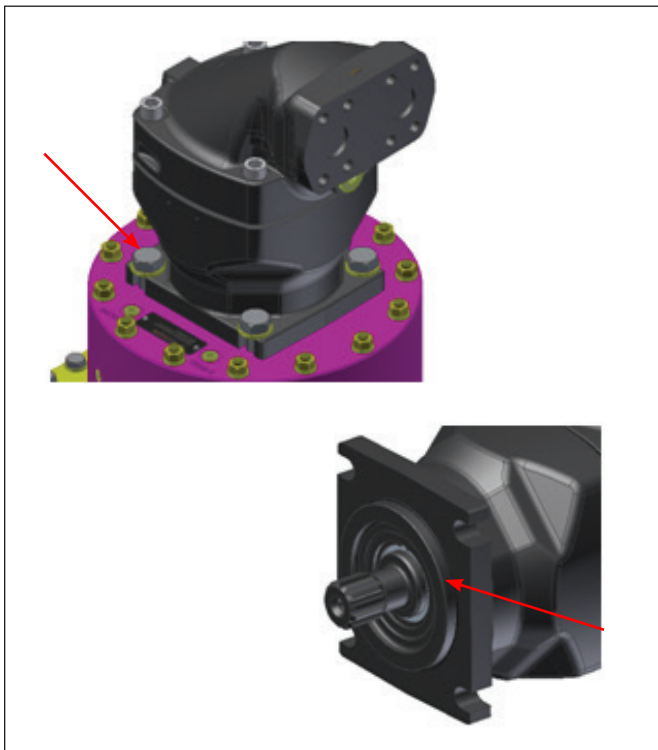
Motor Side Components Disassembly

Note: Disassembly will require the use of at least (3) heavy duty clamps with a minimum of 14 in. clamping capacity and 6 in. throat depth.

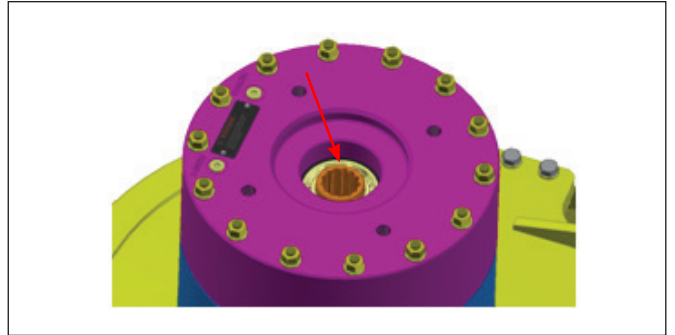
1. Unbolt and remove drum guard.



2. Unbolt and remove the motor. Remove the O-ring from the motor pilot.



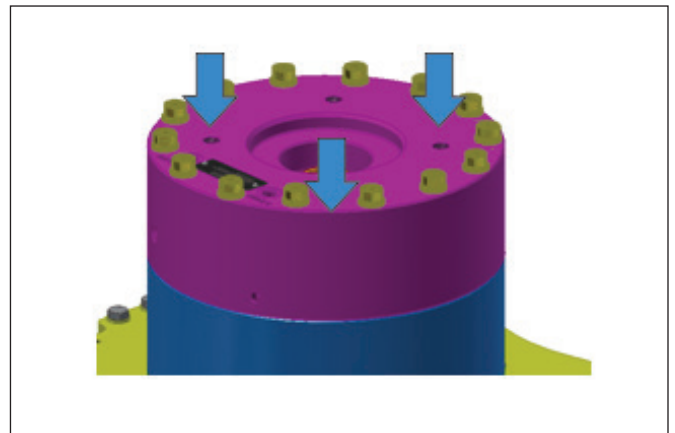
3. Remove the snap ring and bearing from the motor adaptor assembly.



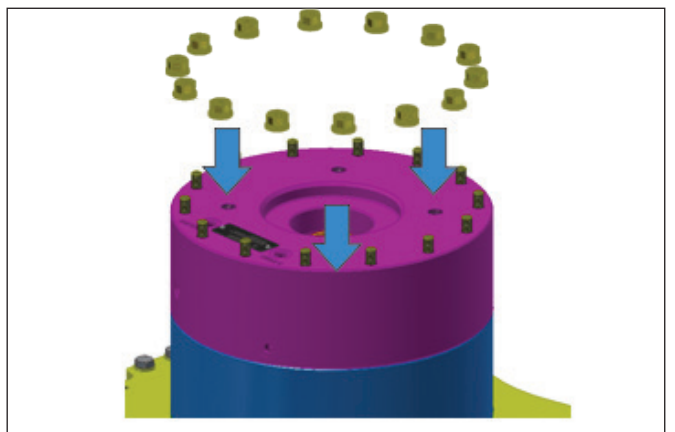
4. Clamp the motor adapter down to the winch frame. Allied makes tool P/N X-204240 for this purpose. Use it along with a port-a-power to compress the springs and remove the motor adapter.

⚠ WARNING

The motor adapter is spring loaded. The spring force from the brake springs is about 8000 lbs. Use clamps with appropriate load rating.



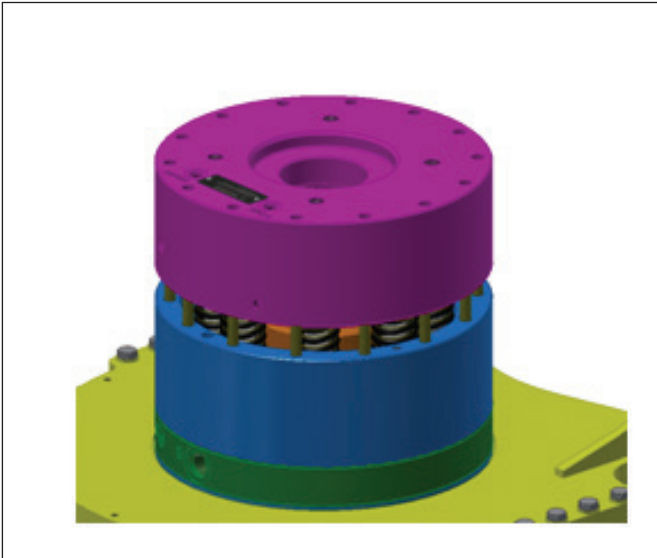
5. With the motor adapter clamped down, remove the nuts and washers holding the motor adapter onto the external planetary reducer.



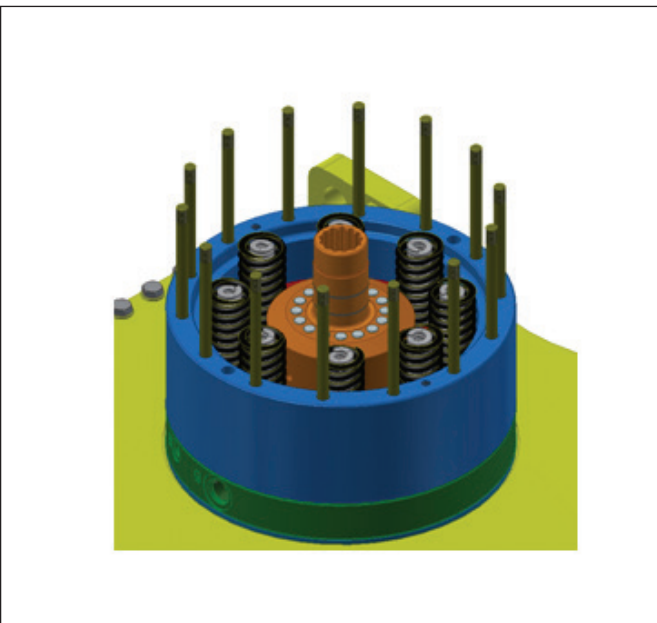
6. Slowly retract clamps to relieve the spring pressure. Once spring pressure is relieved, remove the motor adapter assembly. Roll pins have been pressed into the under side of the motor adapter. These pins do not need to be removed, unless the adapter is being replaced.

! WARNING

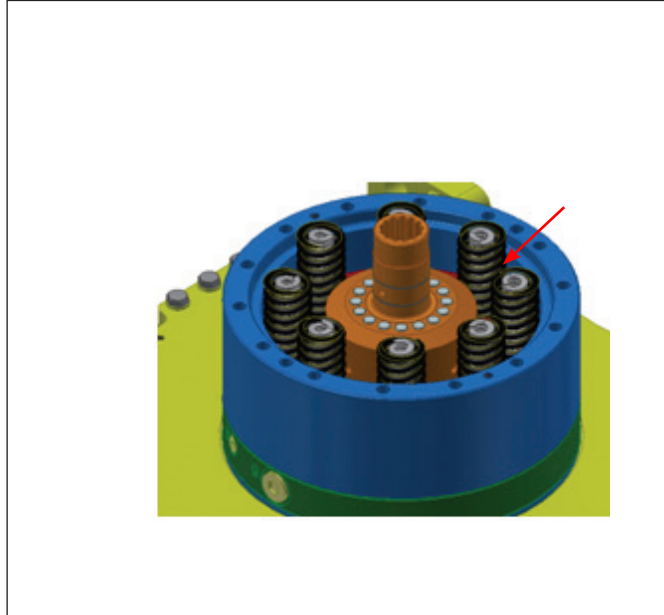
Maintain equal pressure on each clamp as much as possible to avoid overloading any one clamp.



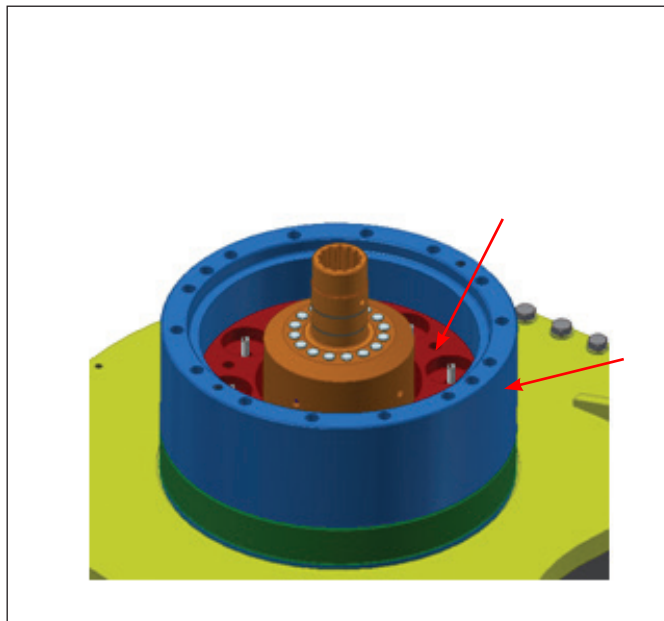
7. Removing the studs is not necessary during disassembly. Subsequent illustrations are shown with them removed for clarity.



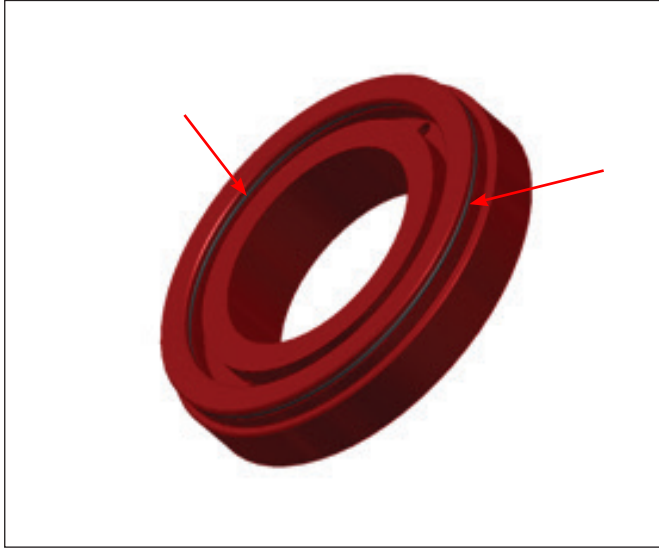
8. Remove the brake springs.



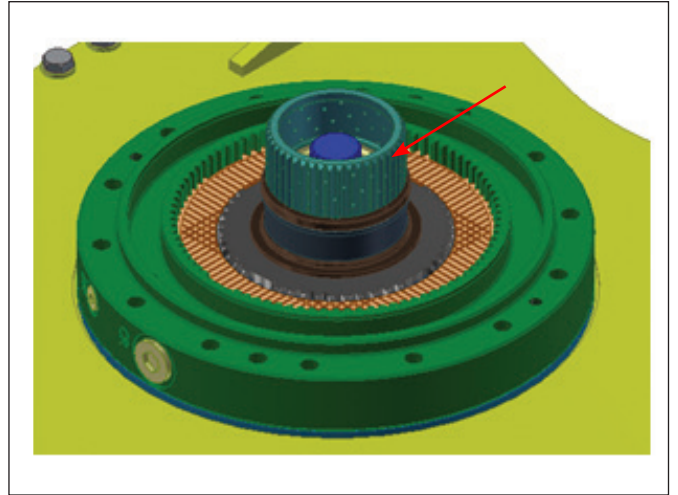
9. Remove the brake housing and the brake piston.



10. Remove the O-rings from the brake piston. Roll pins have been pressed into the other side of the piston. These pins do not need to be removed, unless the piston is being replaced.

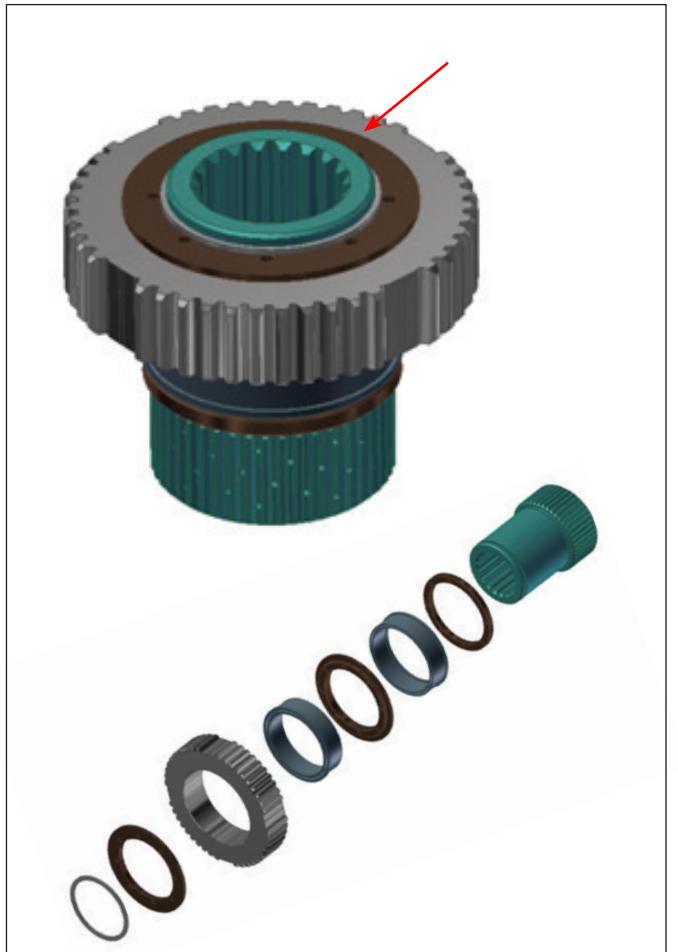
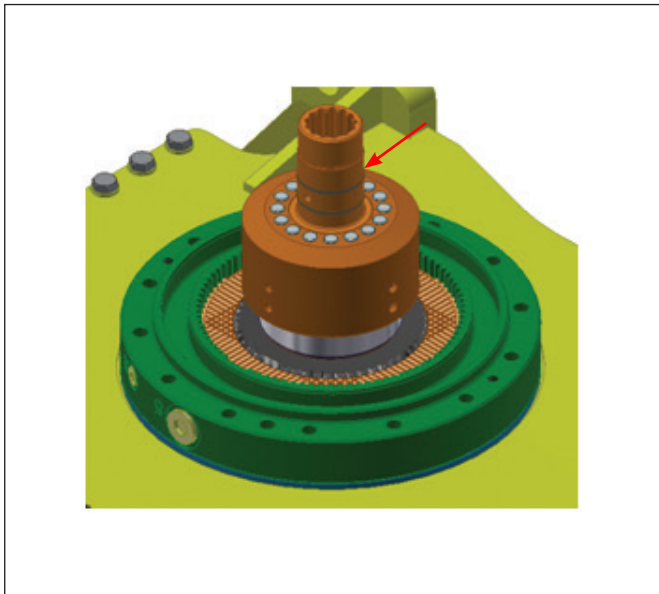


12. Remove the clutch hub. This will also pull the brake hub, sprag clutches and spacers out because they are retained to the clutch hub with a snap ring.

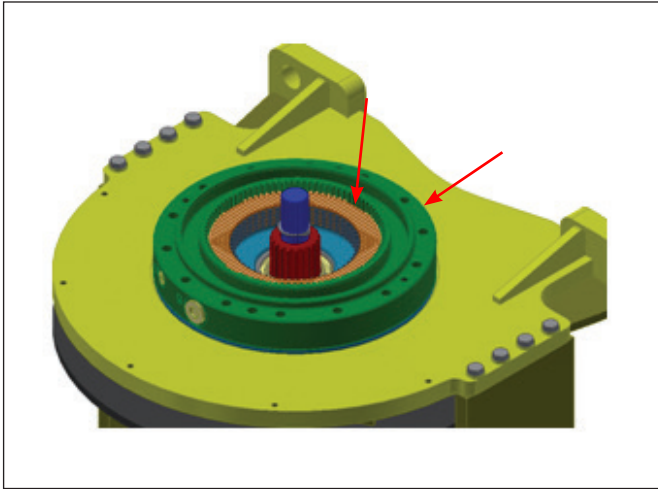


13. Remove the snap ring from the clutch hub and disassemble the brake hub, bushings and sprag brakes from them. Inspect the bronze bushings for excessive wear or play and replace as needed.

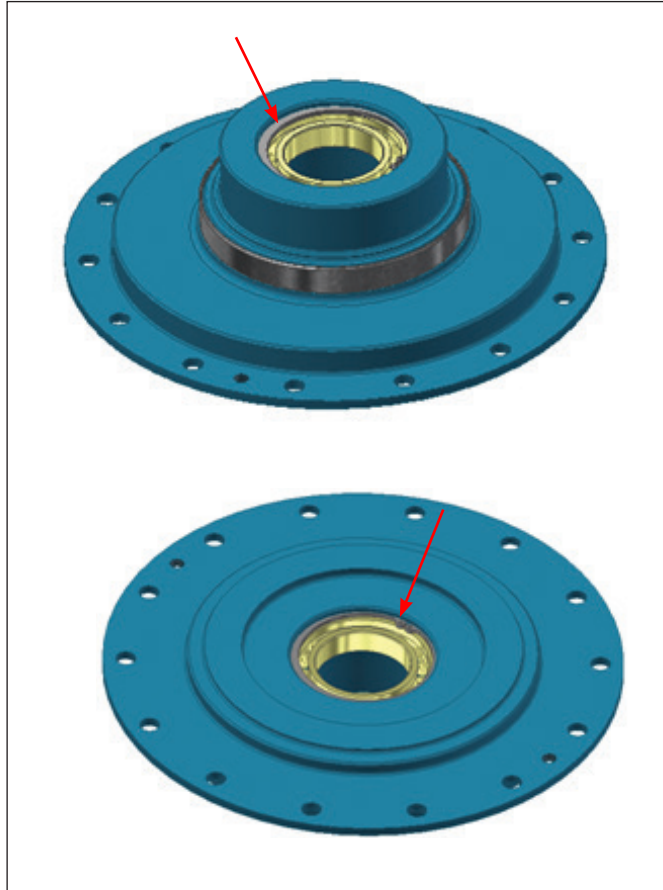
11. Remove the 2 speed clutch.



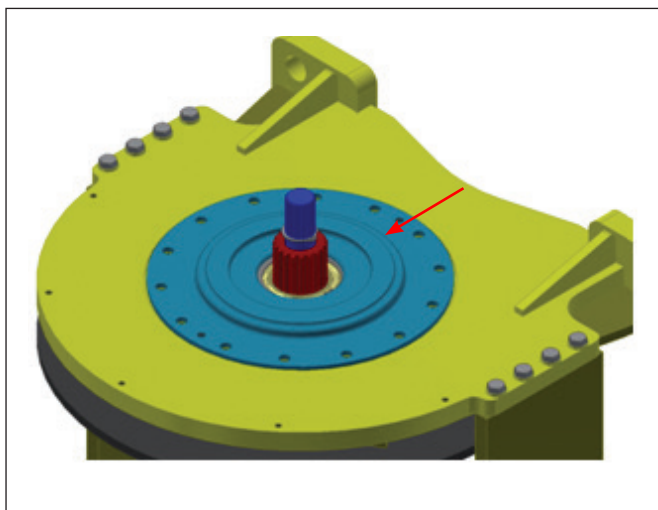
14. Remove the brake discs, separators and brake cage.



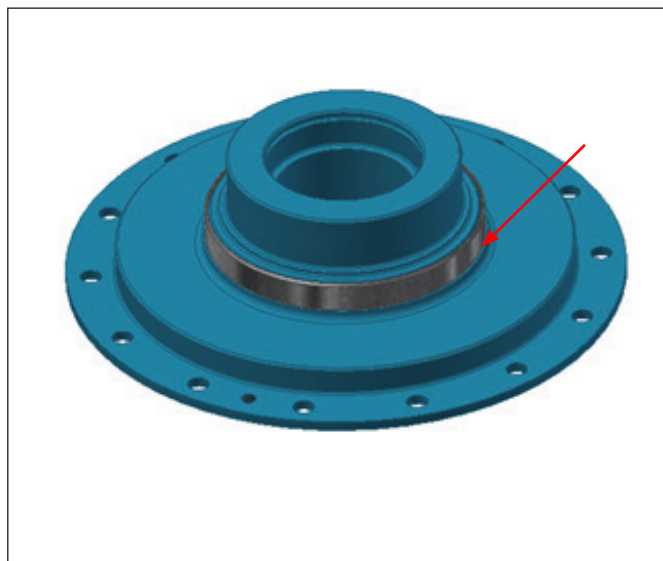
16. Remove the snap rings and bearings from both ends of the drum carrier.



15. Remove the drum bearing carrier.

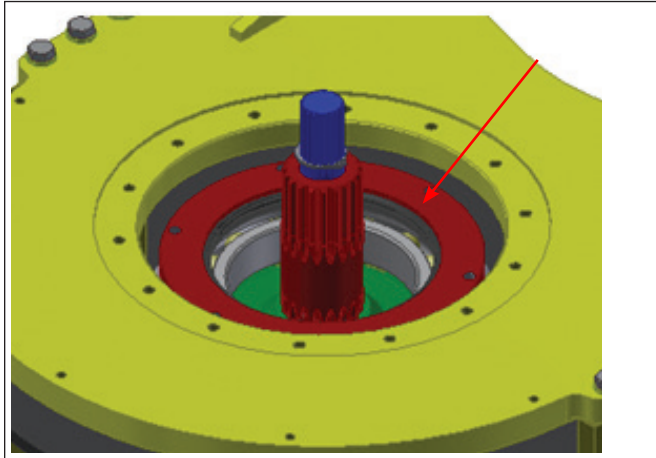


17. Inspect the wear sleeve on the drum bearing carrier for wear. Replace as needed.



Drum Disassembly

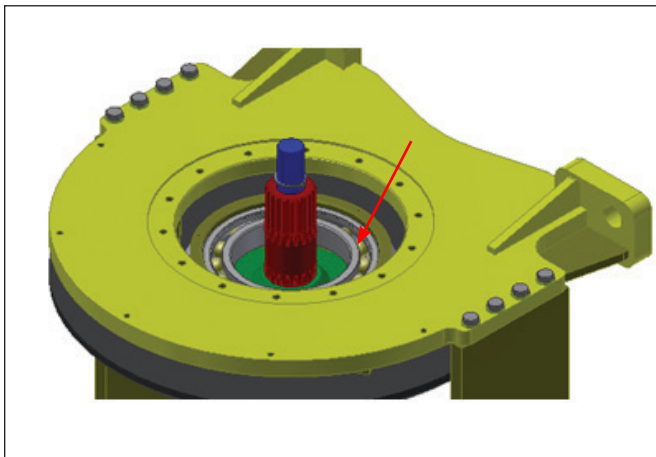
1. Unbolt and remove drum seal retainer.



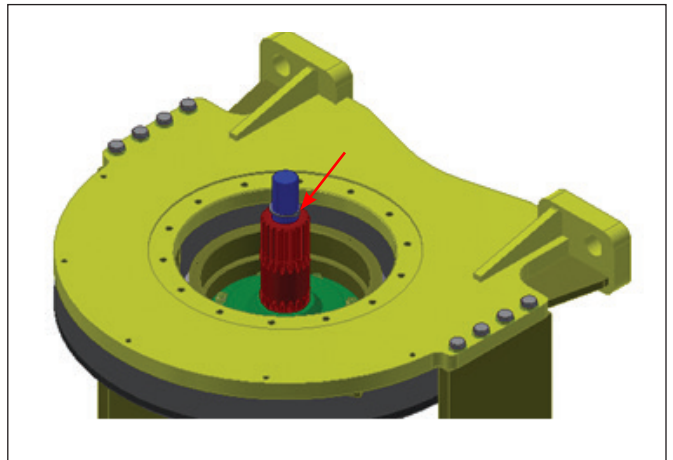
2. Remove the drum seal from the drum seal retainer and discard.



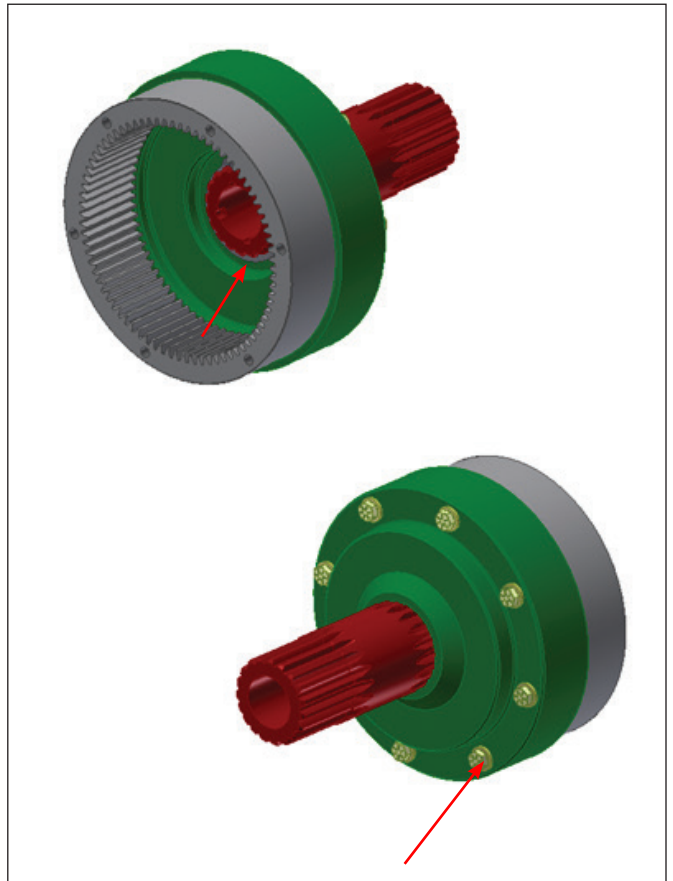
3. Remove the drum bearing with a bearing puller or a pry-bar.



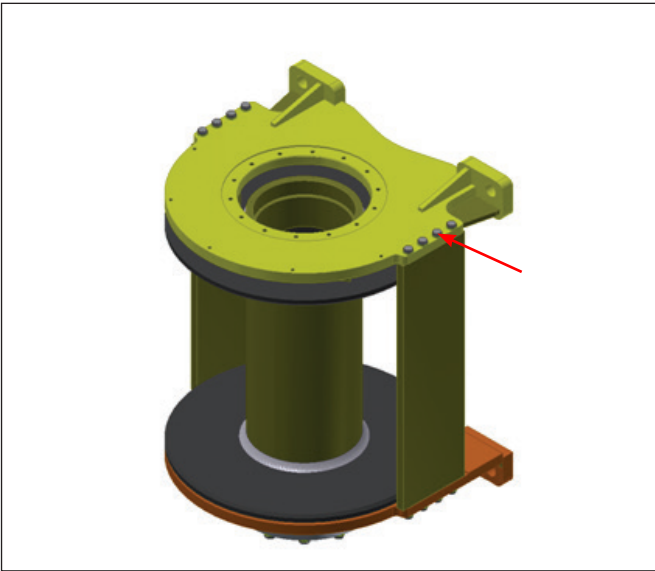
4. Pull out the inner planetary's input shaft and remove its snap ring.



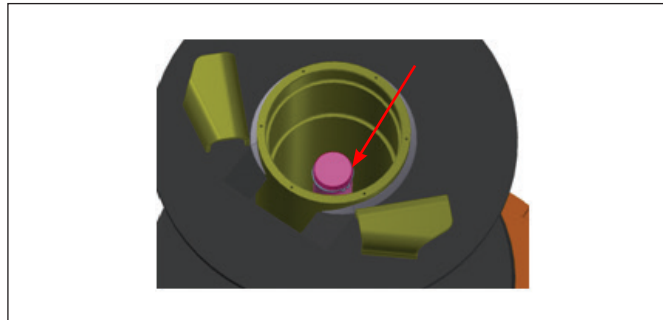
5. Pull the brake shaft. The planetary hub and ring gear will come out with it as one piece. To disassemble them, remove the snap ring from the brake shaft and unbolt the ring gear from the ring gear hub.



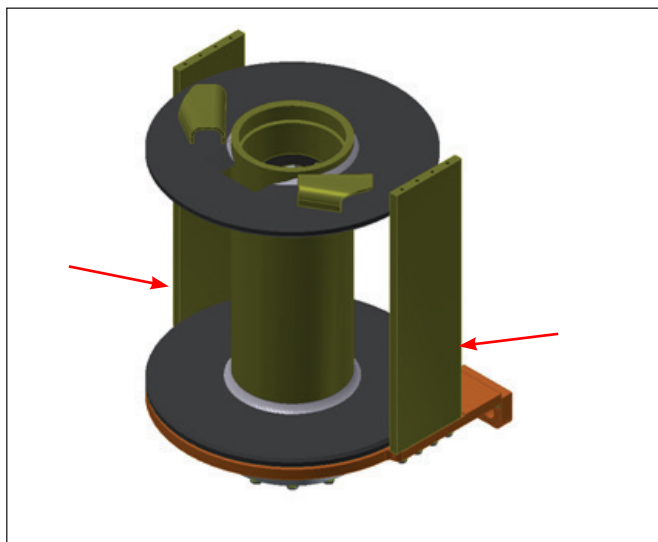
6. Unbolt and remove the winch motor side frame from the frame cross plates.



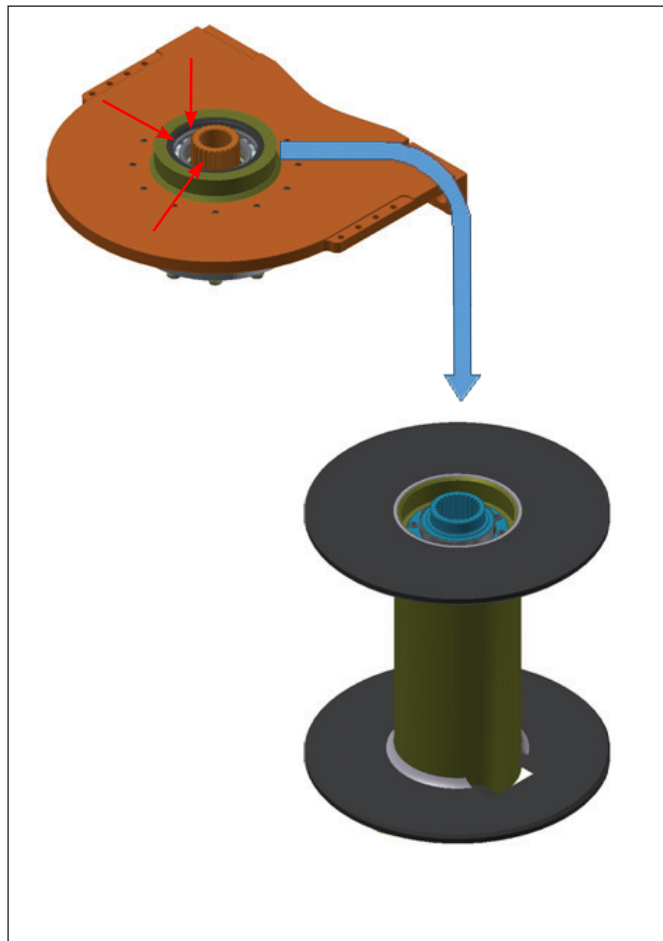
9. Pull the drum shaft out of the drum and remove its snap ring.



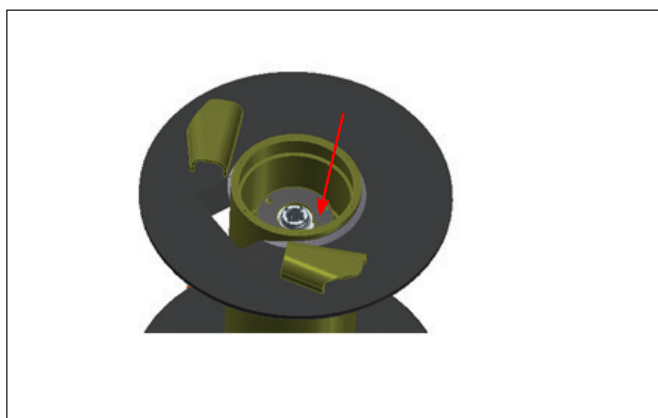
7. Unbolt and remove the cross plates from the planetary side frame.



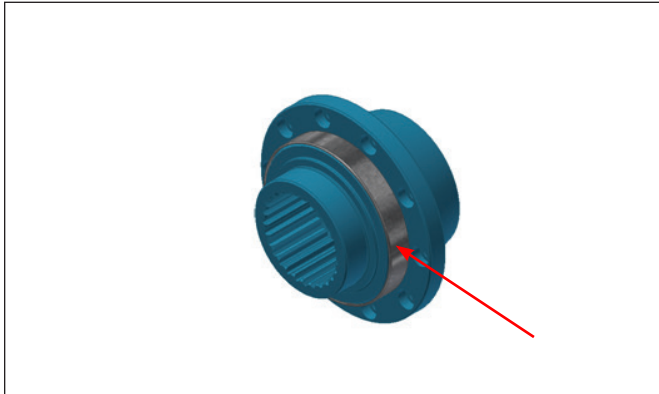
10. Lift the drum off the planetary side frame and set it down on its motor side flange. At this point you can remove and discard the planetary side drum seal and remove the bearing and drum hub shaft.



8. Pull the internal planetary carrier out of the drum.

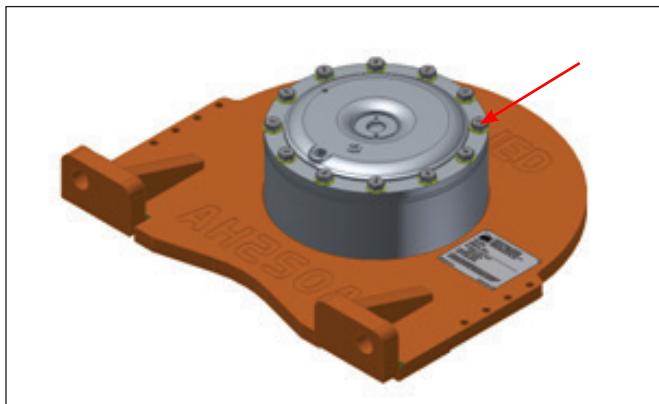


11. Unbolt and remove the drum hub. Inspect the wear sleeve for excessive wear and replace as needed.

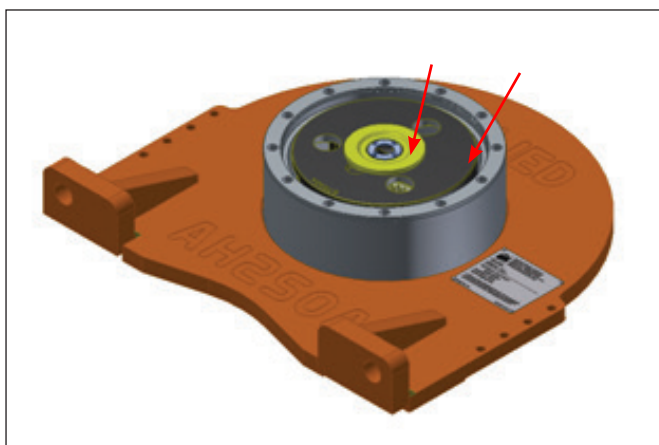


Planetary Side Components Disassembly

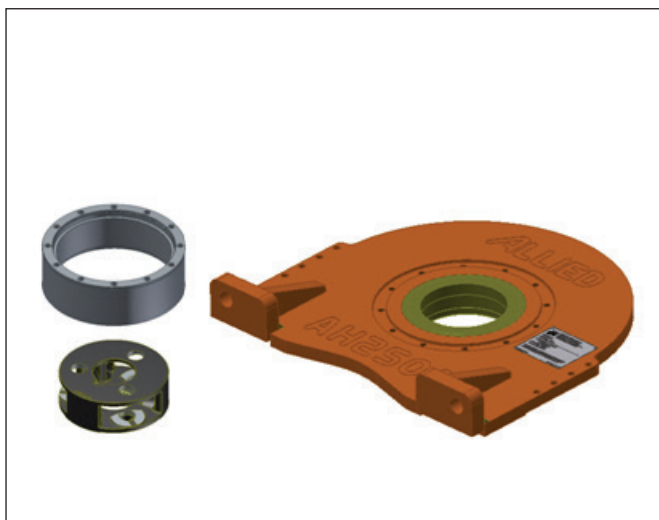
1. Flip the planetary side frame over and unbolt and remove the planetary cover.



2. Remove the carrier spacer and thrust washer. Note, the thrust washer may be sticking to the planetary cover. Check washer for wear and replace if needed.

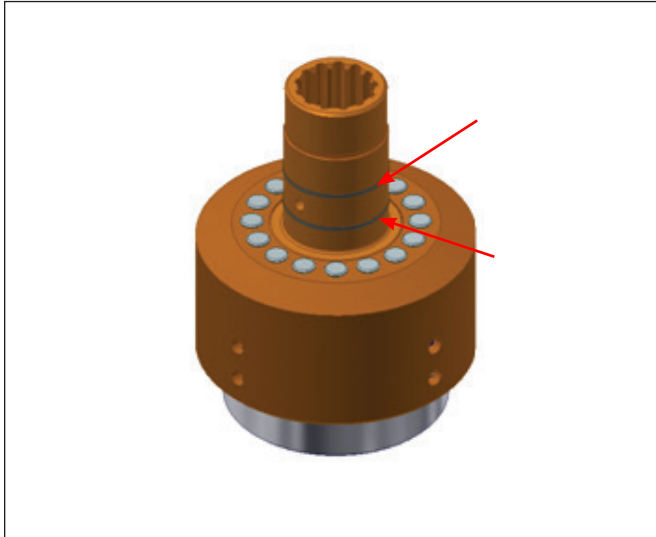


3. Remove ring gear and planetary carrier.

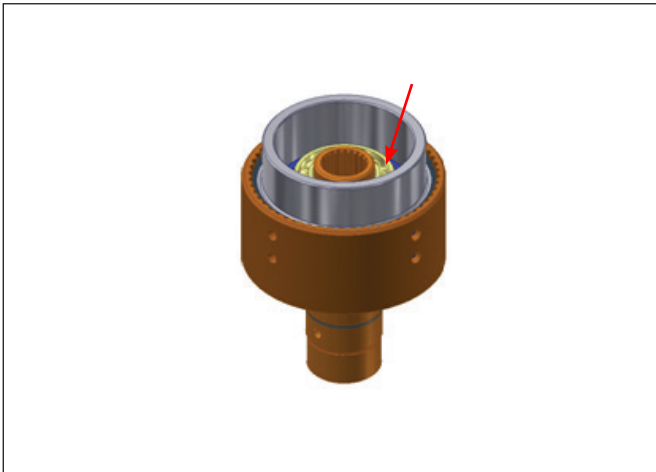


Clutch Disassembly

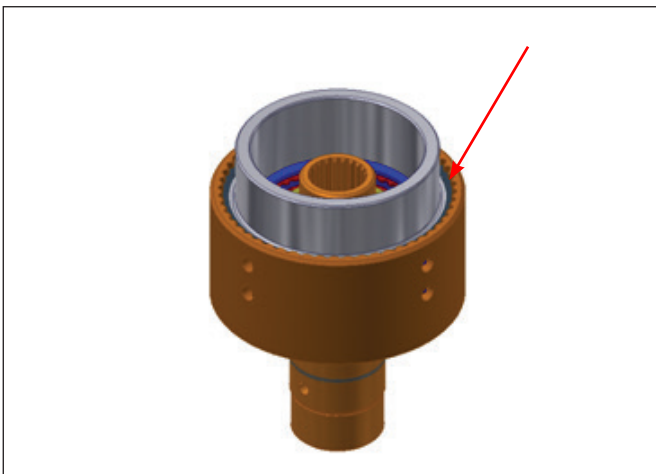
1. Remove seal rings from clutch shaft.



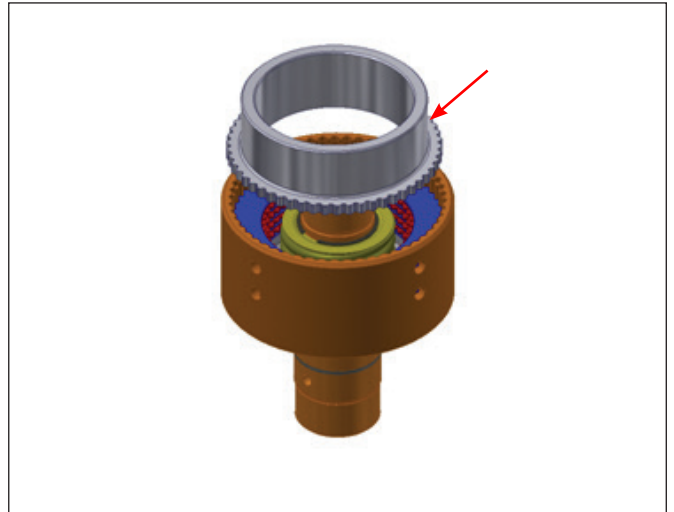
2. Remove ball bearing from clutch shaft.



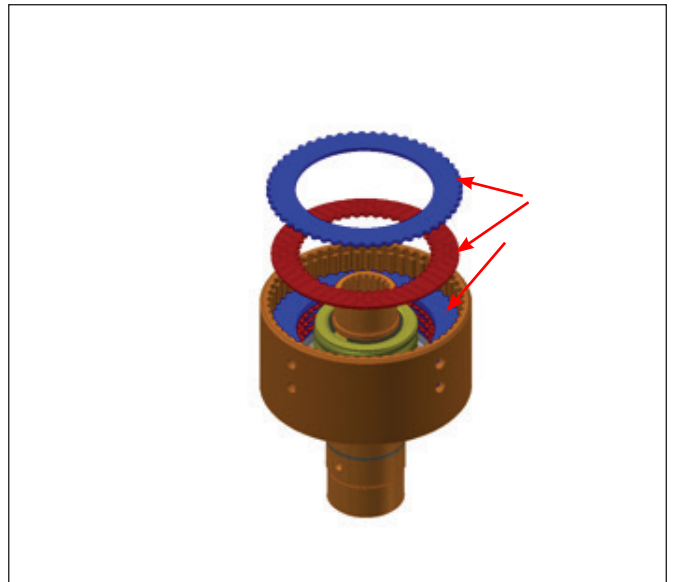
3. Remove snap ring from inside clutch housing.



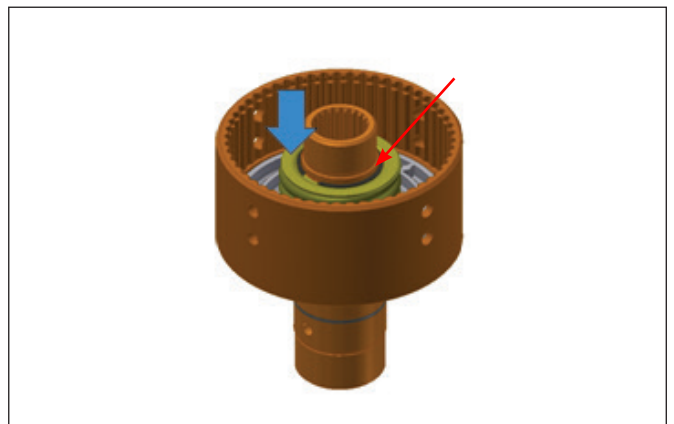
4. Remove pressure plate.



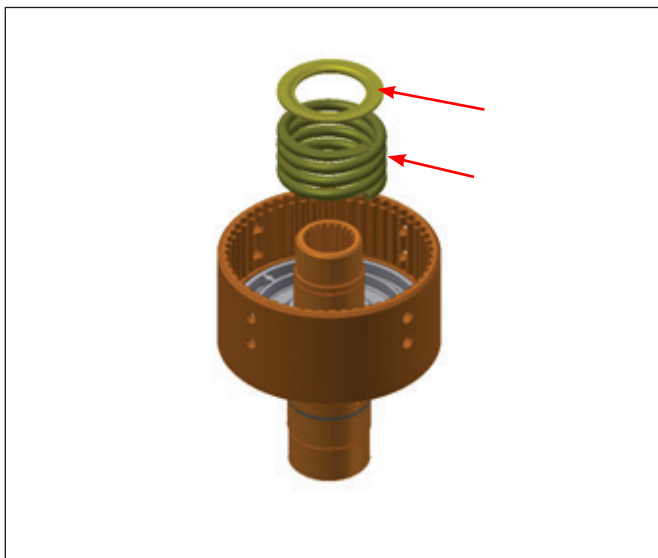
5. Remove friction discs and separators.



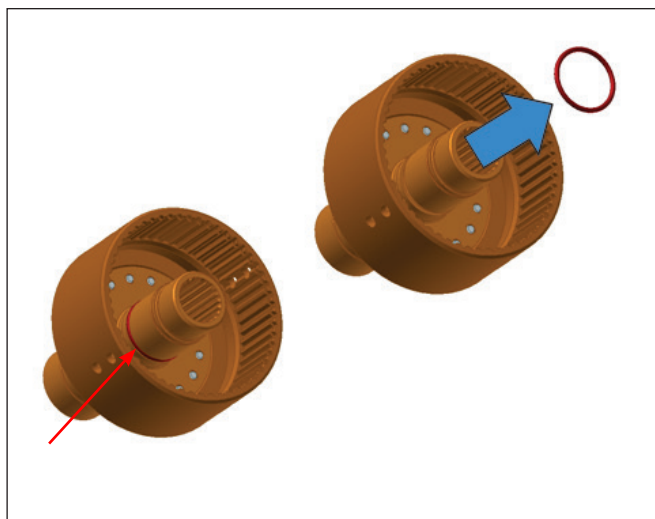
6. Compress clutch spring and remove the snap ring.



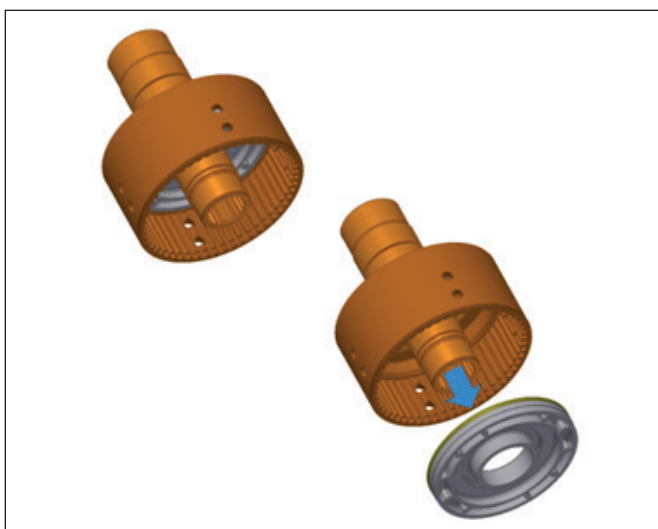
7. Retract spring compressor until spring is relaxed. Remove the spring guide and spring.



9. Remove O-ring from clutch shaft inside the clutch housing assembly.



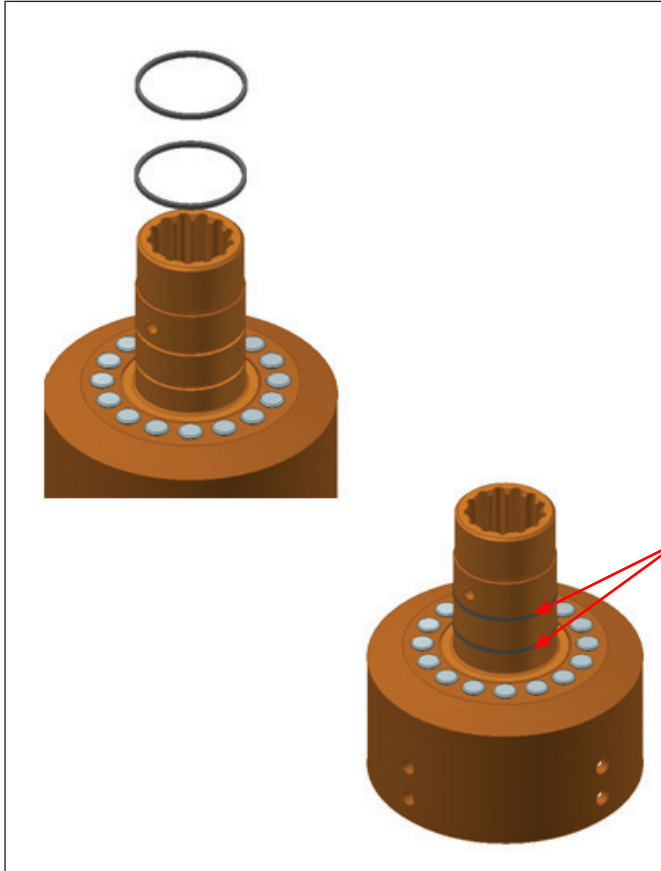
8. Invert the clutch housing assembly and gently tap the end on a soft board to remove the clutch piston.



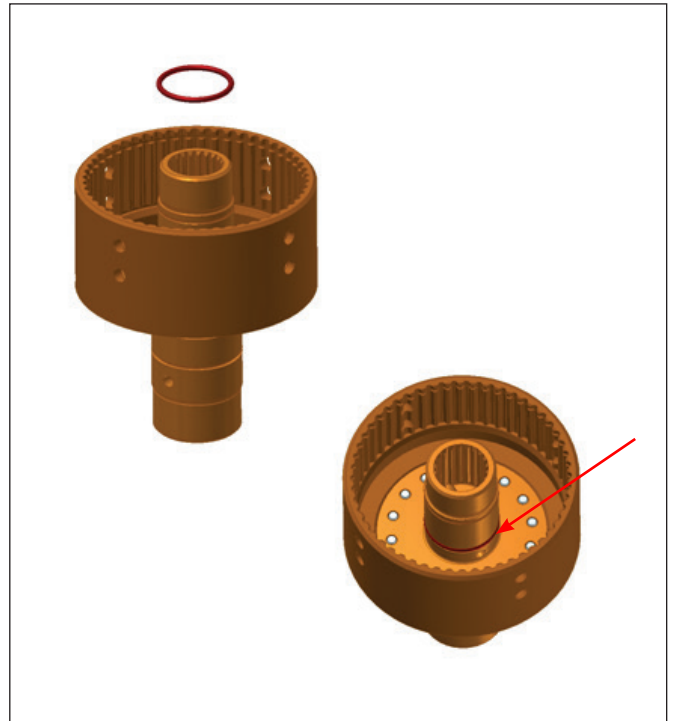
Clutch Assembly

Before assembly make sure to inspect all parts per Figure 4-1, and clean them.

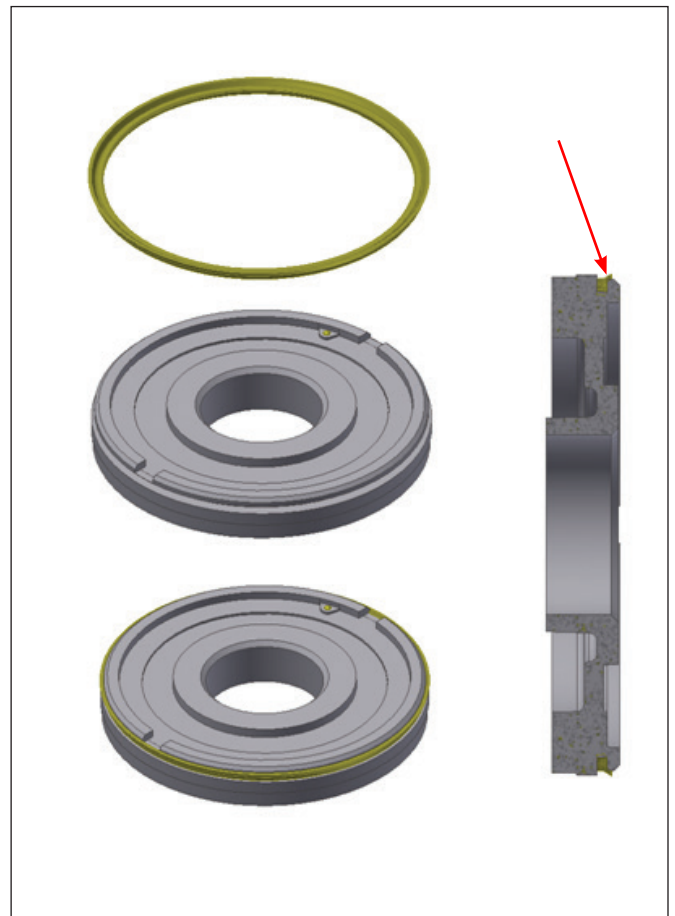
1. Install seal rings.



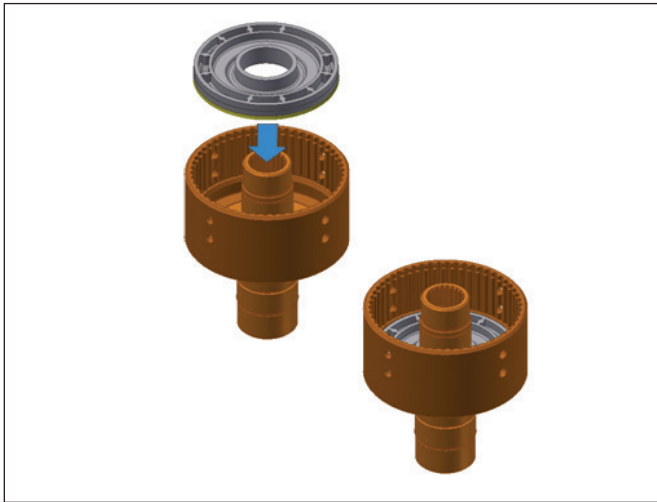
2. Install O-ring into O-ring groove.



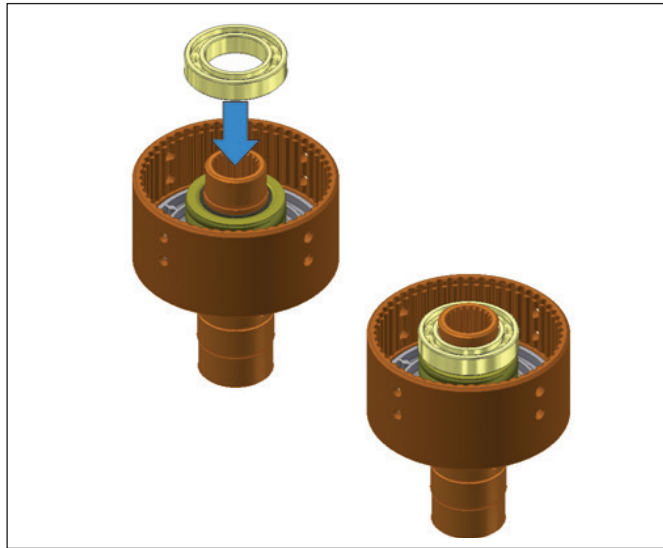
3. Install seal onto piston. Note seal orientation.



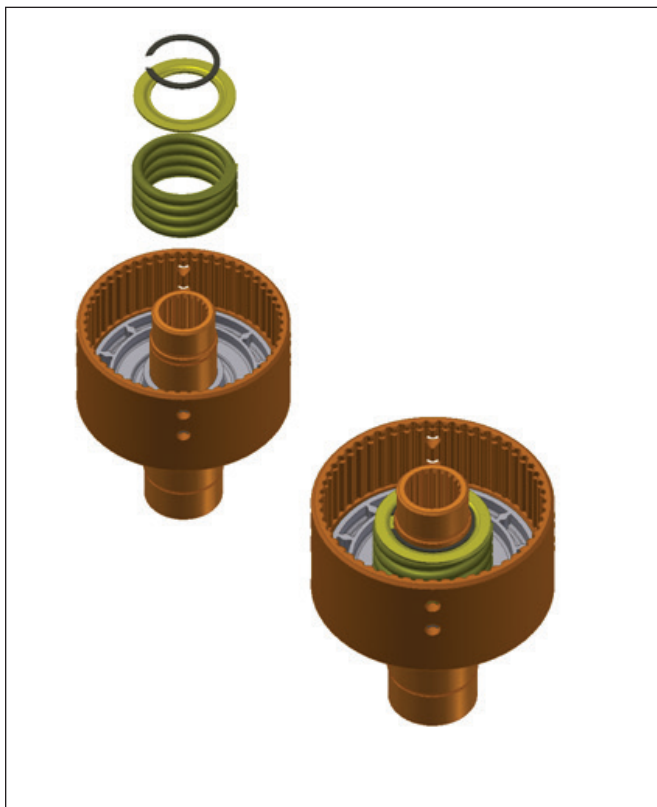
4. Coat O-ring and piston seal with oil and install piston into the clutch housing.



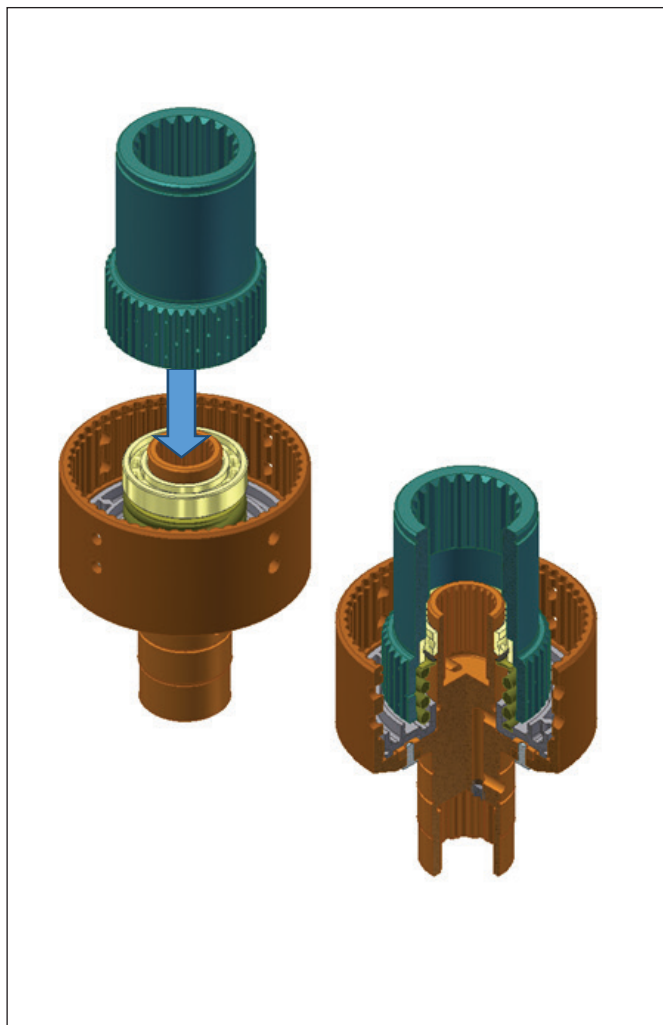
6. Install bearing.



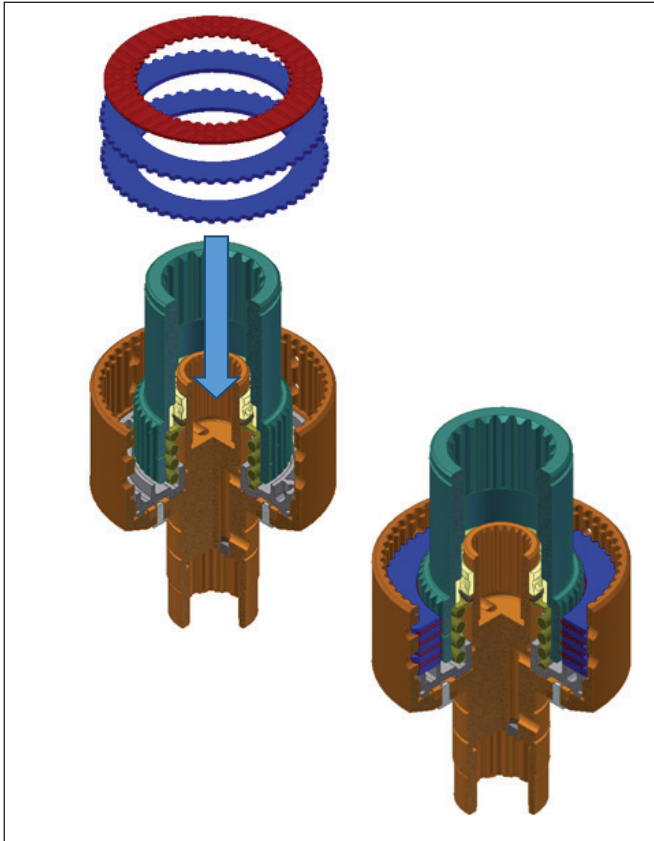
5. Compress the spring and spring guide into the clutch housing and install the snap ring into the groove on the shaft.



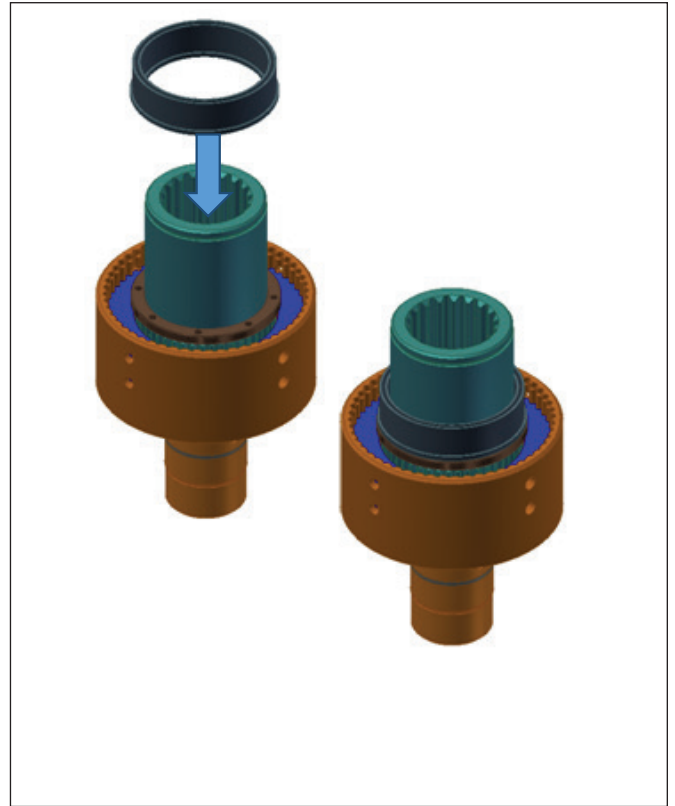
7. Install clutch hub.



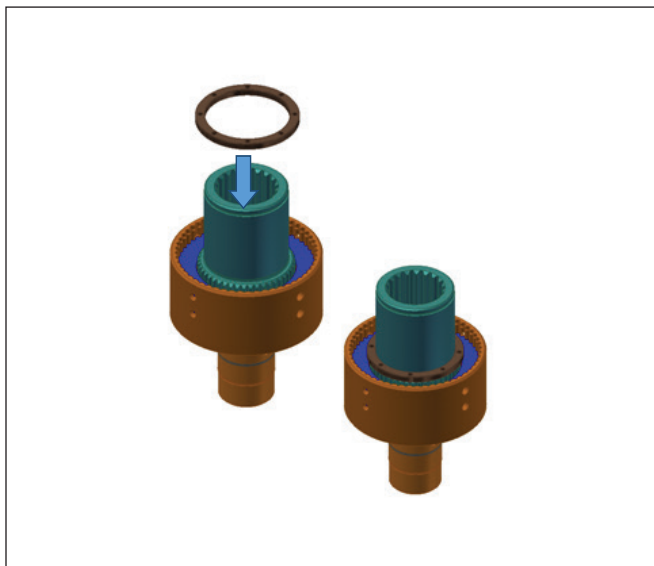
8. Install separators and friction discs. Start with two separators then one friction & repeat pattern until all nine separators and four friction discs are used.



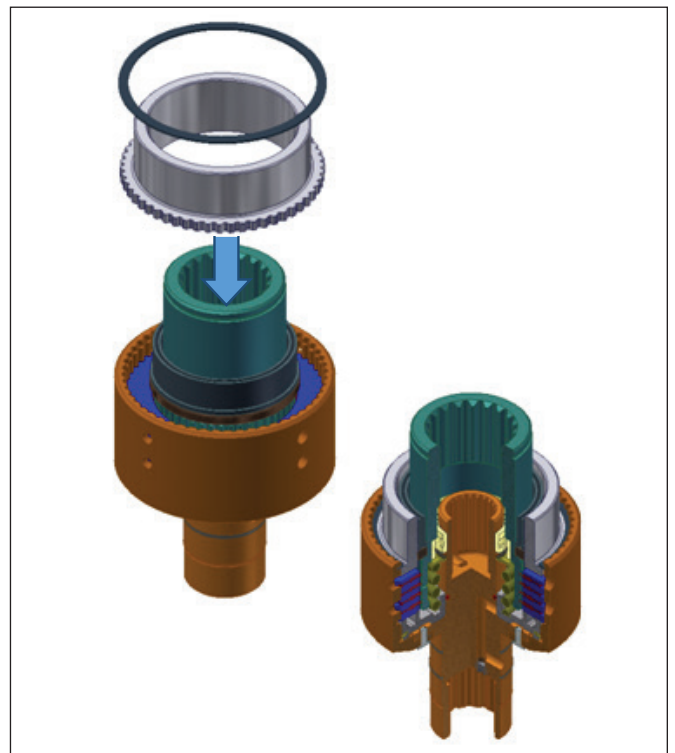
10. Install clutch sprag. For overwind winch configuration (see Section 1 for overwind definition), orient the thicker, flanged part of the sprag toward the piston. Install opposite for underwind.



9. Install bushing.



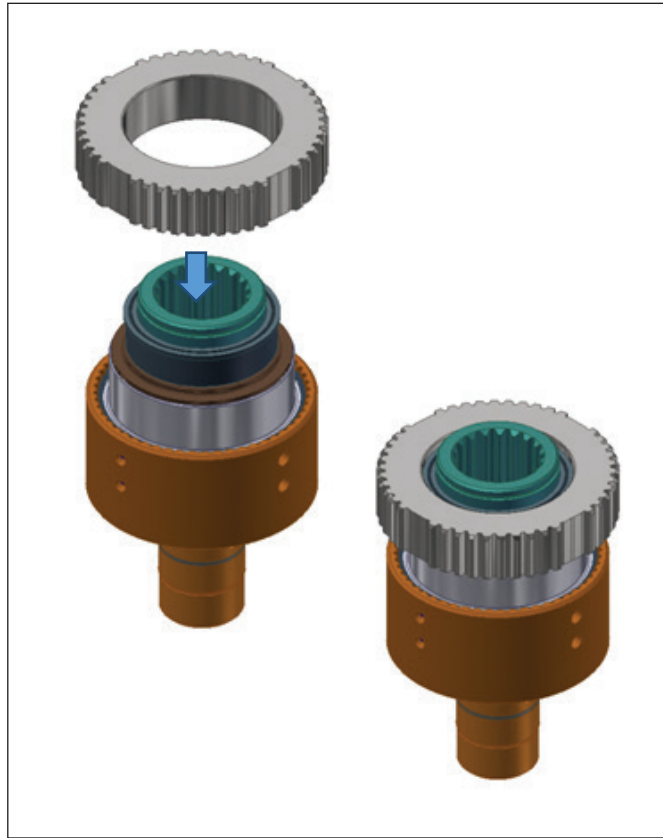
11. Install pressure plate and snap ring.



12. Install bushing.



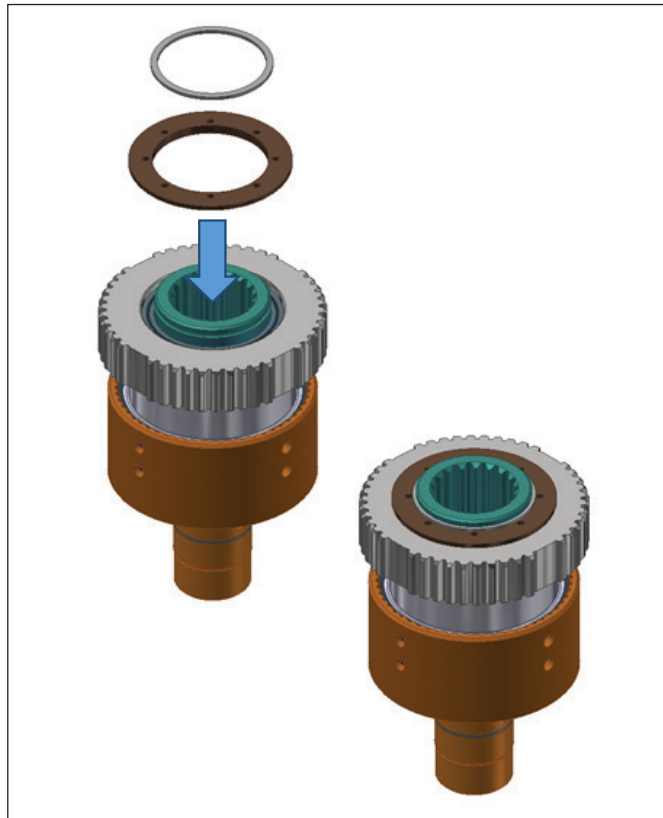
14. Install the brake hub.



13. Install brake sprag. For overwind configuration (see Section 1 for overwind definition), orient the thicker, flanged part of the retaining rings away from the piston. Install opposite for underwind.

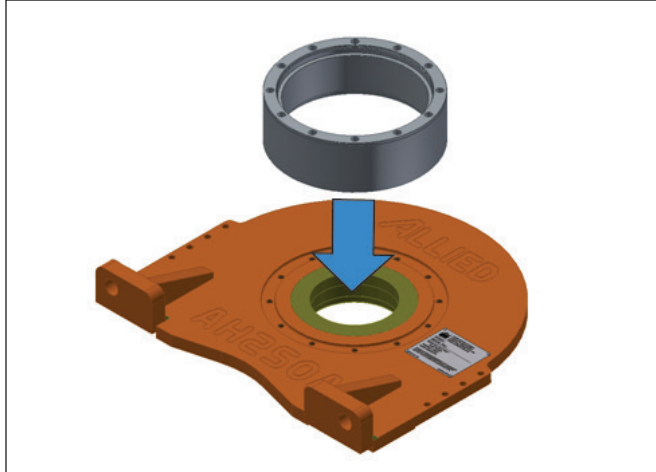


15. Install the last bushing, retain it with the snap ring.

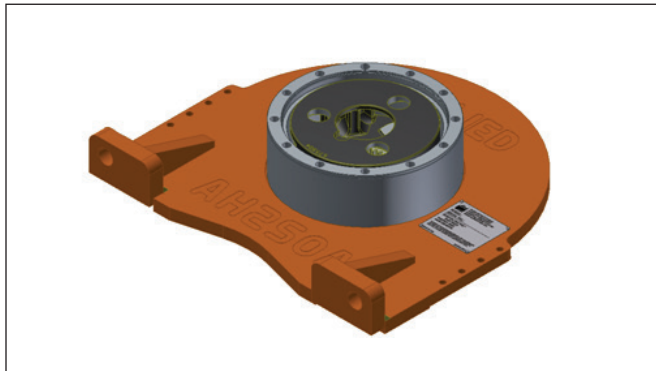


Planetary Side Components Assembly

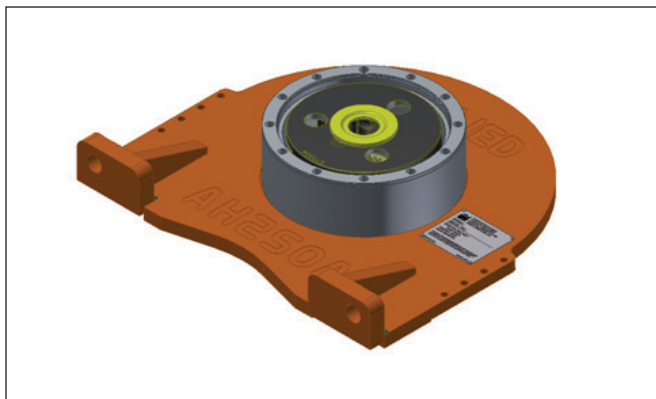
1. Apply Loctite 515, or equivalent between the ring gear, and the winch frame. Set the planetary ring gear on the winch side frame. Align ring gear holes with the holes in winch frame.



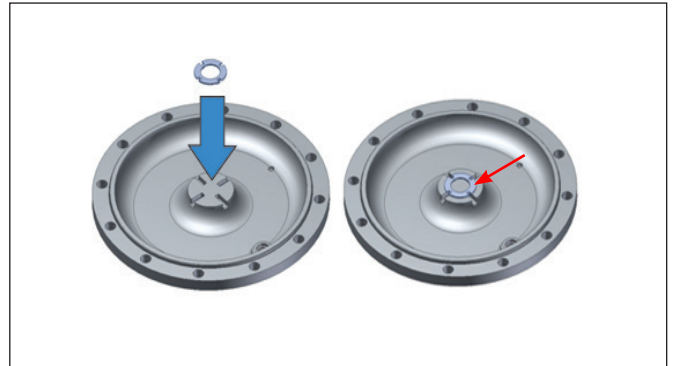
2. Install the planetary carrier into the ring gear.



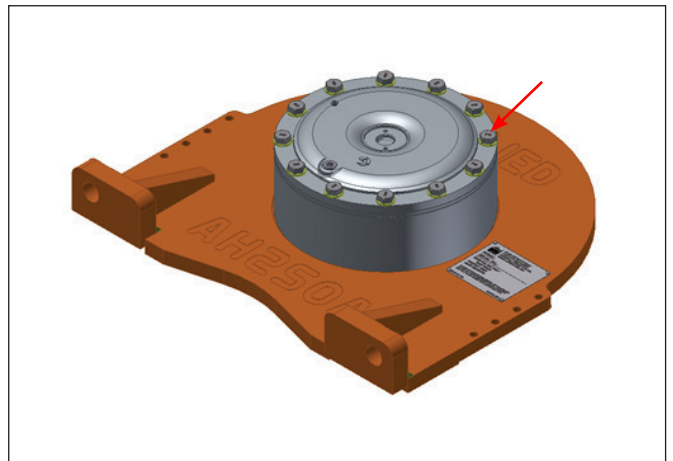
3. Place the carrier spacer in the center of the planetary carrier. The spacer should pilot into the carrier.



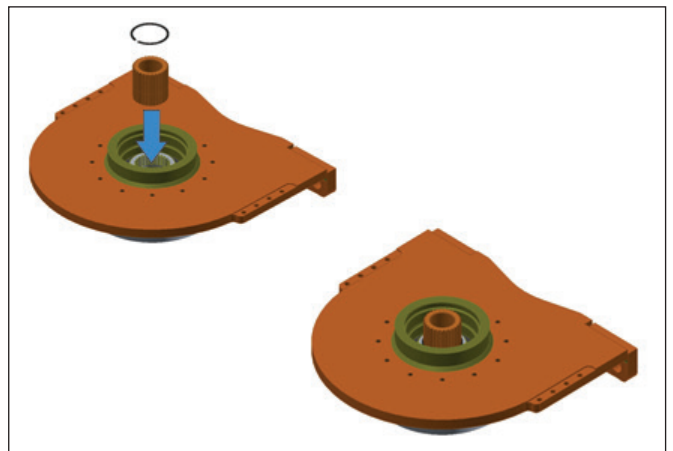
4. Install the tanged thrust washer into the planetary cover. Use assembly grease to keep it in place.



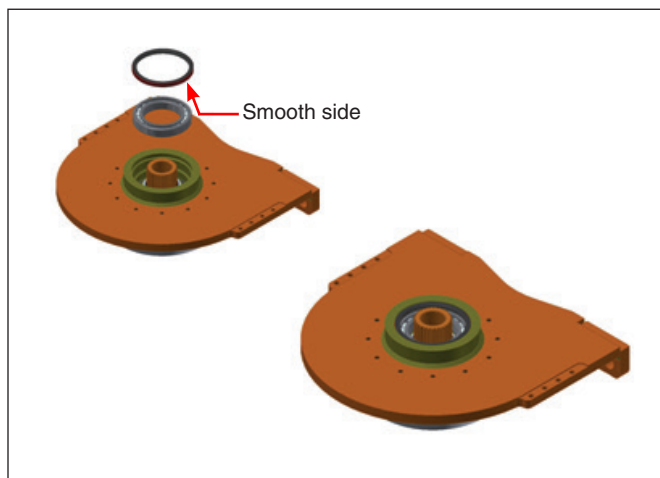
5. Apply liquid gasket sealant from step 1 between cover and ring gear. Install cover to ring gear, taking caution to keep the thrust washer in place. Torque hardware to 135-140 ft-lbs (185-190 Nm). It is recommended that the cover be oriented so the magnetic plug is at the lowest point when the winch is installed on the machine.



6. Install snap ring onto the drum hub shaft groove and insert it into the planetary carrier input splines.

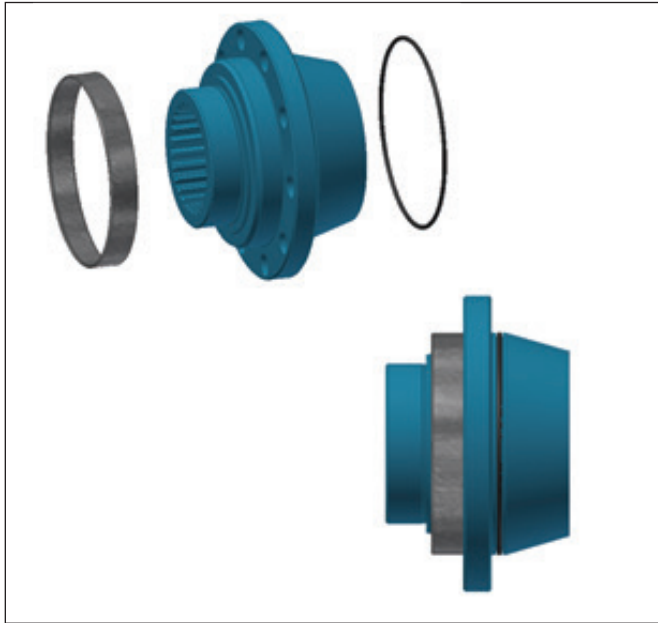


7. Install drum bearing and drum seal to winch frame.
Note: use of bore sealant is recommended between the seal and the winch frame. Allied uses Loctite #80017.

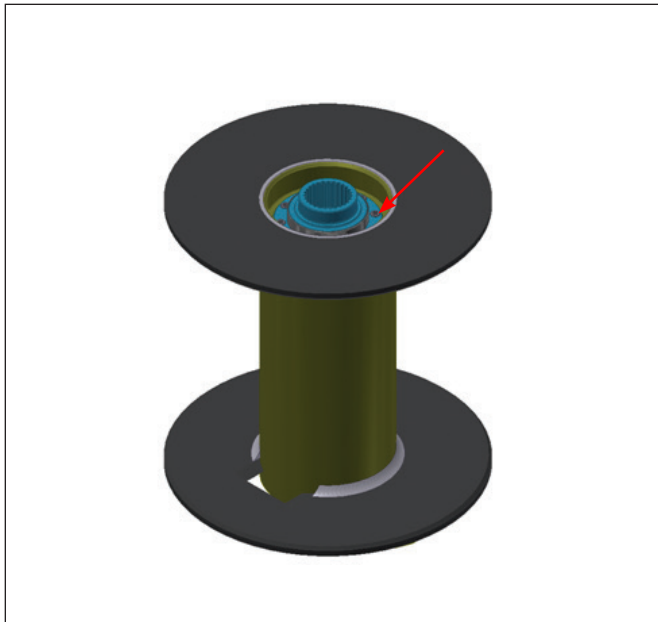


Drum Assembly

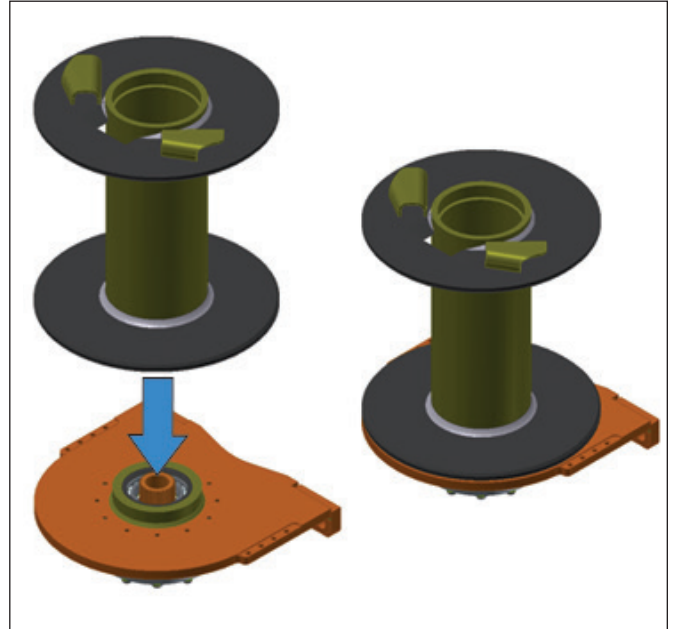
1. Install wear sleeve and O-ring to drum hub.



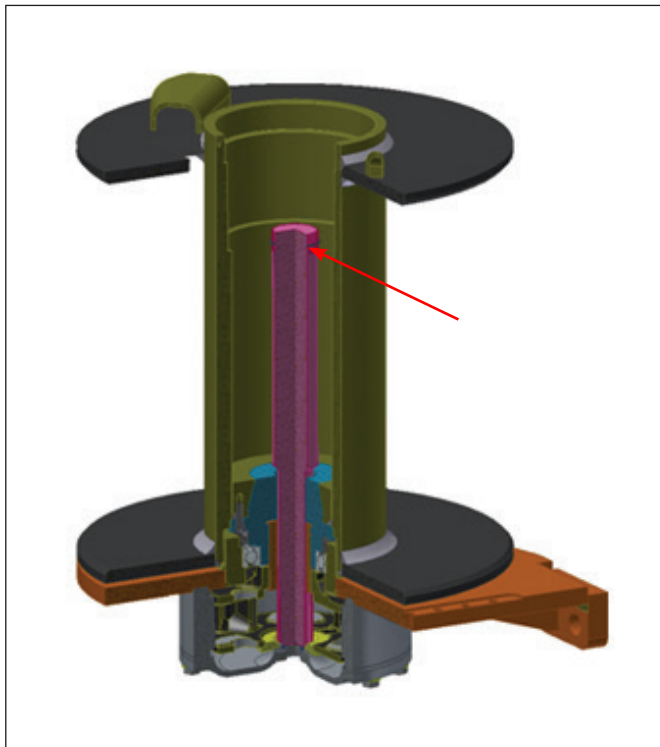
2. Apply a light coat of oil to the O-ring on the drum hub and install the drum hub to the drum. Torque hardware to 91-100 ft-lbs (130-135 Nm).



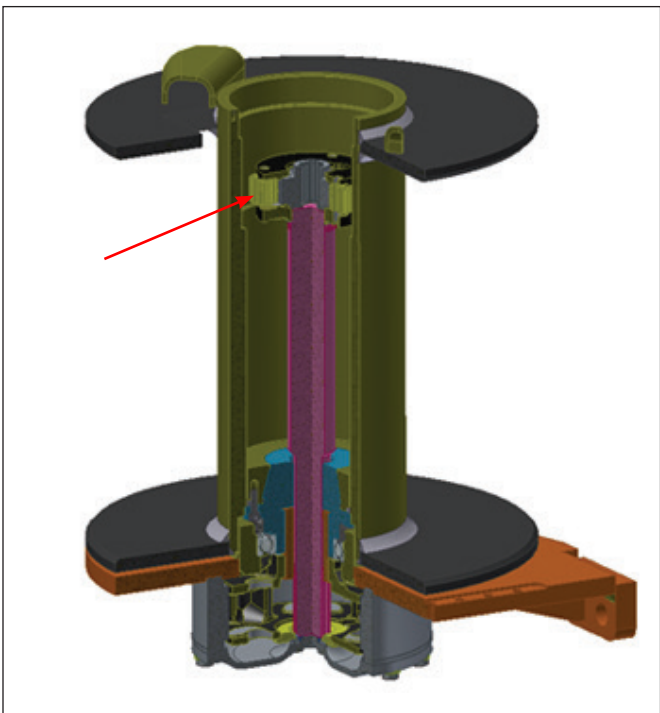
3. Apply light coat of oil to drum seal in the winch side frame. Install drum onto side frame.



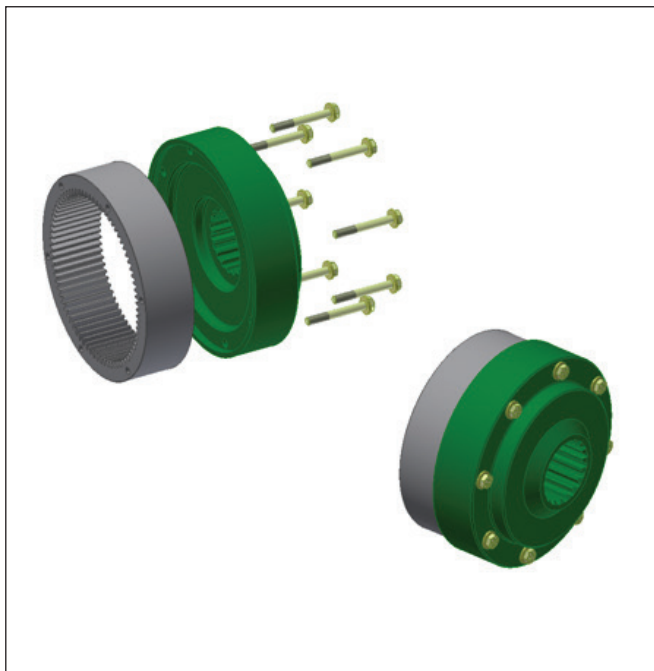
4. Install snap ring onto drum shaft groove and install drum shaft. Shaft should pass through planetary and mesh with the planet gears and rest on the tanged thrust washer on the planetary cover.



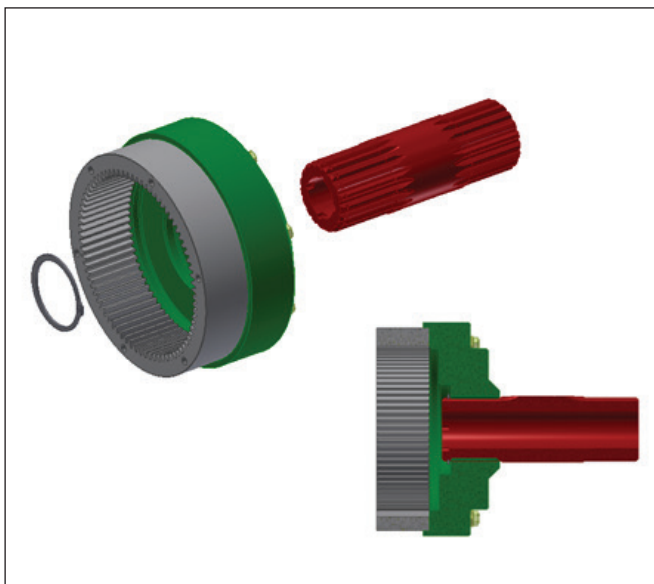
5. Install internal planetary carrier onto the drum shaft.



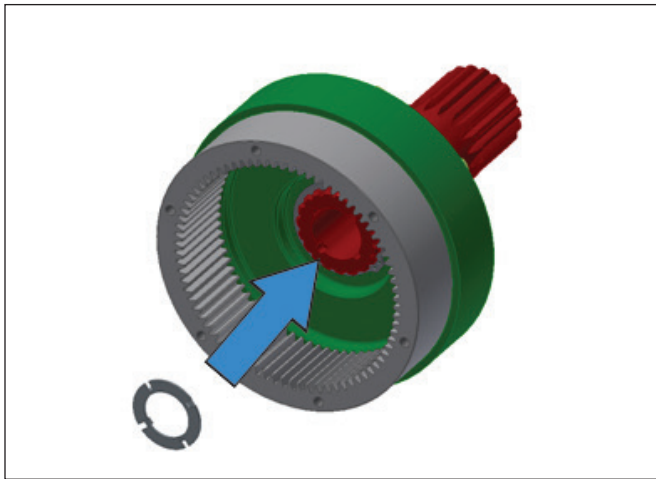
6. Assemble the internal planetary ring gear to the ring gear hub.



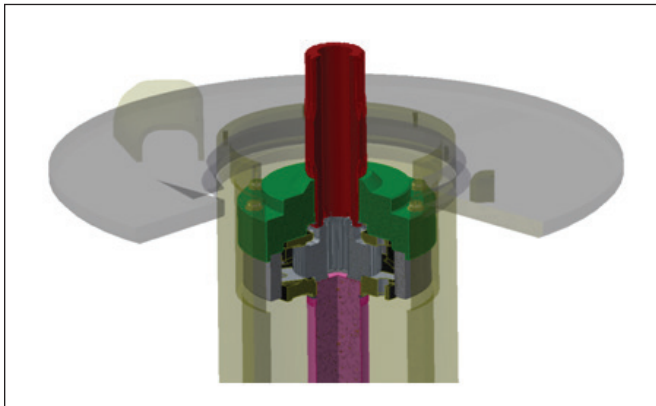
7. Insert the brake shaft through the ring gear hub and install the snap ring onto the brake shaft groove.



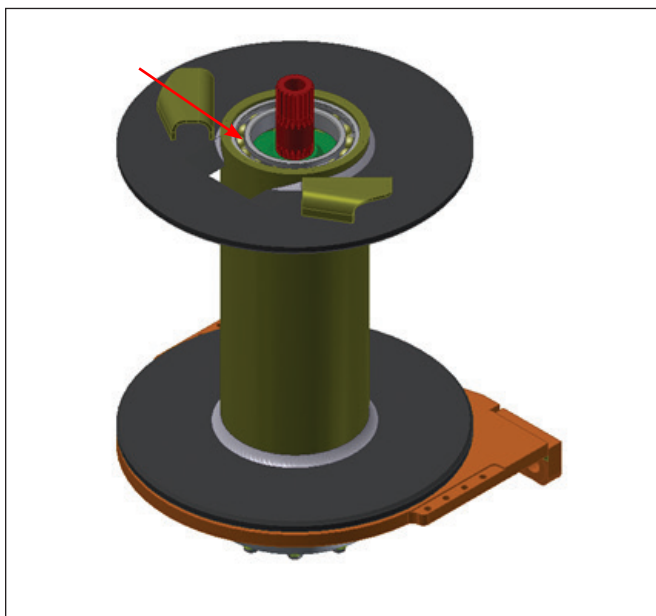
8. Install tanged washer from the internal planetary kit onto the end of the brake shaft using assembly grease to keep it in place.



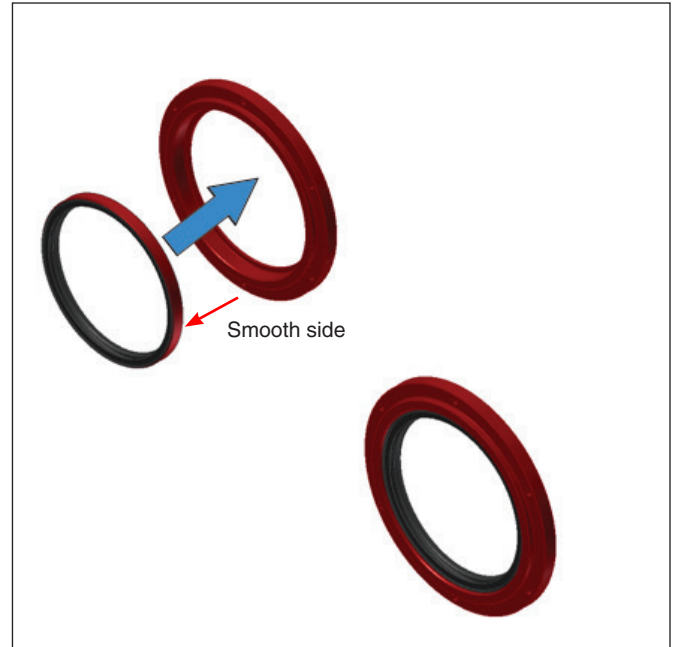
9. Install the ring gear assembly over the internal planetary carrier.



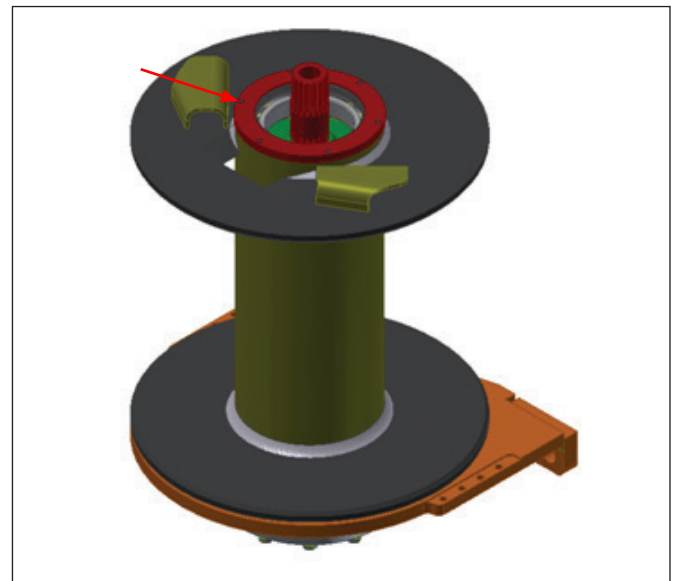
10. Install drum bearing into drum.



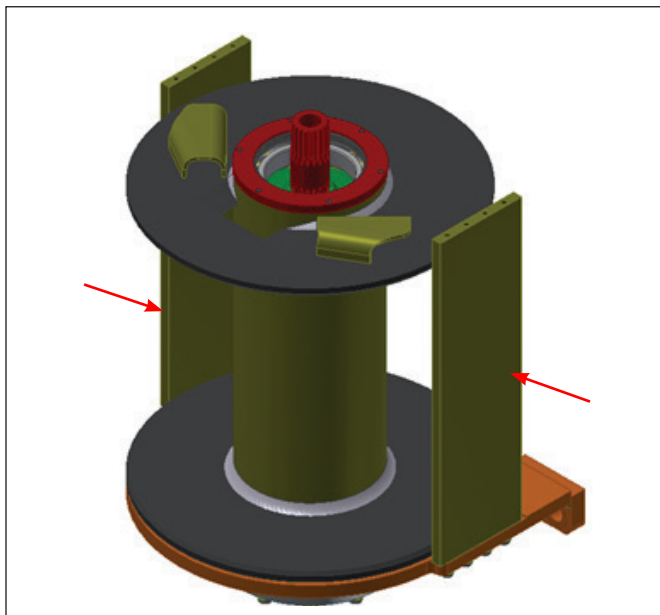
11. Install drum seal into drum seal retainer. Note: use of bore sealant is recommended between the seal and seal retainer. Allied uses Loctite #80017.



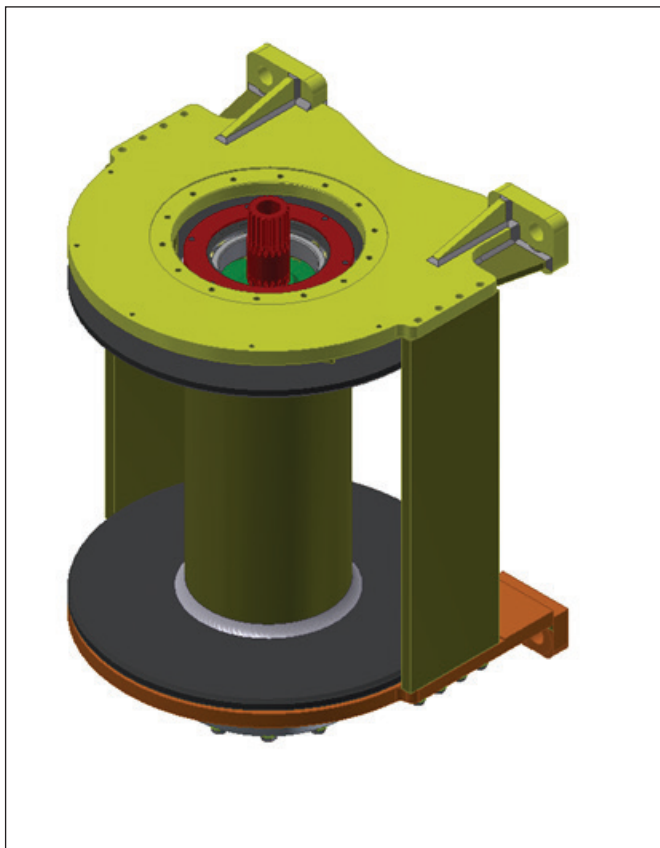
12. Apply liquid gasket sealant between the drum and seal retainer and install seal retainer onto the drum.



13. Bolt the cross plates to the planetary side frame.

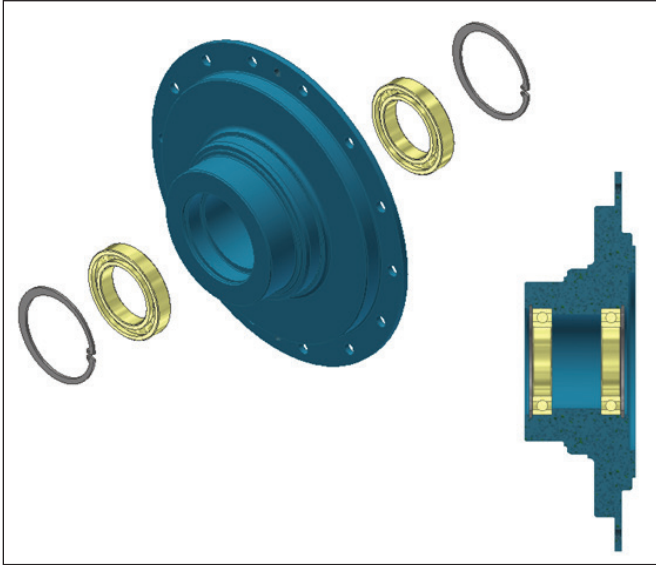


14. Bolt the motor side frame onto the cross plates.

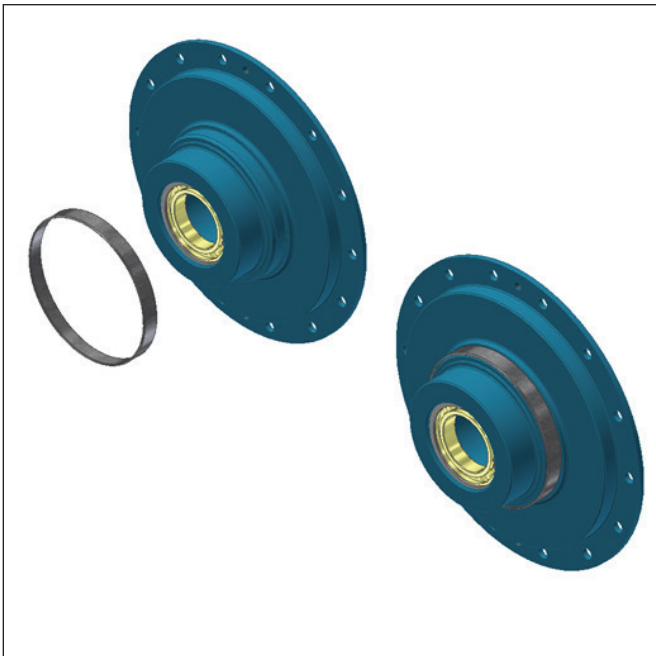


Bearing Carrier Assembly

1. Install bearings and snap rings into both sides of bearing carrier.



2. Install wear sleeve onto bearing carrier.

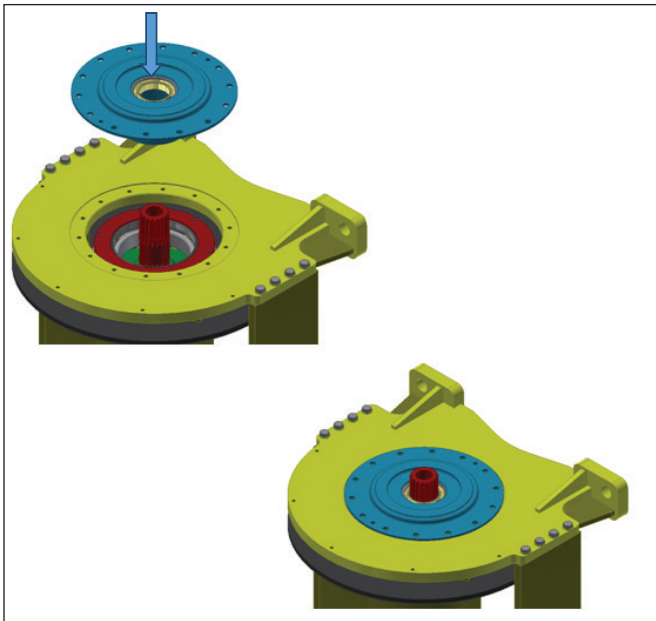


Motor Side Components Assembly

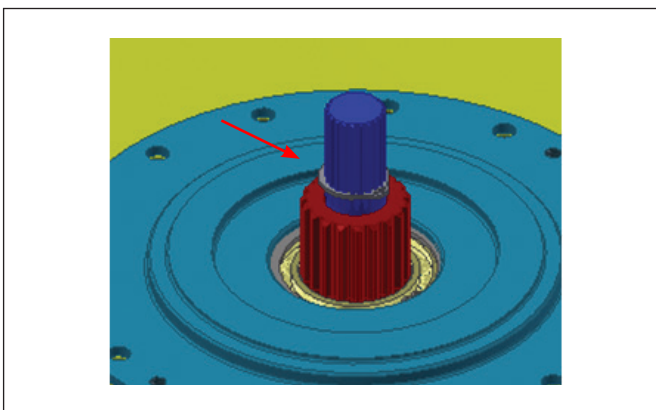
Note: Assembly will require the use of at least (3) heavy duty clamps with a minimum of 14 in. clamping capacity and 6 in. throat depth.

1. Apply a light coating of oil to the drum seal and install the bearing carrier to the side frame.

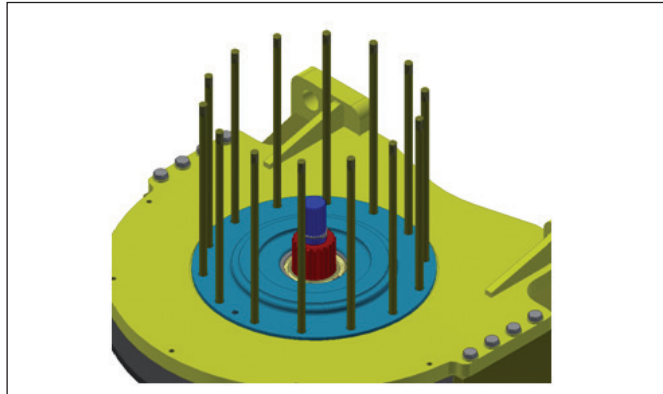
Note: Although the studs are not shown in the illustrations, they should still be threaded on to the bearing carrier assembly as noted in the disassembly process.



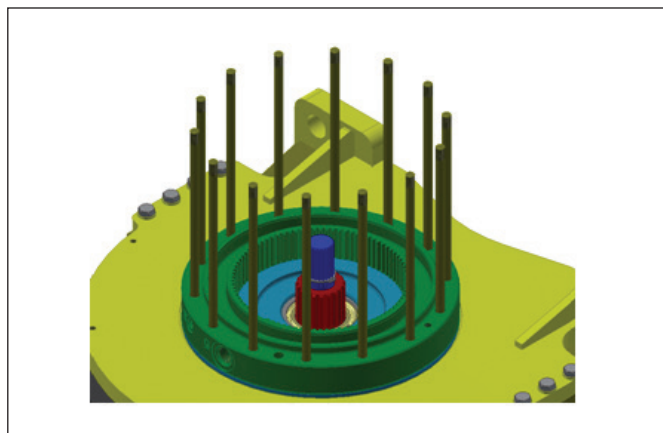
2. Install internal planetary input shaft and snap ring.



3. Apply high strength thread locker (Loctite 271 or equivalent) to studs and install in frame mounting holes.



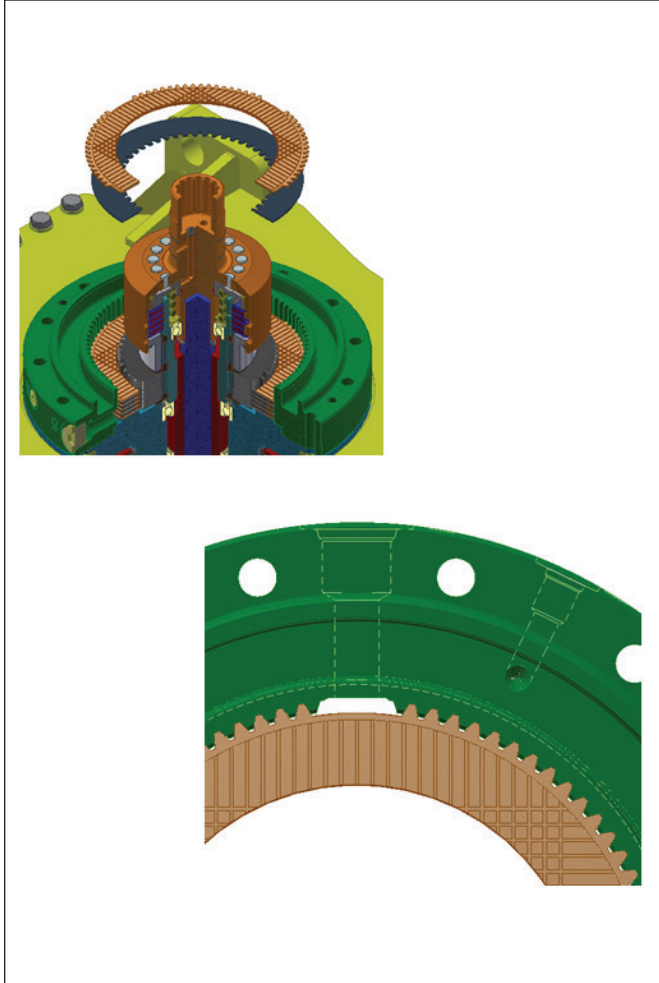
4. Apply liquid gasket sealant between bearing carrier and brake cage. It is recommended to install the brake cage oriented so the "CR" port is at the highest point when installed on the machine.



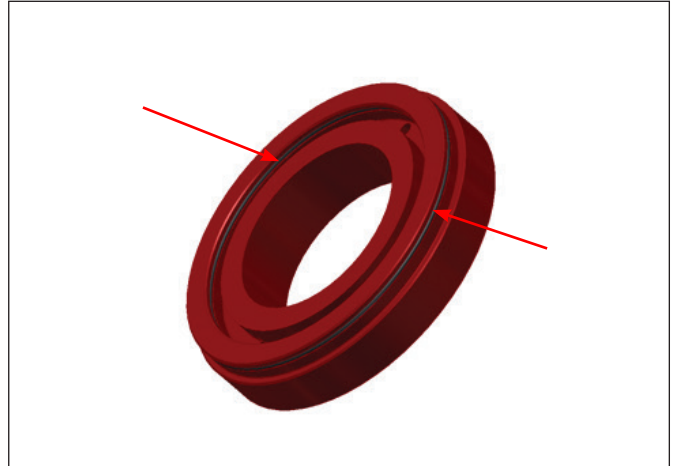
5. Install the 2-speed clutch assembly assembled previously.



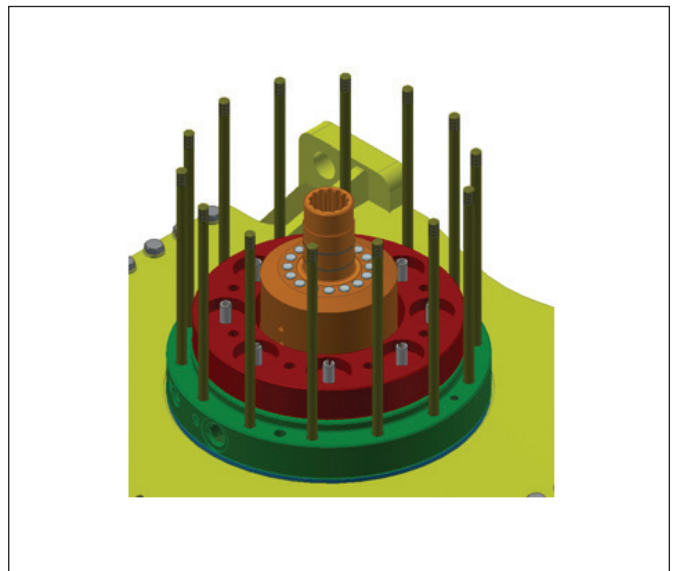
6. Install the brake friction discs and separators. Start with a friction disc and alternate between the two to create the brake friction pack. Orient the blanked out teeth in the friction discs to be centered on the "CR" port in the brake cage (studs not shown for clarity).



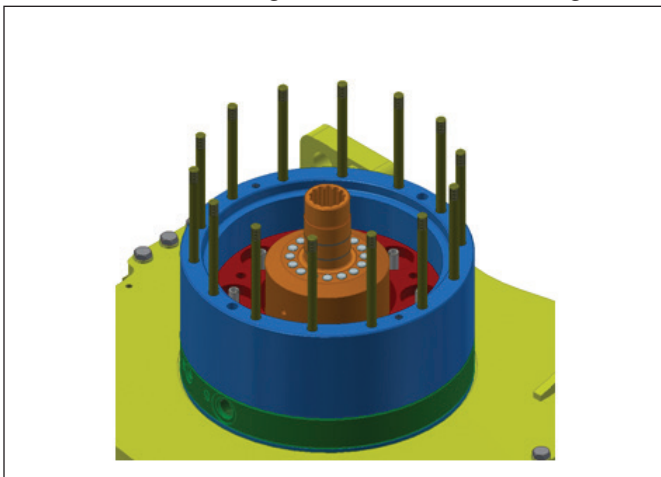
8. Install O-rings to brake piston.



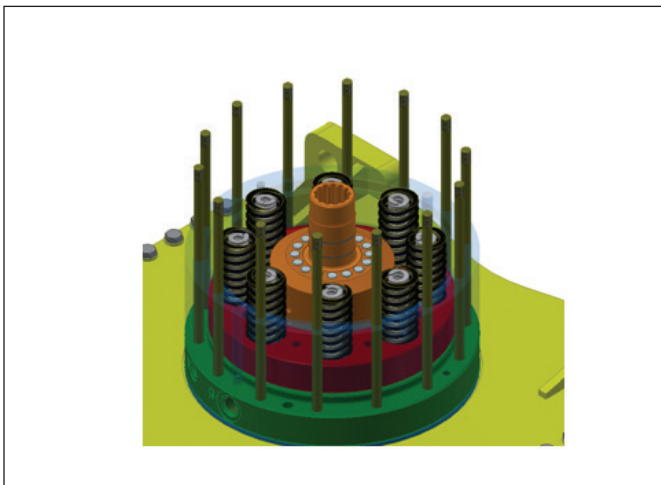
9. Coat brake piston O-rings in oil and install piston into brake cage.



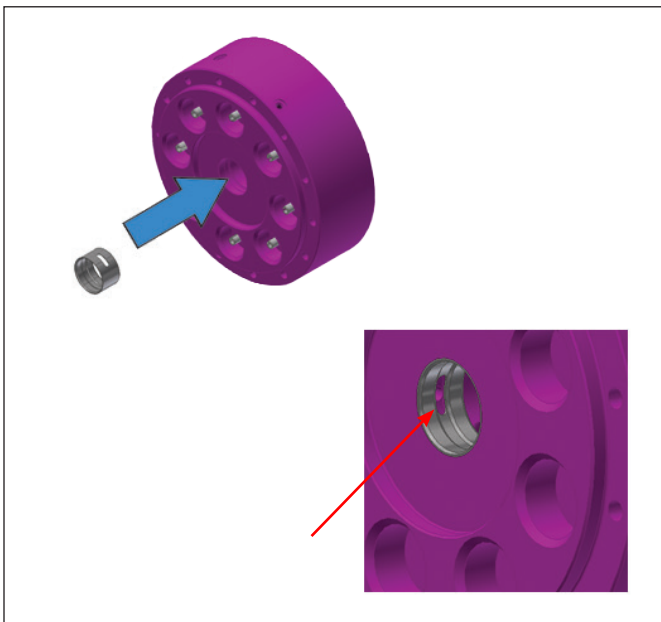
10. Apply liquid gasket adhesive between brake cage and brake housing and install brake housing.



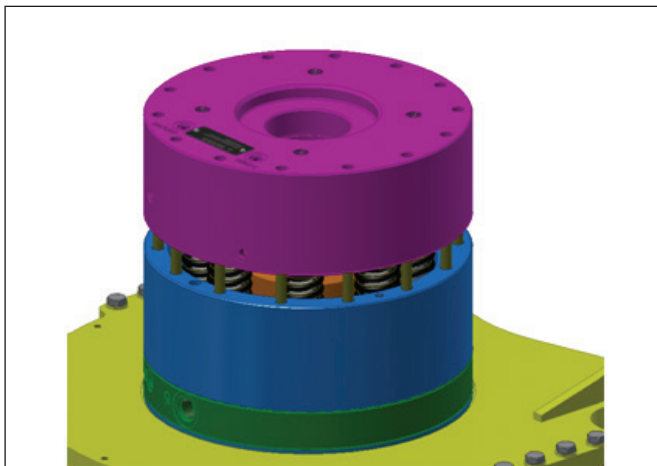
11. Install springs over pins and in holes on brake piston.



12. Press sleeve into motor adapter. Make sure the slot in the sleeve is aligned with the cross port hole in the motor adapter.



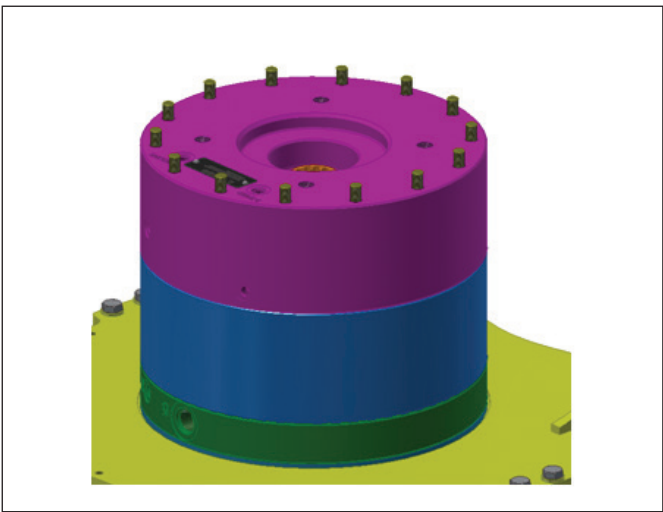
13. Place the motor adapter over the studs. Ensure the smaller springs are piloted over the roll pins and the larger springs go into the holes on the motor adapter. This can be done with a flathead screwdriver.



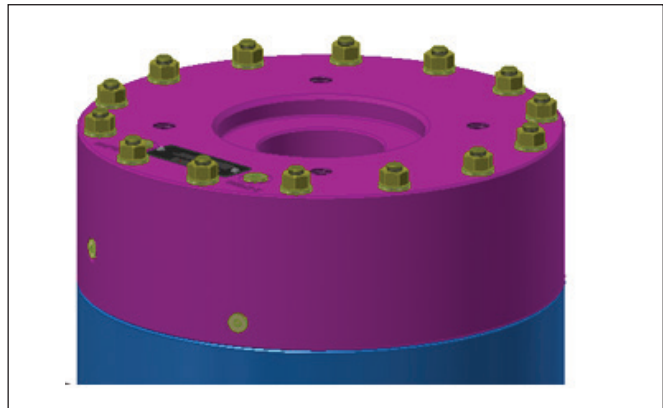
- Once all the springs are properly piloted in the motor adapter, clamp the motor adapter down to the brake housing, compressing the brake springs. Note: the spring force from the brake springs is about 8000 lbs. Use clamps with appropriate load rating.

! WARNING

Maintain equal pressure on each clamp as much as possible to avoid overloading any one clamp.



- Apply medium strength thread locker (Loctite 242 or equivalent), and install nuts onto studs. Tighten nuts in a star pattern, see Figure 4-3. Initial torque should be between 33-66% of final torque. Final torque all nuts to 84-88 ft-lbs (114-120 Nm).



- Install bearing and snap ring into motor adapter assembly.

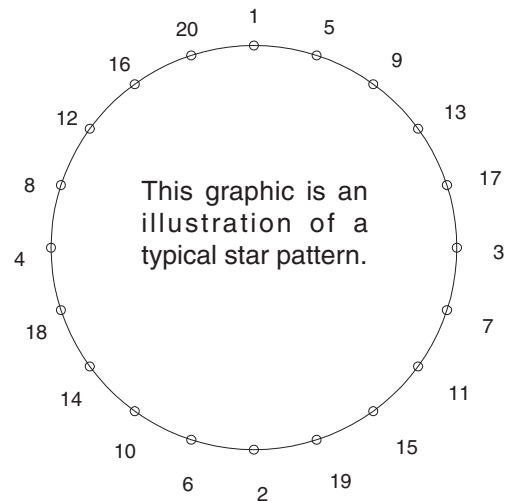
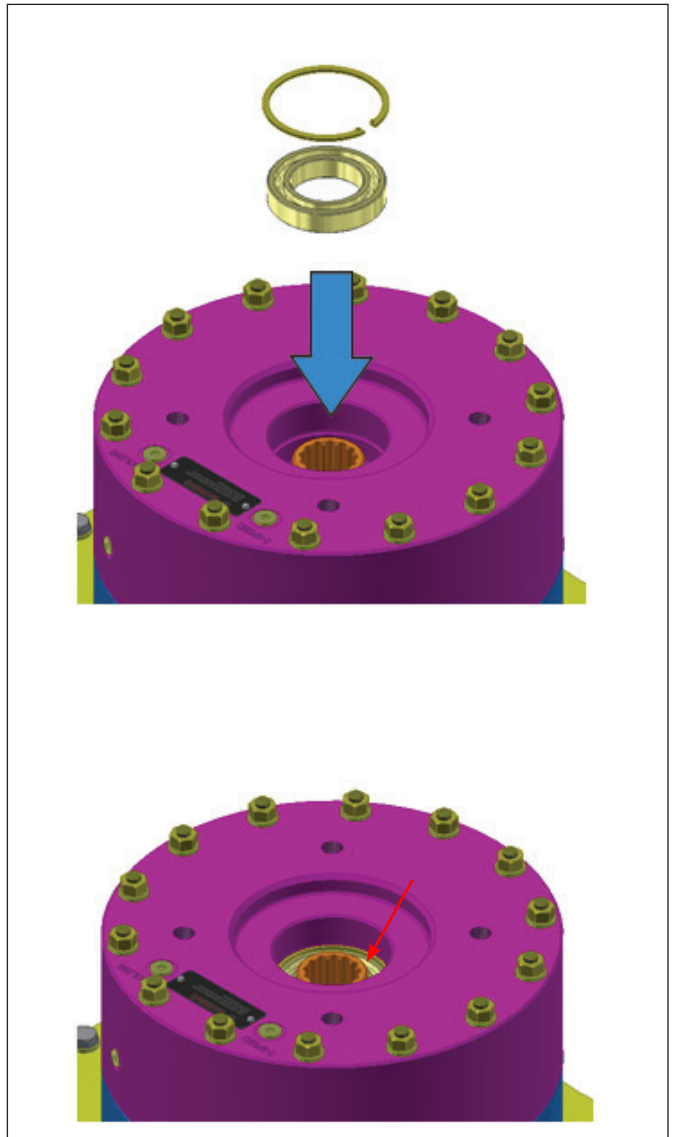


Figure 4-3 Nut Tightening Pattern

17. If the motor is being replaced, ensure the shaft seal has been removed, and install O-ring onto the pilot feature. Coat the O-ring in oil.



18. Install the motor onto the motor adapter. Apply medium strength thread locker to mounting capscrews.



Winch installation

1. Thoroughly clean the mounting surfaces on the winch and the machine. Clean the mounting holes and hardware of dirt, grit and oil.
2. Raise the winch.
3. Secure the winch in place. Tighten mounting hardware to proper torque specification. Refer to Section 1 or machine manual for proper torque specification.



WARNING

Make sure the lifting device has a minimum rated capacity of 1750 lbs. (800 kg) before lifting the winch.



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