OPERATION & PARTS MANUAL

Guide Rod Swivel
GRS-50

Rock Boring Unit
RBU

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SERVICE • RELIABILITY • INNOVATION

Introduction

This manual contains important safety, operation, maintenance and parts information for your Akkerman GRS-50 (Guide Rod Swivel) and RBU (Rock Boring Unit) upsize tooling. You must read and understand this manual, your Akkerman Guided Boring Machine Operator's Manual, Bentonite & Lubrication Operation & Parts Manual, Tri-Hawk Tooling Installation Operator's Manual, Disc Cutter Installation & Maintenance Manual and any additional equipment manuals before you operate and maintain this equipment. Keep this manual with your GBM System at all times. Additional copies of this manual may be purchased from the Akkerman Aftermarket Support Department, or downloaded from the Akkerman web site at www.akkerman.com.

The contractor is responsible for the overall safety program on the job site. Use this manual as a part of the safety program.

The use of second rate parts could affect the efficient performance of the GRS and RBU tooling. ALWAYS use genuine Akkerman parts.

Understand safety signal words, DANGER, WARNING, CAUTION, SAFETY INSTRUCTIONS, and NOTICE. When you see these words in this manual or on safety decals mounted on your equipment, follow the safety message to avoid personal injury and/or property damage.

⚠DANGER Indicates an extremely hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠CAUTION Indicates a potentially hazardous situation, which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.

SAFETY INSTRUCTIONS Usually consists of individual messages stating procedures or actions that must be followed for the safe operation of a product.

NOTICE Identifies potential property damage and important installation, operator, or maintenance information.

GRS-50 With Shipping Cradle

RBU With Shipping Cradle

Akkerman GRS and RBU Upsize Tooling

The ***GRS-50 Guide Rod Swivel*** series is an upsizing tool located between the guide rod assembly and the auger boring machine (or Akkerman GBM 4800 with high torque casing adapter [HTCA]) to keep pilot tubes stationary while allowing the rotation of the cutter teeth and augers to remove spoils from the pipeline. The GRS-50 is rated for 50 ton continuous working thrust load.
With the GRS-50 bearing swivel guide rod needle inserted into the pilot tube guide rod assembly, and the GRS-50 retractable wing cutters, the GRS-50 assembly can be removed (pullback) from the casings in the event an obstruction is encountered, or for inspection of tunnel or cutter face.

The ***RBU Rock Boring Unit*** is an upsizing tool attached to the lead casing and is advanced by the auger boring machine (or Akkerman GBM 4800 series with augering adapter assembly or HTCA). As the augers rotate, allowing the rotation of the disc cutters, the RBU paddles will move spoils away from the cutter face to the auger for removal from the pipeline.
The RBU is capable of boring rock up to 25,000 psi UCS. The RBU 24/30/36/42/48/54 are rated for 90,000/90,000/110,000/160,000/180,000/216,000 lbf continuous working thrust loads, respectively.
With the auger boring machine augers inserted into the RBU hex shaft needle, the augers can be removed (pullback) from the casings in the event an obstruction is encountered, or for inspection of tunnel or RBU.

If you find any errors with this manual or have any suggestions for improvement, please let us know. Email your comments via the Akkerman web site (Contact Us web page), or mail your suggestions to: Akkerman Inc, ATTN: Technical Publications, 58256 266th Street, Brownsdale, MN 55918.

Akkerman Inc. reserves the right to improve its product without notice or obligation.

NOTES

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NOTES

Safety

BE ALERT FOR SAFETY INFORMATION

When you see this safety alert symbol on your equipment or in this manual, be alert to the possibility of personal injury or property damage.

Read all safety information.

Keep safety decals clean and in good condition. Replace missing or damaged safety decals.

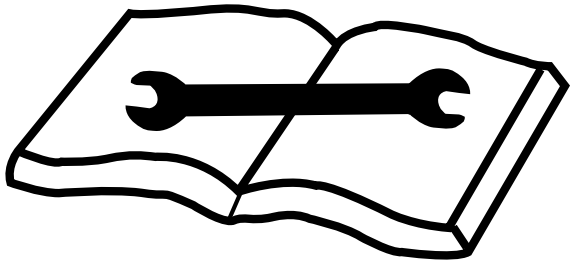
ATTENTION!
BECOME ALERT!
YOUR SAFETY IS INVOLVED!

READ OPERATOR'S MANUAL

⚠WARNING Unsafe operation or maintenance can cause severe injury or death.

Read and understand the Operator's Manual before operating or servicing this equipment.

Any unauthorized modifications will void the warranty.



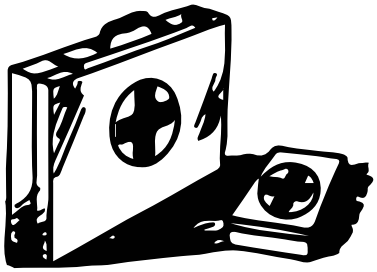
WEAR PROTECTIVE CLOTHING

Wear OSHA approved protective clothing, such as hard hat, gloves, safety goggles, earmuffs or ear plugs, face shield, and steel-toed boots, when operating and servicing this equipment.

Wear reasonably close fitting clothing and remove jewelry before working on or near this equipment. This will help prevent the danger of catching them in moving parts or controls.

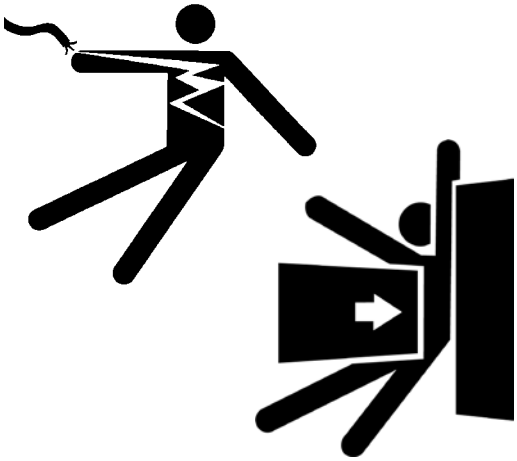
KEEP FIRST-AID KIT ACCESSIBLE

Keep a first-aid kit handy and properly maintained. Call 9-1-1 for emergencies.



LOCKOUT TAGOUT POWER BEFORE SERVICING

LOCKOUT TAGOUT power before attempting to make repairs, service, adjustments or daily shut down. Proper lockout tagout will prevent accidents and save lives. OSHA requires equipment placed in Lockout Tagout when the unexpected machine start up or release of stored energy could injure workers during cleaning, adjustments, repairing and servicing.



⚠DANGER Failure to lockout tagout power before servicing WILL cause severe personal injury or death.

LOCKOUT TAGOUT power before servicing. Any electrical repairs must be performed only by a certified electrician.

The contractor is fully responsible for the safety of all personnel on the job site. The contractor must determine the best lockout tagout practices for his/her employees on the job site.

HYDRAULIC OIL/FLUIDS UNDER PRESSURE

⚠WARNING Escaping oil or other fluids under pressure can penetrate your skin causing serious injury.

Release all pressure before performing maintenance or repairs. Never weld near pressurized fluid lines.

DO NOT use your hands to check for leaks. When searching for leaks, use a piece of wood or cardboard.

Contact medical help immediately if any oil or fluid is injected into your skin. A serious infection or reaction can emerge without proper medical treatment.

BEWARE OF SUSPENDED LOADS

⚠WARNING Suspended loads may fall and cause severe personal injury or death.

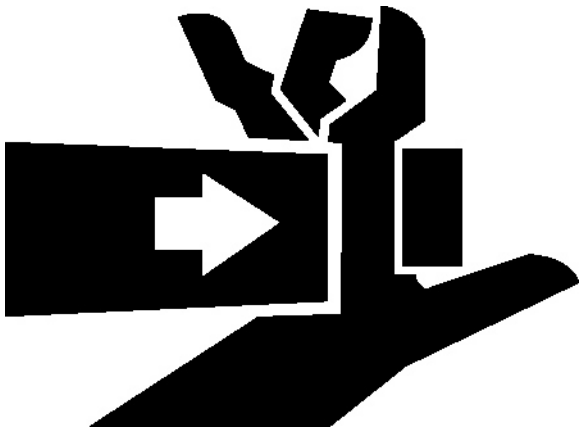
If a hydraulic hose breaks from the boom of a crane/excavator, or the lifting support fails, the boom and/or load can fall instantly.

Do not enter area under or around a suspended load.

KEEP PERSONNEL AWAY FROM MOVING PARTS

⚠WARNING Crushing hazard.
Keep personnel away from inside of GBM when jacking or moving GBM. Failure to do so can result in serious personal injury or death.

AVOID PINCH POINTS



⚠WARNING Moving parts or the mishandling of parts can cause severe personal injury.

Keep hands away from moving parts.

Watch your fingers, hands, and legs while equipment is in operation.

Handle parts carefully to avoid crushing and pinch point hazards.

USING PLUMB BOB

⚠WARNING Falling plumb bob can cause serious personal injury or death, and/or equipment damage.

NEVER hang or secure the plumb bob overhead when not in use.

ALWAYS remove the plumb bob from the string lines and place in storage container after use.

PRACTICE SAFE MAINTENANCE

⚠WARNING Unexpected Jacking System movement may cause serious personal injury.

LOCKOUT TAGOUT power and stored energy before performing any maintenance. .

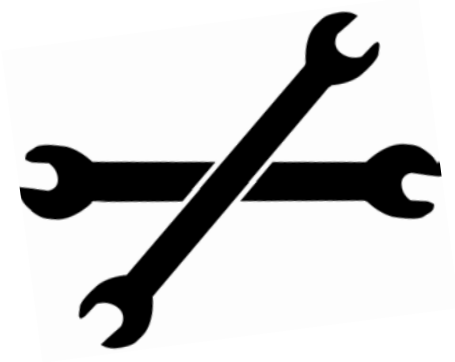
Shut down GBM before making repairs, adjustments, or removing obstructions.

Only trained and qualified personnel should perform maintenance or repairs.

Keep the area around the equipment clean and dry when performing maintenance.

Do not service the machine while it is in motion.

Replace worn or damaged parts. Remove grease, oil, or debris buildup.



TEST SHAFT & TUNNEL VENTILATION

⚠WARNING Keep shafts and tunnel well ventilated at all times.

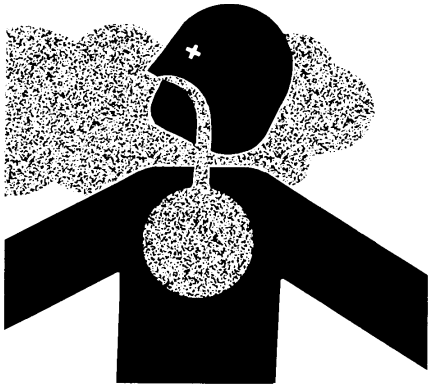
Use an approved air analyzer to detect hazardous gases and oxygen content.

Before and during the shaft operation, test for combustible and toxic gases and oxygen deficiency.

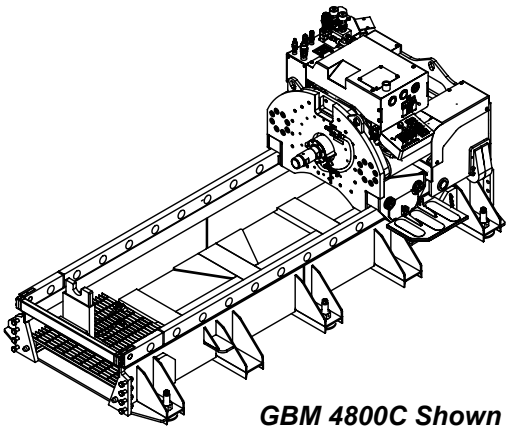
If the levels exceed OSHA prescribed levels, leave tunnel and shaft immediately! Do not activate or deactivate any electrical or hydraulic devices, since any sparks could cause an explosion.

Once ALL personnel are out of tunnel/shaft, cut power from power source.

Gases must be removed before reentering tunnel/shaft.



HIGH PRESSURE HYDRAULICS



GBM 4800C Shown

⚠WARNING The GBM frame contains high pressure hydraulics.

Keep all guards in place.

KEEP AWAY FROM AUGER

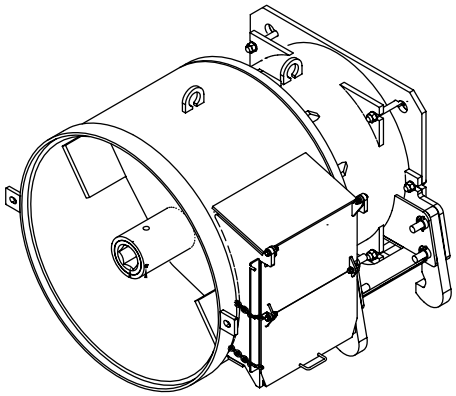
⚠DANGER Contact with rotating auger will cause severe injury or death.

Keep hands, body, and objects clear of operating auger.

Do not operate without covers and guards in place.

Lockout Tagout power before servicing. Refer to Lockout Tagout Procedure Guideline in this section.

KEEP AWAY FROM ROTATING PADDLES & AUGER



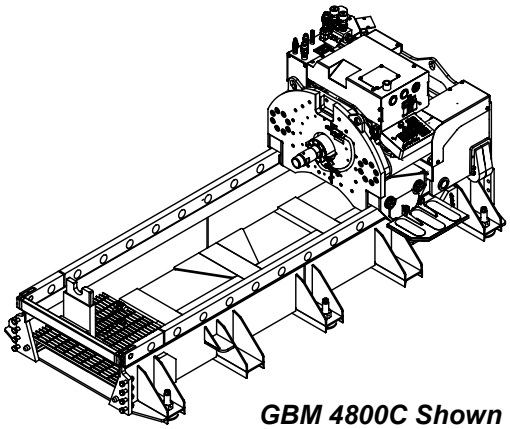
⚠DANGER Contact with rotating paddles or auger WILL cause severe injury or death.

Keep hands, body and objects clear of dirt chamber and auger.

REGULARLY CLEAN AND INSPECT EQUIPMENT

Remove any grease, oil, or debris buildup to avoid potential injury or equipment damage.

Inspect equipment for damage. If damaged, repair or replace immediately.

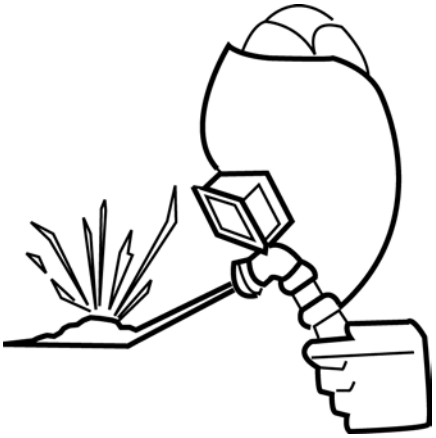


GBM 4800C Shown

UNAUTHORIZED WELDING

⚠WARNING Unauthorized welding can cause structural failure resulting in possible injury or death.

Do not weld on any structural member. Unauthorized welding or repair will void the warranty.



FIRE PREVENTION

⚠CAUTION Fires can cause injury or property damage.

Keep equipment clean. Remove all debris from equipment.

Have a fire extinguisher available at all times. Keep the fire extinguisher fully charged.

SLIPPERY WHEN WET

⚠WARNING Slips and falls can cause serious personal injury.

Ensure firm footing in wet or slippery conditions.

Replace skid-resistant material if it is damaged or missing to prevent slips and falls.

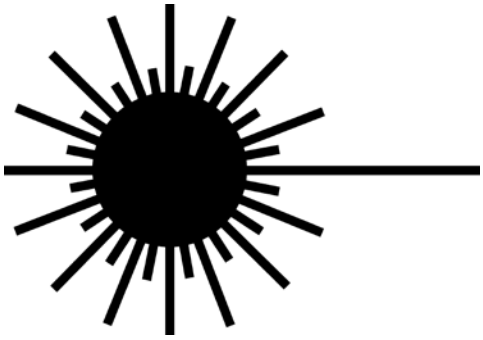
Remove any buildup of grease, oil, or debris.

KEEP JOB SITE CLEAN AND ORGANIZED

⚠WARNING Tripping can cause serious personal injury.

Be sure to keep job site clean and organized.

AVOID LASER LIGHT EXPOSURE

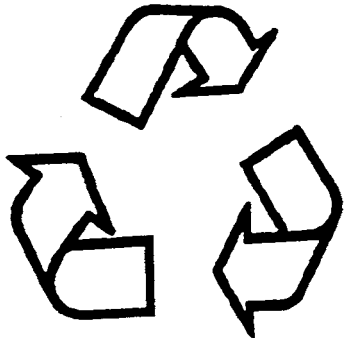


⚠DANGER Staring into laser light will cause severe injury.

Do not stare into laser guidance system light beam. Avoid direct eye exposure.

To avoid possible exposure to radiation in excess of acceptable emission limits, all repairs to laser must be performed by the original manufacturer or an authorized service technician.

RECYCLE WASTE



Follow local, state, federal, and international regulations when recycling or disposing of waste. Waste includes fluids/oil, fuel, filters, coolant, and batteries.

Use leakproof containers when draining fluids/oil. Do not pour waste on the ground, down a drain, or into any water source.

NOTES

Safety Decals

Keep all operational and safety decals clean and readable. Use soft cloth, water, and a mild soap to clean the decals if they are too dirty to read. DO NOT clean decals with solvent. Solvent can damage the decal. Replace safety decals immediately if they are damaged, missing, or hard to read.

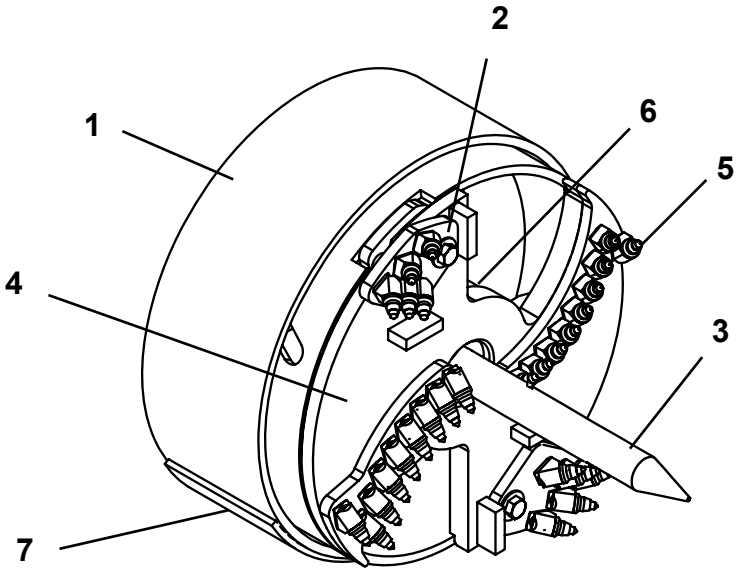
Serious injury or property damage can occur if safety instructions are not followed. Contact your Akkerman Aftermarket Support representative for free replacement safety decals.

If a part is replaced that has a decal on it, apply a new decal to the replacement part. Before applying a new decal, be sure the surface is clean and dry.

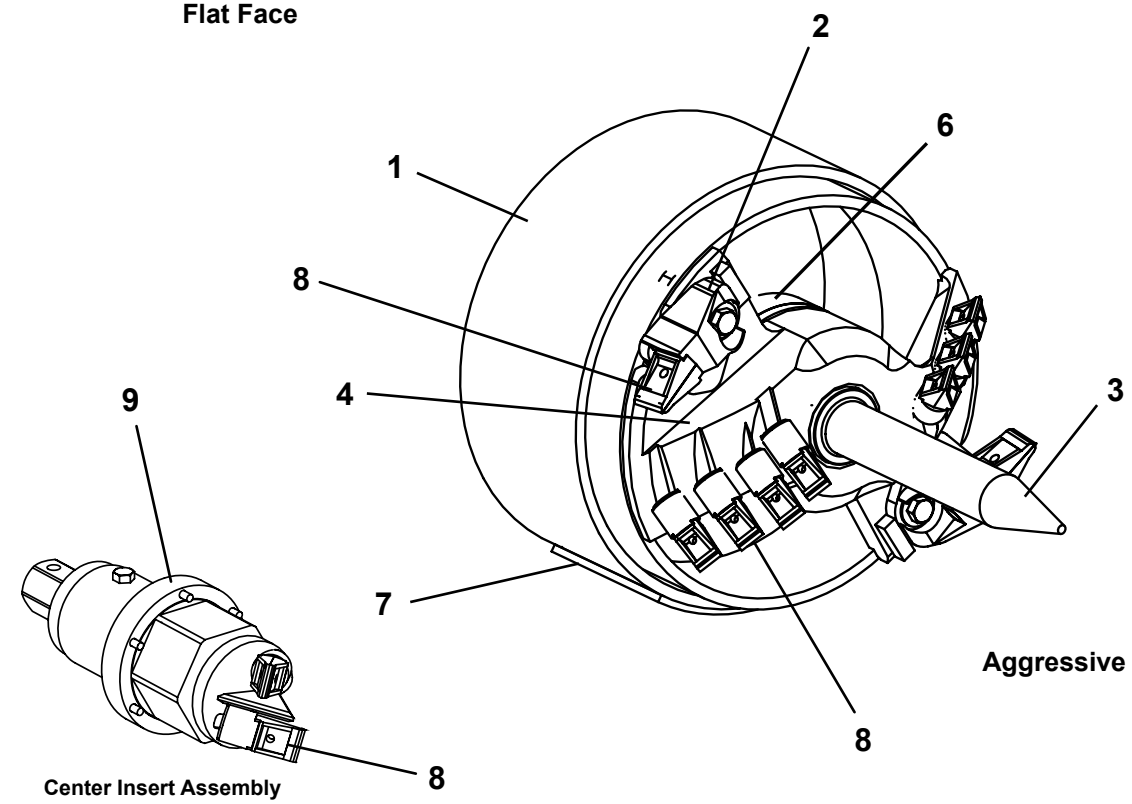
NOTES

Terminology

GRS-50



Flat Face

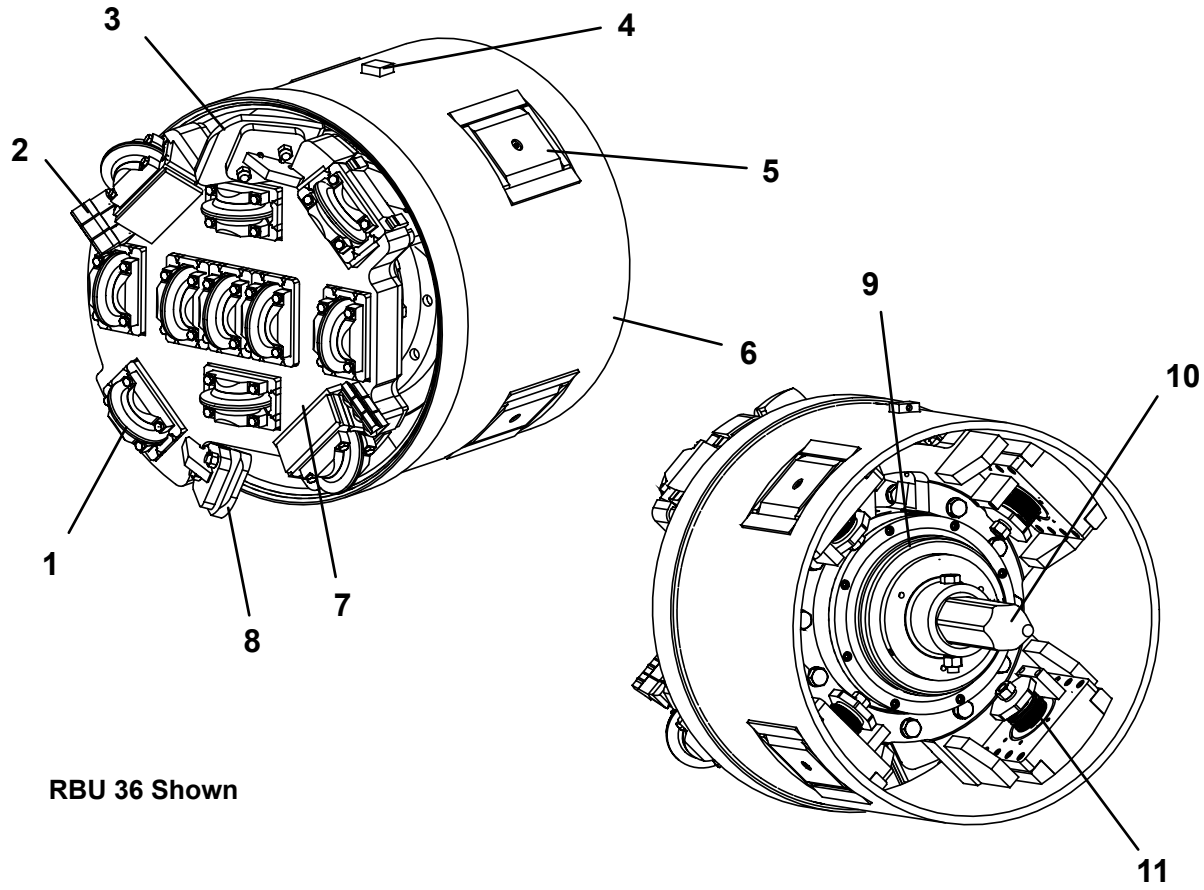


Aggressive

Center Insert Assembly
Used With Unguided Operation

1. Lead Casing
2. Retractable Wing Cutters
3. Bearing Swivel Guide Rod Needle
4. Cutterhead Assembly
5. Cutter Teeth
6. Bearing Swivel Assembly
7. Lead Casing Belly Pan
8. Spade Tooth
9. Center Insert Assembly

RBU



RBU 36 Shown

1. Disc Cutters
2. Cutter Bit (if equipped)
3. Scoop, Top (if equipped)
4. Water Manifold
5. Stabilizer Assembly
6. Casing Assembly
7. Cutterhead Assembly
8. Scoop, Bottom (if equipped)
9. Bearing Assembly
10. 4” Hex Shaft Needle RBU 24/30/36/42
10. 5” Hex Shaft Needle RBU 48
11. Stabilizer Assembly Adjustment Screw

Controls & Instruments

The typical controls and instruments used on the Akkerman GBM equipment with the GRS-50 and RBU tooling are shown in this section. Be sure to refer to your Akkerman equipment manuals for complete controls and instruments information.

Refer to your other equipment manuals for controls and instruments information.

EMERGENCY STOP

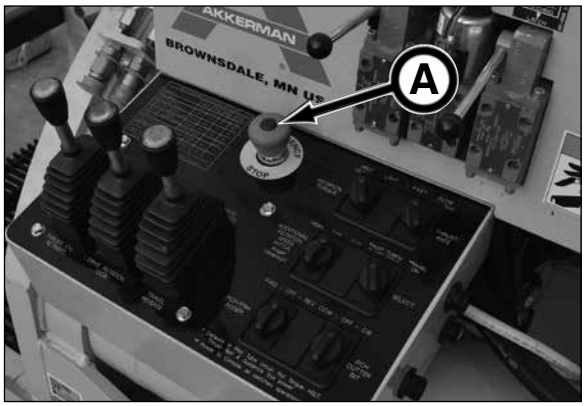
IMPORTANT: Emergency Stop buttons are used for emergency situations only. Emergency Stop buttons alone are ***NOT*** intended for lockout tagout purposes. The contractor is fully responsible for the safety of all personnel on the job site. The contractor must determine the best lockout tagout practices for his/her employees on the job site.

⚠WARNING **ALL** Emergency Stop buttons MUST be operating properly BEFORE operating the GBM and Power Pack. Failure to do so may cause severe injury or death. **Never use an E-Stop as a power on/off button.**

GBM 4800C Control Console
Push Emergency Stop button (A) IN to stop power to the control console. This will stop all functions including the auger drive.

The button will illuminate when it is pulled OUT.

The button must be pulled out to reenergize console power.



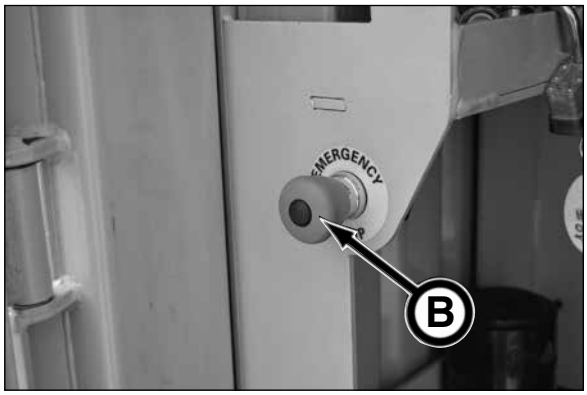
4800C Control Console Emergency Stop Button

Power Pack
Refer to your equipment manual for the specific location of the Emergency Stop button on the power pack.

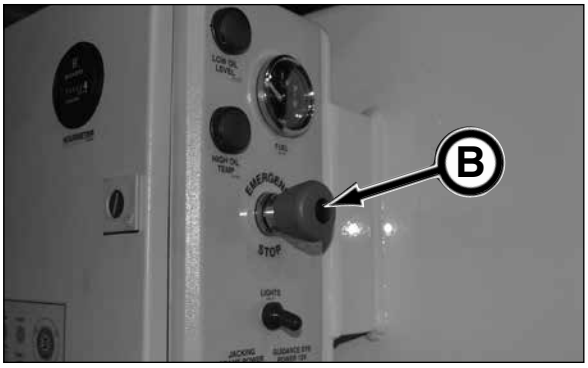
Push Emergency Stop button (B) IN to stop all electrical and hydraulic functions.

The button will illuminate when it is pulled OUT.

This button must be pulled out to restart engine/motor.



P4075D Power Pack Emergency Stop Button



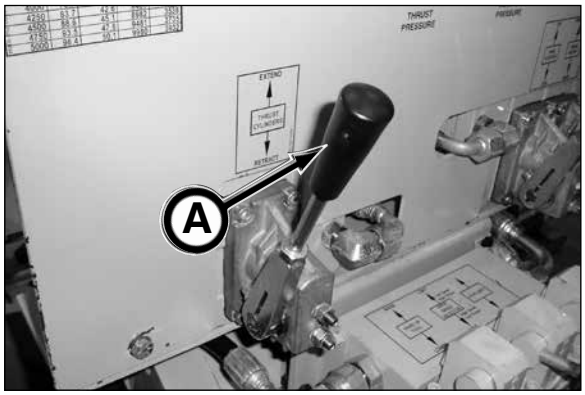
P250D Power Pack Emergency Stop Button

THRUST CYLINDER CONTROL

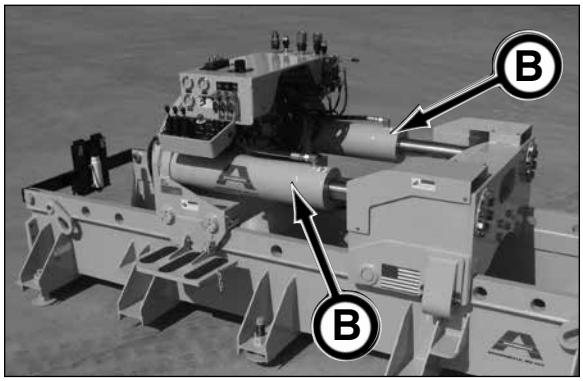
Use the Thrust Cylinder control (A) to extend and retract the frame thrust cylinders (B). This control is a spring centered, variable control and will return to the neutral position when released.

Extend Cylinders - Push lever Forward
Retract Cylinders - Pull lever Back

GBM 4800C Thrust Cylinder Control



GBM 240A Thrust Cylinder Control



GBM 4800C Thrust Cylinders Shown

JACKING THRUST RATE (SPEED) SWITCH (4800C)

The Jacking Thrust Rate switch (A) controls the advance speed of the thrust cylinders.

Select Fast or Slow on the jacking thrust rate switch as follows:

Fast - 100 ton
Use for pilot tube installation, 11” to 16” casing with 2” hex connection, up to 100 ton maximum rated pipe, and soft ground conditions.

Slow - 265 ton
Use for 16” casing with 3” hex connection, up to 265 ton rated pipe, and hard ground conditions. Do not use this setting for 2” hex tooling. Doing so will cause damage.

NOTICE The Slow mode will be functional once the Select switch (B) is turned to Panel On position.

The thrust cylinder retraction speed is not affected by the Fast/Slow switch. The Fast/Slow switch controls the advance speed.

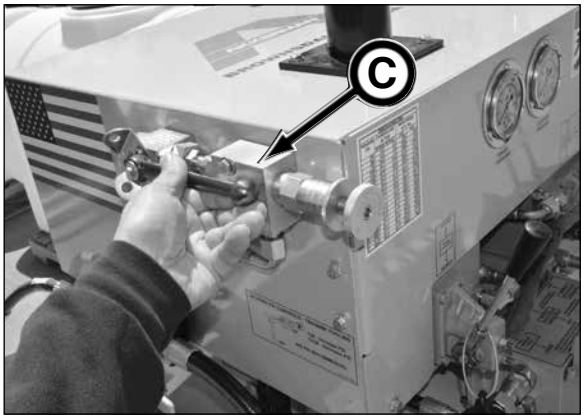
JACKING PSI CONTROL

Refer to your TriHawk® Tooling Installation Operator's Manual for details on the proper use of the TriHawk tooling.

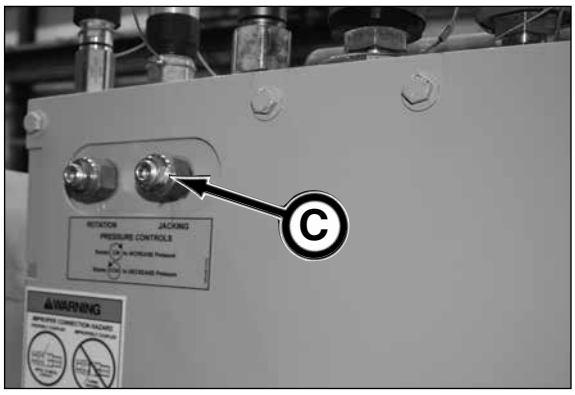
The Jacking PSI controls (C) are used to regulate the thrust pressure (500 psi maximum) when operating the TriHawk tooling or other tooling.

This control limits the thrust pressure so the cutter bit teeth are not overloaded (may result in breakage) and will also help prevent stalling.

(Earlier Control) BEFORE operating the TriHawk tooling, flip the pressure control to the ON position.



GBM 240A Frame - Earlier Controls



GBM 240A Frame - Later Controls

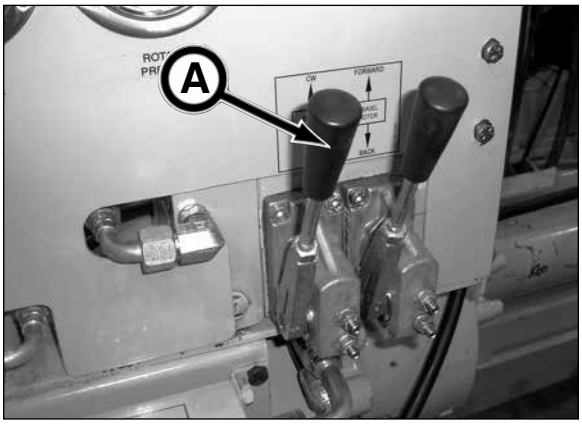
DRIVE ROTATION CONTROL

The Drive Rotation control (A) is used to rotate the steering head, pilot tube, and augers from the gear box auger drive. This control is a spring centered, variable control and will return to the neutral position when released.

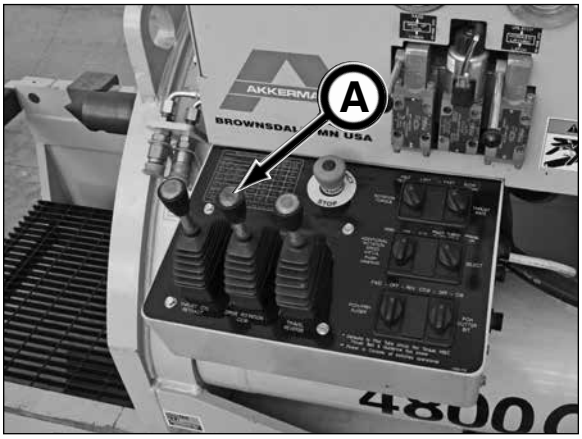
Clockwise (CW) Rotation - Push lever Forward
Counter-Clockwise (CCW) Rotation - Pull lever Back

NOTICE Always rotate the steering head, pilot tube and augers in the CW (clockwise) direction. Rotating the pilot tubes CCW (counterclockwise) will unthread the pilot tubes in the pipeline resulting in unrecoverable pilot tubes.

Use CCW rotation ONLY when the steering head adapter or pilot tube is locked into the make up tool for removal from the gear box drive adapter or when cleaning the auger casings.



GBM 240A Drive Rotation Control



GBM 4800C Drive Rotation Control

DRIVE SELECTORS

240A

The drive speed selector (A) controls the rotational drive motor speed and torque.

When pushing pilot tubes, use the LSHT or Low Speed High Torque position.

When using auger casings, use the HSLT or High Speed Low Torque position.

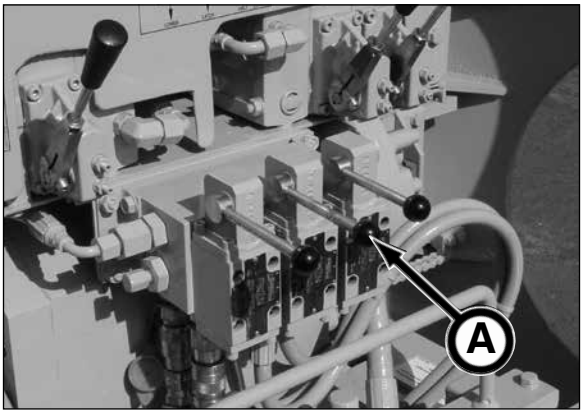
NOTICE Depending on soil conditions and length of drive, for better augering performance you may want to change the speed selector from HSLT position to the LSHT position, or if your thrust frame is equipped with a three speed drive motor, a mid speed setting (see note 3 below).

LSHT - Push lever Up
HSLT - Pull lever Down

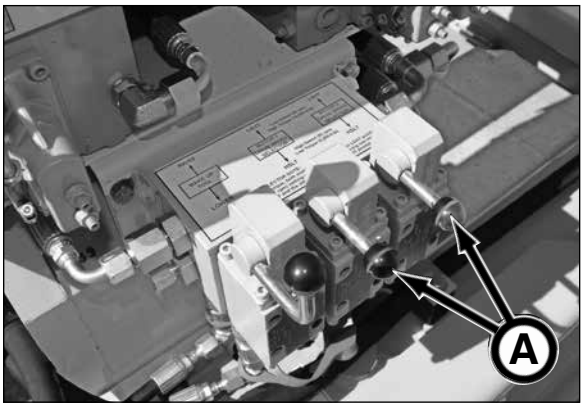
Three Speed Drive Motor Selector Notes:

1. For maximum torque, both drive speed selector levers must be in the LSHT position.
2. For maximum speed, both drive speed selector levers must be in the HSLT position.
3. A mid speed (37 rpm) setting can be achieved by placing one drive speed motor selector in HSLT position and the other drive speed motor selector in LSHT position.

Refer to your 240A Operator's manual for details on the proper use of the controls.



240A SN FA40027F-55 & Before (2 Speed Drive Motor)



240A SN FA40027F-56 & After (3 Speed Drive Motor)

4800C

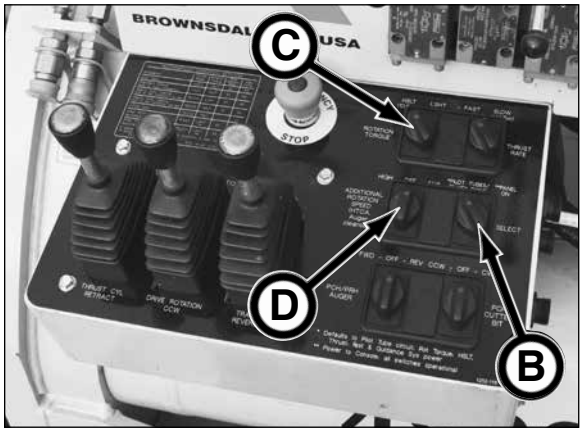
There are various selectors on the 4800C control console to control the rotational speed and torque depending on equipment usage.

Rotation Select Switch (B)
- fast thrust rate / Panel On

Rotation Torque Switch (C)
- HSLT (High Speed Low Torque) or
  LSHT (Low Speed High Torque)

Additional Rotation Speed Switch (D)
- Aux. / HTCA (High Torque Capacity Assembly)

Refer to your 4800C Operator's manual for details on the proper use of these controls.



4800C Control Console

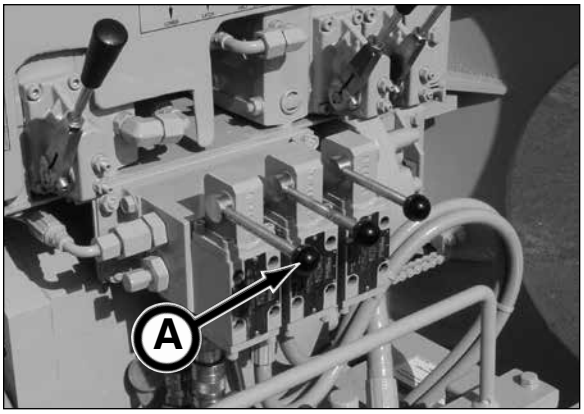
MAKE UP TOOL CONTROL

The hydraulic Make Up Tool control (A) is used to extend and retract the make up tool hydraulic cylinder (B). This control is a three position, detent control.

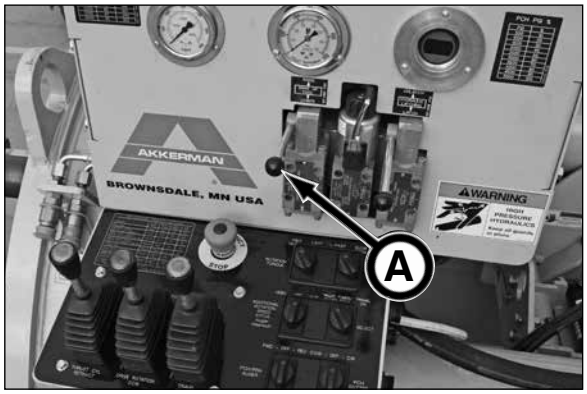
The make up tool holds each section of the pilot tubes as they are being tightened and installed in the launch shaft.

In pullback operation, the make up tool is used to separate (unlock) the pilot tubes in the launch shaft.

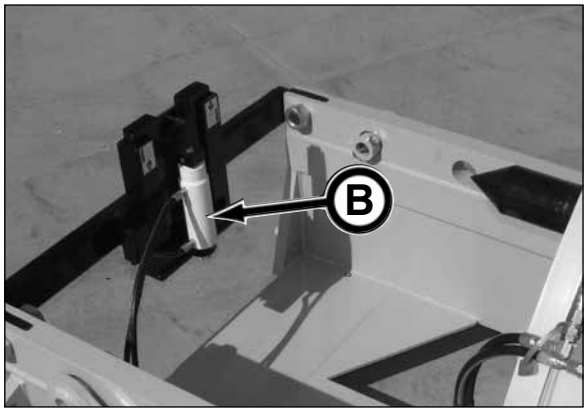
Extend Cylinder	- Pull lever Up
Retract Cylinder	- Push lever Down



GBM 240A Drive Rotation Control



GBM 4800C Drive Rotation Control



GBM 4800C Make Up Tool Cylinder Shown

TRAVEL CONTROL (4800C)

The Travel control (A) regulates the drive movement of the gear box assembly hydraulic travel motors (B) on the frame rails. This control is a spring centered, variable control and will return to the neutral position when released.

Forward Travel - Push lever Forward
Reverse Travel - Pull lever Back

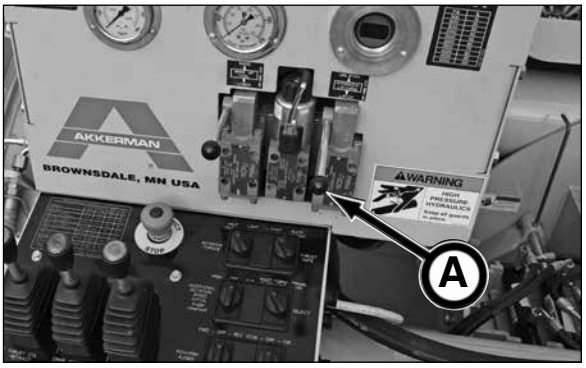
NOTICE The Hydraulic Latching control must be in Unlatch position to allow frame travel.

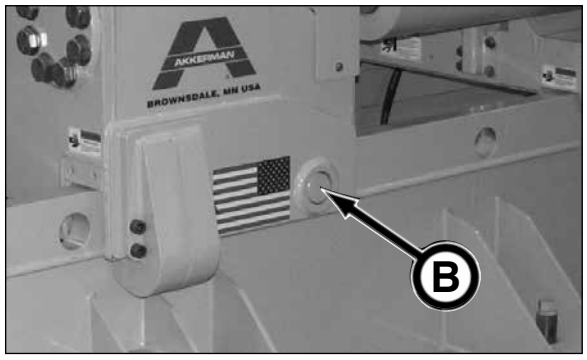
HYDRAULIC LATCHING CONTROL (4800C)

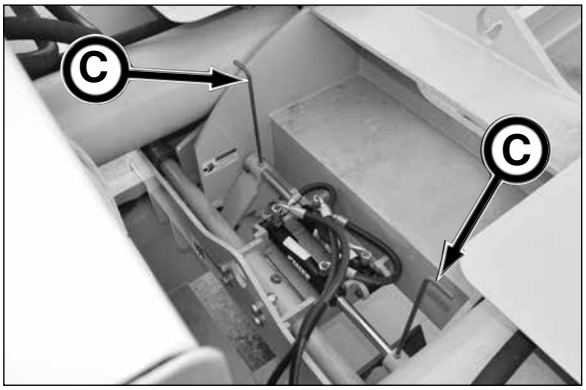
Use the Hydraulic Latching control (A) to hydraulically latch (lock) and unlatch (unlock) the GBM latching pins (B) to the frame holes. This control is a three position, detent control.

NOTICE Latching pins MUST be completely engaged into frame holes before jacking or transporting. Failure to do so could cause machine damage.

Unlatch (unlock) - Pull lever Up
Latch (lock) - Push lever Down







The GBM is equipped with latching pin indicators (C) for ease of the operator determining when the latching pins are latched or unlatched in the frame.

HYDRAULIC PRESSURE GAUGES

Use the pressure gauges to monitor the GBM jacking thrust (B) and rotation (A) pressure.

GBM 240A

Jacking (A) & Rotation (B)

Operating range is up to 4,000 psi (27.6 MPa) with a maximum pressure of 5,000 psi (34.5 MPa).

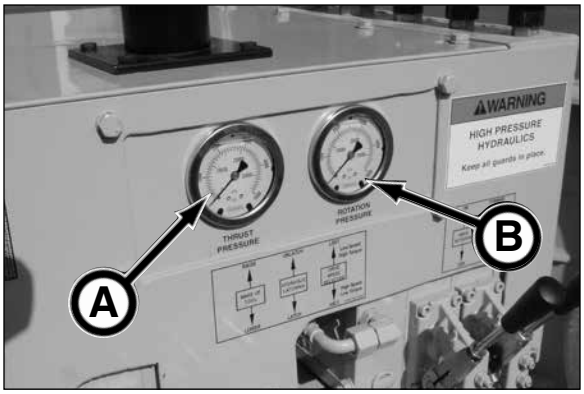
GBM 4800C

Jacking (A)

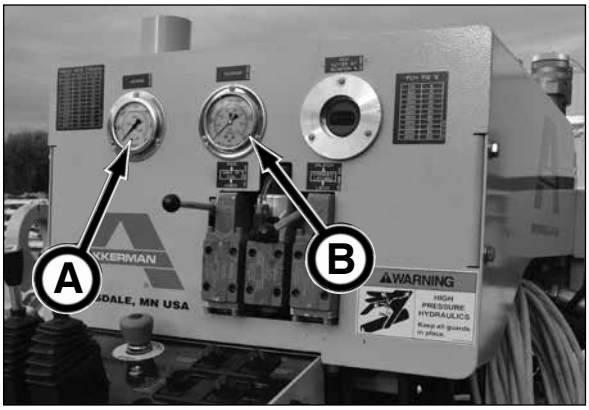
Operating range is up to 5,000 psi (34.5 MPa) with a maximum pressure of 6,000 psi (41.4 MPa).

Drive Rotation (B)

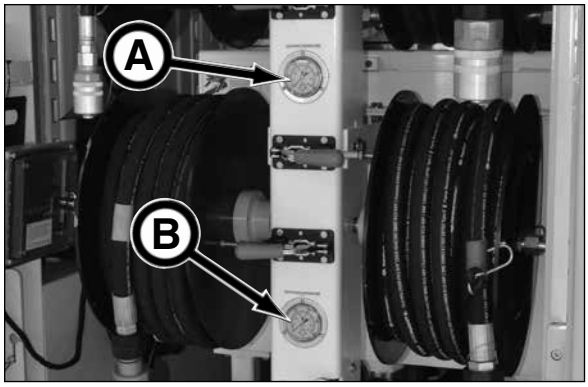
Operating range is up to 4,000 psi (27.6 MPa) with a maximum pressure of 5,000 psi (34.5 MPa).



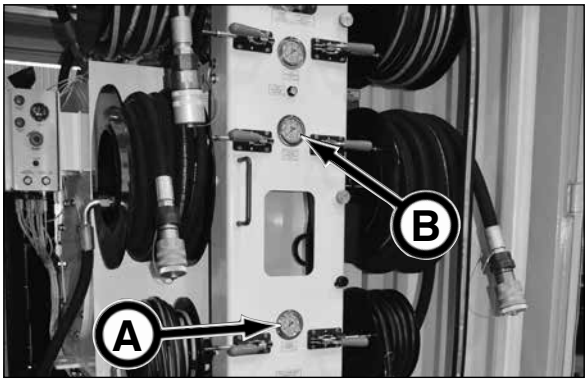
GBM 240A Frame



GBM 4800C



P4075D Power Pack



P250D Power Pack

BENTONITE & LUBRICATION PUMP CONTROLS

The pump system assists with lubricating the pilot tubes, casing and augers and product pipe by reducing friction and easing the jacking process. The unit is capable of displacing a viscosity (Marsh Funnel) as high as 100 seconds.

For proper operation, refer to your Bentonite & Lubrication Pump Operation & Parts Manual.

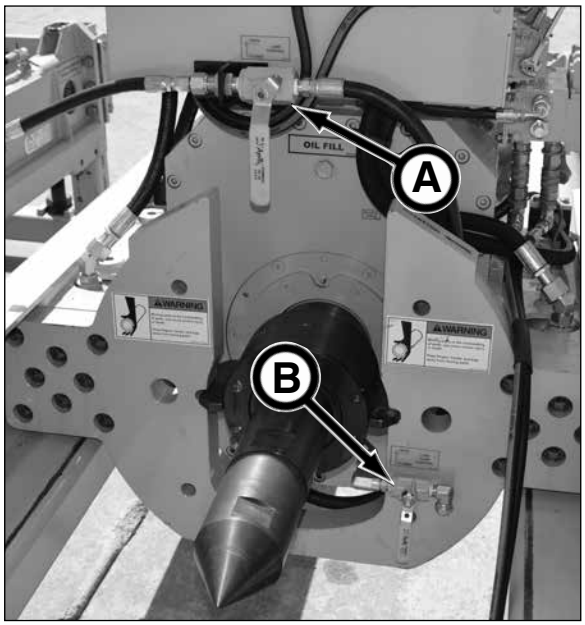
1525B/D Shown

LUBRICATION CONTROLS ON GBM FRAME

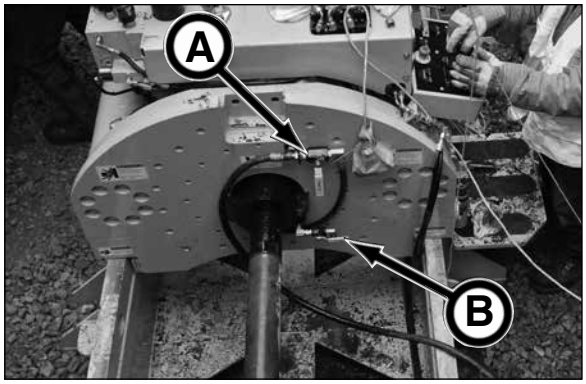
The pump system assists with lubricating the pilot tubes, casing and augers and product pipe by reducing friction and easing the jacking process. The unit is capable of displacing a viscosity (Marsh Funnel) as high as 100 seconds.

LUBE CONTROL
The lube control (A) regulates the lubricant flow to the drive swivel which allows the lubricant to flow through the dual walled pilot tube annular space and then out the TriHawk cutter bit port. Control lubrication flow so there is lubricant/cuttings flowing out of the bored hole into the launch shaft.

LUBE DUMP CONTROL
Using the lube dump control (B), vents the lubricant fluid into a catch pan or other suitable container **BEFORE LOOSENING PILOT TUBE JOINTS**. This will relieve fluid pressure and prevent the fluid from entering the inner tube of the pilot tube.



240A Shown



4800C Shown

NOTES

Pre-Start Inspection

⚠WARNING Do not operate this equipment until you read, study, and understand this manual, the Akkerman GBM Operator's Manual and any other equipment manuals (for example: auger boring machine) that may be used. A daily inspection of the equipment must be performed to prevent severe personal injury or death.

The contractor is fully responsible for the safety of all personnel on the job site. Check with the contractor that all site preparation requirements are in place. Be sure to comply with all MSHA and OSHA regulations, such as: an active safety program is in practice, a confined space permit (if needed) is issued, personal protective equipment is being worn; flammable, combustible, and hazardous materials are properly stored; and a lockout/tagout procedure is in place.

Use the following checklist ✓ as a guide for your daily pre-start inspection or shift change. Make a copy of this Pre-Start Inspection checklist. Once it is complete, check off, initial and date each item and file the copy as a record of maintenance.

	1. Follow the MSHA (Mining Safety & Health Administration) and OSHA (Occupational Safety & Health Administration) regulations.
	2. Contractor is responsible for all personnel to wear proper protective equipment on the job site. Replace equipment if defective.
	3. Combustible, toxic and oxygen deficiency detectors MUST be in place, tested, and in proper working condition.
	4. A qualified electrician must check that all electrical connections are properly secured and grounded prior to operation.
	5. Thoroughly clean equipment of mud and dirt.
	6. Inspect all equipment for damage. Repair or replace as needed.
	7. Remove combustible or flammable materials from equipment. Store materials properly.
	8. Test all E-Stop (Emergency Stop) buttons for proper operation at the start of each shift.
	9. Test air monitoring and ventilation detectors for proper operation.
	10. Check controls and switches for proper operation. Repair or replace if damaged or worn.
	11. Check all fluid levels. Add as needed.
	12. Check for fluid leaks. Repair leak or replace components.
	13. Check hydraulic reservoir oil level. Add as needed.
	14. Check for loose or missing hardware. Replace damaged or missing hardware.
	15. Check for worn, loose, or damaged wire connections. Repair or replace wiring connections.
	16. Tighten loose clamps or fittings.
	17. Refer to all equipment manuals for a pre-start inspection checklist.
	18. Keep job site clean and organized.

NOTES

Operation

⚠WARNING Do not operate this equipment until you read, study, and understand this manual, your Akkerman Guided Boring Machine Operator's Manual, and any other equipment manuals (for example: auger boring machine) that may be used. Failure to do so, could result in severe personal injury or death.

HOW TO USE THIS SECTION

This manual covers both the Akkerman Guide Rod Swivel (GRS-50) and the Rock Boring Unit (RBU). Therefore, this section is divided into three subsections to help you identify the contents of this section. The subsections will also make it easier for you to go back to specific areas for reference.

Operation - Operation Guidelines

GENERAL OPERATING GUIDELINES

⚠WARNING Do not operate this equipment until you read, study, and understand this manual, your Akkerman Guided Boring Machine Operator's Manual, and any other equipment manuals (for example: auger boring machine) that may be used. Failure to do so, could result in severe personal injury or death.

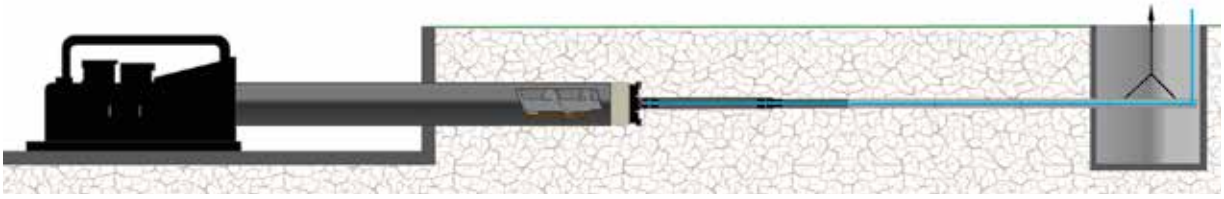
1. Before operating, read and understand the Safety, Pre-Start Inspection, and Operation sections of all equipment manuals being used on the job.
2. Do not operate this equipment while under the influence of alcohol, drugs, or medication.
3. Follow all Federal, State, and Local safety regulations and procedures.
4. Be sure OSHA prescribed safety personal protective equipment is being worn by all personnel.
5. Be sure the area is safe for operation. Keep work site clean and organized.
6. NEVER operate equipment if it has been engulfed with water. Contact your Akkerman Aftermarket Support representative for proper procedures on how to restore equipment for operation.
7. Have a fully charged fire extinguisher on the job site at all times.
8. Before operating, repair all equipment problems and be sure controls are in the OFF or neutral position.
9. Be sure the excavated launch and reception shafts are properly shored or braced to prevent slides or cave-ins.
10. Before operation, determine whether the job site has confined spaces. Follow OSHA regulations for proper training required for employees working in and around confined spaces.
11. Test air monitoring and ventilation detectors for proper operation. Never enter a tunnel without gas detectors.
12. A fully trained and qualified signal person must direct the excavator or crane operator when lifting and lowering equipment into the launch or reception shafts.
13. Never walk or work under any part of the excavator or crane and suspended loads.
14. Remove plumb bobs from string lines and place in storage container after use. Never hang or secure plumb bobs over shaft. Doing so may cause severe injury or death from a falling plumb bob.
15. Test all controls to make sure they work properly. Be sure to check all Emergency Stop buttons for proper operation.
16. Pressure peaks cause hoses to jump without notice. Keep all personnel away from hoses during operation of equipment.
17. Lockout tagout power at the source before servicing or adjusting components. The contractor must determine the best lockout/tagout practices for his/her employees on the job site.
18. Avoid pinch points. Keep hands away from moving parts. Watch your fingers, hands, and legs while equipment is in operation.
19. If this manual is lost, contact your Akkerman Aftermarket Support Representative for a new manual or download this manual from the Akkerman web site at www.akkerman.com.
20. High pressure hydraulics are used on the GBM. Be sure all covers and guards are in place before operating.
21. Check line and grade alignment on target monitor often to avoid misalignment. Keep pilot tube ventilated to prevent condensation buildup in tube which will result in poor target visibility.
22. Do not make any modifications to any Akkerman products. Doing so could cause structural failure and will void the warranty.
23. Do not make adjustments or repairs to the hydraulic system components while in operation or until all pressure is released and power pack is in lockout, tagout.

GRS-50 INSTALLATION OPTIONS

There are two installation options using the GRS-50:

- Guided method (with pilot tube installation)
- Unguided method (with GRS-50 center insert)

• Guided



GRS-50 Guided Installation With Auger Boring Machine

The GRS-50 Guide Rod Swivel series is an upsizing tool located between the guide rod assembly and the auger boring machine (or Akkerman GBM 4800 with HTCA) to keep pilot tubes stationary while allowing the rotation of the cutter teeth and augers to remove spoils from the pipeline. The GRS-50 is rated for 50 ton continuous working thrust load.

With the GRS-50 bearing swivel guide rod needle inserted into the pilot tube guide rod assembly, and the GRS-50 retractable wing cutters, the GRS-50 assembly can be removed (pullback) from the casings if an obstruction is encountered, or for inspection of tunnel or cutter face.

• UnGuided

GRS-50 UnGuided Installation With Auger Boring Machine

The GRS-50 Guide Rod Swivel series is an upsizing tool attached to the lead casing and is advanced by the auger boring machine (or Akkerman GBM 4800 with HTCA) allowing the rotation of the cutter teeth and augers to remove spoils from the pipeline. The GRS-50 is rated for 50 ton continuous working thrust load.

The GRS-50 assembly equipped with retractable wing cutters, allows the GRS-50 assembly to be removed (pullback) from the casings if an obstruction is encountered, or for inspection of tunnel or cutter face.

GRS-50 INSTALLATION & OPERATION - GUIDED

For proper equipment operation, refer to your Akkerman Guided Boring Machine Operator's Manual, Bentonite & Lubrication Operation & Parts Manual, Tri-Hawk Tooling Installation Operator's Manual and any additional equipment manuals.

The GRS-50 Guide Rod Swivel series is an upsizing tool located between the guide rod assembly and the auger boring machine (or Akkerman GBM 4800 with HTCA) to keep pilot tubes stationary while allowing the rotation of the cutter teeth and augers to remove spoils from the pipeline. The GRS-50 is rated for 50 ton continuous working thrust load.

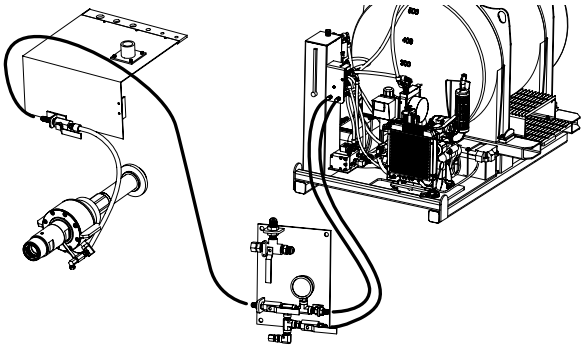
With the GRS-50 bearing swivel guide rod needle inserted into the pilot tube guide rod assembly, and the GRS-50 retractable wing cutters, the GRS-50 assembly can be removed (pullback) from the casings if an obstruction is encountered, or for inspection of tunnel or cutter face.

1. Using lubrication, install pilot tubes with TriHawk® or other soft rock steering head tooling. Control the flow so there is lubrication flowing (flush cuttings) out from around the pilot tubes to the launch shaft.

   IMPORTANT: Lubrication MUST be used during pilot tube installation as follows:
   As a guideline, use up to 4 gpm of lubricant to flush cuttings to launch shaft and for cooling of tool. Typically a mix of bentonite and polymer is used to keep the cuttings floating until they are removed in the launch shaft. Contact your polymer supplier for help with the proper lubrication mixture for your project.

GBM 240A Frame Shown

The polymer fluid is pumped from the lubrication pump through the GBM frame drive swivel, into the pilot tube annular space, then out the tooling bit port back to the launch shaft.

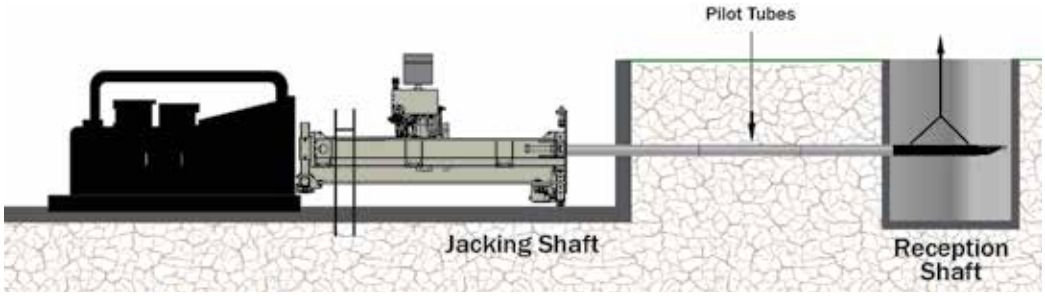


NOTICE Moisture or condensation may build up in the pilot tube resulting in poor target visibility. If this occurs, install the air/fluid connector to the end of the pilot tube and add air through port (A) to purge the moisture or condensation and increase visibility to the target. Use nitrogen, not oxygen, and as a guideline, maintain 50 psi (345 kPa) for 5 minutes per 100 ft (30.5 m), and adjust accordingly.

(Continued on next page)

2. Once the steering head tooling reaches the reception shaft, push the last pilot tube until the notches in the tube line up with the tube support on the make-up tool.

   IMPORTANT: When advancing pilot tubes (or casings at no load), the thrust rating MUST be below 50 ton otherwise damage will occur to drive swivel.



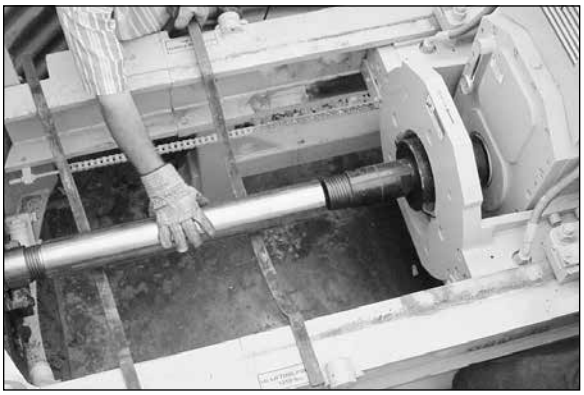
3. Engage the make-up tool tube support to the notches on the pilot tube.

4. Disengage the drive adapter swivel from the pilot tube by rotating the drive CCW while retracting the jacking cylinders.

5. Release the make up tool from pilot tube.

6. Place another pilot tube, only as a means of a temporary spacer pilot tube, between the last pilot tube and the drive swivel assembly. Loosely thread (do not tighten connection) the spacer pilot tube to the last pilot tube and push the pilot tubes forward with the GBM frame until the last pilot tube, not spacer pilot tube, completely clears GBM frame.

7. Remove spacer pilot tube.



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8. Move the gear box to the middle of the GBM frame. Be sure drive swivel adapter is fully secured to frame.

⚠WARNING Suspended loads may fall and cause severe personal injury or death. Do not enter area under or around a suspended load.

9. Remove GBM frame from launch shaft.

GBM 240A Frame Shown

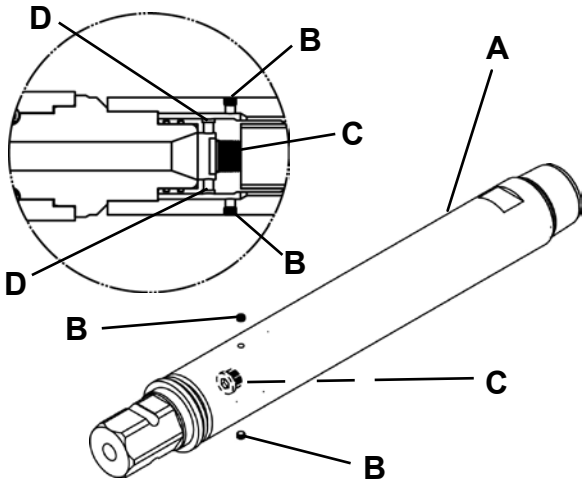
10. Prior to installing the fluid assembly adapter (A) (A48901A, part of FA49088F) into the launch shaft, the adapter must be inspected to be sure the plugs are properly oriented.

B - ***OPTION 1 (Typical)***
- Fluid discharges at the face of the cutterhead.
INSTALLED 02MP-HHP Plug (2 external locations).

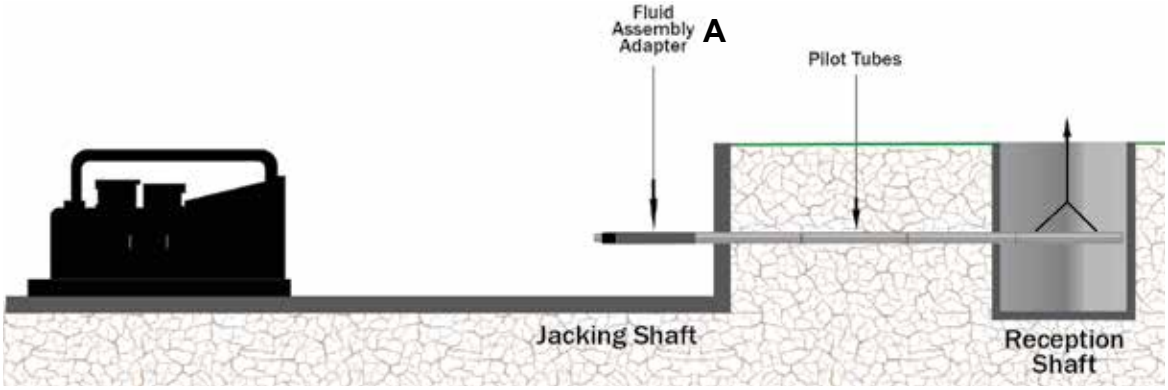
B - ***OPTION 2 (Not Typical)***
- Fluid discharges 5 feet ahead of the cutterhead, potentially softening the ground.
REMOVED 02MP-HHP Plug (2 external locations).

C - **INSTALLED** 12MP-HHP Plug (1 location), this plug is in the inside of the tube, but is visible when looking through the center of the tube. If the plug is not in place, the inner tube will have to be removed to install the plug (refer to your Akkerman Aftermarket Support representative for more information).

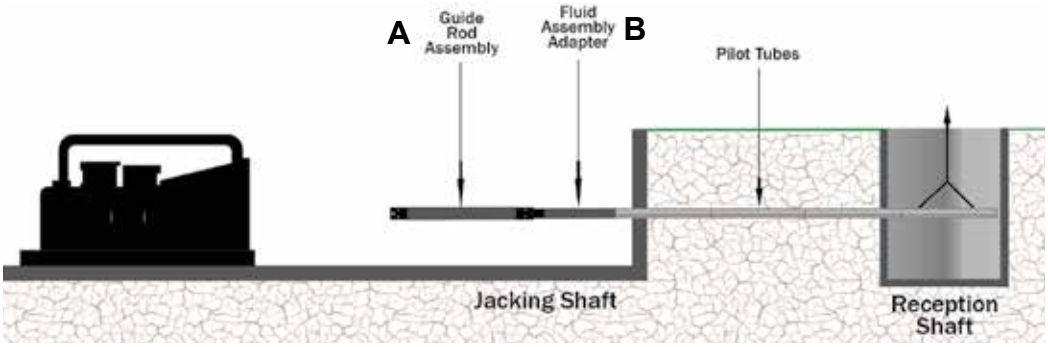
D - **INSTALLED** 02MP-HHP Plug (2 internal locations). The inner tube will have to be removed to check if the plugs have been installed (refer to your Akkerman Aftermarket Support representative for more information).

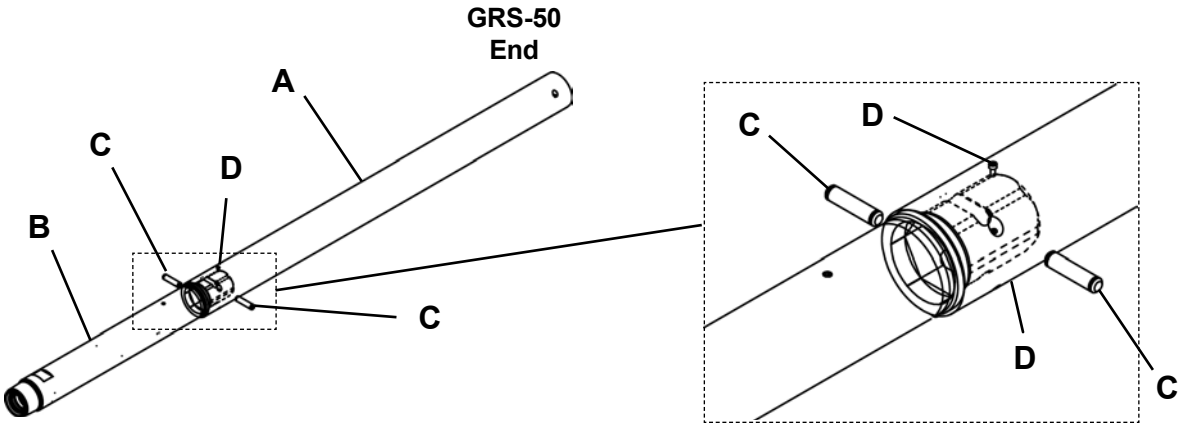


11. Using a properly rated hoist, lower the fluid assembly adapter behind the last pilot tube. Thread fluid assembly adapter to the pilot tube using one of the wrenches from the GBM wrench set.



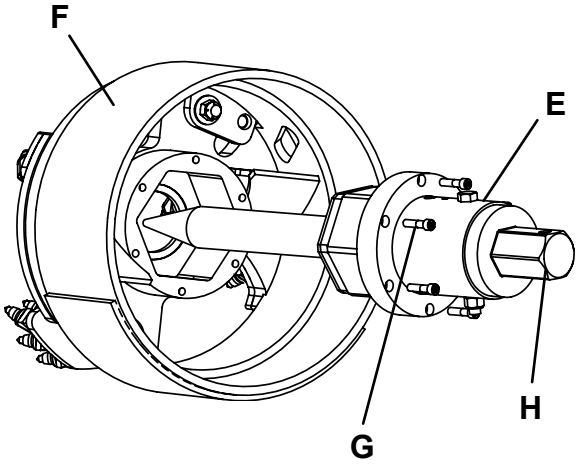
12. Lower the guide rod assembly (A) (A49126A, part of FA49088F) to the fluid assembly adapter (B). Properly align the guide rod assembly and fluid assembly adapter, and secure with two connection pins (C) (A40582P) and two set screws (D) (P0031-1024-001.5). The other end of the guide rod assembly **will not use** the connection pin holes to allow for pullback of the augers and bearing swivel. Support the tubes in the launch shaft as needed to prevent damage to the entrance of the bored hole.





13. On the ground level, if not already installed, install the GRS bearing swivel assembly (E) to the GRS cutter head (F) with six 5/8 UNC x 2.5 in bolts (G).

    Connect the auger (in the steel casing) to the GRS bearing swivel assembly sleeve hex connection (H).



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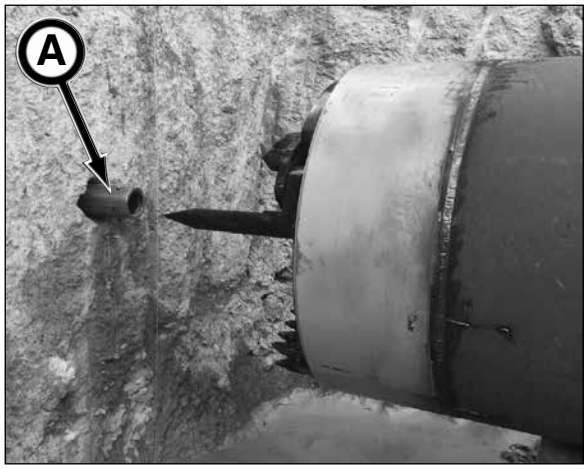
NOTICE **Before operating the GRS-50**, be sure to perform proper lubrication and maintenance (refer to section 9, Periodic Maintenance - GRS-50 in this manual or contact your Akkerman Aftermarket Support representative for more information).

14. Align the GRS assembly (cutterhead, bearing swivel assembly and lead casing) with the steel casing.

15. Weld the GRS lead casing to the steel casing. The GRS lead casing belly pan must be located at the 6 o'clock position before operating.

    IMPORTANT: The lead auger in the steel casing MUST NOT be worn. When using a worn lead auger, the GRS bearing swivel assembly will carry the weight of the auger resulting in swivel failure.

16. Move the GRS cutterhead/bearing swivel assembly into the steel casing to expose the auger shaft at the opposite end of the steel casing. The cutter head should be positioned two to three inches ahead of the GRS weld ring.



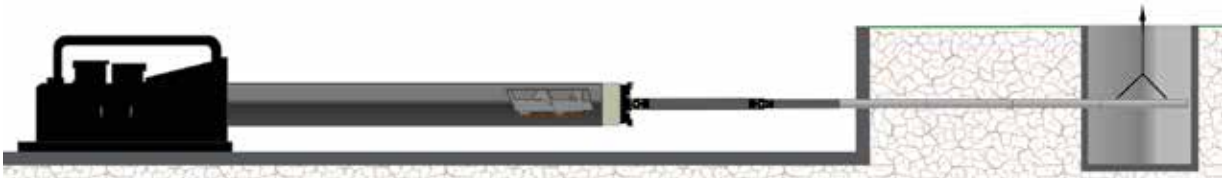
⚠WARNING Suspended loads may fall and cause severe personal injury or death. Do not enter area under or around a suspended load.

17. With components properly secured within the steel casing, lower the steel casing into the launch shaft.

18. Align the GRS bearing swivel guide rod needle into guide rod assembly, A48907A (A).

19. Advance the auger boring machine to line up the steel casing/auger/GRS assembly.

20. Connect the steel casing auger to the hex connection on the auger boring machine. Continue to advance until the GRS cutter head is at the shaft wall.



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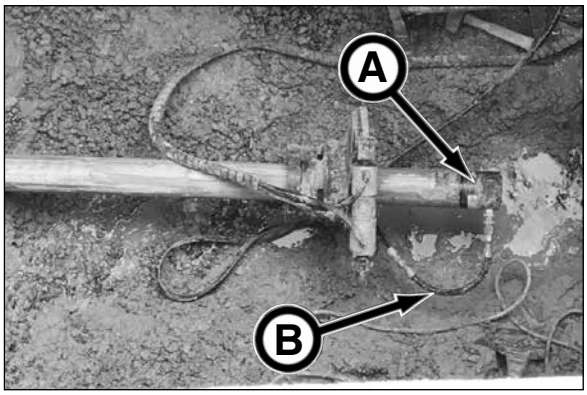
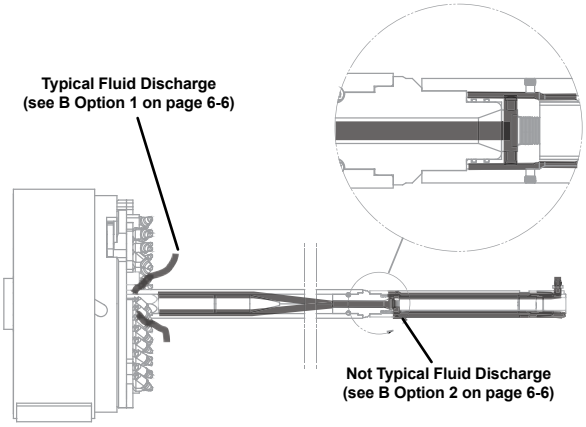
21. The GRS assembly must be supplied with lubrication to help in lubricating the spoils. In the reception shaft, connect the fluid connector (A) to the pilot tube. Connect lubrication hose (B) from pump to the fluid connector.

22. Start bentonite and lubrication pump to test to make sure lubricant is being supplied to the GRS assembly.



NOTICE If the lubricant does not flow from center of the fluid adapter assembly hex, the internal plugs were removed from the adapter.

23. As a guideline during the boring process, start the lubrication setting at 6 gpm and adjust as needed for spoil removal.

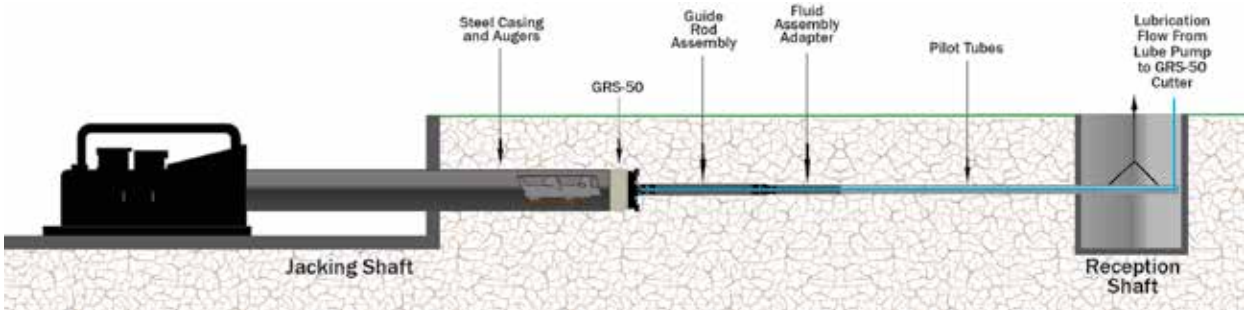


GRS-50 Lubrication Path From Reception Shaft

24. Proceed with the auger boring process, adding additional steel casing/augers while removing the pilot tubes, fluid adapter assembly and guide rod assembly from the reception shaft until the steel casings reach the reception shaft.

    Use the following recommended GRS-50 cutter head speed guidelines. Faster speeds will prematurely wear cutter teeth.

24” - 18 rpm 26” - 18 rpm 28” - 15 rpm 30” - 15 rpm 36” - 12 rpm 42” - 10 rpm

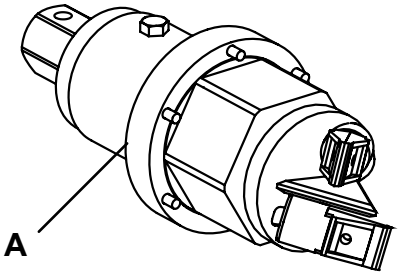


GRS-50 INSTALLATION & OPERATION - UNGUIDED

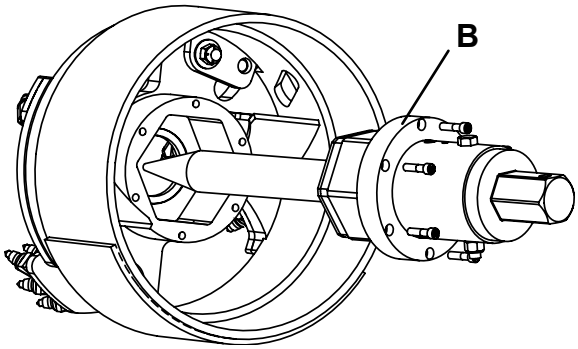
For proper equipment operation, refer to your Akkerman Guided Boring Machine Operator's Manual and any additional equipment manuals.

The GRS-50 Guide Rod Swivel series is an upsizing tool attached to the lead casing and is advanced by the auger boring machine (or Akkerman GBM 4800 with HTCA) allowing the rotation of the cutter teeth and augers to remove spoils from the pipeline. The GRS-50 is rated for 50 ton continuous working thrust load. The GRS-50 assembly equipped with retractable wing cutters, allows the GRS-50 assembly to be removed (pullback) from the casings in the event an obstruction is encountered, or for inspection of tunnel or cutter face.

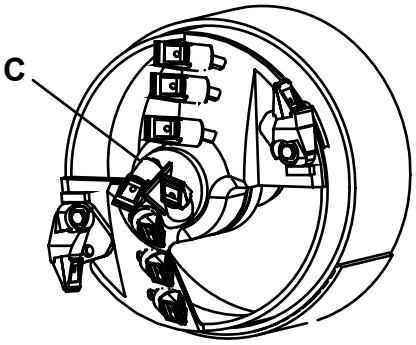
1. Before installing the GRS-50, the assembly must be equipped with the GRS center insert assembly, A63846A (A) as follows:



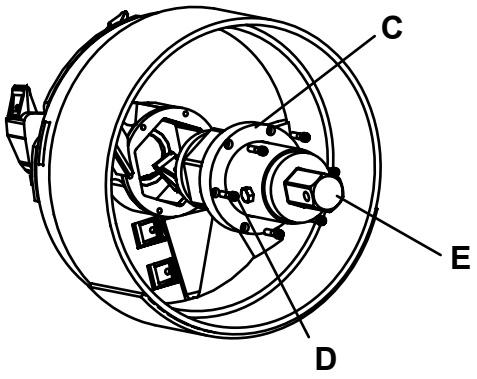
a. If equipped, remove the bearing swivel assembly FA49160F (B) from the GRS-50 assembly.



b. Install the center insert assembly A63846A (C) into the GRS assembly and secure with six 5/8 UNC x 2.5 socket head cap screws (D).



c. Connect the auger (in the steel casing) to the GRS hex connection (E).



(Continued on next page)

2. With the center insert mounted to the GRS-50 assembly, align the GRS assembly (cutterhead, center insert and lead casing) with the steel casing.

3. Weld the GRS lead casing to the steel casing. The GRS lead casing belly pan must be located at the 6 o'clock position before operating.

4. Move the GRS cutterhead assembly into the steel casing to expose the auger shaft at the opposite end of the steel casing. The cutter head should be positioned two to three inches ahead of the GRS weld ring.

⚠WARNING Suspended loads may fall and cause severe personal injury or death. Do not enter area under or around a suspended load.

5. With components properly secured within the steel casing, lower the steel casing onto the rails in the launch shaft.

6. Connect the steel casing auger to the hex connection on the auger boring machine.

7. Advance the auger boring machine to line up the steel casing/auger/GRS assembly.

8. Test the GRS connection to the steel casing auger by rotating augers with auger boring machine.

   If the cutter head rotates, the auger is properly aligned.

9. Advance the auger boring machine until the GRS cutter head is at the shaft wall.

10. Proceed with the auger boring process, adding additional steel casing/augers until the steel casings reach the reception shaft.

Use the following recommended GRS-50 cutter head speed guidelines. Faster speeds will prematurely wear cutter teeth.

24" - 18 rpm **26" - 18 rpm** **28" - 15 rpm** **30" - 15 rpm** **36" - 12 rpm** **42" - 10 rpm**

NOTES

RBU INSTALLATION OPTION

The Rock Boring Unit (RBU) is an upsizing tool attached to the lead casing and is advanced by the auger boring machine (or Akkerman GBM 4800 series with augering adapter assembly or high torque casing adapter [HTCA]). As the augers rotate, allowing the rotation of the disc cutters, the RBU paddles will move spoils away from the cutter face to the auger for removal from the pipeline.
The RBU is capable of boring rock up to 25,000 psi UCS. The RBU 24/30/36/42/48/54 are rated for 90,000/90,000/110,000/160,000/180,000/216,000 lbf continuous working thrust loads, respectively.

RBU Installation With Auger Boring Machine

With the auger boring machine augers inserted on the RBU hex shaft, the augers can be removed (pullback) from the casings in the event an obstruction is encountered, or for inspection of tunnel or RBU.

RBU INSTALLATION & OPERATION

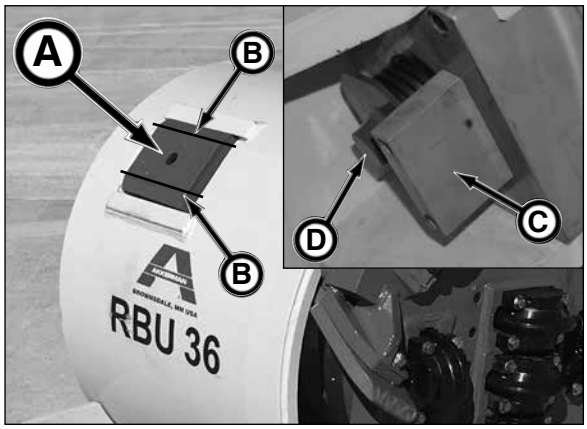
For proper equipment operation, refer to your Akkerman Guided Boring Machine Operator's Manual and any additional equipment manuals.

The Rock Boring Unit (RBU) is an upsizing tool attached to the lead casing and is advanced by the auger boring machine (or Akkerman GBM 4800 series with augering adapter assembly or high torque casing adapter [HTCA]). As the augers rotate, allowing the rotation of the disc cutters, the RBU paddles will move spoils away from the cutter face to the auger for removal from the pipeline.
The RBU is capable of boring rock up to 25,000 psi UCS. The RBU 24/30/36/42/48/54 are rated for 90,000/ 90,000/110,000/160,000/180,000/216,000 lbf continuous working thrust loads, respectively.

IMPORTANT: Follow your disc cutter manufacturer's instructions for proper disc cutter installation.

1. (RBU 30 thru RBU 54) Check the RBU stabilizer shoe (A) adjustments measured at the leading edges (highest point of shoe) (B) as follows at the back of the RBU looking forward in the direction of travel:
   • ***2 o'clock stabilizer:*** adjust to 1/4" (7/8" from casing) of gage cut diameter or to the full gage cut diameter.
   • ***4 o'clock stabilizer:*** adjust to 5/8" from casing.
   • ***8 o'clock stabilizer:*** adjust to 5/8" from casing.
   • ***10 o'clock stabilizer:*** adjust to 5/8" out from casing.

   To adjust stabilizer shoe:
   a. remove stop block (C).
   b. adjust stabilizer screw (D) as needed.
   c. replace and secure stop block shoulder bolts to 38 ft-lbs (51.5 N·m) torque (lubricated).



Stabilizer Shoe Adjustment

2. Align the RBU assembly with the steel casing.

3. Weld the RBU casing to the steel casing as squarely as possible.

(continued on next page)

⚠WARNING Suspended loads may fall and cause severe personal injury or death. Do not enter area under or around a suspended load.

4. With components secured within the steel casing, lower the RBU/steel casing onto the rails in the launch shaft.

5. Connect the steel casing auger to the hex connection on the auger boring machine.

6. Advance the auger boring machine to align the auger boring machine auger onto the RBU hex shaft.

NOTICE The RBU hex shaft needle allows the augers to be pulled back in the event an obstruction is encountered or inspection of the tunnel or RBU is necessary. **Proper tunnel ventilation is critical before attempting adjustment.**

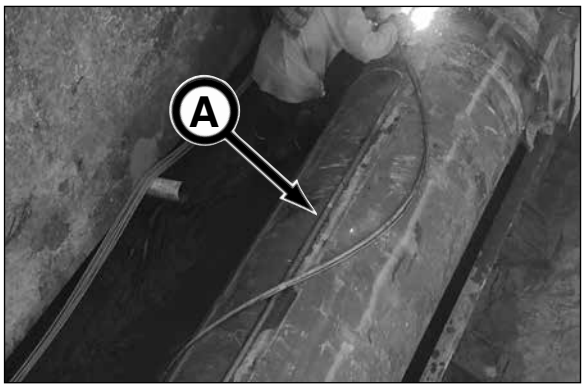
7. Test the RBU connection to the steel casing auger by rotating augers with auger boring machine. If the RBU cutter bit rotates, the auger is properly aligned with the RBU hex shaft needle.

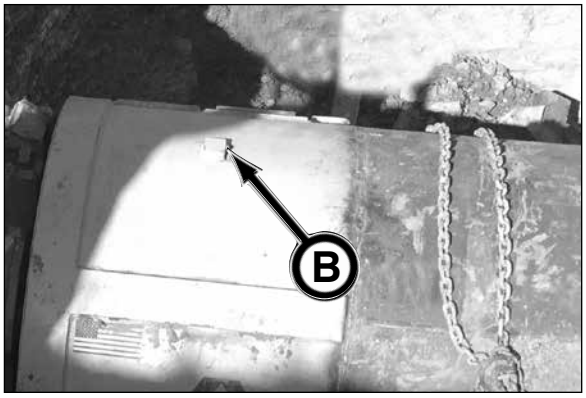
(Continued on next page)

8. Weld a 1/4 NPT lubrication line (A) to the top of the steel casing. Connect line to the RBU lubrication block (B). Lubricant will be pumped forward of the RBU and down into the RBU cutter area.

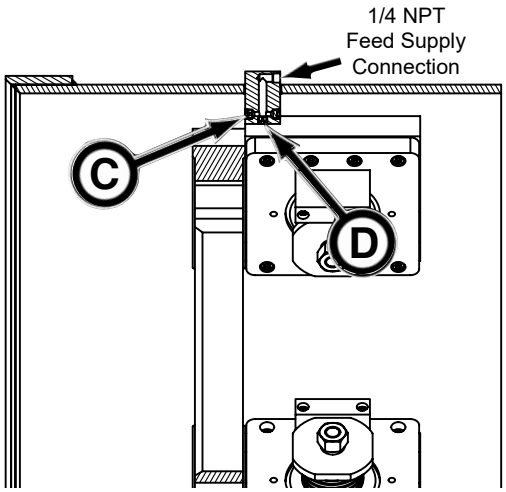
9. Start the bentonite and lubrication pump and test to be sure lubricant will be supplied to the RBU assembly. Shut off the pump flow after test.

NOTICE **Contact your polymer supplier for assistance with the proper lubrication mixture for your project.**





RBU 24 Shown



IMPORTANT: BEFORE launch, lubricant **MUST** flow from front facing 1/8” port (C) **AND** inward 3/32” port (D). If there is no lubricant flow through these ports, they **MUST** be unplugged prior to launch otherwise tunnel failure may occur.

10. Advance the auger boring machine until the RBU cutter head is at the shaft wall.

11. Start the bentonite and lubrication pump. As a guideline during the boring process, start the lubrication setting at 6 gpm and adjust as needed for spoil removal.

(Continued on next page)

RBU 24 Shown

12. Perform final disc cutter torque check (refer to your disc cutter manufacturer's instructions).

    For Akkerman Disc Cutters: Launch disc cutter head with full disc cutter assembly engagement and then advance an additional 18 in. (457 mm). Then pullback and recheck the torque (94 ft-lb) on all bolts.
    If bolts are worn, damaged or do not hold torque, the bolts and nord-lock washers MUST be replaced with new.

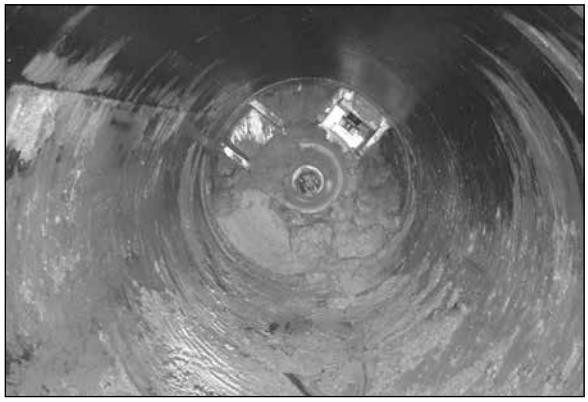
13. Proceed with the auger boring process, adding additional steel casing/augers until the casings reach the reception shaft. Refer to operating guidelines below:

First 3' to 5' of Bore Limitation (thrust lbs / cutter head rpm):

RBU 24	70,000 lbs	8 - 10 rpm
RBU 30	70,000 lbs	8 - 10 rpm
RBU 36	77,000 lbs	8 - 12 rpm
RBU 42 MGH	100,000 lbs	8 - 12 rpm
RBU 42 RKH	110,000 lbs	8 - 12 rpm
RBU 48 MGH	110,000 lbs	8 - 12 rpm
RBU 48 RKH	130,000 lbs	8 - 12 rpm
RBU 54 MGH	160,000 lbs	8 - 12 rpm

Next 20' of 5 ft to 10 ft per hour Bore Limitation (thrust lbs / cutter head rpm):

RBU 24	80,000 lbs	15 - 20 rpm
RBU 30	80,000 lbs	15 - 20 rpm
RBU 36	100,000 lbs	15 - 20 rpm
RBU 42 MGH	115,000 lbs	15 - 20 rpm
RBU 42 RKH	125,000 lbs	15 - 20 rpm
RBU 48 MGH	125,000 lbs	15 - 20 rpm
RBU 48 RKH	150,000 lbs	15 - 20 rpm
RBU 54 MGH	190,000 lbs	15 - 20 rpm

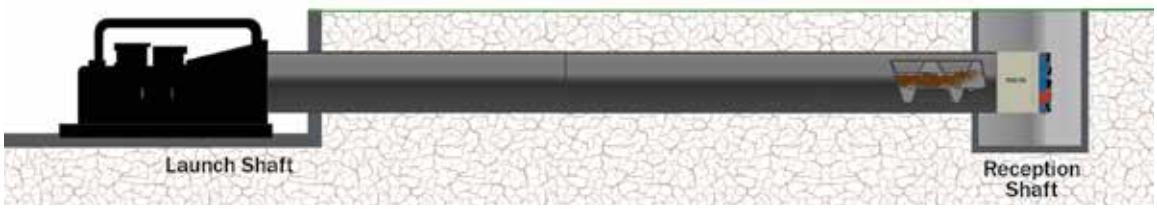


Maximum Operating Thrust (thrust lbs / cutter head rpm):

RBU 24	90,000 lbs	20 rpm
RBU 30	90,000 lbs	20 rpm
RBU 36	110,000 lbs	20 rpm
RBU 42 MGH	150,000 lbs	20 rpm
RBU 42 RKH	160,000 lbs	20 rpm
RBU 48 MGH	150,000 lbs	20 rpm
RBU 48 RKH	180,000 lbs	20 rpm
RBU 54 MGH	216,000 lbs	20 rpm

MGH - Mixed Ground Head RKH - Rock Head

IMPORTANT: The recommended maximum RBU cutter head speed is 20 rpm. Faster speeds will prematurely wear disc cutters.



NOTES

Transporting

NOTICE Refer to your equipment manuals for proper transporting of equipment and any specific lifting instructions.

TRANSPORTING GUIDELINES

RBU 42 Shown

⚠WARNING Suspended loads may fall and cause severe personal injury or death.

If a hydraulic hose breaks from the boom of a crane/excavator, or the lifting support fails, the boom and/or load can fall instantly.

Do not enter area under or around a suspended load.

1. Know the local, state, and federal transportation regulations.
2. Obtain required permits for transporting.
3. Remove any obstacles from the trailer floor.
4. Clean ALL debris from equipment.
5. Load and unload on level ground.
6. If lifting equipment with a hoist or other lifting device, the equipment lifting eyes and sling must be inspected for damage before lifting. If damaged, replace before lifting.
7. Use shipping straps to fasten the GRS-50 and/or RBU to trailer.
8. Secure all loose items.

NOTES

Lubricants

NOTICE Use of inferior lubricants will affect the efficient performance of your Akkerman equipment. Always use high quality lubricants. Refer to section 9, Periodic Maintenance section for proper lubrication quantity, maintenance intervals, and procedures.

GRS-50 BEARING SWIVEL GREASE

The GRS-50 bearing swivel (FA49160F) housing is filled with Paragon® 3000 lithium grease.

The Paragon® 3000 grease is a special high temperature, high performance, lithium grease.

Use Paragon® 3000 grease or equivalent when lubricating the bearing swivel.

The bearing swivel housing capacity is approximately 1.88 qts. Do not overfill.

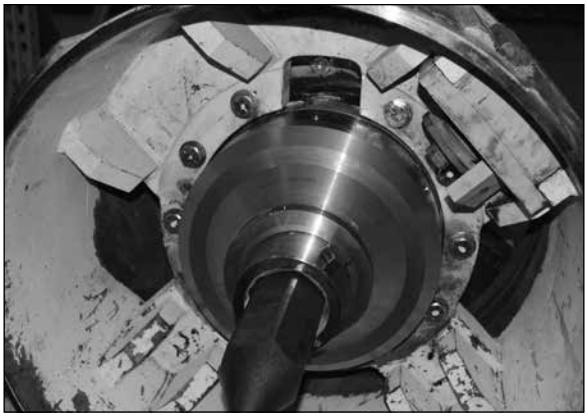
RBU BEARING CAVITY LUBRICANT

The RBU bearing cavity is filled with Mobil SHC™ 630 Synthetic Bearing and Gear Oil.

Use Mobil SHC 630 or equivalent when adding or changing lubricant. Do not mix oils.

NOTICE The Mobil SHC 630 Synthetic Bearing and Gear oil is a synthetic oil specifically designed for this application. If you change to a different oil, use a reputable oil supplier to meet or exceed the Mobil SHC 630 oil specification. **Do not mix oil manufacturers or grades.**

Oil capacity is approximately 2 gal [7.6 L]).

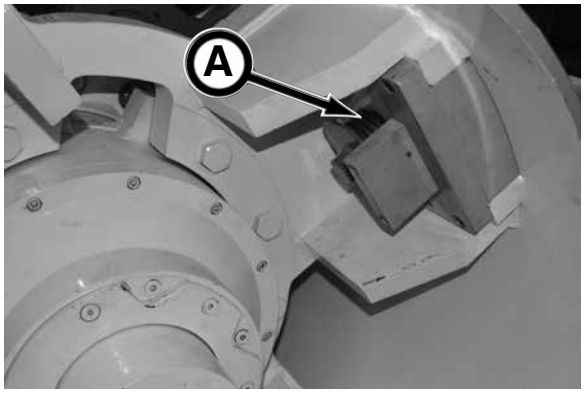


RBU STABILIZER ASSEMBLY ADJUSTMENT SCREW LUBRICANT

The RBU stabilizer adjustment screws (A) (four places) are lubricated with Mobilgrease® XHP222 Premium Lubricating Grease.

The XHP 222 grease is a multi-purpose, high performance, high temperature, lithium grease.

Use Mobilgrease® XHP222 Premium Lubricating Grease or equivalent when greasing the stabilizer screws.



DISC CUTTER LUBRICANT

NOTICE When using the Akkerman disc cutters, refer to 050169A Installation & Maintenance Manual for lubricant and maintenance details.

The Akkerman disc cutter assembly is filled with Paragon® 3000 lithium grease.

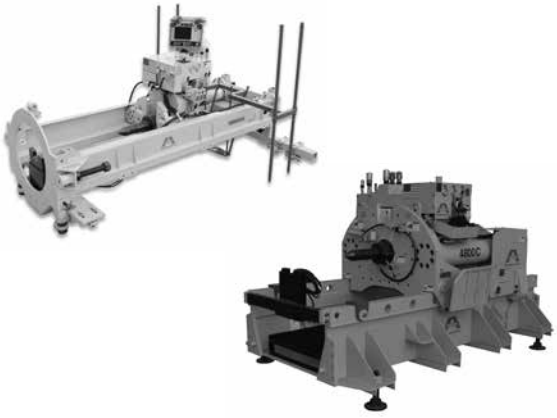
The Paragon® 3000 grease is a special high temperature, high performance, lithium grease.

Use Paragon® 3000 grease or equivalent when lubricating the bearing swivel.

The disc cutter lubricant capacity is 3 oz.

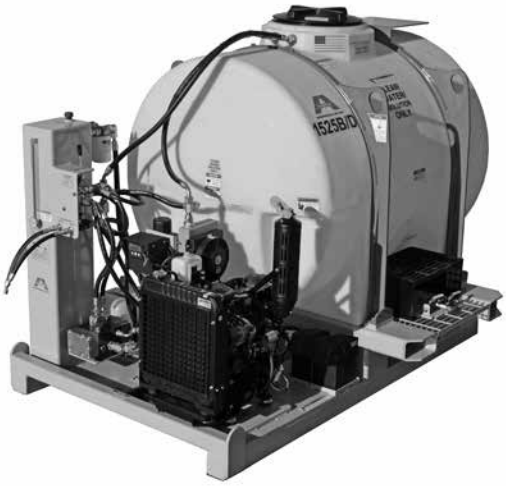
SUPPORTING EQUIPMENT LUBRICANTS

Refer to your Akkerman Operator's Manuals and other equipment manuals for the proper lubricant for your equipment.



Jacking Frame

Power Pack



Bentonite & Lubrication Pump

Reception Shaft Breakout Tool

STORING LUBRICANTS

Your equipment can operate at maximum performance only if clean lubricants are used. Use clean containers to handle all lubricants.

Lubricants should be stored in an area protected from dust, moisture, and other contaminates.

All lubricants must be stored at least 100 ft (30.5 m) from the portal, entrance to the tunnel, launch shaft or reception shaft.

NOTES

Periodic Maintenance

⚠WARNING Review the Safety section in this manual and all supporting equipment manuals before performing maintenance. Failure to do so, could cause severe injury or death.

The requirements for lubrication and maintenance are shown on the maintenance charts in this section. Intervals of maintenance are based on normal operating conditions. If operating under more difficult conditions, use a shorter time interval between maintenance.

HOW TO USE THIS SECTION

This manual covers both the Akkerman Guide Rod Swivel (GRS-50) and the Rock Boring Unit (RBU). Therefore, this section is divided into three subsections to help you identify the contents of this section. The subsections will also make it easier for you to go back to specific areas for reference.

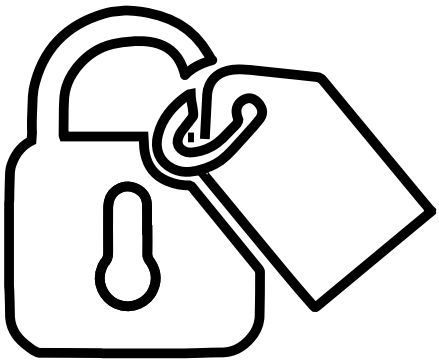
Periodic Maintenance - Maintenance Safety

⚠WARNING Review the Safety section in this manual and all supporting equipment manuals before performing maintenance. Failure to do so, could cause severe injury or death.

LOCKOUT TAGOUT POWER BEFORE SERVICING

⚠WARNING Severe personal injury or death can result from unexpected machine movement.

LOCKOUT TAGOUT power before attempting to make repairs or adjustments to this equipment, unless otherwise indicated. Proper lockout tagout will prevent accidents and save lives. Performing lockout tagout will also prevent the equipment from moving unexpectedly.

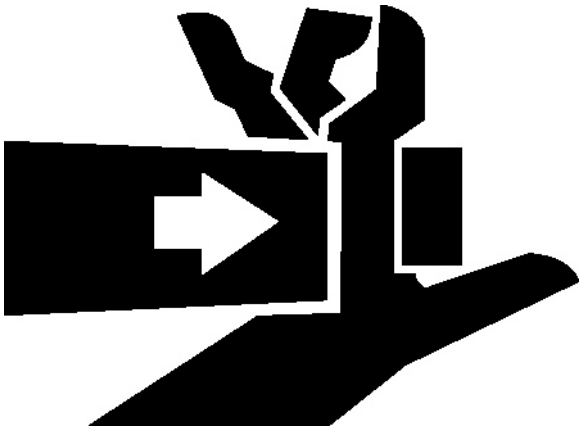


AVOID PINCH POINTS

⚠WARNING Moving parts or the mishandling of parts can cause severe injury.

Keep hands and legs away from moving parts.

Handle parts carefully to avoid crushing and pinch point hazards.



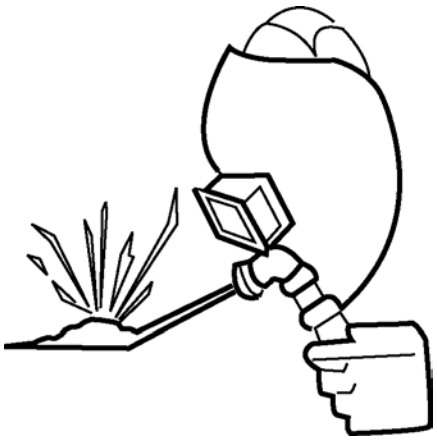
WELDING SAFETY

Before welding, read and understand your welding equipment operation manual including all safety precautions.

Wear proper gloves, clothing, and welding helmet with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc.

Make sure the welding machine frame is grounded, that neither terminal of the welding generator is bonded to the frame, and that all electrical connections are properly secured. The ground connection must be attached firmly to the work.

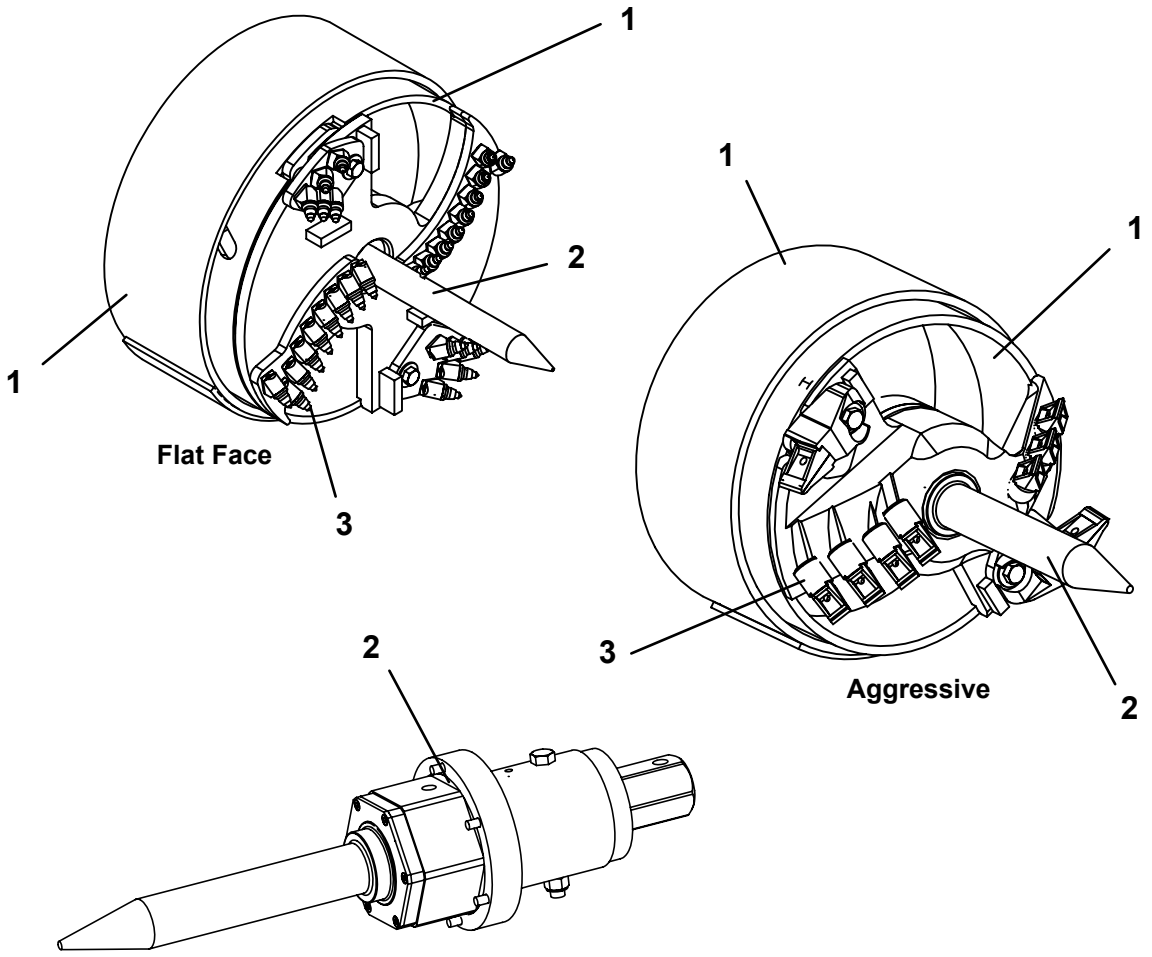
Keep welding cables dry and free of oil or grease. Keep cables in good condition.



NOTES

MAINTENANCE CHARTS - GRS-50

NOTICE Use the item number in the chart to refer to the detailed maintenance instructions later in this section.

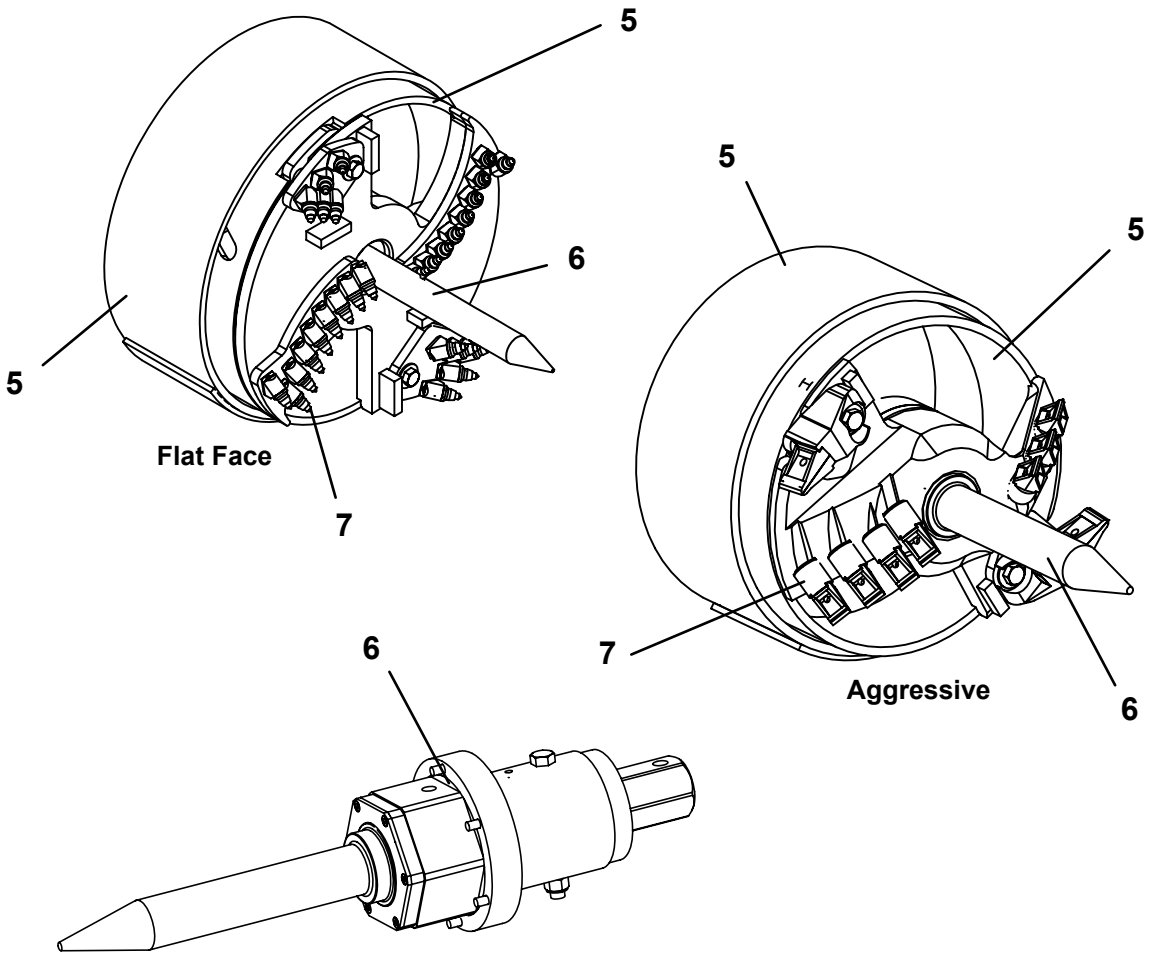


PRIOR TO EACH JOB LAUNCH

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
1.	GRS Assembly & Casing	Clean & Inspect	If parts are damaged or missing, replace with new.	
2.	Bearing Swivel	Lubricate	Purge grease.	Paragon 3000
3.	Bullet Teeth/ Spade Teeth	Inspect	If damaged or worn, replace with new.	
4.	Supporting Equipment*	Inspect	Refer to equipment manual. Check for wear.	

* Not Shown

NOTICE Use the item number in the chart to refer to the detailed maintenance instructions later in this section.



COMPLETION OF EACH DRIVE

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
5.	GRS Assembly & Casing	Clean & Inspect	If parts are damaged or missing, replace with new.	
6.	Bearing Swivel	Lubricate	Purge grease.	Paragon 3000
7.	Bullet Teeth/ Spade Teeth	Inspect	If damaged or worn, replace with new.	
8.	Supporting Equipment*	Inspect	Refer to equipment manual. Check for wear.	

* Not Shown

PRIOR TO EACH JOB LAUNCH

1. CLEAN & INSPECT GRS ASSEMBLY & CASING

Perform a visual inspection of the GRS assembly and casing. Inspect structures, mountings (cutter wings) teeth/tooth holders and bearing swivel.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

Check for grease leakage and debris buildup. Clean dirt and debris. Make repairs as needed.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

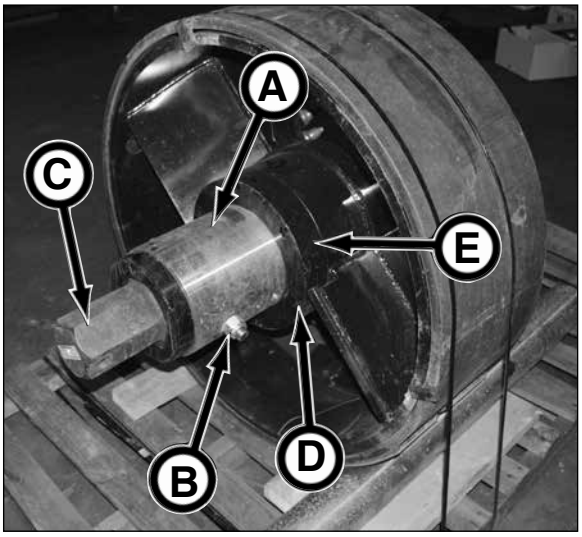
Tighten hardware as needed. Do not overtighten hardware.

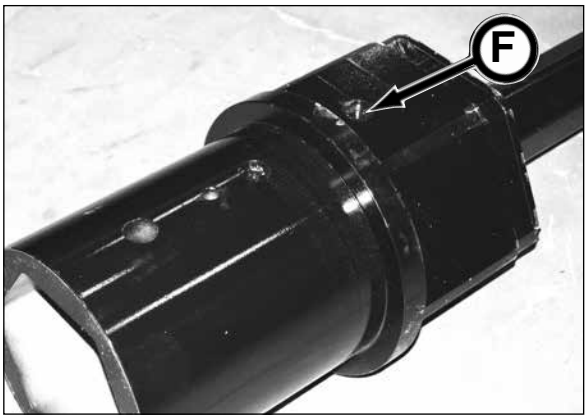
2. LUBRICATE BEARING SWIVEL

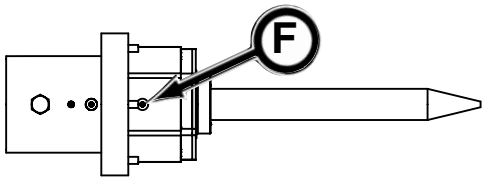
The GRS-50 bearing swivel must be lubricated prior to each job launch AND at the completion of each drive.

⚠WARNING Assemblies are heavy. Use proper devices to prevent assembly from unexpectedly moving during lubrication procedure.

1. CAREFULLY remove the bearing swivel assembly (FA49160F) (A) from the GRS-50 assembly as follows:
2. Remove 1 x 10” adapter bolt and nut (B).
3. Remove male adapter (C) from bearing swivel assembly.
4. Remove swivel retainer hardware, six 5/8 UNC x 2.5 socket head cap screws (D).
5. Remove swivel retainer (E).
6. Remove plug (F) from vent port.
7. Secure the bearing swivel from moving during lubrication process.







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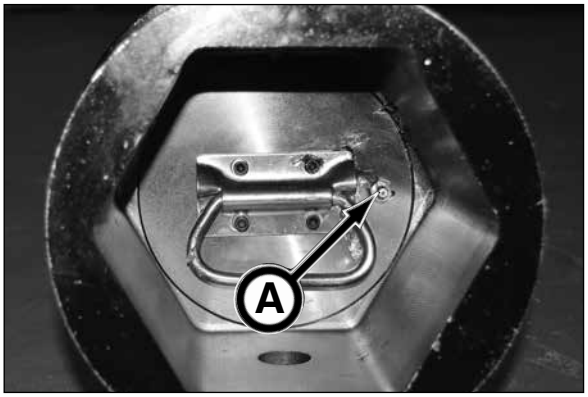
8. Gain access to the bearing swivel grease fitting (A).

9. Load grease gun with Paragon® 3000 Grease or equivalent.

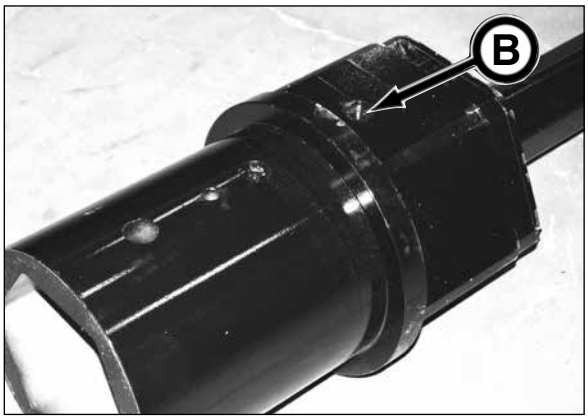


10. Place grease gun to grease fitting and pump grease until it is purged out of the vent port (B). Check purged grease for any signs of contamination.

    If there are no signs of contamination, proceed to step 11.

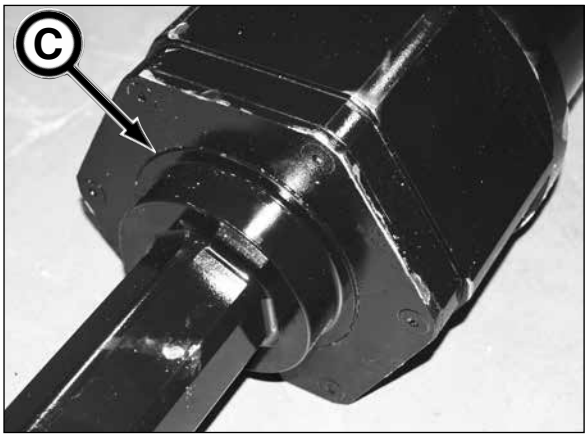
    If there are signs of contamination, contact your Akkerman Aftermarket Support representative.

11. Replace plug to vent port (B).



12. Continue pumping grease while rotating the swivel until grease is purged out of the front bearing swivel seal area (C).

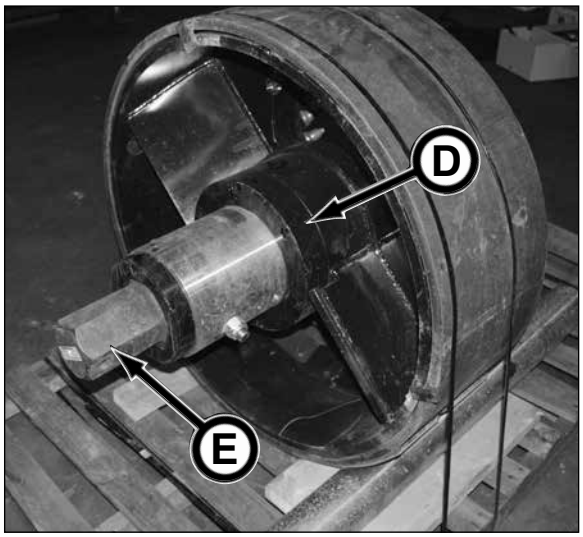
13. Remove grease gun.



14. Reinstall bearing swivel assembly into GRS assembly as follows:

15. Replace swivel retainer (D) and secure with six 5/8 UNC x 2.5 socket head cap screws. Tighten to 170 ft-lb (231 N·m) (lubricated) torque.

16. Replace male adapter (E) and secure with 1 x 10” adapter bolt and nut.



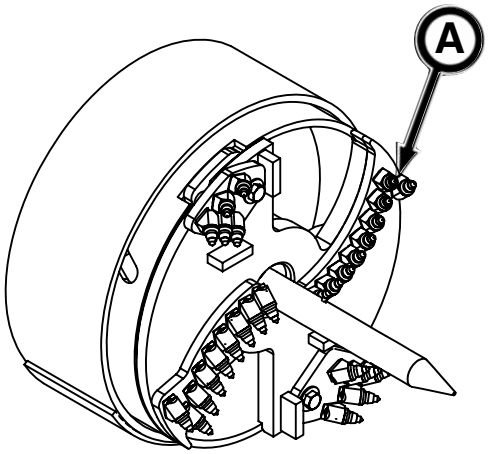
3. INSPECT TEETH

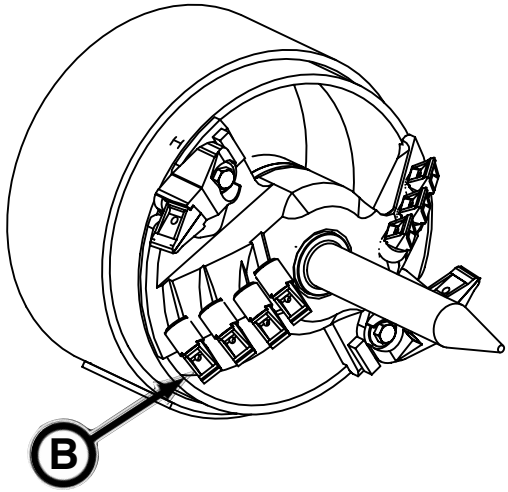
Check all carbide bullet teeth (A) and spade teeth (B) for wear or damage. If worn or damaged, replace with new. In addition, check tooth receiver (holder) for wear or damage. If worn or damaged, replace with new.

The bullet teeth should rotate with light resistance.

When replacing teeth:
- thoroughly clean the tooth receiver before installing new tooth.

- NEVER directly strike the tooth when installing. Place a wood block over the tooth to prevent damage while installing the tooth.





4. VISUALLY INSPECT SUPPORTING EQUIPMENT

NOTICE Refer to your supporting equipment manuals for more information.

Perform a visual inspection of the supporting equipment. Inspect structures, cylinders, mountings and lubricant levels.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

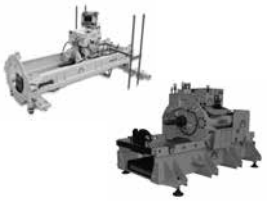
Check for oil or coolant leaks, and debris buildup. Make repairs as needed and remove debris.

Check air intake and exhaust system hoses and connections. Replace any defective parts.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

Tighten hardware as needed. Do not overtighten hardware.

Be sure all decals are clean and readable. Replace missing or damaged decals.

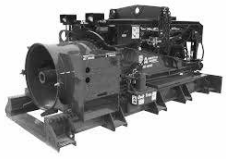


Jacking Frame

Power Pack

Bentonite & Lubrication Pump

Reception Shaft Breakout Tool



Auger Boring Machine

COMPLETION OF EACH DRIVE

5. CLEAN & INSPECT GRS ASSEMBLY & CASING

Perform a visual inspection of the GRS assembly and casing. Inspect structures, mountings (cutter wings) teeth/tooth holders and bearing swivel.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

Check for grease leakage and debris buildup. Clean dirt and debris. Make repairs as needed.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

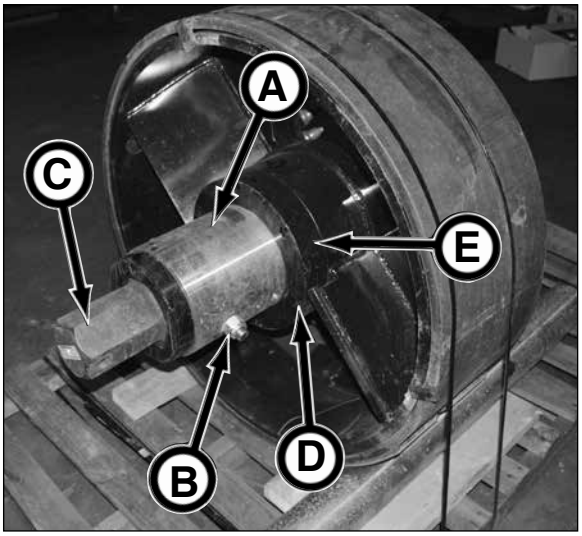
Tighten hardware as needed. Do not overtighten hardware.

Thoroughly flush GRS-50 with water to clean the unit of dirt and debris before the dirt hardens to the assembly.

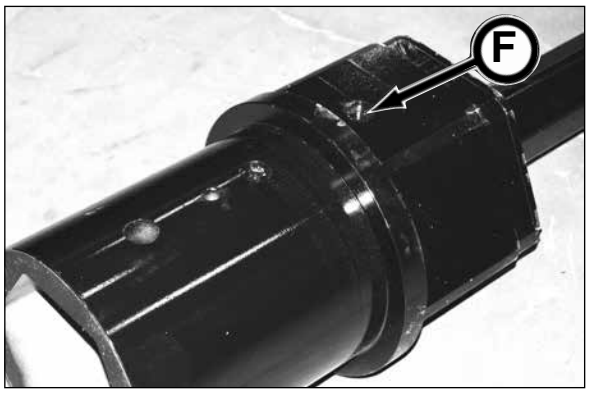
6. LUBRICATE BEARING SWIVEL

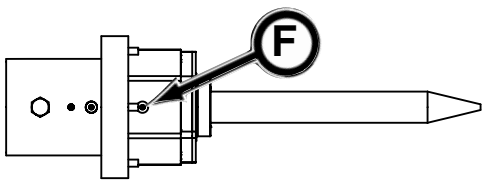
The GRS-50 bearing swivel must be lubricated prior to each job launch AND at the completion of each drive.

⚠WARNING Assemblies are heavy. Use proper devices to prevent assembly from unexpectedly moving during lubrication procedure.



1. CAREFULLY remove the bearing swivel assembly (FA49160F) (A) from the GRS-50 assembly as follows:
2. Remove 1 x 10” adapter bolt and nut (B).
3. Remove male adapter (C) from bearing swivel assembly.
4. Remove swivel retainer hardware, six 5/8 UNC x 2.5 socket head cap screws (D).
5. Remove swivel retainer (E).
6. Remove plug (F) from vent port.
7. Secure the bearing swivel from moving during lubrication process.

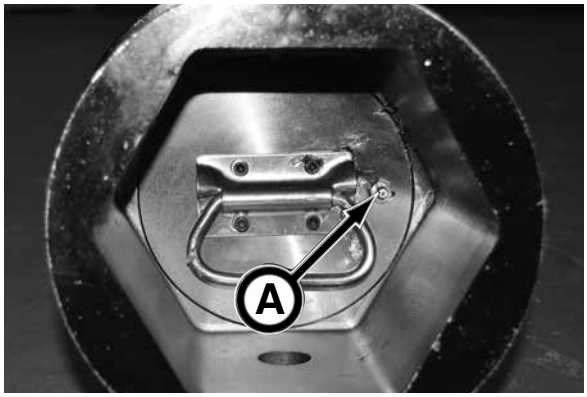




(Continued on next page)

8. Gain access to the bearing swivel grease fitting (A).

9. Load grease gun with Paragon® 3000 Grease or equivalent.

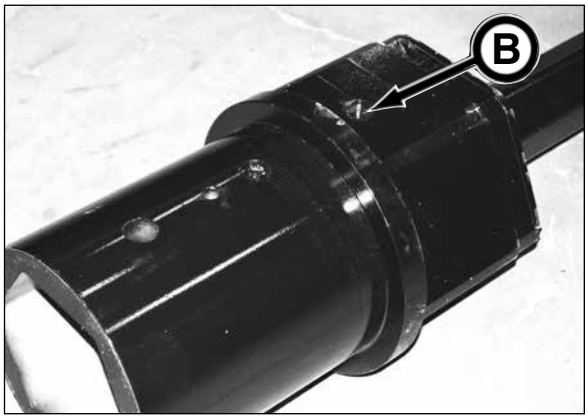


10. Place grease gun to grease fitting and pump grease until it is purged out of the vent port (B). Check purged grease for any signs of contamination.

    If there are no signs of contamination, proceed to step 11.

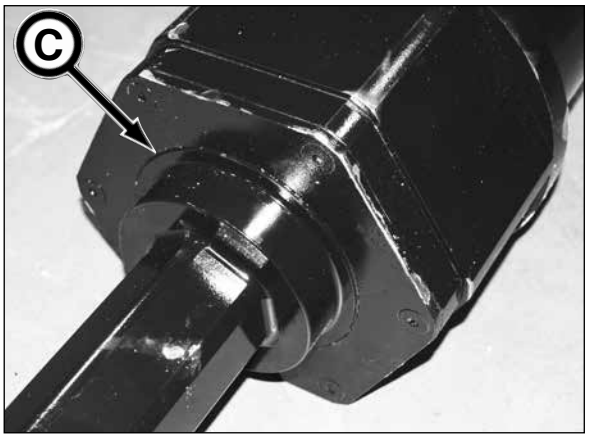
    If there are signs of contamination, contact your Akkerman Aftermarket Support representative.

11. Replace plug to vent port (B).



12. Continue pumping grease while rotating the swivel until grease is purged out of the front bearing swivel seal area (C).

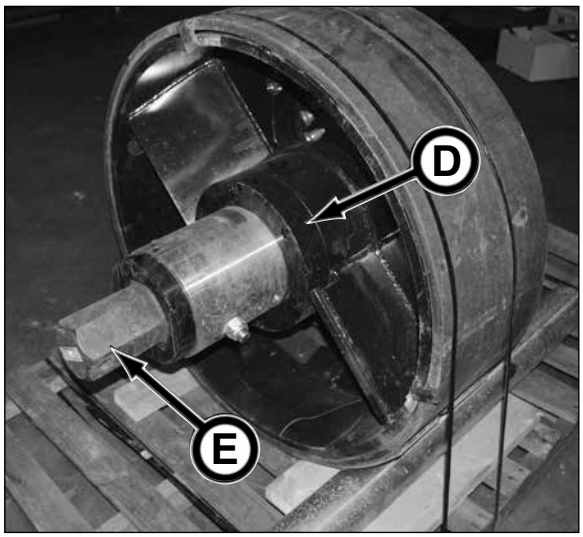
13. Remove grease gun.



14. Reinstall bearing swivel assembly into GRS assembly as follows:

15. Replace swivel retainer (D) and secure with six 5/8 UNC x 2.5 socket head cap screws. Tighten to 170 ft-lb (231 N·m) (lubricated) torque.

16. Replace male adapter (E) and secure with 1 x 10” adapter bolt and nut.



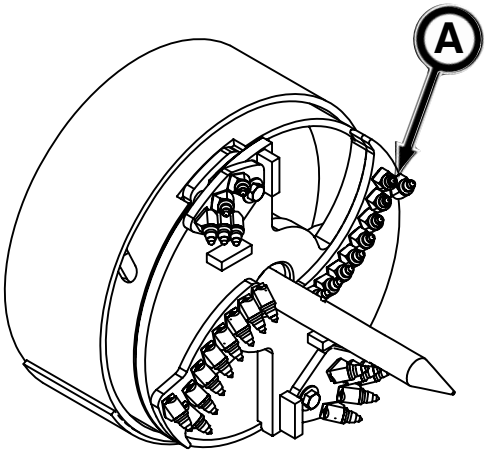
7. INSPECT TEETH

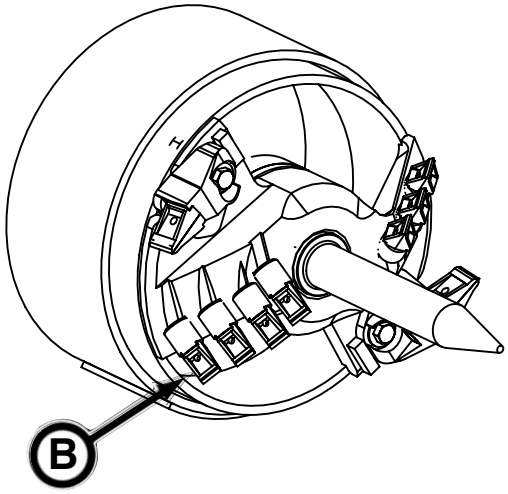
Check all carbide bullet teeth (A) and spade teeth (B) for wear or damage. If worn or damaged, replace with new. In addition, check tooth receiver (holder) for wear or damage. If worn or damaged, replace with new.

The bullet teeth should rotate with light resistance.

When replacing teeth:
- thoroughly clean the tooth receiver before installing new tooth.

- NEVER directly strike the tooth when installing. Place a wood block over the tooth to prevent damage while installing the tooth.





8. VISUALLY INSPECT SUPPORTING EQUIPMENT

NOTICE Refer to your supporting equipment manuals for more information.

Perform a visual inspection of the supporting equipment. Inspect structures, cylinders, mountings and lubricant levels.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

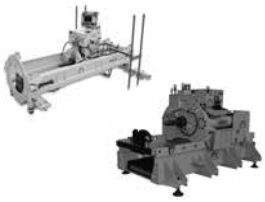
Check for oil or coolant leaks, and debris buildup. Make repairs as needed and remove debris.

Check air intake and exhaust system hoses and connections. Replace any defective parts.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

Tighten hardware as needed. Do not overtighten hardware.

Be sure all decals are clean and readable. Replace missing or damaged decals.

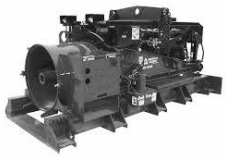


Jacking Frame

Power Pack

Bentonite & Lubrication Pump

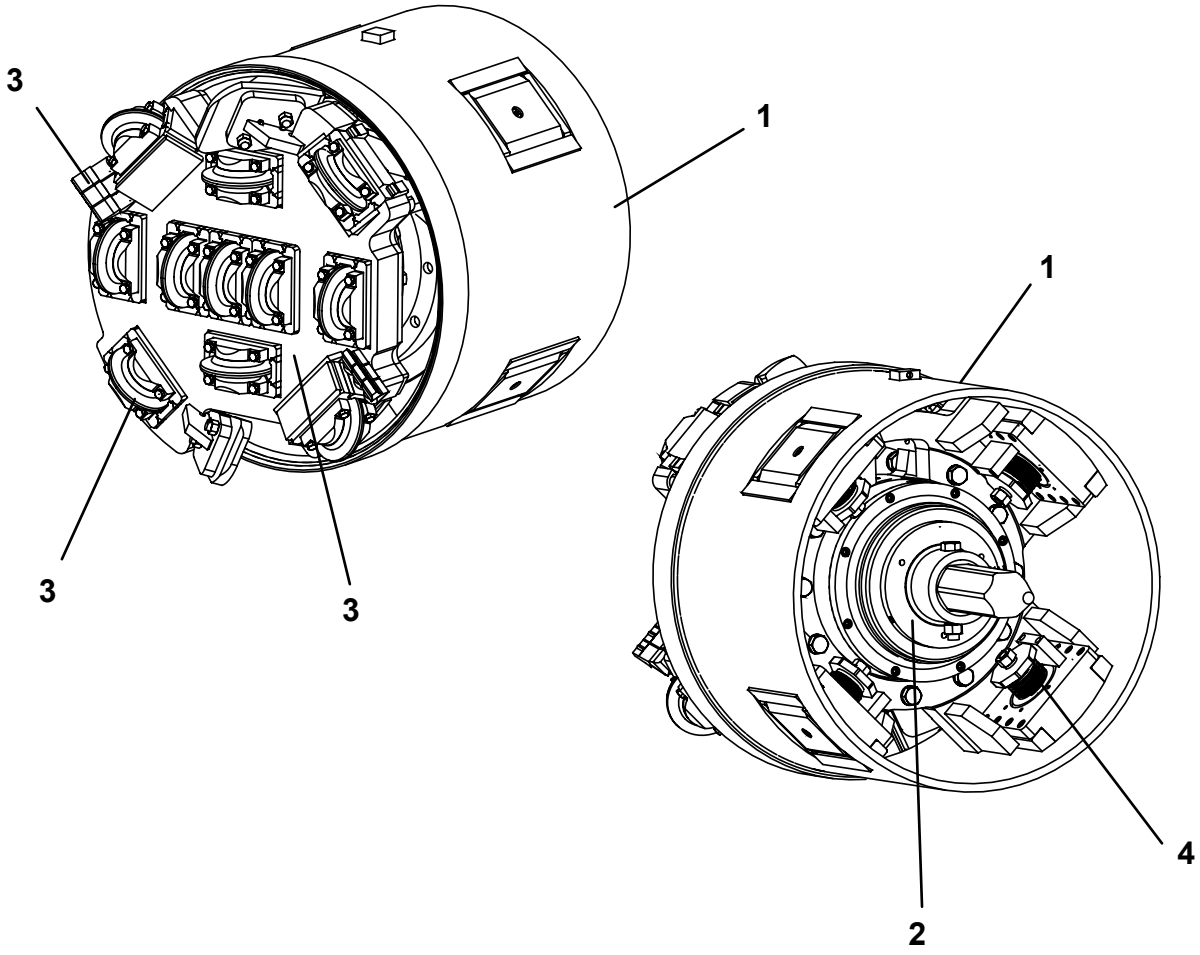
Reception Shaft Breakout Tool



Auger Boring Machine

MAINTENANCE CHARTS - RBU

NOTICE Use the item number in the chart to refer to the detailed maintenance instructions later in this section.

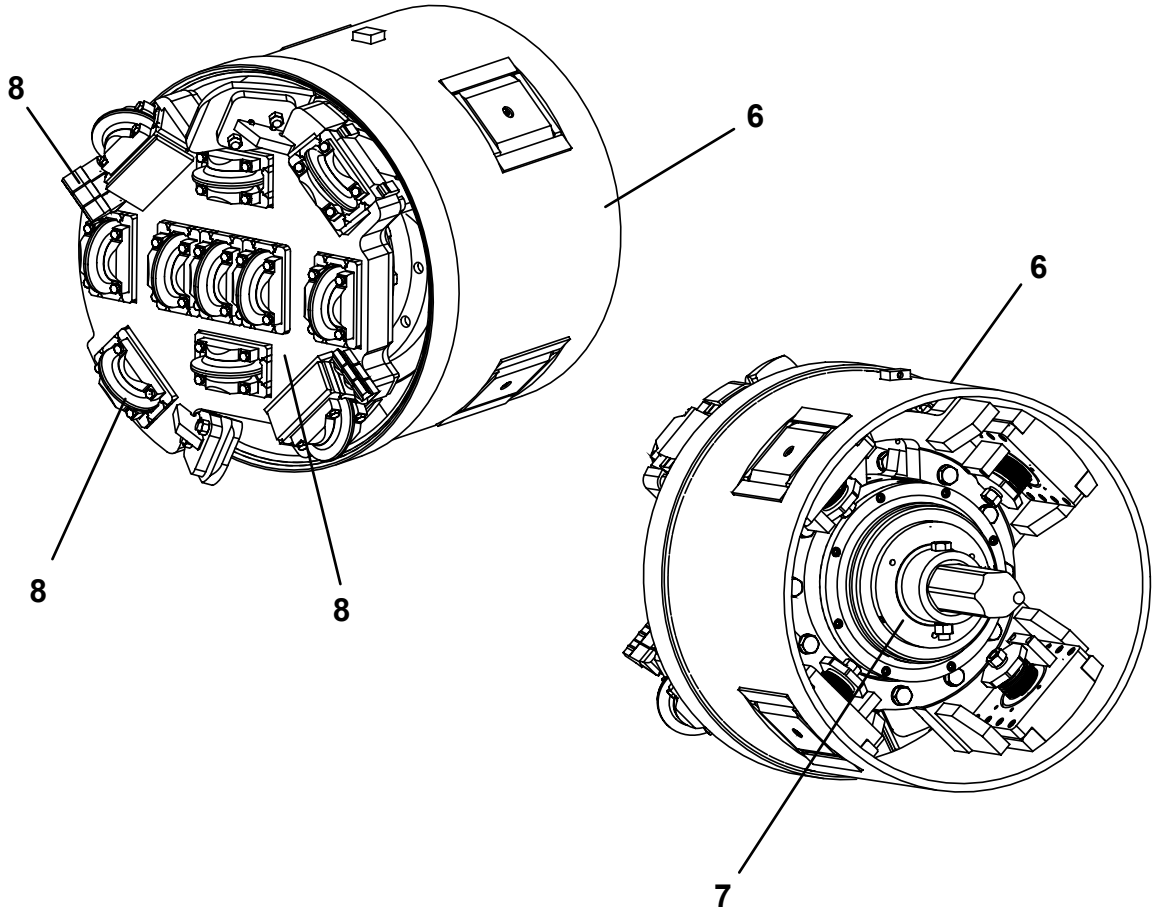


PRIOR TO EACH JOB LAUNCH

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
1.	RBU Assembly & Casing	Clean & Inspect	If parts are damaged or missing, repair or replace with new.	
2.	Bearing Cavity	Inspect	Refer to maintenance detail.	Mobil SHC 630
3.	Cutter Head	Maintenance	Refer to maintenance detail.	Paragon 3000
4.	Stabilizer Shoe & Screws	Clean/ Lubricate (4 places)	Lubricate generously.	Mobil XHP 222
5.	Supporting Equipment*	Inspect	Refer to equipment manual. Check for wear.	

* Not Shown

NOTICE Use the item number in the chart to refer to the detailed maintenance instructions later in this section.



COMPLETION OF EACH DRIVE

ITEM	COMPONENT	SERVICE	REQUIREMENT	MATERIAL
6.	RBU Assembly & Casing	Clean & Inspect	If parts are damaged or missing, repair or replace with new.	
7.	Bearing Cavity	Drain & Fill Cavity	Refer to maintenance detail.	Mobil SHC 630
8.	Cutter Head	Maintenance	Refer to maintenance detail.	Paragon 3000
9.	Supporting Equipment*	Inspect	Refer to equipment manual. Check for wear.	

* Not Shown

PRIOR TO EACH JOB LAUNCH

1. CLEAN & INSPECT RBU ASSEMBLY & CASING

Perform a visual inspection of the RBU assembly and casing. Inspect structures, mountings, teeth/holders and bearing housing.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

Check for grease leakage and debris buildup. Clean dirt and debris. Make repairs as needed.

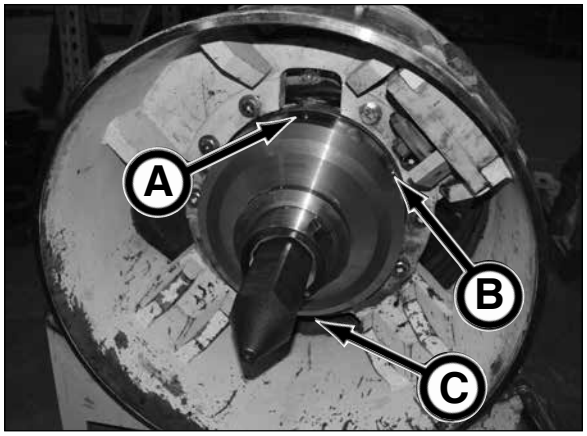
Check for loose, damaged, or missing parts. Repair or replace as necessary.

Tighten hardware as needed. Do not overtighten hardware.

2. INSPECT BEARING CAVITY

The RBU bearing cavity must be inspected prior to each job launch AND maintained at the completion of each drive. Failure to do so may result in the RBU failing underground.

NOTICE This inspection may not be necessary if the completion of each drive bearing cavity maintenance (maintenance item 7) has been performed.



1. Orient the RBU with the fill (A) (12 o'clock position) and check (B) (2 o'clock position) ports as shown and secure to prevent rolling.

2. Clean area around the fill, check and drain (C) ports of the bearing housing to prevent contamination from entering bearing cavity during inspection.

3. Check the oil condition of the bearing cavity by draining a measured sampling of the oil. Replace drain plug.

4. Inspect the drained oil for contaminants.

5. If the bearing cavity oil shows any signs of contamination (water, grease, metal fragments, milky or foaming oil), the bearing or mechanical seals may be damaged and must be replaced.

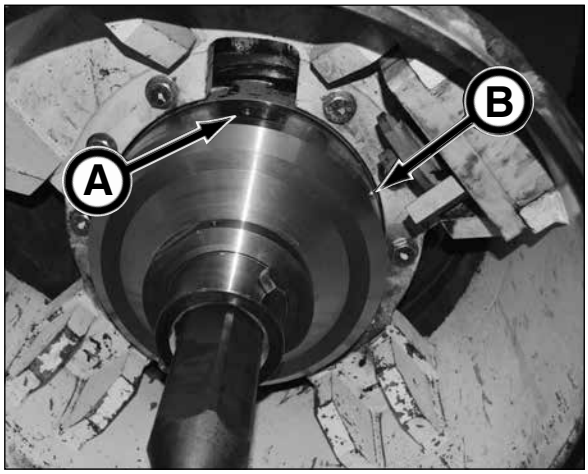
NOTICE Precise bearing and/or mechanical seal replacement is critical to prevent contamination from entering the bearing cavity. The bearing and/or mechanical seal replacement MUST be performed by an experienced technician. Contact your Akkerman Aftermarket Support representative for replacement.

(Continued on next page)

6. Gain access to the fill (A) and check (B) plugs. Clean area around the fill and check plugs to prevent contamination from entering bearing. Remove both fill and check plugs.

7. If lubricant is at check port level, replace both fill and check plugs.

8. If lubricant is not at check plug level, add Mobil SHC™ 630 Synthetic Bearing and Gear oil or equivalent into fill port until the lubricant is level with the check port. Replace both fill and check plugs.



3. PERFORM CUTTER HEAD MAINTENANCE

NOTICE For further information on disc cutter maintenance, refer to the manufacturer's cutter maintenance and installation manual. Contact your Akkerman Aftermarket Support representative for a copy of the manual for your specific cutters.
When using Akkerman disc cutters, refer to 050169A Installation & Maintenance Manual for additional lubricant and maintenance details.

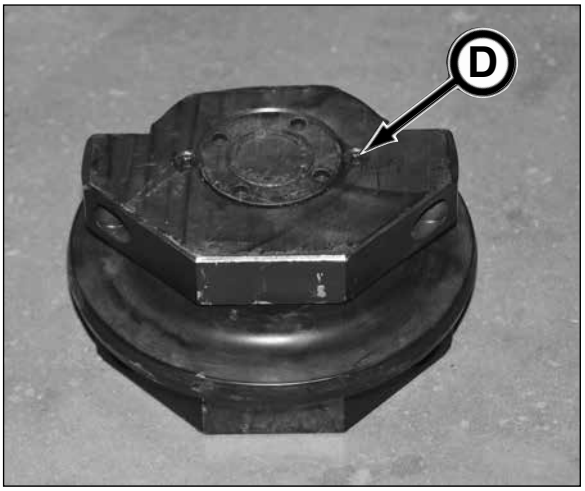
1. Before each launch, each disc cutter (C) must be removed and the grease on the inside of the cutter must be checked and purged.

   A. On one side of the disc cutter, remove plug (D) and take a small sampling of the grease on the inside of the cutter.
   If the sampling shows evidence of water, dirt, metal, dark black, burnt smell from the grease or if there is a large void of air on the inside of the disc cutter, the cutter must be rebuilt per the cutter manufacturer's instructions (contact your Akkerman Aftermarket Support representative for the maintenance and installation manual for your cutters) or replaced with new.

   B. On one side of the disc cutter, remove plug (if not already performed in 1A) and install a grease fitting. On the other side of the cutter disc, remove the plug. Pump Paragon® 3000 grease or equivalent until the old grease is purged out of the open port.

   C. After purging grease through disc cutter disc, a small amount of air must be added to the cutter to allow for grease expansion created during cutter operation. Add air to the cutter to only remove a maximum of 1/2 to 1 tsp of grease.

   D. Remove grease fitting and replace both plugs.



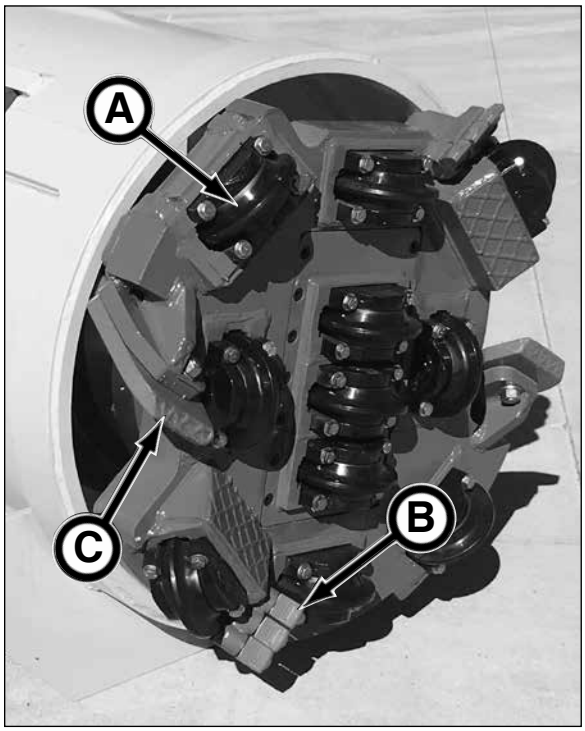
Disc Cutter Assembly Showing Grease Port Plug (C)

(Continued on next page)

2. Completely clean the cutter externally including the grooves between the disc cutter and mount. If debris is allowed to dry in these areas, it will be difficult to rotate the disc cutter resulting in failure.

3. Check for signs of lubricant leakage from the disc cutter. If there is any leakage, the cutter must either be repaired or replaced with new (contact your Akkerman Aftermarket Support representative for the maintenance and installation manual for your cutters).

4. When installing new or repaired disc cutters (A), ALWAYS replace with new hardware as follows:



Akkerman 6.63" Disc Cutters
- PN: P0001-08-011B
  SCREW, Hex Head Cap
  1/2 UNC x 2.75 Grade 9 Zinc
- PN: P0043-003
  WASHER, Nord Lock 1/2
- Tighten mounting hardware to 94 ft-lbs. lubricated

NOTICE For more information on disc cutter maintenance, refer to the manufacturer's disc cutter maintenance and installation manual.

5. If there are any flat spots visible on the disc cutter, this is an indication that the cutter is skidding. This may be a result of a damaged bearing. Replace any disc cutter with flat spots with a new disc cutter.

6. If a disc cutter is cracked, shows signs of chipping or other excessive wear, the cutter disc must be replaced.

7. When the disc cutters are removed, thoroughly clean the cutter housing. Be sure the housing is clean and free of any sharp edges, protrusions and other foreign matter.

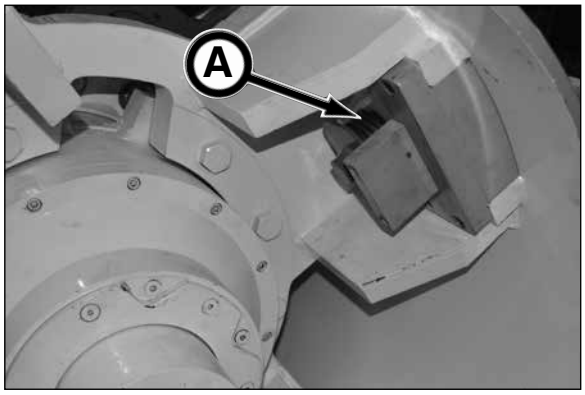
8. Inspect the housing and mounts for excessive wear. Repair or replace as needed.

9. Inspect cutter bit teeth (B) and paddles (C) for excessive wear. Replace as needed.

When replacing teeth:
- thoroughly clean the tooth receiver before installing new tooth.

- NEVER directly strike the tooth when installing. Place a wood block over the tooth to prevent damage while installing the tooth.

4. CLEAN / LUBRICATE STABILIZER SHOES & ADJUSTMENT SCREWS



Remove stabilizer shoes, clean out debris from pocket areas. Replace stabilizer shoes.

Generously lubricate the stabilizer adjustment screws (A) (four places) with Mobilgrease® XHP222 Premium Lubricating Grease or equivalent.

5. VISUALLY INSPECT SUPPORTING EQUIPMENT

NOTICE Refer to your supporting equipment manuals for more information.

Perform a visual inspection of the supporting equipment. Inspect structures, cylinders, mountings and lubricant levels.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

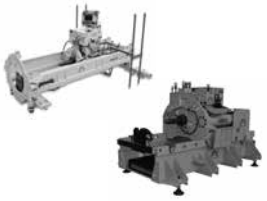
Check for oil or coolant leaks, and debris buildup. Make repairs as needed and remove debris.

Check air intake and exhaust system hoses and connections. Replace any defective parts.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

Tighten hardware as needed. Do not overtighten hardware.

Be sure all decals are clean and readable. Replace missing or damaged decals.



Jacking Frame

Power Pack

Bentonite & Lubrication Pump

Auger Boring Machine

COMPLETION OF EACH DRIVE

6. CLEAN & INSPECT RBU ASSEMBLY & CASING

Perform a visual inspection of the RBU assembly and casing. Inspect structures, mountings, teeth/holders and bearing housing.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

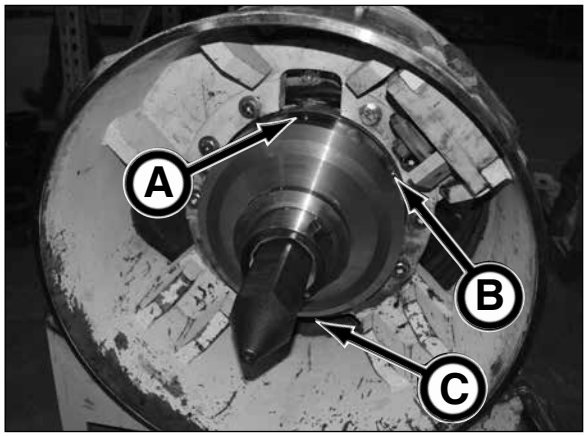
Check for grease leakage and debris buildup. Clean dirt and debris. Make repairs as needed.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

Tighten hardware as needed. Do not overtighten hardware.

Thoroughly flush RBU with water to clean the RBU of dirt and debris before the dirt hardens to the RBU assembly.

7. DRAIN & FILL BEARING CAVITY



1. Orient the RBU with the fill (A) (12 o'clock position), check (B) (2 o'clock position) and drain (C) (6 o'clock position) ports as shown.

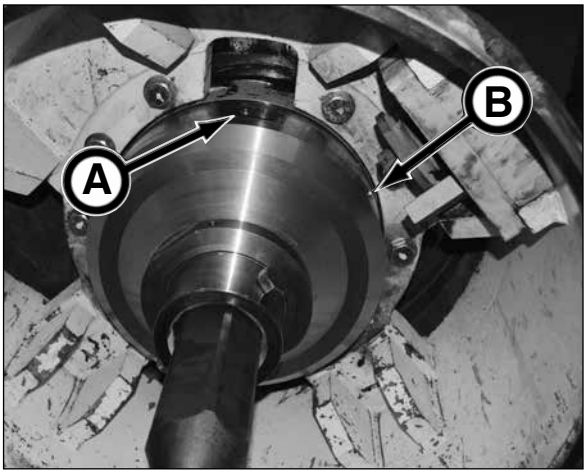
2. With the RBU assembly secured to prevent rolling, gain access to the fill and drain plugs. Clean area around the fill, check and drain plugs to prevent contamination from entering bearing cavity.

3. Place a suitable sized catch container under the drain plug.

4. Remove the fill (A) and drain (C) plugs. Once all oil is drained, replace the drain plug.

5. Inspect the drained oil for contaminants. Once inspected, dispose of oil properly.

NOTICE If the bearing cavity oil shows any signs of contamination (water, grease, metal fragments, milky or foaming oil), the bearing or mechanical seals may be damaged and must be replaced. Contact your Akkerman Aftermarket Support representative for replacement.



6. Remove check plug (B).

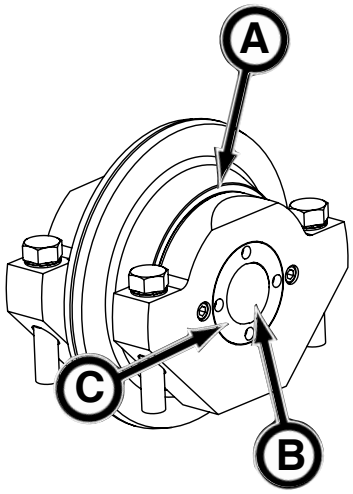
7. Add new Mobil SHC™ 630 Synthetic Bearing and Gear oil or equivalent (approx. 2 gal [7.6 L]) into fill port until the lubricant is level with the check port. Replace both top and check plugs.

8. Affix an information tag to the RBU stating that the bearing oil has been replaced and oil levels checked. Include date completed.

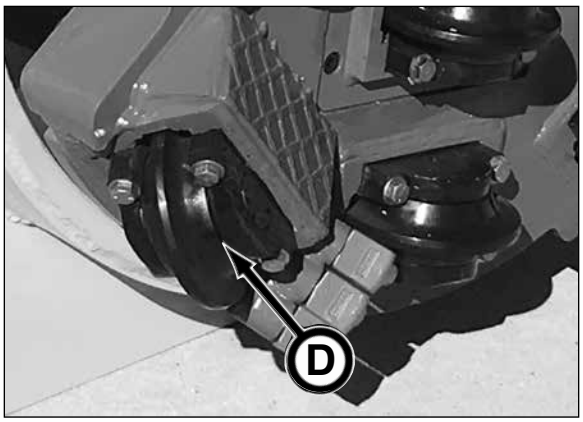
8. PERFORM CUTTER HEAD MAINTENANCE

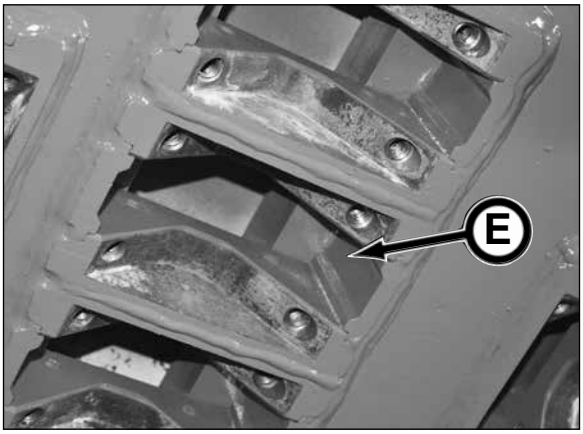
NOTICE For more information on disc cutter maintenance, refer to the manufacturer's disc cutter maintenance and installation manual. Contact your Akkerman Aftermarket Support representative for a copy of the manual for your specific cutters.
When using Akkerman disc cutters, refer to 050169A Installation & Maintenance Manual for additional lubricant and maintenance details.

Inspect disc cutters as follows:



1. Check for signs of lubricant leakage from around the cutter end plates and disc cutter (A). If leakage is found, DO NOT install the cutter. The cutter MUST be repaired or replaced before mounting onto cutter head.
2. Inspect disc cutter shaft (B) and nut (C) for damage. If damaged, replace with new disc cutter.
3. If any flat spots or polished marks are visible on the cutter, this is an indication that the cutter is skidding, and is most likely a result of a damaged bearing. Install a new cutter to replace any cutter with polished or flat spots.
4. If a disc cutter is cracked, shows signs of chipping or other excessive wear, the disc cutter must be replaced.
5. The disc cutter should rotate by hand with considerable resistance. If it does not rotate, a bearing may be worn or damaged. Replace bearing.
6. If the mounting bolts are worn or damaged, replace with new.
7. Completely clean the cutter externally including the grooves between the disc cutter and mount (D). If debris is allowed to dry in these areas, it will be difficult to rotate the disc cutter resulting in failure.





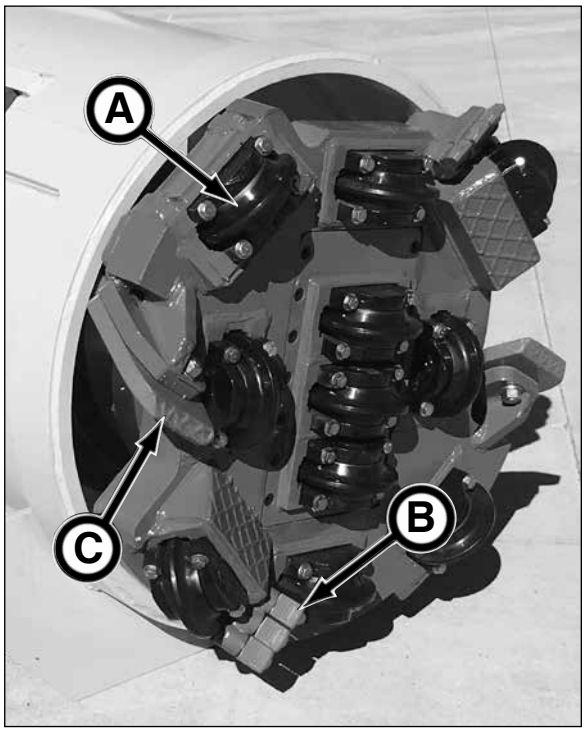
8. Clean cutter housing as follows:
   • Be sure the housing (E) area is clean and free of any sharp edges, protrusions and other foreign matter.

   • Inspect the housing and mounts for excessive wear. Repair or replace as needed.

(Continued on next page)

9. When installing new or repaired disc cutters (A), ALWAYS replace with new hardware as follows:

   Akkerman 6.63" Disc Cutters
   - PN: P0001-08-011B
     SCREW, Hex Head Cap
     1/2 UNC x 2.75 Grade 9 Zinc
   - PN: P0043-003
     WASHER, Nord Lock 1/2
   - Tighten mounting hardware to 94 ft-lbs. lubricated



NOTICE For more information on disc cutter maintenance, refer to the manufacturer's disc cutter maintenance and installation manual.

- If there are any flat spots visible on the disc cutter, this is an indication that the cutter is skidding. This may be a result of a damaged bearing. Replace any disc cutter with flat spots with a new disc cutter.

- If a disc cutter is cracked, shows signs of chipping or other excessive wear, the cutter disc must be replaced.

- When the disc cutters are removed, thoroughly clean the cutter housing. Be sure the housing is clean and free of any sharp edges, protrusions and other foreign matter.

- Inspect the housing and mounts for excessive wear. Repair or replace as needed.

10. Inspect cutter bit teeth (B) and paddles (C) for excessive wear. Replace as needed.

    When replacing teeth:
    - thoroughly clean the tooth receiver before installing new tooth.

    - NEVER directly strike the tooth when installing. Place a wood block over the tooth to prevent damage while installing the tooth.

9. VISUALLY INSPECT SUPPORTING EQUIPMENT

NOTICE Refer to your supporting equipment manuals for more information.

Perform a visual inspection of the supporting equipment. Inspect structures, cylinders, mountings and lubricant levels.

Immediately report any structural problems to your Akkerman Aftermarket Support representative.

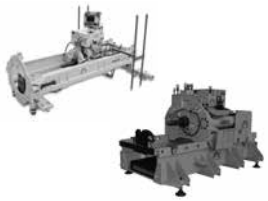
Check for oil or coolant leaks, and debris buildup. Make repairs as needed and remove debris.

Check air intake and exhaust system hoses and connections. Replace any defective parts.

Check for loose, damaged, or missing parts. Repair or replace as necessary.

Tighten hardware as needed. Do not overtighten hardware.

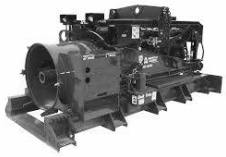
Be sure all decals are clean and readable. Replace missing or damaged decals.



Jacking Frame

Power Pack

Bentonite & Lubrication Pump



Auger Boring Machine

NOTES

Storage

PREPARING FOR STORAGE

NOTICE Refer to your supporting equipment manuals for more information on storing the equipment.

1. Repair worn or damaged parts.

2. Wash all equipment thoroughly.

3. Repaint equipment where necessary.

4. Inspect each disc cutter for leaks. If leaks appear, the cutter must be repaired or replaced.

5. Check to be sure each disc cutter rotates by hand with considerable resistance. If not, the cutter must be repaired or replaced.

6. Store GRS-50, RBU with disc cutters and additional disc cutters under cover and out of the weather in a ventilated area. Always store disc cutters away from heat and out of direct sunlight. Otherwise the grease may expand and damage the seals.

7. If RBU and disc cutters will be stored for a long period of time, it is recommended that the disc cutter lubricant be removed and replaced with fresh lubricant.

REMOVING FROM STORAGE

NOTICE Refer to your supporting equipment manuals for more information on removing the equipment from storage.

1. Clean equipment thoroughly.

2. Follow the periodic maintenance requirements in section 9, Periodic Maintenance.

3. Check carbide cutter bit teeth to be sure they are not damaged and can be rotated with some resistance.

4. Inspect disc cutters for leaks. Repair or replace as necessary.

5. Check to be sure each disc cutter rotates by hand with considerable resistance. If not, the cutter must be repaired or replaced.

6. If the RBU and/or disc cutters have been stored for a long period of time, the lubricant in the disc cutters must be replaced with fresh lubricant.

7. Perform maintenance as described in Section 9, Periodic Maintenance.

8. Be sure to keep all extra disc cutters under cover and out of the weather in a ventilated area. Always store disc cutters away from heat and out of direct sunlight. Otherwise the grease may expand and damage the seals.

9. Review this manual and all supporting operation and maintenance manuals before operating the equipment.

NOTES

Troubleshooting

NOTICE For additional troubleshooting information, refer to your equipment Operator's Manual.

GRS-50

Problem	Cause	Solution
Slow advance rate.	Head clogged.	Add water/polymer as needed to ease flow of material through cutter head.
Shaft is loose.	Over loading, side loading and/or high thrust load. Damaged seal.	Free up pilot tube string prior to installing GRS. Check bearing preload. If loose, bearing must be rebuilt.
Bearing swivel shaft bent.	High thrust load in mixed ground or obstacle caused casing deflection.	Slow advance rate. Remove object. Repair or replace swivel as needed.

RBU

Problem	Cause	Solution
Slow advance rate.	Running at half rpm.	Rotate to recommended rate of 20 rpm.
	Low thrust force.	Increase thrust load.
Bearing locked up.	Bearing seal failure, overloading, contamination.	Replace bearing seals. May require complete refurbishment.
Debris buildup in head.	No water or lack of water.	Add or increase water supply usage.

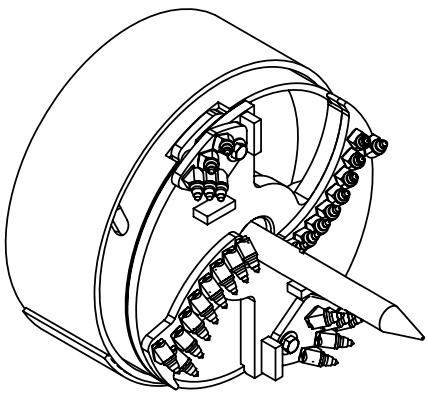
NOTICE For additional disc cutter troubleshooting information, refer to your disc cutter manufacturer owner's manual.

Akkerman Disc Cutters - 6.63"

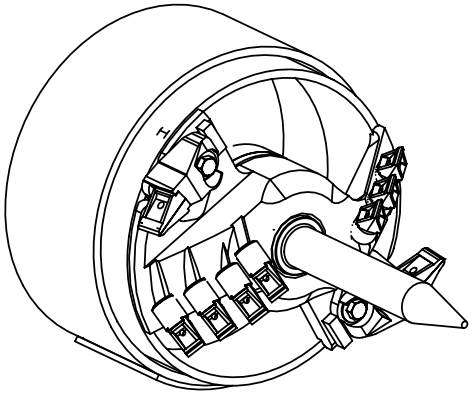
Problem	Cause	Solution
Disc cutters have flat spots or polished marks on the cutting surface.	Bearing is worn or damaged.	Replace bearing and/or cutter. Contact your Akkerman Aftermarket Support Representative for bearing replacement.
There is end play or slack between the shaft and end plate, or a loose or rough feel when turning the cutter in its mount.	The disc cutter shaft nut was not properly tightened.	Check for cutter damage. Tighten shaft nut.
	Mounting bolts not properly tightened.	Check for cutter damage. Tighten bolts to 94 ft-lb torque.
	Bearing is worn or damaged.	Replace bearing. Contact your Akkerman Aftermarket Support Representative for bearing replacement.
Cutter will not turn.	Bearing is worn or damaged.	Replace bearing. Contact your Akkerman Aftermarket Support Representative for bearing replacement.
Signs of leakage from the seal area.	Faulty seal.	Replace seal. Contact your Akkerman Aftermarket Support Representative for seal replacement.
No lubrication is visible through the drain plugs.	Drain plug(s) is missing.	Flush and fully lubricate the cutter and replace drain plug(s).
	Faulty seal.	Replace seal. Contact your Akkerman Aftermarket Support Representative for seal replacement.
The mounting bolts cannot be properly tightened.	Debris in cutter housing or bolt hole.	Remove debris and replace mounting bolts and lock washers with new.
Newly lubricated cutters are leaking.	Grease in cutter expanded and ruptured the seals at one or both end plates.	Cutters must be stored in a cool location, out of direct sunlight. Contact your Akkerman Aftermarket Support Representative for repair.

Specifications

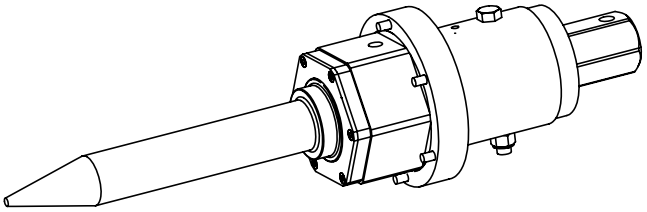
GRS-50



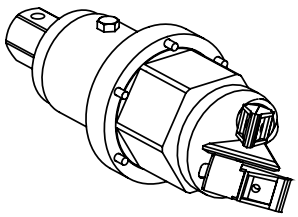
Flat Face



Aggressive



Bearing Swivel



Center Insert

Outside Diameter (OD)
- GRS-50 24 ..... 24 in. (610 mm)
- GRS-50 26 ..... 26 in. (660 mm)
- GRS-50 28 ..... 28 in. (711 mm)
- GRS-50 30 ..... 30 in. (762 mm)
- GRS-50 36 ..... 36 in. (914 mm)
- GRS-50 42 ..... 42 in. (1,067 mm)

Weight (with bearing swivel) (approx.)
- GRS-50 24 ..... 1,200 lbs. (544 kg)
- GRS-50 26 ..... 1,300 lbs. (590 kg)
- GRS-50 28 ..... 1,400 lbs. (635 kg)
- GRS-50 30 ..... 1,500 lbs. (680 kg)
- GRS-50 36 ..... 1,800 lbs. (816 kg)
- GRS-50 42 ..... 2,100 lbs. (953 kg)

Hex Shaft Connection ..... 4 in. (102 mm)

Working Continuous Load ..... 50 ton

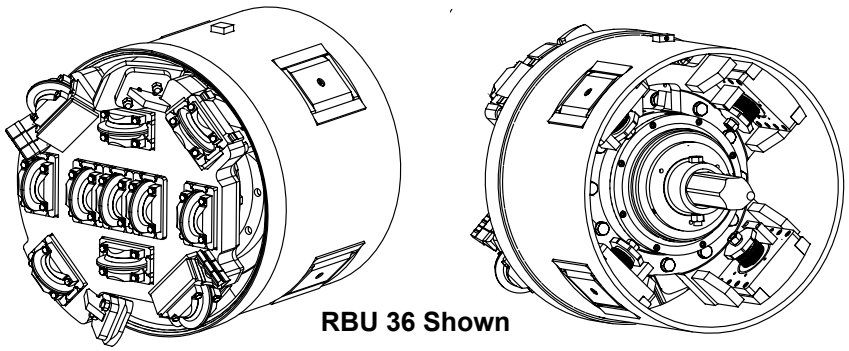
Cutter Teeth
- Flat Face ..... Carbide Bullet
- Aggressive ..... Spade

Bearing Swivel (FA49160F)
- Weight (approx.) ..... 375 lbs. (170 kg)
- Length ..... 43.25 in. (1,099 mm)
- Sleeve, Hex ..... 6 to 4 in. (152 to 102 mm) / 6 to 5 in. (152 to 127 mm)
- Swivel Lead Guide Rod Diameter ..... 3.625 in. (92 mm)

GRS Center Insert (Used For Unguided Operation)
- Weight (approx.) ..... 759 lbs. (344 kg)
- Length ..... 32.63 in. (829 mm)

Akkerman Inc. reserves the right to improve its products without notice or obligation.

RBU



RBU 36 Shown

Outside Diameter (OD)
- RBU 24 ..... 24 in. (610 mm)
- RBU 30 ..... 30 in. (762 mm)
- RBU 36 ..... 36 in. (914 mm)
- RBU 42 ..... 42 in. (1,067 mm)
- RBU 48 ..... 48 in. (1,219 mm)
- RBU 54 ..... 48 in. (1,219 mm)

Weight (approximate)
- RBU 24/30 ..... 2,200/2,800 lbs. (998/1,270 kg)
- RBU 36 ..... 4,000 lbs. (1,815 kg)
- RBU 42 ..... 4,700 lbs. (2,132 kg)
- RBU 48 ..... 7,350 lbs. (3,334 kg)
- RBU 54 ..... 8,900 lbs. (3,334 kg)

Length (front of disc cutter to end of hex connector needle shaft)
- RBU 24 ..... 46.375 in. (1,178 mm)
- RBU 30 ..... 47.75 in. (1,213 mm)
- RBU 36 ..... 48.125 in. (1,222 mm)
- RBU 42 ..... 48.125 in. (1,222 mm)
- RBU 48 ..... 50.375 in. (1,280 mm)
- RBU 54 ..... 54.9375 in. (1,395 mm)

Disc Cutters Quantity *(RBU 24 - 48 utilize 6.63" disc cutters; RBU 54 utilize 9.5 disc cutters)*
- RBU 24/30 9
- RBU 36 11
- RBU 42 MGH / RKH ..... 15 / 16
- RBU 48 MGH / RKH..... 15 / 18
- RBU 54 MGH..... 15

MGH - Mixed Ground Head RKH - Rock Head

Disc Cutter Diameter (RBU 24 - 48).....6.5 in. (170 mm)
Disc Cutter Diameter (RBU 54).....9.5 in. (240 mm)

Disc Cutter Radial Load Rating
- 6.63" ..... 12,000 lbs
- 9.5" ..... 17,600 lbs

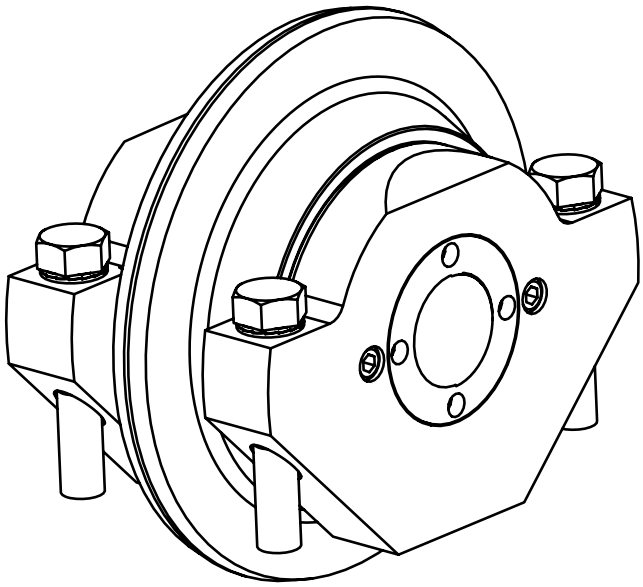
Rock Strength Rating (Uniaxial Compressive Strength) ..... Up to 25,000 psi UCS

Thrust Load Rating (Maximum)
- RBU 24/30 ..... 90,000 lbf (400,500 N)
- RBU 36 ..... 110,000 lbf (489,500 N)
- RBU 42 MGH/RKH ..... 150,000 / 160,000 lbf (667,000 / 711,500 N)
- RBU 48 MGH/RKH ..... 150,000 / 180,000 lbf (667,000 / 800,500 N)
- RBU 54 MGH ..... 216,000 lbf (960,800 N)

Rotation (Maximum) ..... 20 rpm

DISC CUTTER - AKKERMAN

NOTICE For further information on disc cutter maintenance, refer to the manufacturers cutter maintenance and installation manual. Contact your Akkerman Aftermarket Support representative for a copy of the manual for your specific cutters.



Cutting Diameter ..... 6.63 in. (168 mm)

Weight (approx.) ..... 23 lbs. (10 kg)

Radial Thrust Capacity (Nominal) ..... 6 Ton

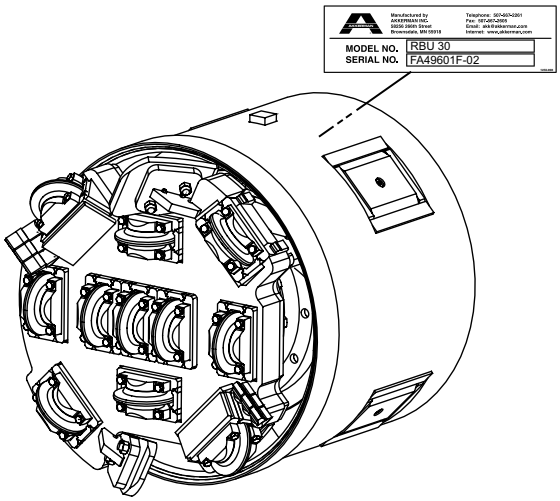
TORQUE CHART

Use these torque values as a guideline when tightening hardware unless otherwise specified in this manual.

Lubricated Coarse UNC Threads Grade 8 Fasteners			**Lubricated Fine UNF Threads Grade 8 Fasteners**		
Bolt Size	**Torque ft. lbs.**	**(N·m)**	**Bolt Size**	**Torque ft. lbs.**	**(N·m)**
1/4 - 20	10	(14)	1/4 - 28	11	(15)
5/16 - 18	20	(27)	5/16 - 24	22	(30)
3/8 - 16	35	(47)	3/8 - 24	39	(53)
7/16 - 14	56	(76)	7/16 - 20	62	(84)
1/2 - 13	85	(115)	1/2 - 20	96	(130)
9/16 - 12	123	(167)	9/16 - 18	137	(186)
5/8 - 11	170	(231)	5/8 - 18	192	(260)
3/4 - 10	301	(408)	3/4 - 16	336	(456)
7/8 - 9	450	(610)	7/8 - 14	500	(678)
1 - 8	680	(922)	1 - 12	740	(1003)
1-1/8 - 7	960	(1302)	1-1/8 - 12	1030	(1397)
1-1/4 - 7	1360	(1844)	1-1/4 - 12	1500	(2034)
1-1/2 - 6	2360	(3200)	1-1/2 - 12	2660	(3607)

Identification Numbers

Model and serial numbers are required when ordering parts or requesting service information. Record your model and serial numbers below.



Rock Boring Unit (RBU)

Model Number _____

Serial Number _____

NOTES

Safety Data Sheets

The Federal Occupational, Safety, and Health Administration (OSHA) Standard 29 CFR 1910.1200, require that specific safety data sheets (SDS) be available to employees before operating this equipment. This may include information on substances contained in this equipment such as fuel and gear lubricant.

Akkerman Inc. will provide, at no cost, SDS which apply to its product line. Simply contact your Akkerman Aftermarket Support representative for a copy.

To ensure a prompt response to your SDS request, include your return address (including zip or postal code) and the equipment's model numbers and serial numbers with your request.

NOTES

Warranty

Akkerman, Inc. warrants that all equipment manufactured by it be free from defects due to workmanship or material when normally used and serviced for a period of 90 days from the date of shipment by Akkerman, Inc. Normal wear and tear to the equipment, including, but not limited to cutter teeth, filters, etc. are not covered by this warranty. Akkerman, Inc. does not warrant that the equipment meets the requirements of any particular safety code or rule governing equipment classification. If the Customer has questions about local safety codes, rules or ordinances, authorities local to the project should be consulted.

In order to be considered as a potential warranty claim, the components in question must be returned to Akkerman, Inc. (freight prepaid) for factory inspection and analysis, and determination of warranty applicability. No warranty is provided for electronics or electrical components of any kind. The validity of all warranty claims are subject to the discretion and determination of the Akkerman Aftermarket Support Department. All such determinations are final.

NOTES

Parts

Contents

INTRODUCTION

This parts section of the manual contains assembly illustrations of the Akkerman GRS-50 and RBU upsize tooling. The illustrations in this manual are intended to show typical construction of various parts. In some instances, the details of parts illustrated may not exactly represent their actual appearance, but will help to identify parts performing the same functions.

LOCATING PARTS
This parts section is organized to help you locate parts information quickly. An Alphabetical Index, Section 17, is provided to determine the page number of the assembly a part is used. If the part number is known,the Numerical Index, Section 18, can also be utilized to find the page number of the assembly.

USE GENUINE AKKERMAN PARTS
The use of second-rate parts could affect the efficient performance of the GRS-50 and RBU equipment. ALWAYS use genuine Akkerman parts.

PARTS ORDERING
To order fast, accurate, and reliable parts service, call (800) 533-0386, (507) 567-2261, or fax (507) 567-2720, and provide the following information.

1. Model Number
2. Serial Number
3. Part Number, Description, and Quantity
4. Shipping Preference

MEASUREMENTS
The unit of measure in this manual is in inches unless indicated otherwise.

HARDWARE SPECIFICATION
All Akkerman products are assembled with SAE Grade 8 bolts, nuts, and washers. ALWAYS use matched fastener hardware when replacing or repairing the unit.

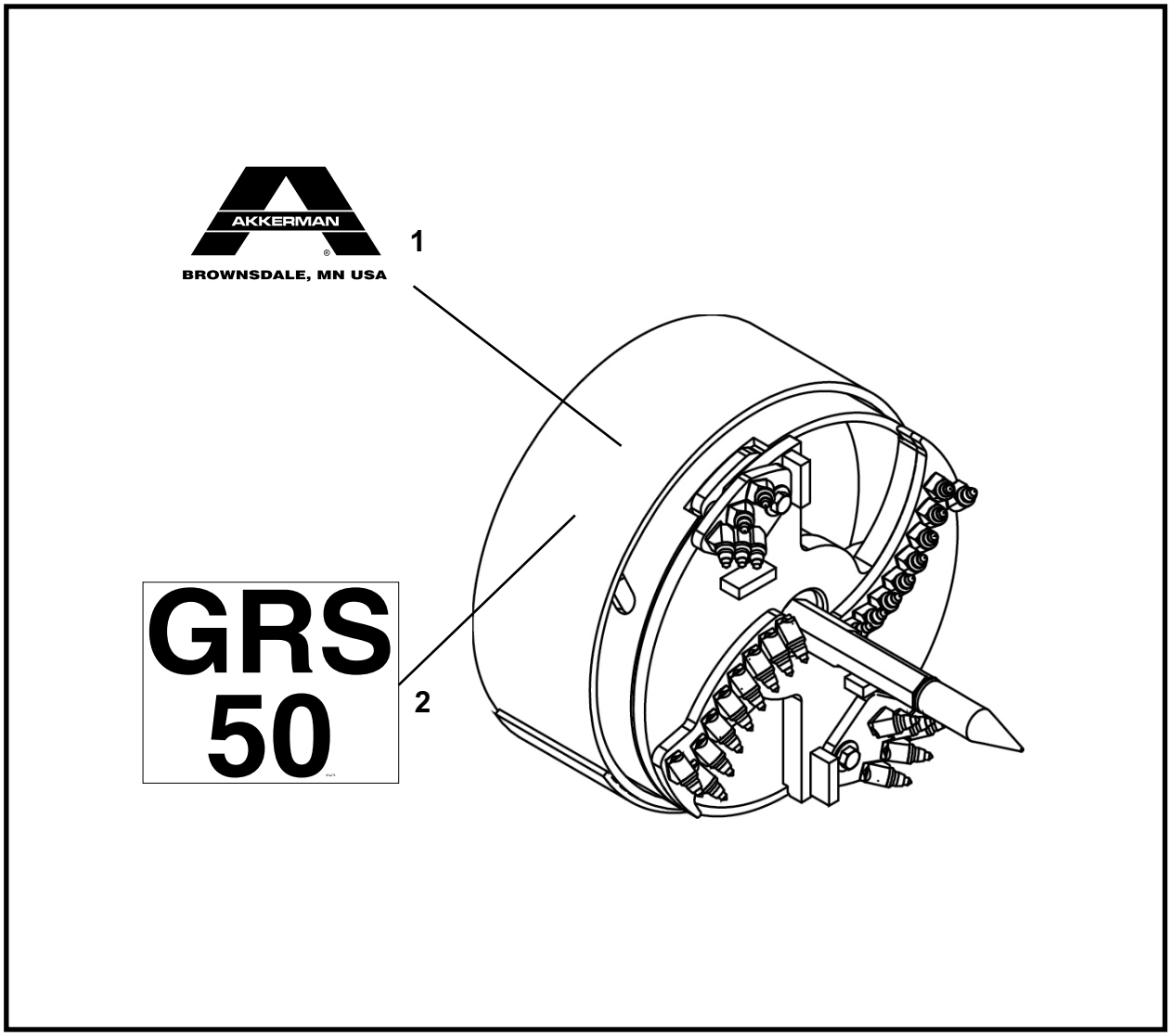
If you find any errors with this manual or have any suggestions for improvement, please let us know. Email your comments via the Akkerman web site (Contact Us web page), or mail your suggestions to: Akkerman Inc, ATTN: Technical Publications, 58256 266th Street, Brownsdale, MN 55918.

Akkerman Inc. reserves the right to improve its product without notice or obligation.

NOTES

GRS-50 DECAL KIT, 1255-082

GRS-50

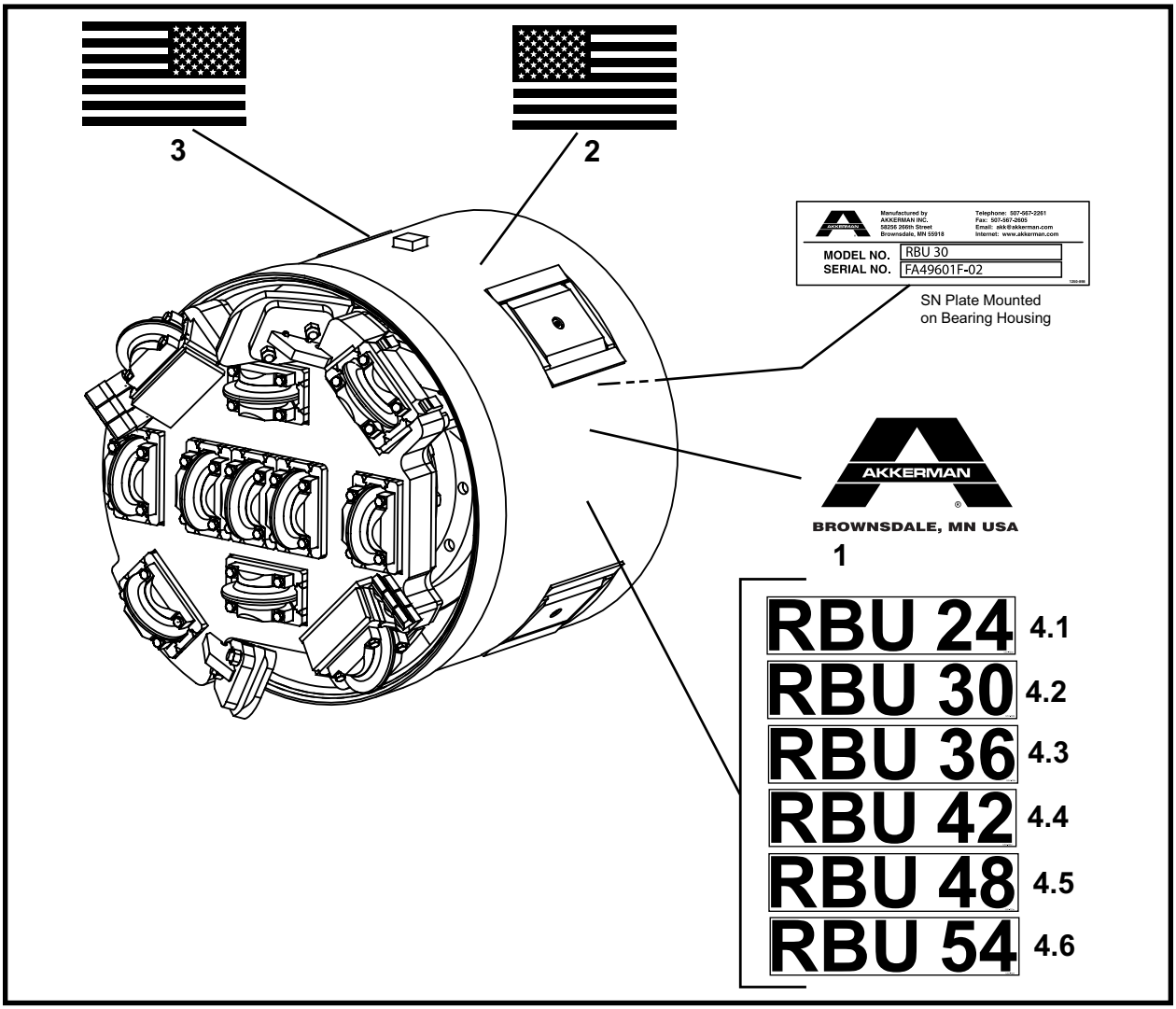


ITEM	QTY	PART NO.	DESCRIPTION
0	1	1255-082	KIT, DECAL, GRS 50
1.1	2	1251-776A	DECAL, GRS 50 (Black Lettering, Use on Gray Paint)
1.2	2	1251-776B	DECAL, GRS 50 (White Lettering, Use on Black Paint)
2	2	1251-246	DECAL, Akkerman Large

NOTE: This decal kit is available upon request.

RBU DECAL KITS

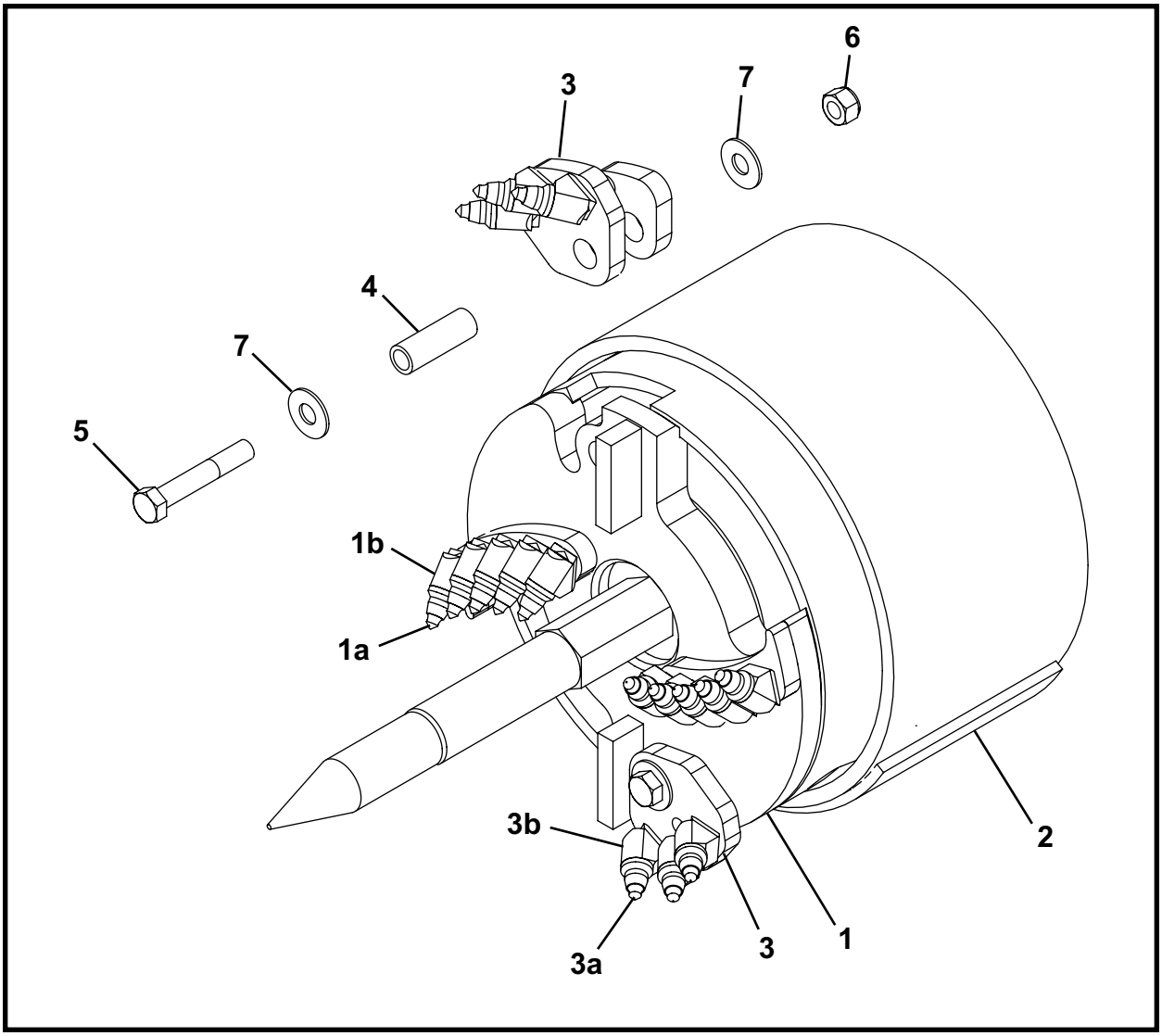
RBU



ITEM	QTY	PART NO.	DESCRIPTION
0.1	1	1255-083A	KIT, Decal RBU 24
0.2	1	1255-083B	KIT, Decal RBU 30
0.3	1	1255-083C	KIT, Decal RBU 36
0.4	1	1255-083D	KIT, Decal RBU 42
0.5	1	1255-083E	KIT, Decal RBU 48
0.6	1	1255-083F	KIT, Decal RBU 54
1.1	2	1251-246	DECAL, Akkerman Large (RBU 24/30)
1.2	2	1251-246	DECAL, Akkerman Large (RBU 24/30)
1.3	2	1251-245	DECAL, Akkerman X-Lrg (RBU 36/42/48/54)
1.4	2	1251-245	DECAL, Akkerman X-Lrg (RBU 36/42/48/54)
1.5	2	1251-245	DECAL, Akkerman X-Lrg (RBU 36/42/48/54)
2	1	1250-558	DECAL, USA Flag Small
3	1	1251-324	DECAL, USA Flag Small
4.1	2	1251-723A	DECAL, RBU 24
4.2	2	1251-723B	DECAL, RBU 30
4.3	2	1251-723C	DECAL, RBU 36
4.4	2	1251-723D	DECAL, RBU 42
4.5	2	1251-723E	DECAL, RBU 48
4.6	2	1251-723F	DECAL, RBU 54

GRS-50 24 CUTTER HEAD, FA48585F

GRS-50 FLAT FACE CUTTER HEAD

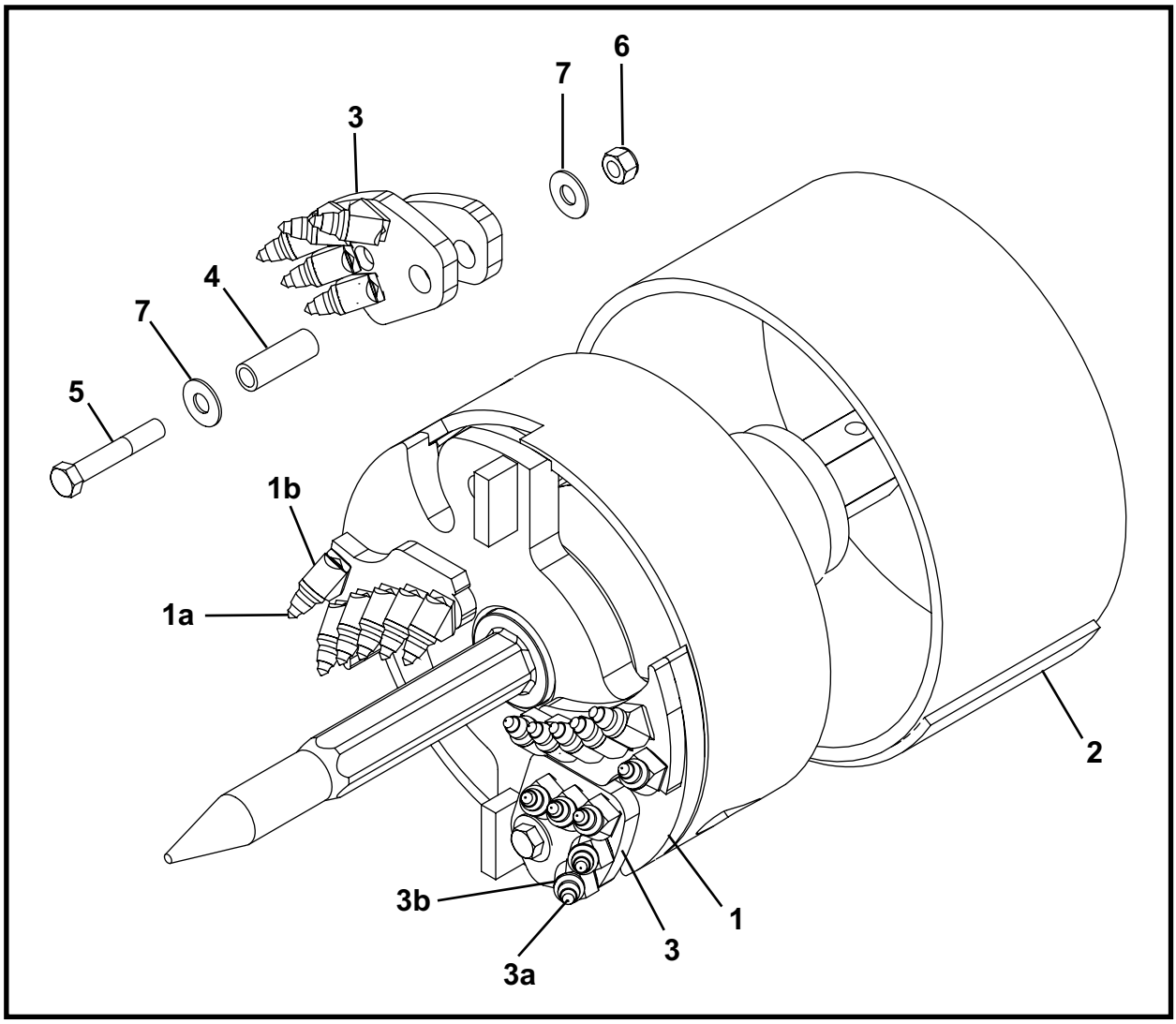


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA48585F	GRS-50 24 CUTTER HEAD ASSEMBLY
1	1	A48525A	CUTTERHEAD (Includes items 1a - 1b)
1a	10	P0050-011	TOOTH, Carbide Bullet
1b	10	P0051-004	HOLDER, Tooth
2	1	A48936A	CASING, Lead
3	2	A48568A	CUTTER, Wing (Includes items 3a - 3b)
3a	3 per wing	P0050-011	TOOTH, Carbide Bullet
3b	3 per wing	P0051-004	HOLDER, Tooth
4	2	A48574P	BUSHING, Wing Cutter
5	2	P0001-16-024	BOLT, Hex 1 UNC x 6
6	2	P0013-16-000	NUT, Nylock 1 UNC
7	4	P0040-016	WASHER, Hardened Flat 1

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 26 CUTTER HEAD, FA49150F

GRS-50 FLAT FACE CUTTER HEAD

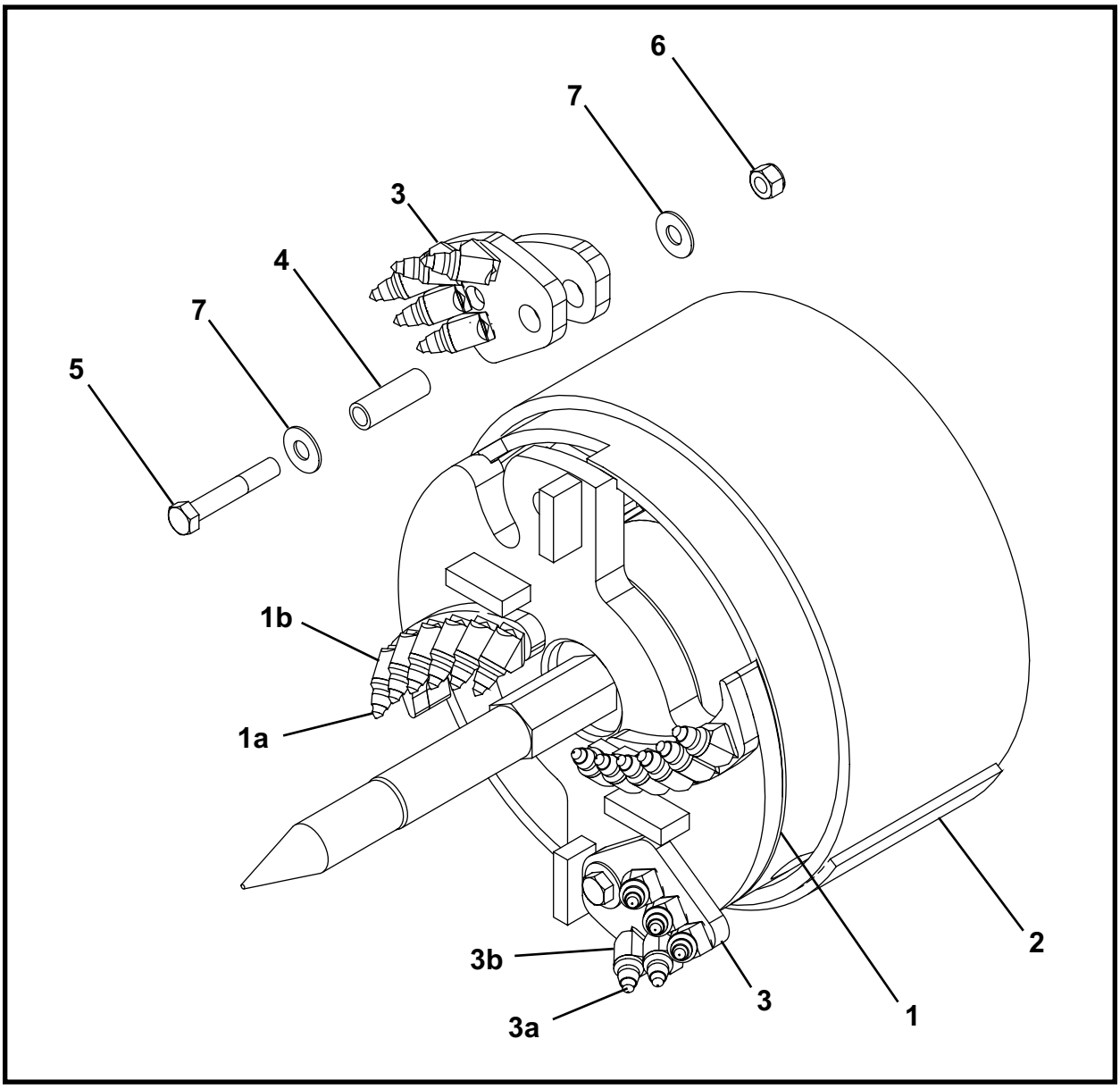


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49150F	GRS-50 26 CUTTER HEAD ASSEMBLY
1	1	A49151A	CUTTERHEAD (Includes items 1a - 1b)
1a	12	P0050-011	TOOTH, Carbide Bullet
1b	12	P0051-004	HOLDER, Tooth
2	1	A49152A	CASING, Lead
3	2	A48930A	CUTTER, Wing (Includes items 3a - 3b)
3a	5 per wing	P0050-011	TOOTH, Carbide Bullet
3b	5 per wing	P0051-004	HOLDER, Tooth
4	2	A48574P	BUSHING, Wing Cutter
5	2	P0001-16-024	BOLT, Hex 1 UNC x 6
6	2	P0013-16-000	NUT, Nylock 1 UNC
7	4	P0040-016	WASHER, Hardened Flat 1

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 28 CUTTER HEAD, FA48586F

GRS-50 FLAT FACE CUTTER HEAD

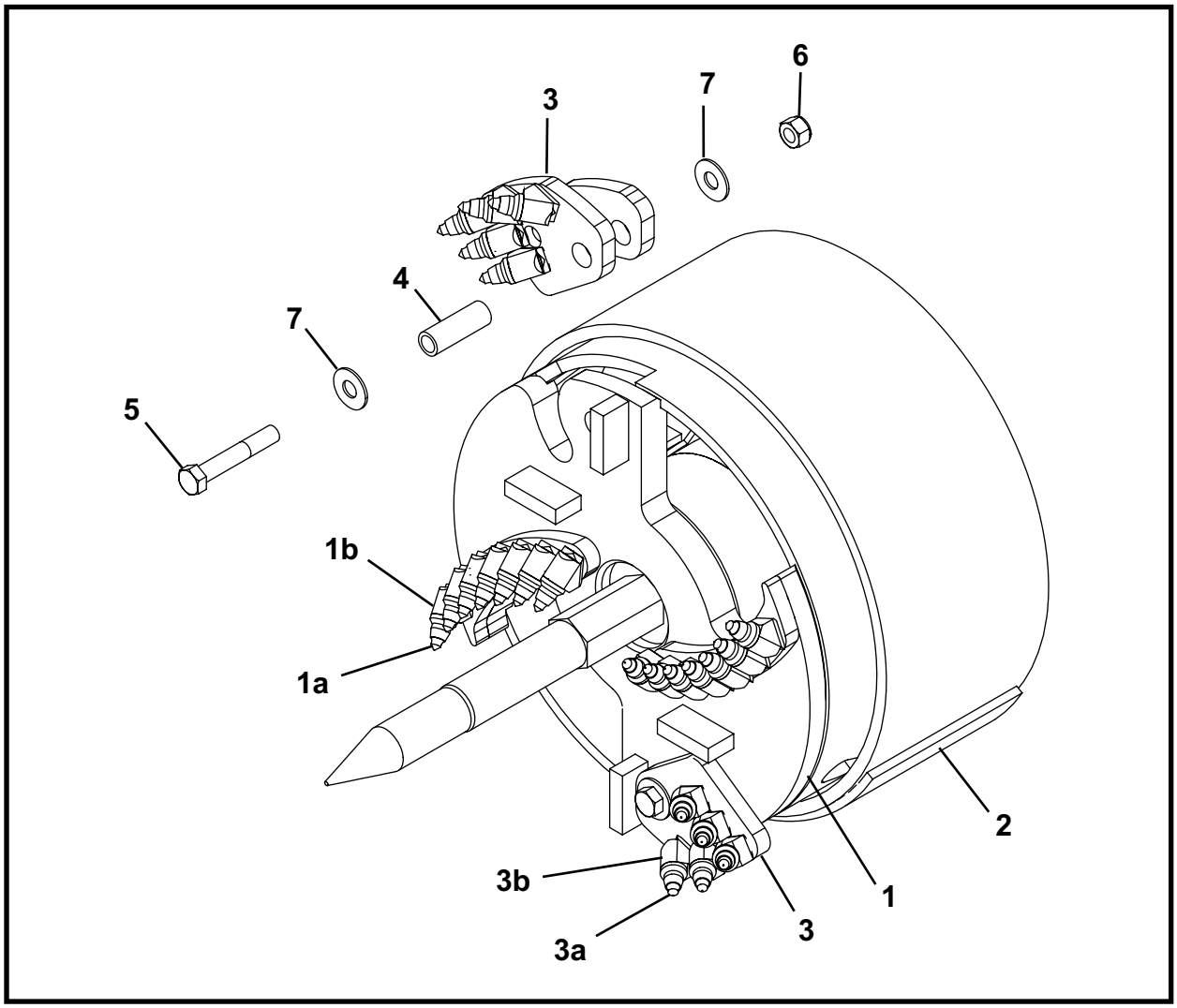


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA48586F	GRS-50 28 CUTTER HEAD ASSEMBLY
1	1	A48532A	CUTTERHEAD (Includes items 1a - 1b)
1a	12	P0050-011	TOOTH, Carbide Bullet
1b	12	P0051-004	HOLDER, Tooth
2	1	A48938A	CASING, Lead
3	2	A48930A	CUTTER, Wing (Includes items 3a - 3b)
3a	5 per wing	P0050-011	TOOTH, Carbide Bullet
3b	5 per wing	P0051-004	HOLDER, Tooth
4	2	A48574P	BUSHING, Wing Cutter
5	2	P0001-16-024	BOLT, Hex 1 UNC x 6
6	2	P0013-16-000	NUT, Nylock 1 UNC
7	4	P0040-016	WASHER, Hardened Flat 1

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 30 CUTTER HEAD, FA48587F

GRS-50 FLAT FACE CUTTER HEAD

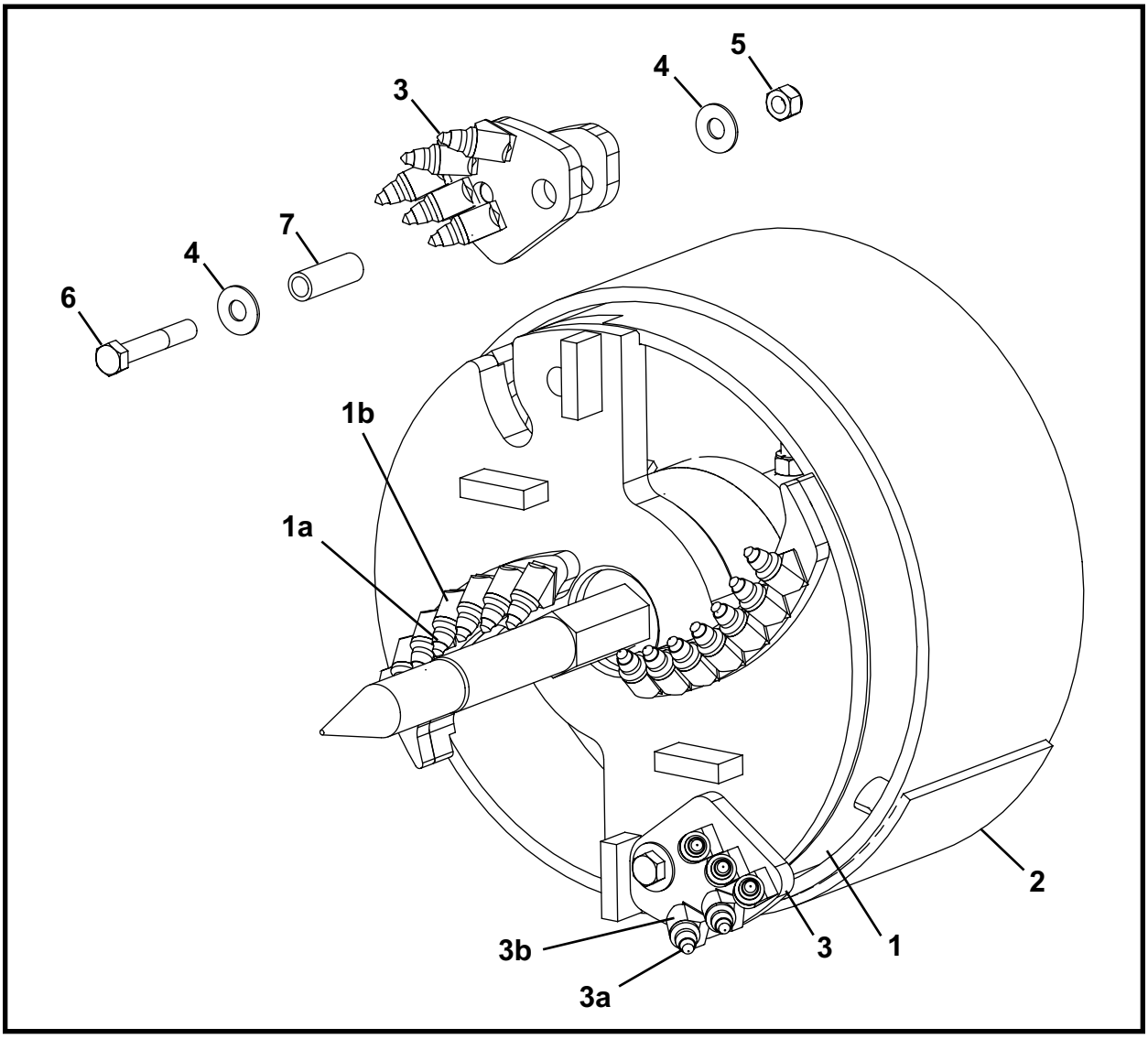


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA48587F	GRS-50 30 CUTTER HEAD ASSEMBLY
1	1	A48538A	CUTTERHEAD (Includes items 1a - 1b)
1a	14	P0050-011	TOOTH, Carbide Bullet
1b	14	P0051-004	HOLDER, Tooth
2	1	A48940A	CASING, Lead
3	2	A48575A	CUTTER, Wing (Includes items 3a - 3b)
3a	5 per wing	P0050-011	TOOTH, Carbide Bullet
3b	5 per wing	P0051-004	HOLDER, Tooth
4	2	A48574P	BUSHING, Wing Cutter
5	2	P0001-16-024	BOLT, Hex 1 UNC x 6
6	2	P0013-16-000	NUT, Nylock 1 UNC
7	4	P0040-016	WASHER, Hardened Flat 1

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 32 CUTTER HEAD, FA63632F

GRS-50 FLAT FACE CUTTER HEAD

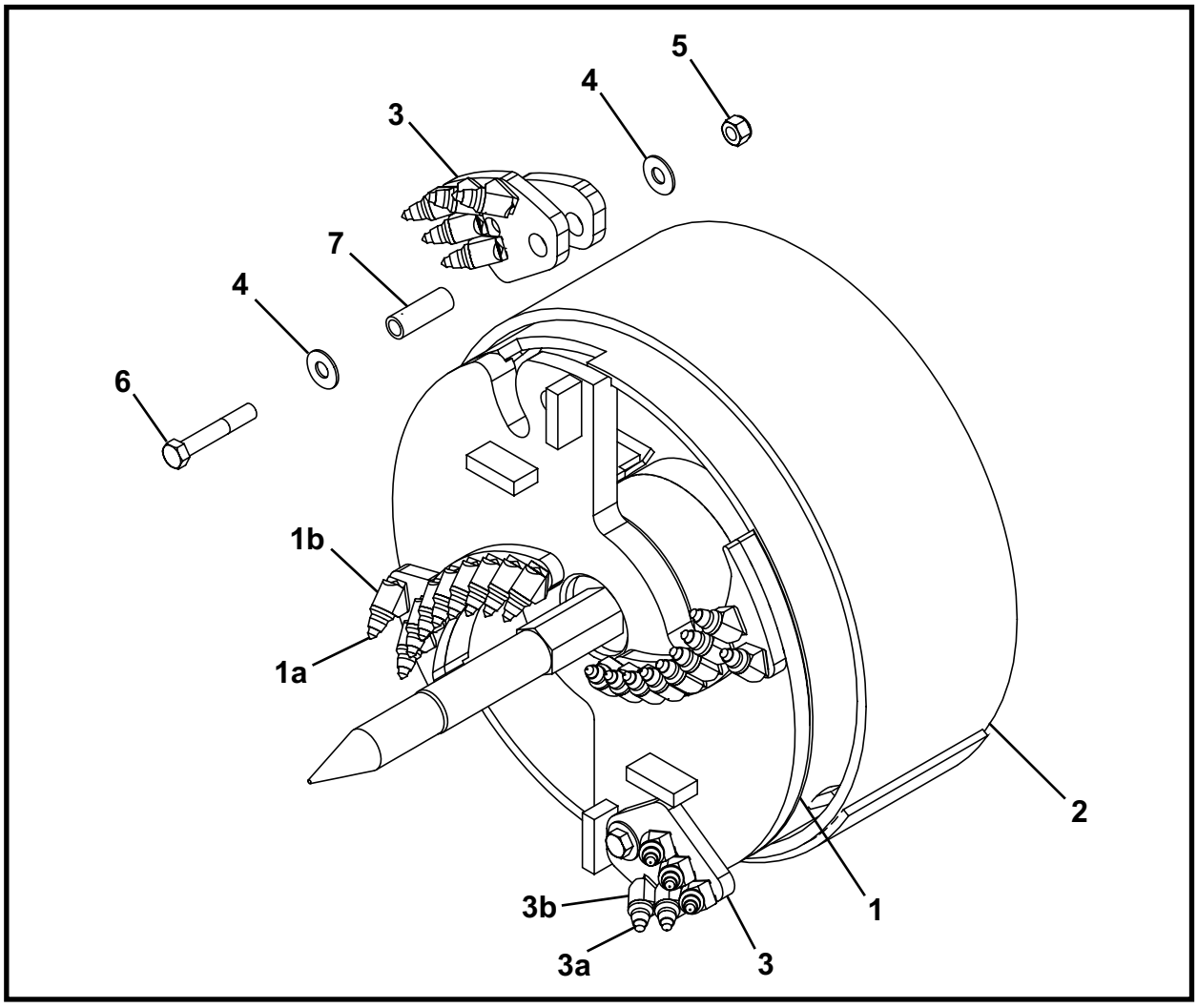


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA63632F	GRS-50 32 CUTTER HEAD ASSEMBLY
1	1	A63633A	CUTTERHEAD (Includes items 1a - 1b)
1a	14	P0050-011	TOOTH, Carbide Bullet
1b	14	P0051-004	HOLDER, Tooth
2	1	A63634A	CASING, Lead
3	2	A48575A	CUTTER, Wing (Includes items 3a - 3b)
3a	5 per wing	P0050-011	TOOTH, Carbide Bullet
3b	5 per wing	P0051-004	HOLDER, Tooth
4	4	P0040-016	WASHER, Hardened Flat 1
5	2	P0013-16-000	NUT, Nylock 1 UNC
6	2	P0001-16-024	BOLT, Hex 1 UNC x 6
7	2	A48574P	BUSHING, Wing Cutter

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 36 CUTTER HEAD, FA48588F

GRS-50 FLAT FACE CUTTER HEAD

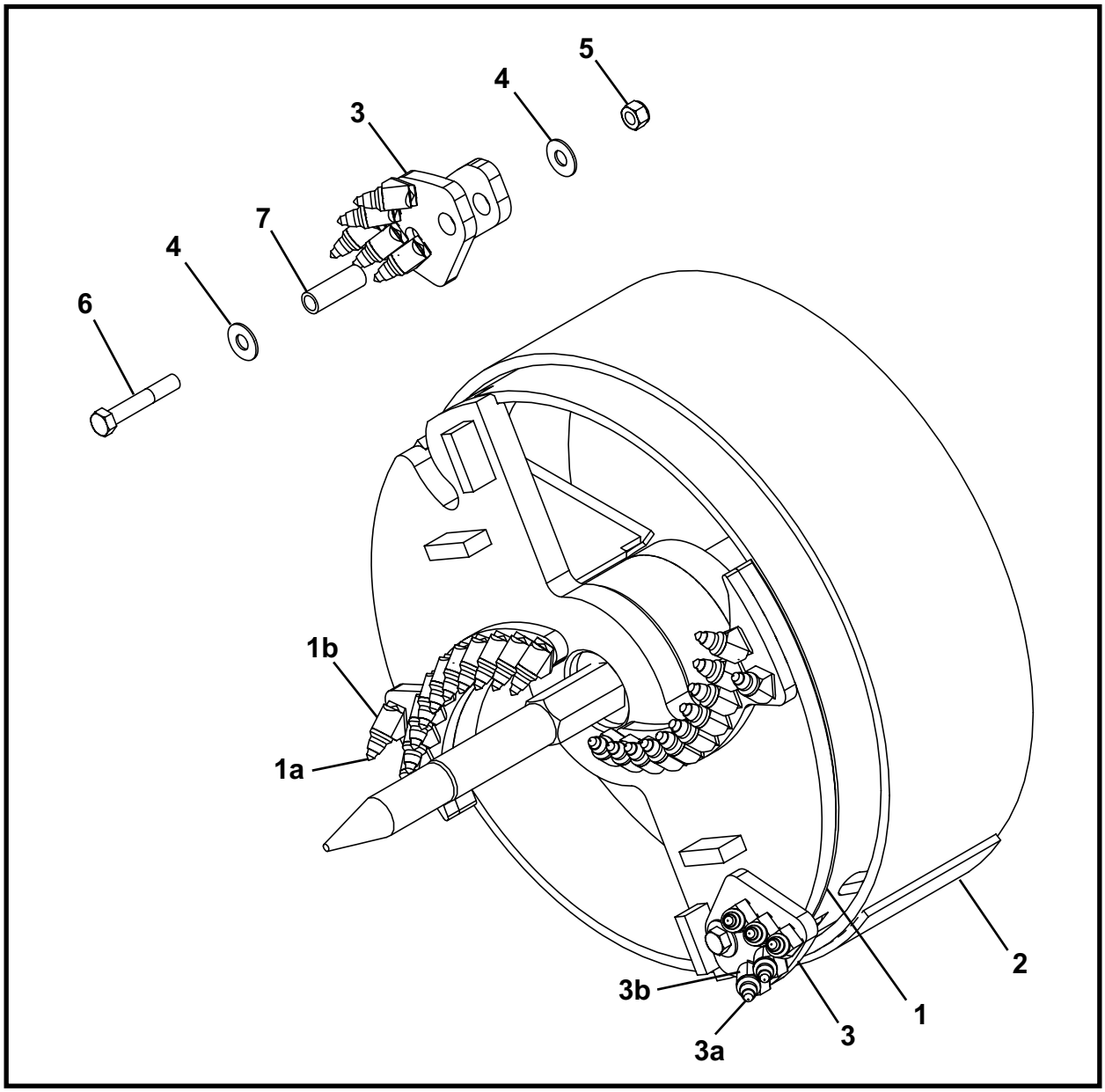


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA48588F	GRS-50 36 CUTTER HEAD ASSEMBLY
1	1	A48544A	CUTTERHEAD (Includes items 1a - 1b)
1a	18	P0050-011	TOOTH, Carbide Bullet
1b	18	P0051-004	HOLDER, Tooth
2	1	A48942A	CASING, Lead
3	2	A48520A	CUTTER, Wing (Includes items 3a - 3b)
3a	5 per wing	P0050-011	TOOTH, Carbide Bullet
3b	5 per wing	P0051-004	HOLDER, Tooth
4	4	P0040-016	WASHER, Hardened Flat 1
5	2	P0013-16-000	NUT, Nylock 1 UNC
6	2	P0001-16-024	BOLT, Hex 1 UNC x 6
7	2	A48574P	BUSHING, Wing Cutter

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 42 CUTTER HEAD, FA48589F

GRS-50 FLAT FACE CUTTER HEAD

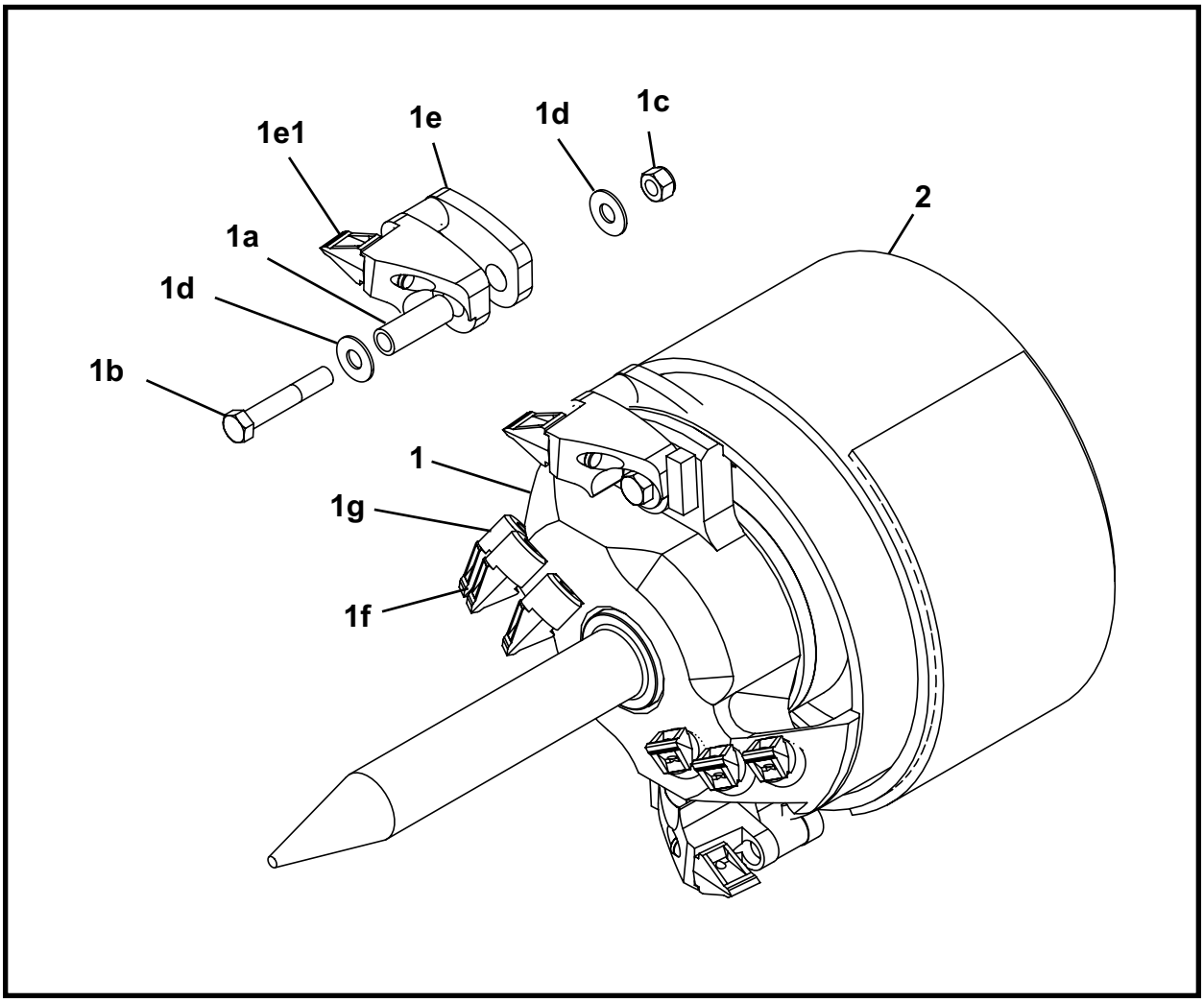


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA48589F	GRS-50 42 CUTTER HEAD ASSEMBLY
1	1	A48562A	CUTTERHEAD (Includes items 1a - 1b)
1a	26	P0050-011	TOOTH, Carbide Bullet
1b	26	P0051-004	HOLDER, Tooth
2	1	A48944A	CASING, Lead
3	2	A48509A	CUTTER, Wing (Includes items 3a - 3b)
3a	5 per wing	P0050-011	TOOTH, Carbide Bullet
3b	5 per wing	P0051-004	HOLDER, Tooth
4	4	P0040-016	WASHER, Hardened Flat 1
5	2	P0013-16-000	NUT, Nylock 1 UNC
6	2	P0001-16-024	BOLT, Hex 1 UNC x 6
7	2	A48574P	BUSHING, Wing Cutter

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 24A CUTTER HEAD, FA63735F

GRS-50 AGGRESSIVE CUTTER HEAD

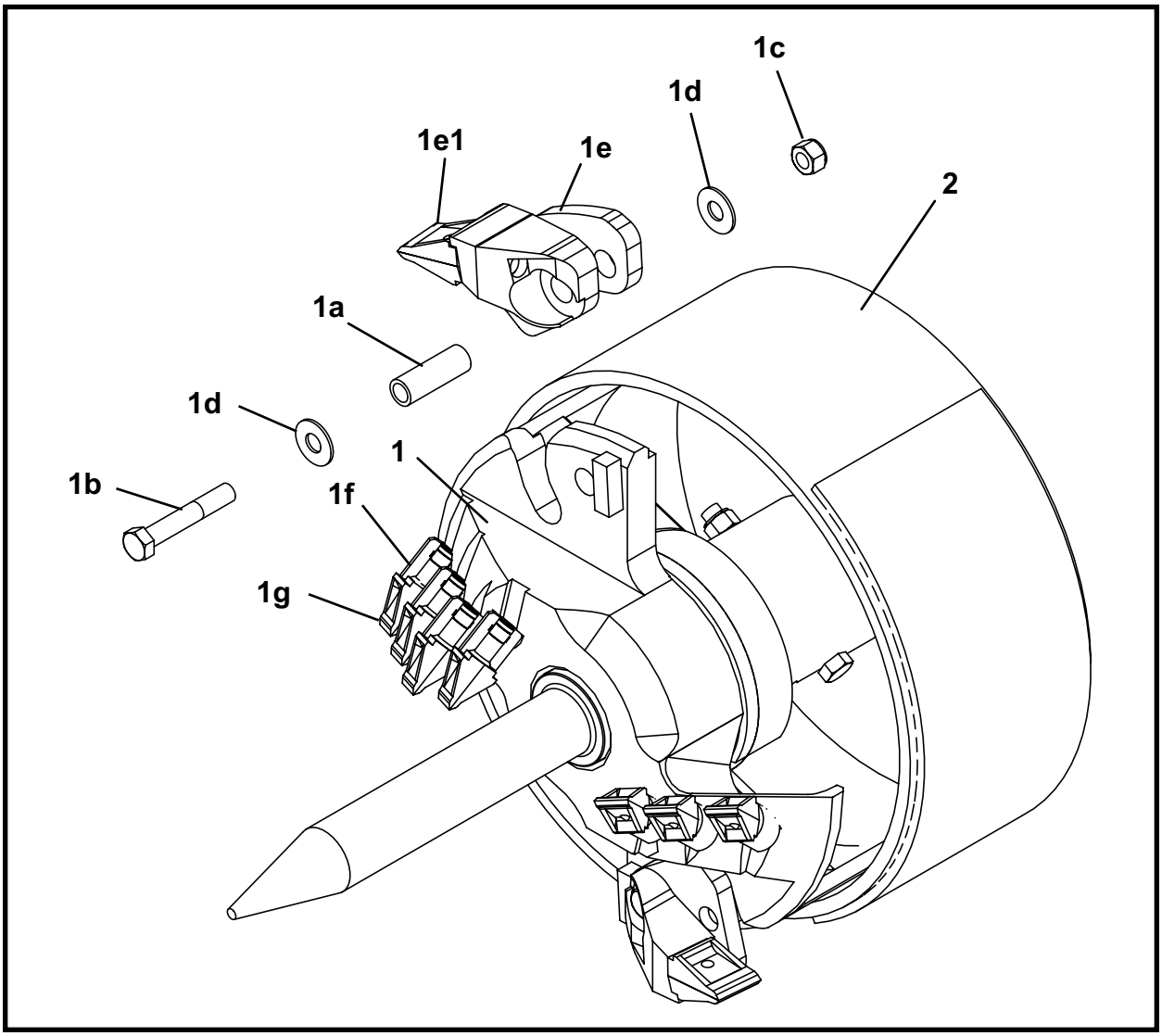


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA63735F	GRS-50 24A CUTTER HEAD ASSEMBLY
1	1	A63734A	CUTTERHEAD (Includes items 1a - 1g)
1a	2	A48574P	BUSHING, Wing Cutter
1b	2	P0001-16-024	BOLT, Hex 1 UNC x 6
1c	2	P0013-16-000	NUT, Nylock 1 UNC
1d	4	P0040-016	WASHER, Hardened Flat 1
1e	2	A63743A	CUTTER, Wing (Includes item 1e1)
1e1	1 per wing	P0050-236	TOOTH, Spade - Medium
1f	6	P0050-235	TOOTH, Spade - Small
1g	6	A63821P	HOLDER, Spade - Small
2	1	A48936A	CASING, Lead

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 30A CUTTER HEAD, FA63300F

GRS-50 AGGRESSIVE CUTTER HEAD

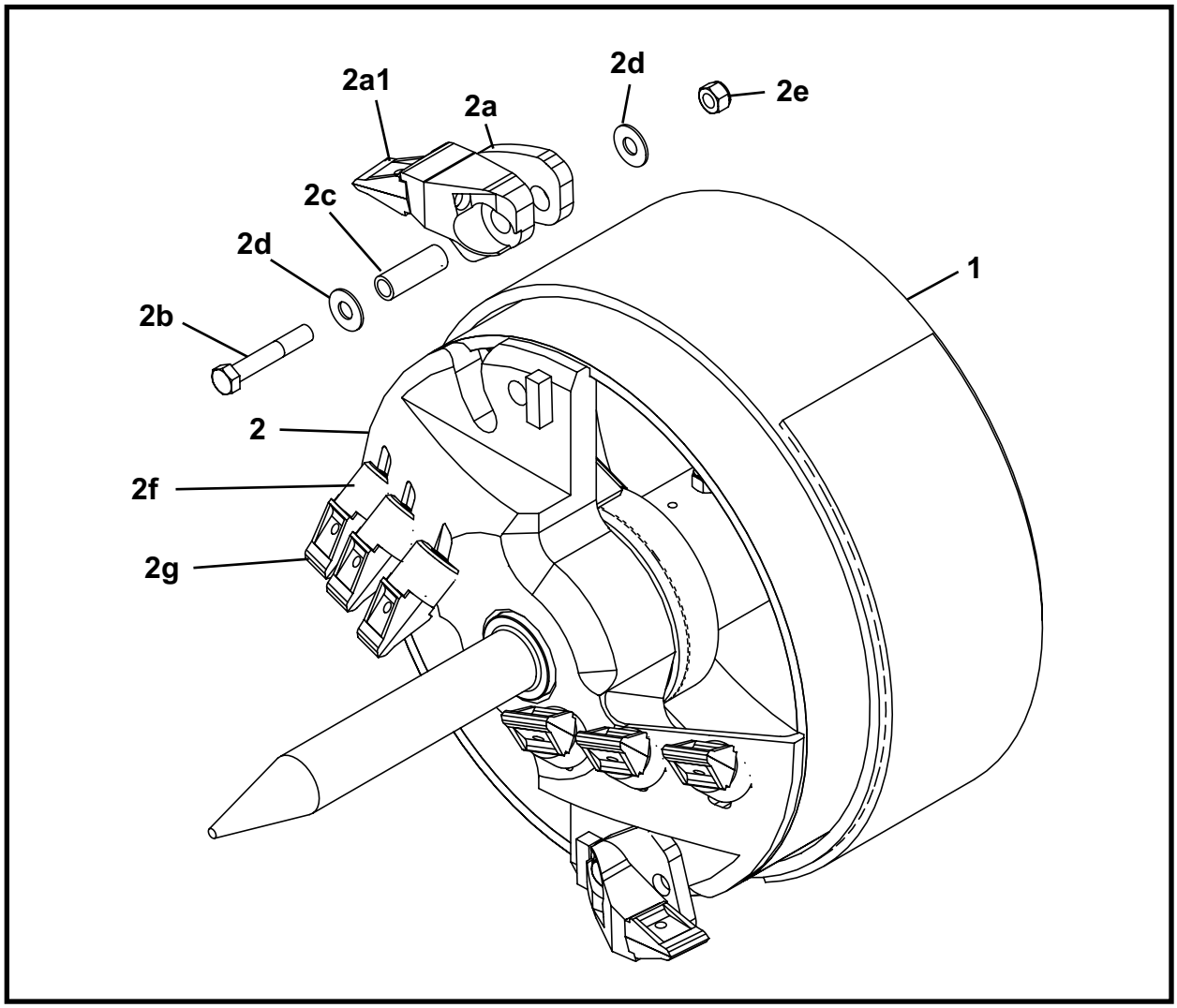


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA63300F	GRS-50 30A CUTTER HEAD ASSEMBLY
1	1	A63801A	CUTTERHEAD (Includes items 1a - 1g)
1a	2	A48574P	BUSHING, Wing Cutter
1b	2	P0001-16-024	BOLT, Hex 1 UNC x 6
1c	2	P0013-16-000	NUT, Nylock 1 UNC
1d	4	P0040-016	WASHER, Hardened Flat 1
1e	2	A63189A	CUTTER, Wing (Includes item 1e1)
1e1	1 per wing	P0050-237	TOOTH, Spade - Large
1f	7	A63897P	HOLDER, Spade - Medium
1g	7	P0050-236	TOOTH, Spade - Medium
2	1	A48940A	CASING, Lead

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 36A CUTTER HEAD, FA63187F

GRS-50 AGGRESSIVE CUTTER HEAD

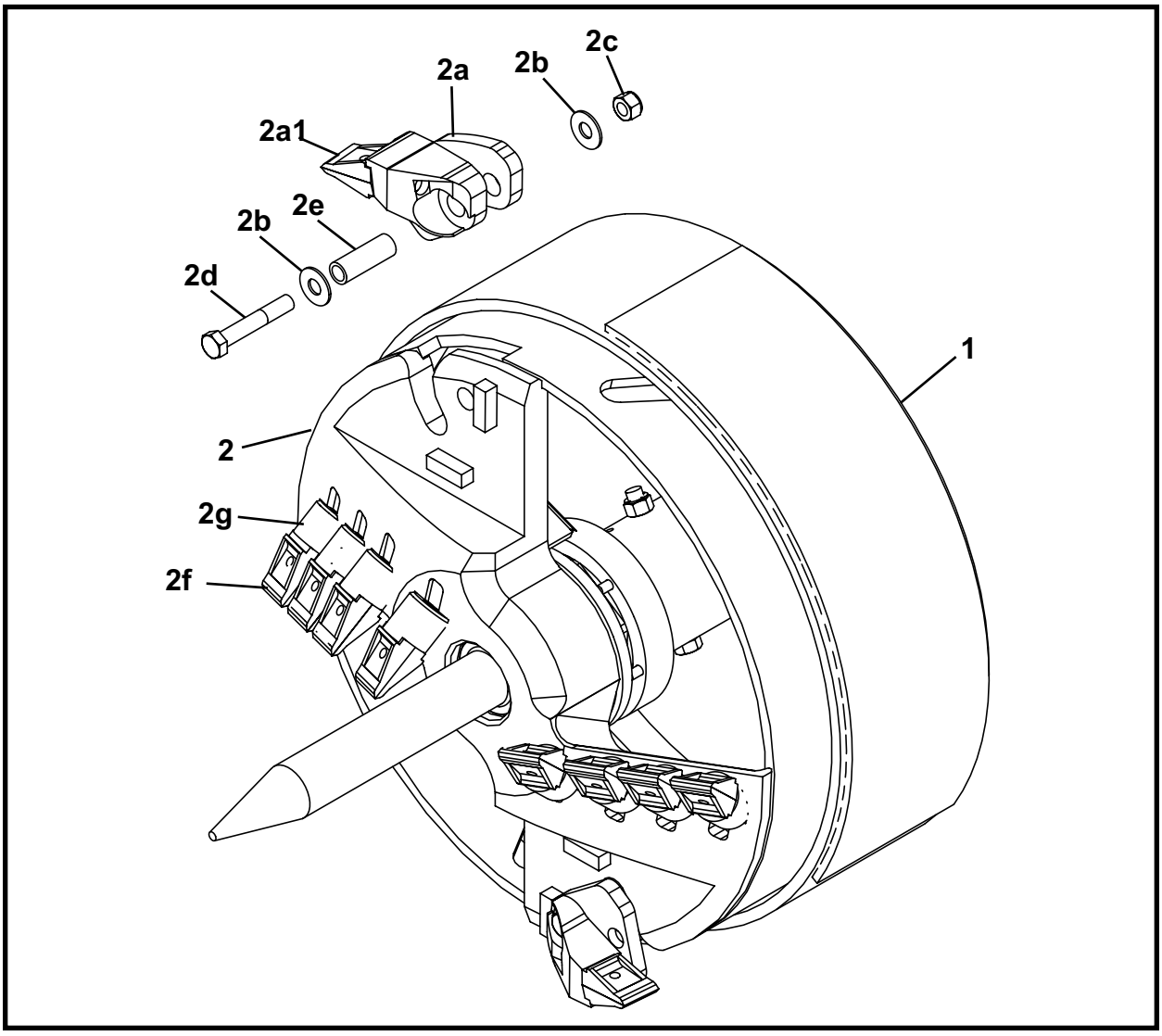


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA63187F	GRS-50 36A CUTTER HEAD ASSEMBLY
1	1	A48942A	CASING, Lead
2	1	A63188A	CUTTERHEAD (Includes items 2a - 2g)
2a	2	A63189A	CUTTER, Wing (Includes item 2a1)
2a1	1 per wing	P0050-237	TOOTH, Spade - Large
2b	2	P0001-16-024	BOLT, Hex 1 UNC x 6
2c	2	A48574P	BUSHING, Wing Cutter
2d	4	P0040-016	WASHER, Hardened Flat 1
2e	2	P0013-16-000	NUT, Nylock 1 UNC
2f	6	A63823P	HOLDER, Spade - Large
2g	6	P0050-237	TOOTH, Spade - Large

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS-50 42A CUTTER HEAD, FA63298F

GRS-50 AGGRESSIVE CUTTER HEAD

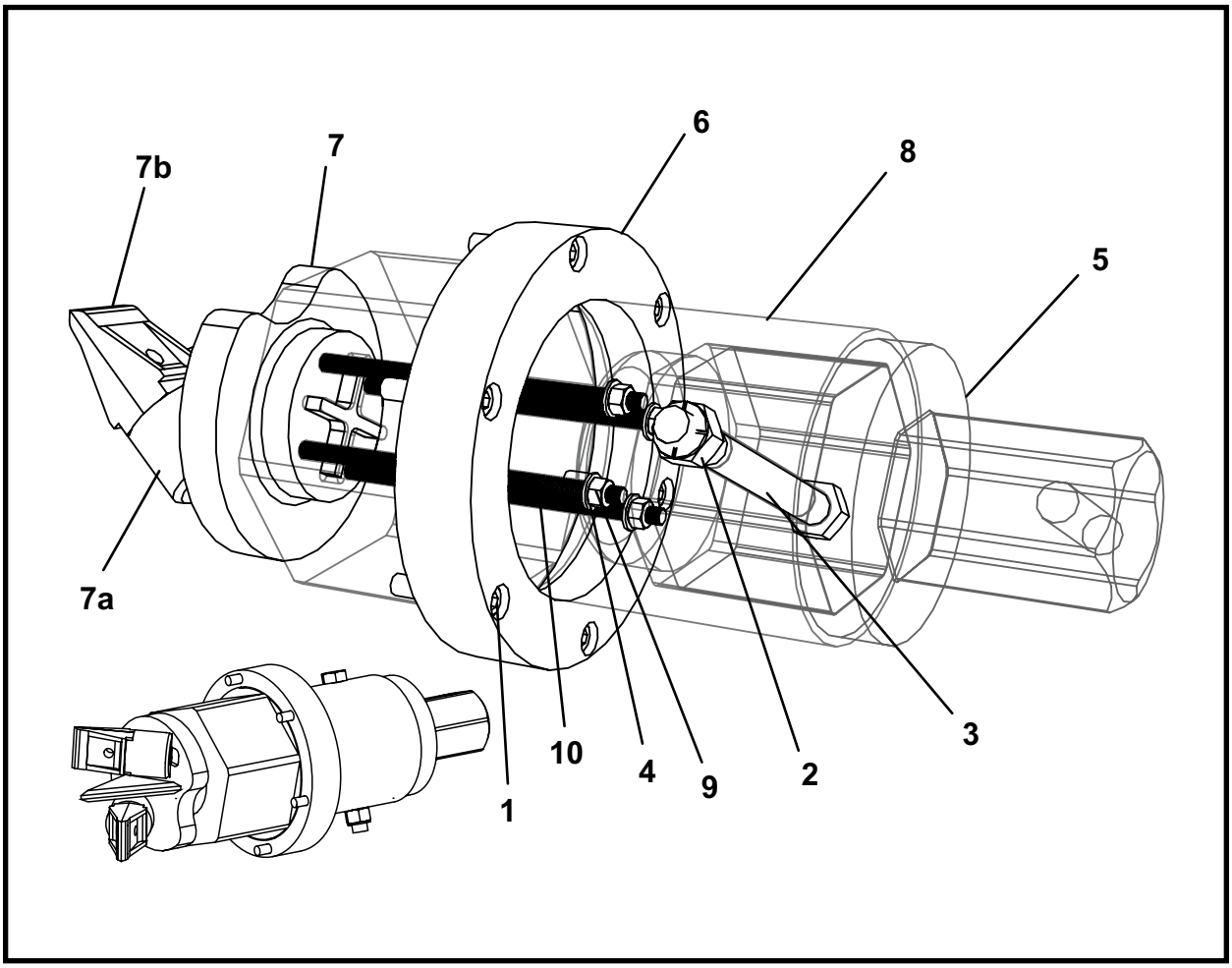


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA63298F	GRS-50 42A CUTTER HEAD ASSEMBLY
1	1	A48944A	CASING, Lead
2	1	A63802A	CUTTERHEAD (Includes items 2a - 2g)
2a	2	A63189A	CUTTER, Wing (Includes item 2a1)
2a1	1 per wing	P0050-237	TOOTH, Spade - Large
2b	4	P0040-016	WASHER, Hardened Flat 1
2c	2	P0013-16-000	NUT, Nylock 1 UNC
2d	2	P0001-16-024	BOLT, Hex 1 UNC x 6
2e	2	A48574P	BUSHING, Wing Cutter
2f	8	P0050-237	TOOTH, Spade - Large
2g	8	A63823P	HOLDER, Spade - Large

NOTE: This GRS-50 cutter head uses Bearing Swivel, FA49160F. Refer to this section for parts information.

GRS CENTER INSERT ASSEMBLY, A63846A

GRS-50 CUTTER HEAD INSERT

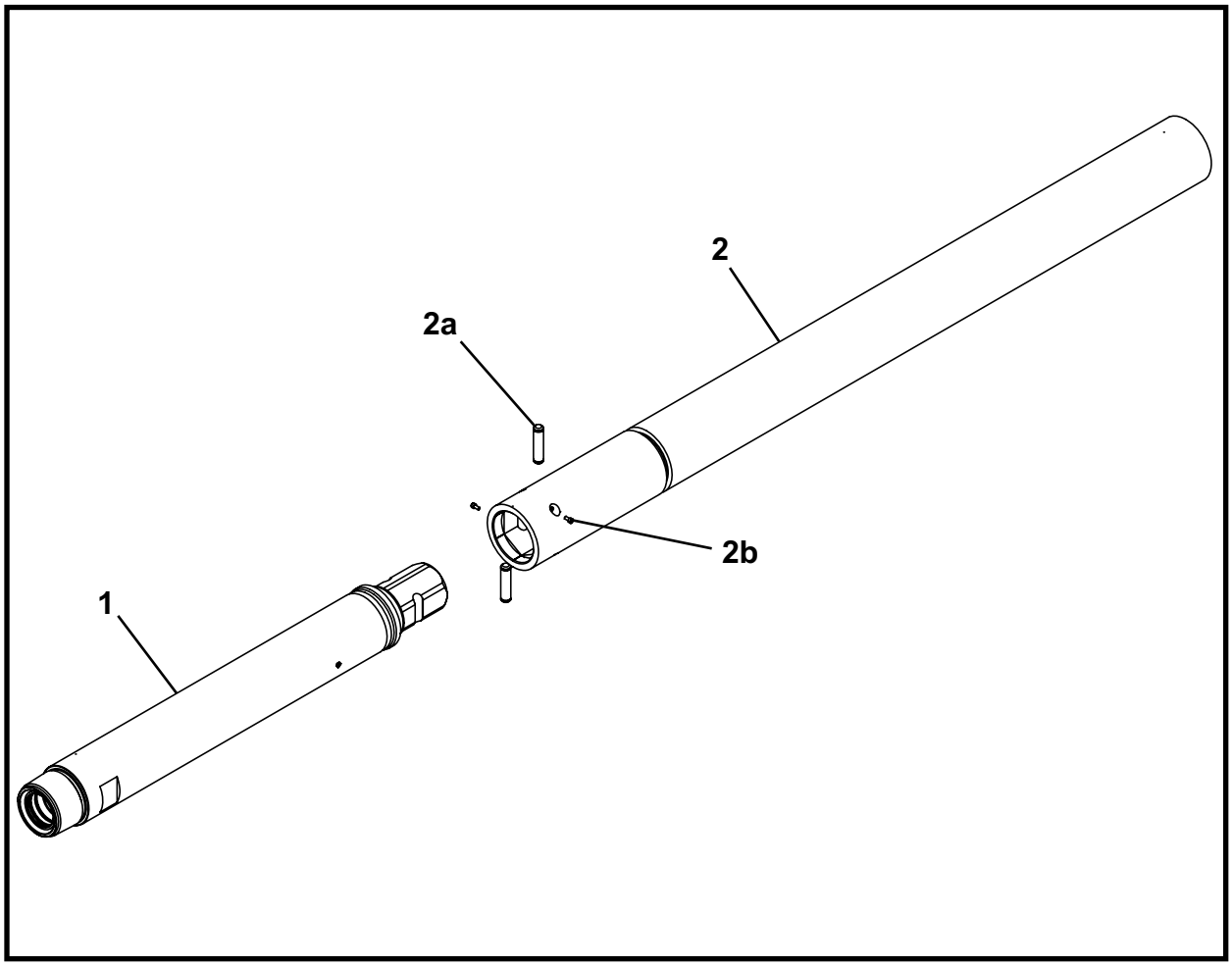


ITEM	QTY	PART NO.	DESCRIPTION
0	1	A63846A	GRS CENTER INSERT ASSEMBLY
1	6	P0031-10-010	SCREW, Socket Head Cap 5/8 UNC x 2.5
2	1	P0013-16-000	NUT, Nylock 1 UNC
3	1	P0001-16-040	BOLT, Hex 1 UNC x 10
4	4	P0040-008	WASHER, Hardened Flat 1/2
5*	1	A62734P	SLEEVE, Hex 6 To 4
6	1	A48584P	RETAINER, AB Bearing Swivel
7	1	A63853A	INSERT, GRS (Includes items 7a - 7b)
7a	2	A63823P	HOLDER, Tooth Spade - Large
7b	2	P0050-237	TOOTH, Spade - Large
8	1	A63847P	HOUSING, Insert
9	4	P0003-08-000	NUT, Hex 1/2 UNC
10	4	A64018P	ROD, Threaded 1/2-13 x 11.50

* Refer to this section for parts information.

ADAPTER & GUIDE ROD ASSEMBLY, FA49088F

GRS-50

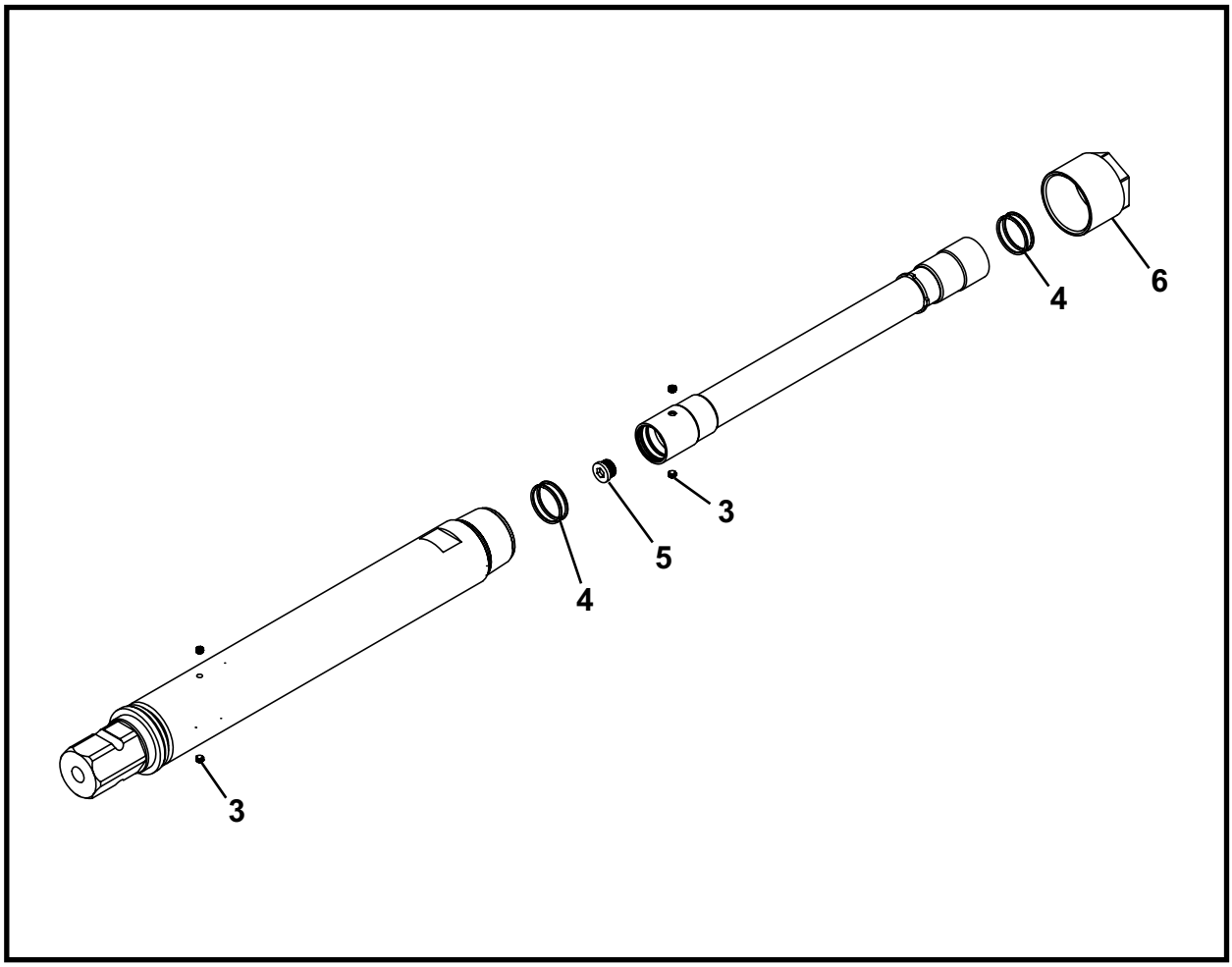


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49088F	ADAPTER & GUIDE ROD ASSEMBLY
1*	1	A48901A	ASSEMBLY, Fluid Adapter
2	1	A49126A	ASSEMBLY, Guide Rod (Includes items 2a - 2b)
2a	2	A40582P	PIN, Connector
2b	2	P0031-1024-001.5	SCREW, Socket Head Cap

* Refer to this section for parts information.

FLUID ADAPTER ASSEMBLY, A48901A

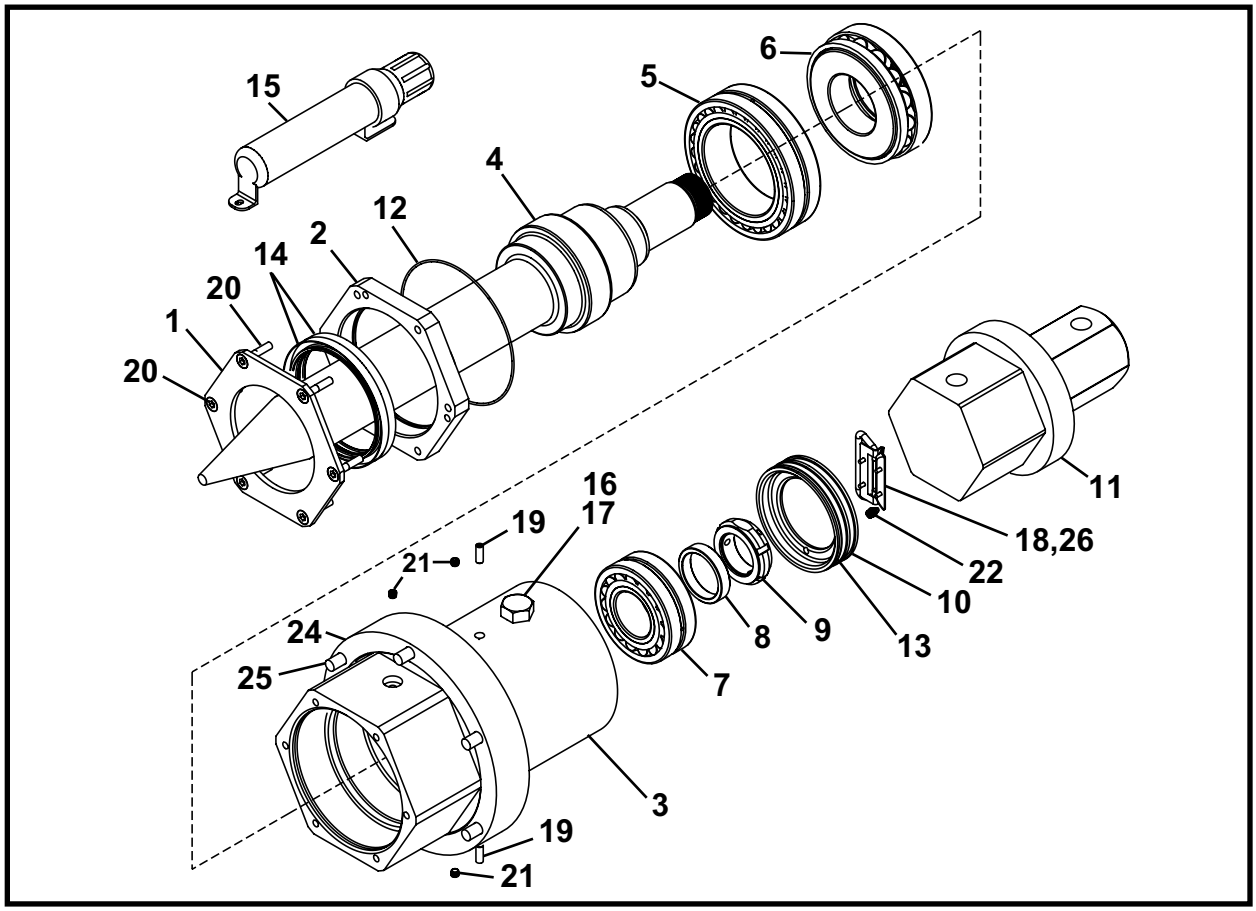
GRS-50 / RBU



ITEM	QTY	PART NO.	DESCRIPTION
0	1	A48901A	FLUID ADAPTER ASSEMBLY
1	1	A48902A	ADAPTER, Fluid
2	1	A48903A	TUBE, Inner
3	4	P0300-144	PLUG, 02MP-HHP
4	4	P0085-228	ORING
5	1	P0300-887	PLUG, 12MB-HHP
6	1	A42362P	CAP

BEARING SWIVEL ASSEMBLY, FA49160F

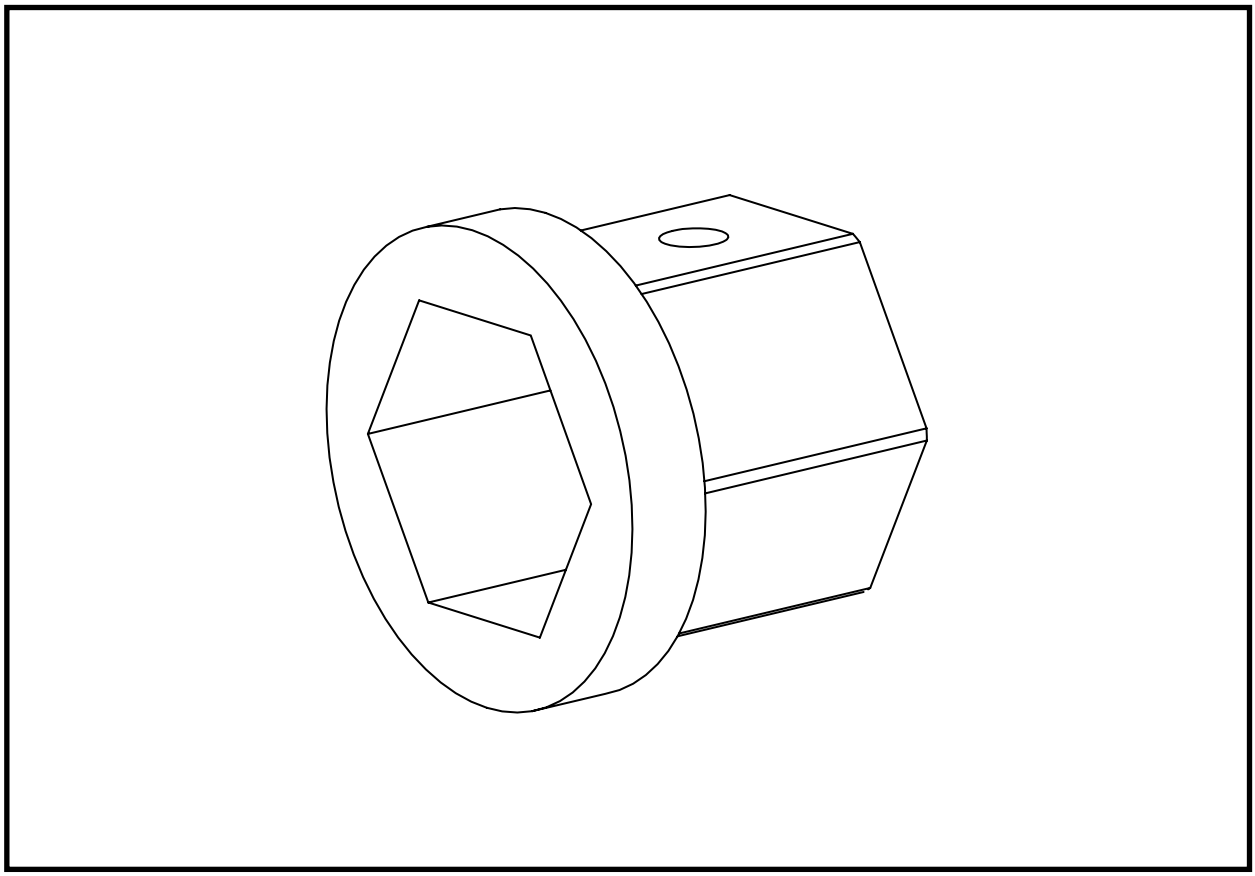
GRS-50



ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49160F	BEARING SWIVEL ASSEMBLY
1	1	A48980P	COVER, Seal
2	1	A48981P	RETAINER, Seal
3	1	A48982P	HOUSING
4	1	A49161P	SHAFT,
5	1	P0065-288	BEARING
6	1	P0065-176	BEARING, Spherical Thrust
7	1	P0065-305	BEARING. Roller
8	1	A48984P	SPACER
9	1	P0065-306	LOCKNUT
10	1	A48985P	CAP
11	1	A62734P	SLEEVE, Hex 6 To 4
12	1	P0085-170	ORING
13	1	P0085-255	ORING
14	2	P0080-060	SEAL, Lip
15	1	P0095-127	CANISTER, Small
16	1	P0001-16-040	BOLT, Hex 1 x 10
17	1	P0013-16-000	NUT, Nylock 1 UNC
18	1	P0059-083	HANDLE, Pull
19	2	P0033-06-016	SCREWS, Socket Set Hex 3/8 UNC x 1
20	6	P0018-14-206	SCREW, Flat Head Cap 3/8 UNC x 2
21	3	P0300-144	PLUG, 02MP-HHP
22	1	P0063-004	FITTING, Grease, Straight 1/8 NPT
23	60 oz	P0126-027	GREASE, Paragon® 3000 (Not Shown)
24	1	A48584P	RETAINER
25	6	P0031-10-010	SCREW, Socket Head Cap 5/8 UNC x 2.5
26	4	P0017-10-375	SCREW, Round Machine 10-24 x 3/8

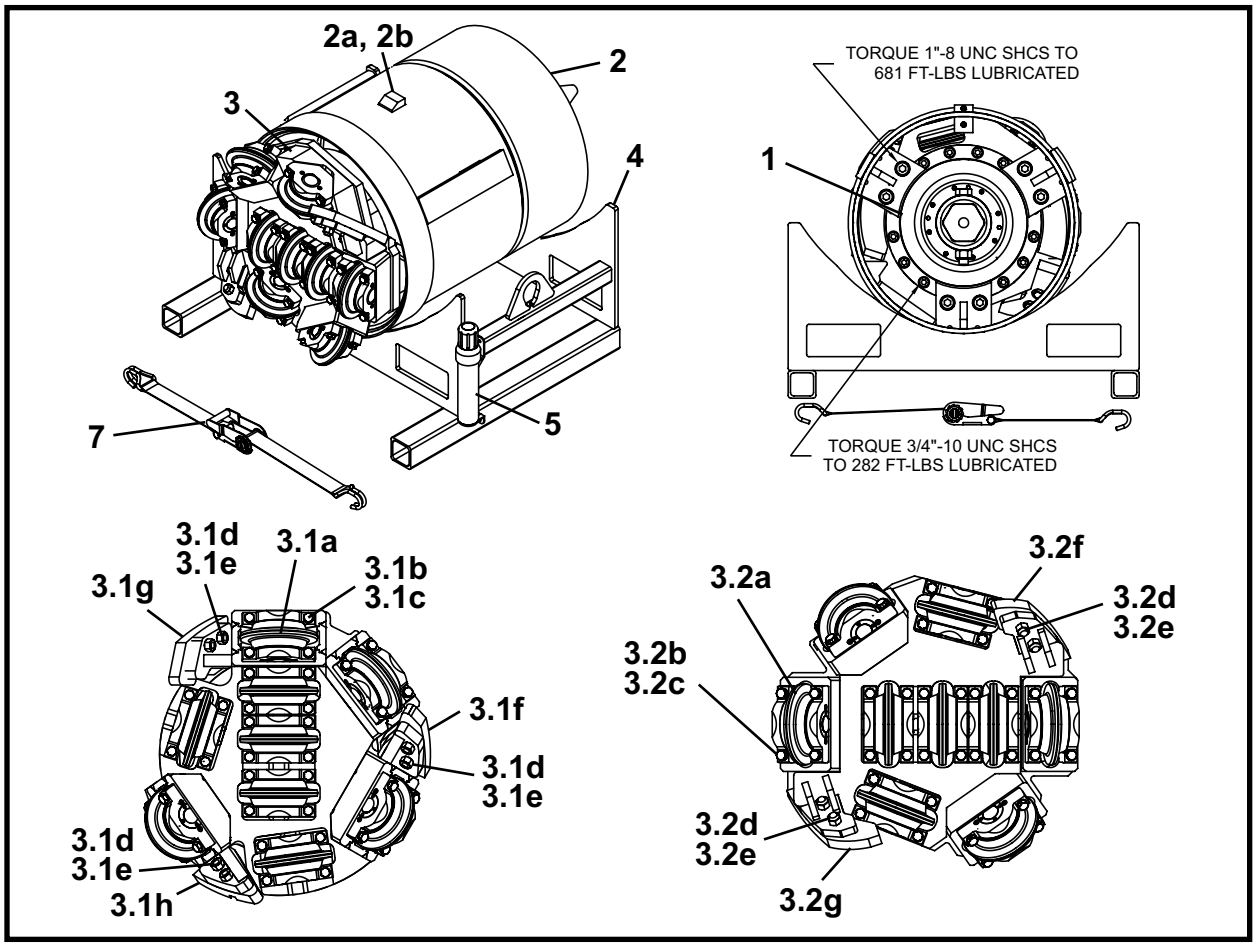
HEX SLEEVE 6" TO 5", A48593P

GRS-50



ITEM	QTY	PART NO.	DESCRIPTION
0	1	A48593P	SLEEVE, Hex 6 To 5

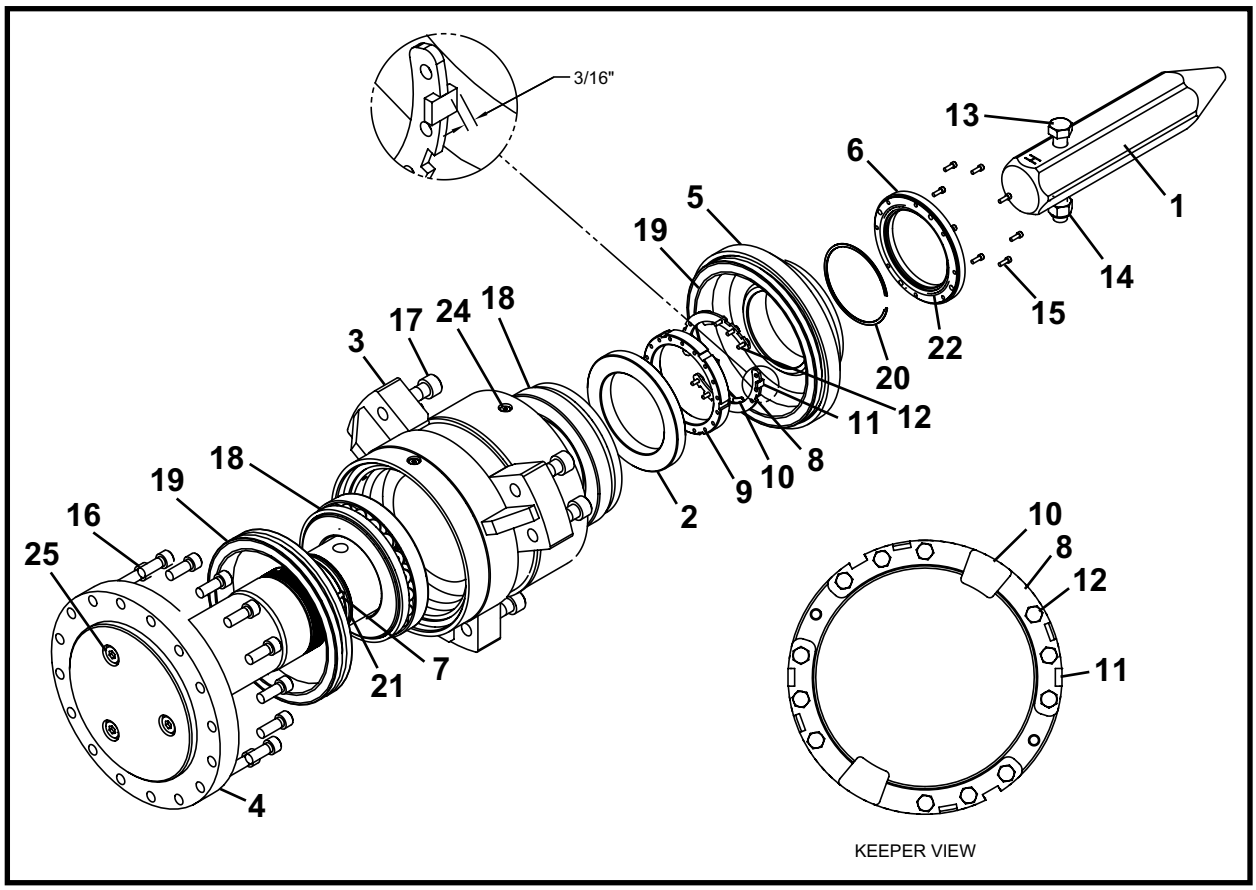
RBU ASSEMBLY - 24, FA49600F
RBU 24



ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49600F	RBU ASSEMBLY - 24
1*	1	FA62424F	ASSEMBLY, Bearing
2	1	A48987A	CASING, 24 RBU (Includes items 2a - 2b)
2a	1	A48947P	MANIFOLD, Water
2b	3	P0300-026	PLUG, 4MP-HHP
3.1	1	A48951A	DISC CUTTER HEAD - RBU 24 (6.5) (Includes item 3.1a - 3.1h)
3.1a*	9	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.1b	36	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.1c	36	P0043-003	WASHER, Nord-Lock 1/2
3.1d	9	P0001-10-010	BOLT, Hex 5/8 UNC x 2.5
3.1e	9	P0003-10-000	NUT, Hex 5/8 UNC
3.1f	1	A48954P	SCOOP 1
3.1g	1	A48955P	SCOOP 2
3.1h	1	A48956P	SCOOP 3
3.2	1	A63199A	DISC CUTTER HEAD - RBU 24 (6.63) (Includes item 3.2a - 3.2g)
3.2a* ^	9	FA48890F	DISC CUTTER ASSEMBLY
3.2b^	36	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.2c^	36	P0043-003	WASHER, Nord-Lock 1/2
3.2d	4	P0001-10-009	BOLT, Hex 5/8 UNC x 2.25
3.2e	4	P0003-10-000	NUT, Hex 5/8 UNC
3.2f	1	A64013P	SCOOP 1
3.2g	1	A61014P	SCOOP 2
4	1	A63495A	CRADLE, Shipping
5	1	P0095-127	CANISTER, Small
6	1	1255-083A	KIT, Decal, RBU 24 (Not Shown)
7	1	P0094-027	STRAP, Ratchet 3 x 12' 5000#

* Refer to this section for parts information. ^ Not part of item 3.2 cutter head assembly

BEARING ASSEMBLY, FA62424F
RBU 24

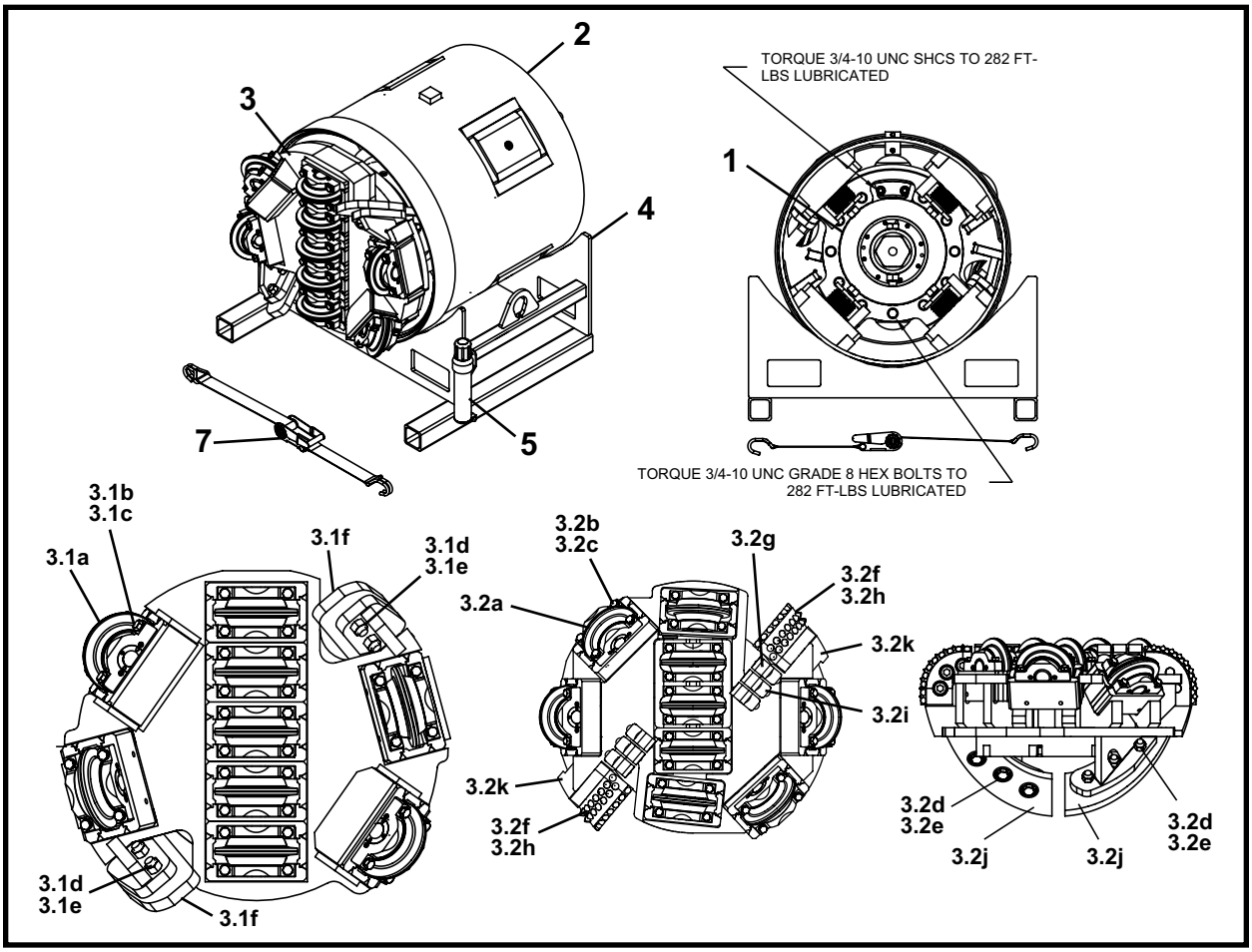


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA62424F	BEARING ASSEMBLY - RBU 24
1	1	A48711P	CONNECTOR, Hex 4"
2	1	A48874P	SPACER,
3	1	A48977A	HOUSING
4	1	A61000P	SHAFT
5	1	A61001P	RETAINER, Mechanical Seal
6	1	A61002P	COVER
7	1	A61003P	KEY, Square 3/8
8	2	A62323P	KEEPER
9	1	A62324P	LOCKNUT
10	2	A63208P	KEEPER 2
11	2	A63212P	BAR
12	12	P0001-04-003	BOLT, Hex 1/4 UNC x .75
13	1	P0001-16-030	SCREW, Hex Head 1 UNC x 7.5
14	1	P0013-16-000	NUT, Nylock 1 UNC
15	8	P0031-04-003	SCREW, Socket Head Cap 1/4 UNC x .75
16	16	P0031-12-008	SCREW, Socket Head Cap 3/4 x 2
17	6	P0031-16-012	SCREW, Socket Head Cap 1 x 3
18	2	P0065-213	BEARING, Thrust Block
19	2	P0065-303	SEAL, Mechanical Shaft
20	1	P0077-067	SPIRAL RING, External Shaft
21	1	P0085-256	ORING
22	1	P0085-261	ORING
23	5 QT	P0126-014	OIL, Duragard® [SGC® 630] ISO-220 (Not Shown)
24	6	P0300-176	PLUG, 06MB-HHP
25	3	P0300-887	PLUG, 12MB-HHP

QT - Quart

NOTE: Contact your Akkerman Aftermarket representative for torquing, preloading, welding and oil filling instructions.

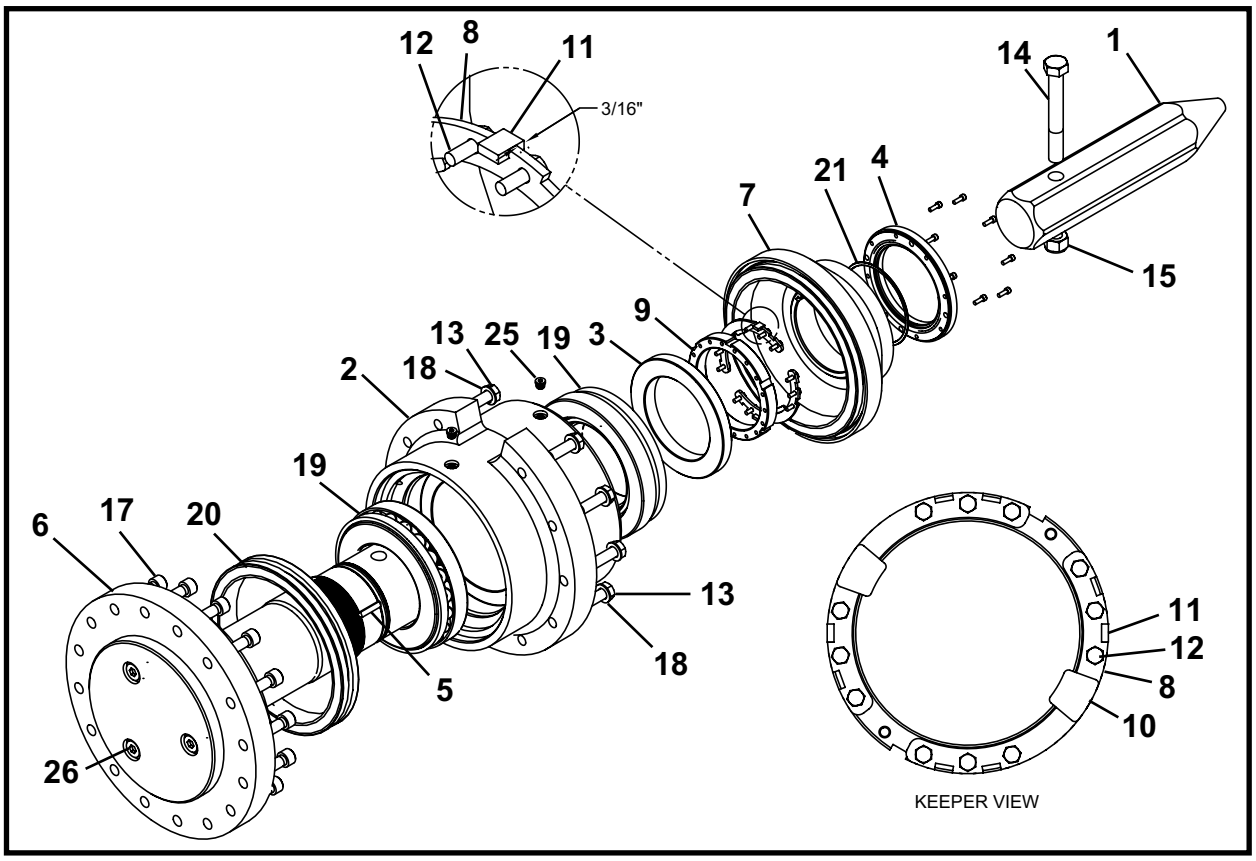
RBU ASSEMBLY - 30, FA49601F
RBU 30



ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49601F	RBU ASSEMBLY - 30
1*	1	FA62426F	ASSEMBLY, Bearing
2*	1	A48843A	CASING
3.1	1	A48842A	CUTTER HEAD - (RK) RBU 30 (Includes items 3.1a - 3.1f)
3.1a*	9	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.1b	36	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.1c	36	P0043-003	WASHER, Nord-Lock 1/2
3.1d	8	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
3.1e	8	P0003-12-000	NUT, Hex 3/4 UNC
3.1f	2	A48889P	SCOOP
3.2	1	A63167A	CUTTER HEAD - (MG) RBU 30 (Includes items 3.2a - 3.2k)
3.2a* ^	9	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.2b^	36	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.2c^	36	P0043-003	WASHER, Nord-Lock 1/2
3.2d	6	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
3.2e	6	P0003-12-000	NUT, Hex 3/4 UNC
3.2f	6	P0031-16-008	SCREW, Socket Cap 1 x 2
3.2g	6	P0050-010	BIT, Cutter
3.2h	2	P0050-191	SCRAPER, Bucket
3.2i	6	P0051-004	HOLDER, Bit
3.2j	2	A63224P	SCOOP, Bottom
3.2k	2	A63228P	SCOOP, Top
4	1	A63495A	CRADLE, Shipping
5	1	P0095-127	CANISTER, Small
6	1	1255-083B	KIT, Decal, RBU 30 (Not Shown)
7	1	P0094-027	STRAP, Ratchet 3 x 12' 5000#

* Refer to this section for parts information. ^ Not part of item 3.2 cutter head assembly
MG - Mixed Ground RK - Rock

BEARING ASSEMBLY, FA62426F
RBU 30

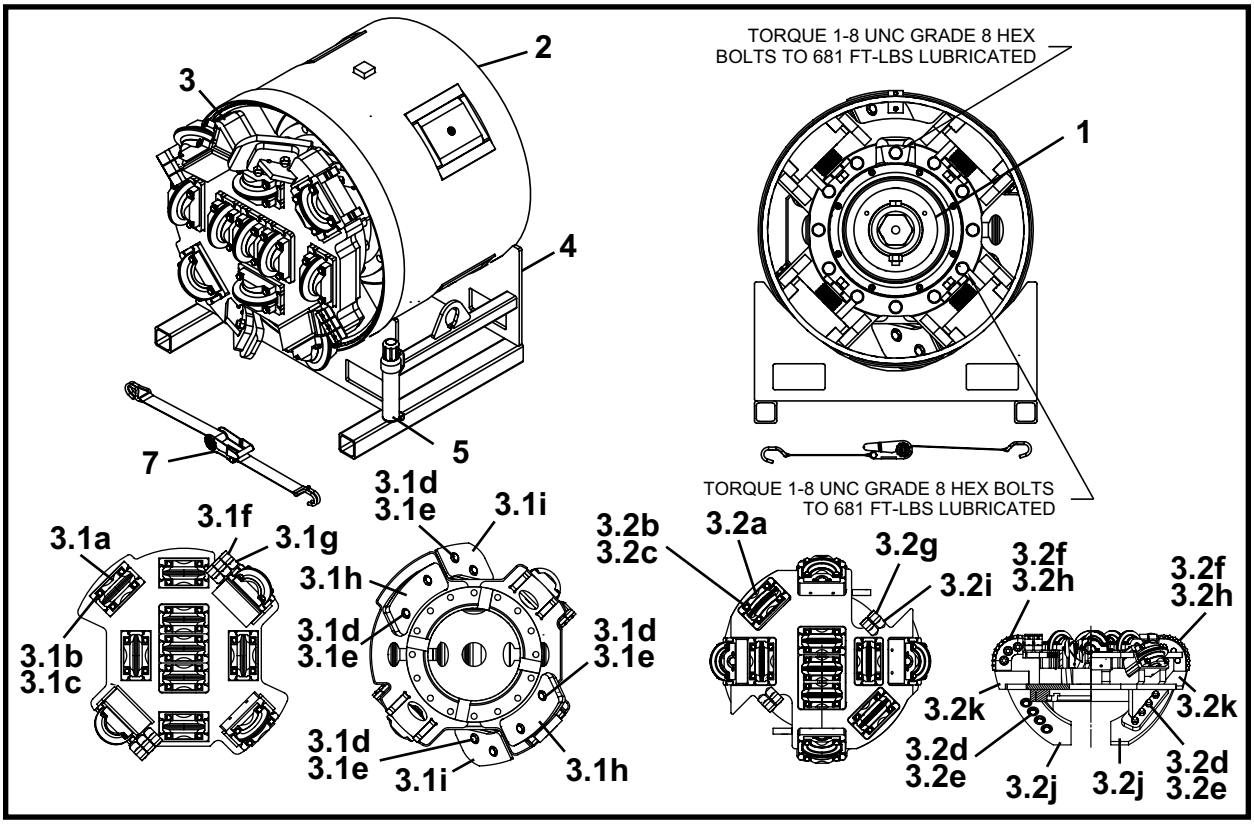


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA62426F	BEARING ASSEMBLY - RBU 30
1	1	A48711P	CONNECTOR, Hex 4
2	1	A48872P	HOUSING
3	1	A48874P	SPACER
4	1	A61002P	COVER
5	1	A61003P	KEY, Square 3/8
6	1	A61004P	SHAFT, Drive
7	1	A61005P	RETAINER, Mechanical Seal
8	2	A62323P	KEEPER
9	1	A62324P	LOCKNUT
10	2	A63208P	KEEPER 2
11	2	A63212P	BAR
12	12	P0001-04-003	BOLT, Hex 1/4 UNC x .75
13	11	P0001-12-016	SCREW, Hex Cap, 3/4 UNC x 4
14	1	P0001-16-030	SCREW, Hex Head Cap 1 UNC x 7.5
15	1	P0013-16-000	NUT, Nylock 1 UNC
16	8	P0031-04-003	SCREW, Socket Head Cap, 1/4 UNC x .75
17	16	P0031-12-008	SCREW, Cap 3/4 x 2
18	11	P0040-012	WASHER, Hardened Flat 3/4
19	2	P0065-213	BEARING, Thrust Block
20	2	P0065-303	SEAL, Mechanical Shaft
21	1	P0077-067	SPIRAL RING, External Shaft
22	1	P0085-256	ORING
23	1	P0085-261	ORING
24	8 QT	P0126-014	OIL, Duragard® [SGC® 630] ISO-220 (Not Shown)
25	6	P0300-176	PLUG, 06MB-HHP
26	3	P0300-887	PLUG, 12MB-HHP

QT - Quart

NOTE: Contact your Akkerman Aftermarket representative for torquing, preloading, welding and oil filling instructions.

RBU ASSEMBLY - 36, FA49602F
RBU 36

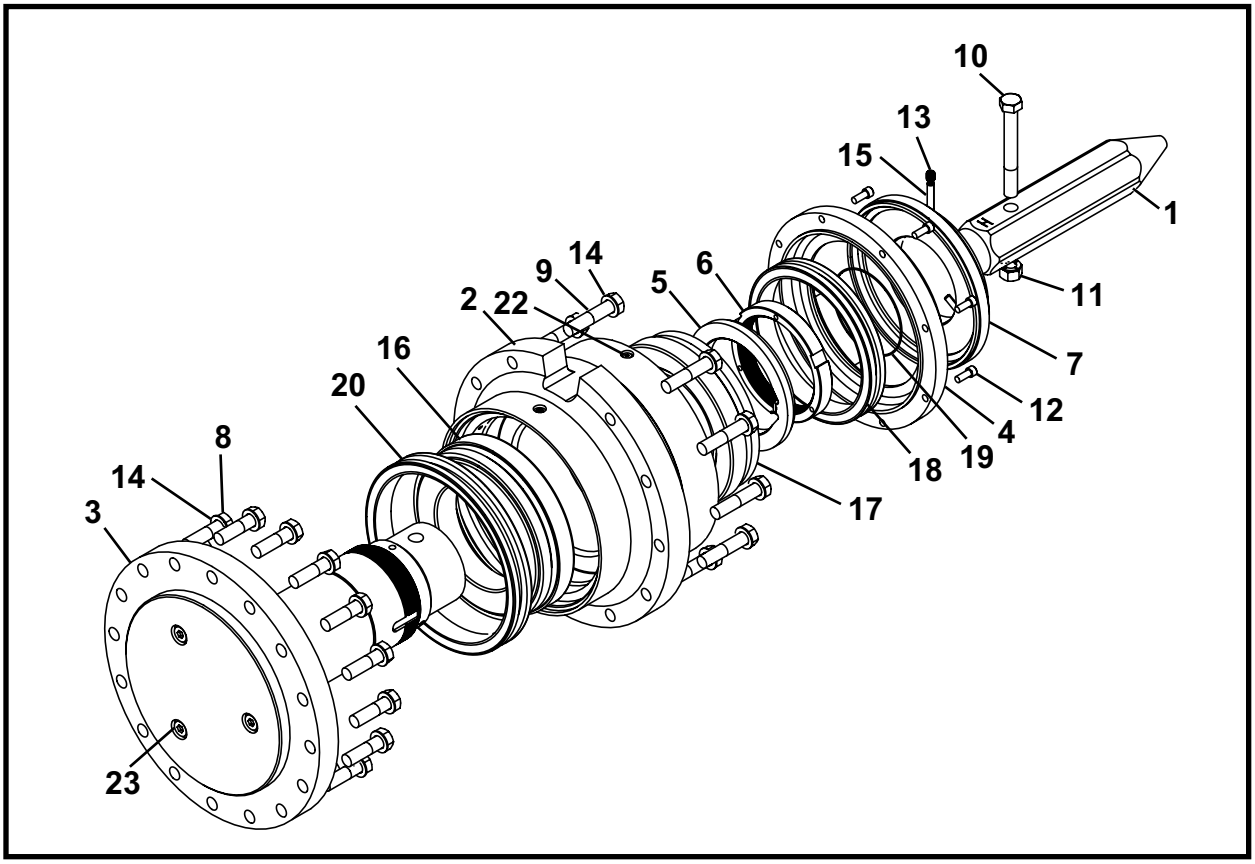


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49602F	RBU ASSEMBLY - 36
1*	1	FA62427F	ASSEMBLY, Bearing
2*	1	A48712A	CASING
3.1	1	A48764A	CUTTER HEAD - (RK) RBU 36 (Includes items 3.2a - 3.2i)
3.1a*	11	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.1b	44	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.1c	44	P0043-003	WASHER, Nord-Lock 1/2
3.1d	8	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
3.1e	8	P0003-12-000	NUT, Hex 3/4 UNC
3.1f	6	P0050-010	BIT, Cutter
3.1g	6	P0051-004	HOLDER, Bit
3.1h	2	A49209P	SCOOP, Bottom
3.1i	2	A49208P	SCOOP, Top
3.2	1	A62187A	CUTTER HEAD - (MG) RBU 36 (Includes items 3.2a - 3.2k)
3.2a* ^	11	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.2b^	44	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.2c^	44	P0043-003	WASHER, Nord-Lock 1/2
3.2d	8	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
3.2e	8	P0003-12-000	NUT, Hex 3/4 UNC
3.2f	6	P0031-16-008	SCREW, Socket Cap 1 x 2
3.2g	4	P0050-010	BIT, Cutter
3.2h	2	P0050-191	SCRAPER, Bucket
3.2i	4	P0051-004	HOLDER, Bit
3.2j	2	A62278P	SCOOP, Bottom
3.2k	2	A62282P	SCOOP, Top
4	1	A63495A	CRADLE, Shipping
5	1	P0095-127	CANISTER, Small
6	1	1255-083C	KIT, DECAL, RBU 36 (Not Shown)
7	1	P0094-027	STRAP, Ratchet 3 x 12' 5000#

* Refer to this section for parts information. ^ Not part of item 3.2 cutter head assembly

MG - Mixed Ground RK - Rock

BEARING ASSEMBLY, FA62427F
RBU 36 - 42

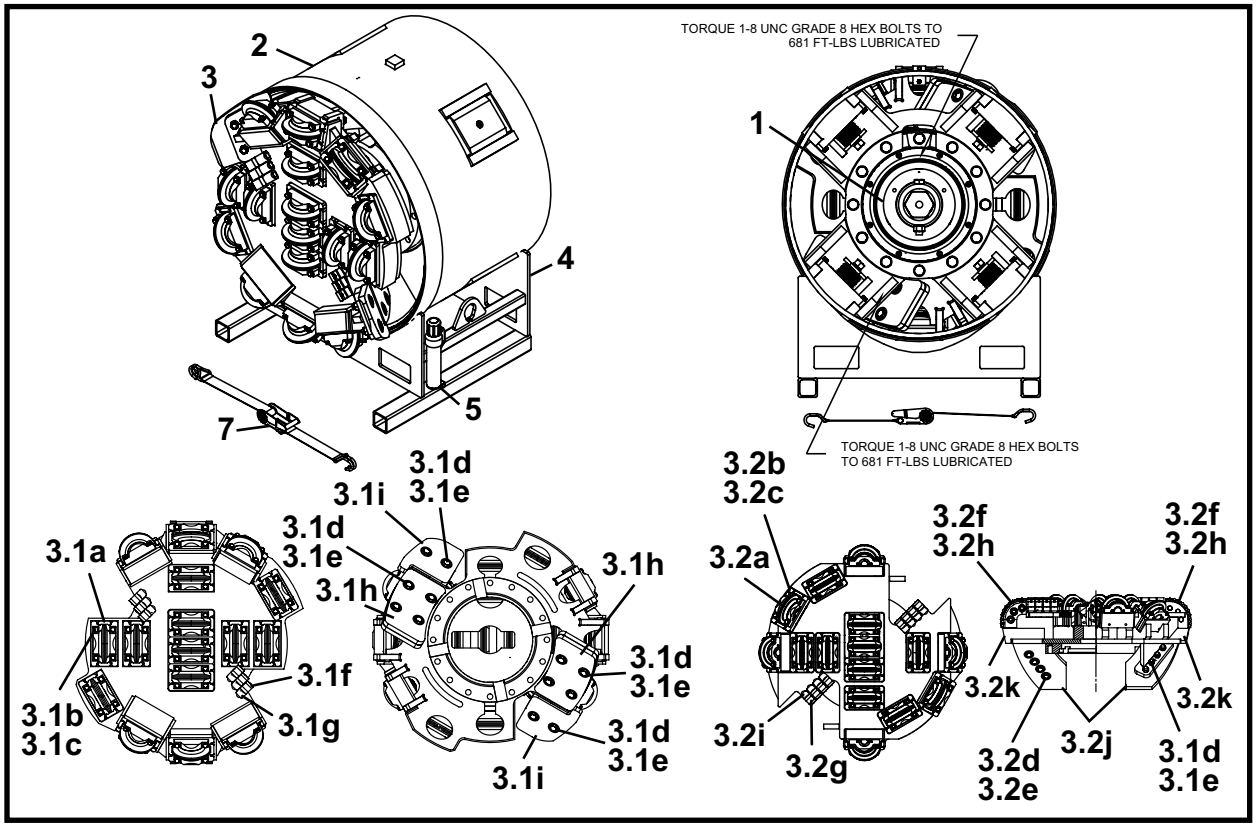


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA62427F	BEARING ASSEMBLY RBU 36 - 42
1	1	A48711P	CONNECTOR, 4
2	1	A49653P	HOUSING
3	1	A49654P	SHAFT, Drive
4	1	A49655P	RETAINER, Bearing
5	1	A63487P	SPACER,
6	1	A63488P	LOCKNUT
7	1	A63489P	RETAINER, Seal
8	16	P0001-16-014	BOLT, Hex 1 UNC x 3.5
9	11	P0001-16-018	BOLT, Hex 1 UNC x 4.5
10	1	P0001-16-032	SCREW, Hex Head Cap 1 UNC x 8
11	1	P0013-16-000	NUT, Nylock 1
12	8	P0031-08-005	SCREW, Socket Head Cap 1/2 UNC x 1.25
13	3	P0033-10-011	SCREW, Socket Set 5/8 x .75
14	27	P0040-016	WASHER, Hardened Flat 1
15	3	P0049-182	PIN, Spring 1/2 x 2.5
16	1	P0065-298	BEARING, Thrust
17	1	P0065-299	BEARING, Thrust
18	1	P0065-303	SEAL, Mechanical Shaft
19	1	P0085-167	ORING
20	1	P0088-231	SEAL, Mechanical
21	8 QT	P0126-014	OIL, Duragard® [SGC® 630] ISO-220 (Not Shown)
22	6	P0300-176	PLUG, 06MB-HHP
23	3	P0300-887	PLUG, 12MB-HHP

QT - Quart

NOTE: Contact your Akkerman Aftermarket representative for torquing, preloading, welding and oil filling instructions.

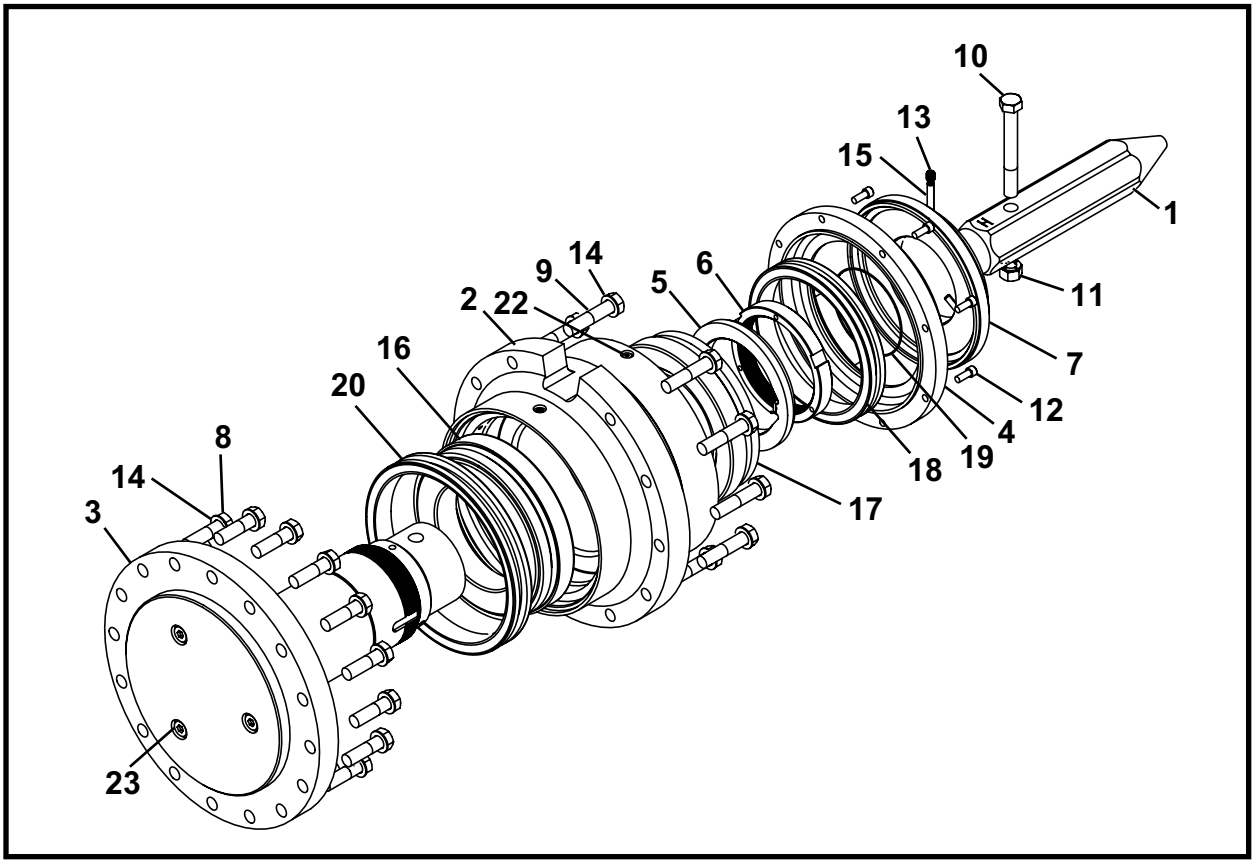
RBU ASSEMBLY - 42, FA49603F
RBU 42



ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49603F	RBU ASSEMBLY - 42
1*	1	FA62427F	ASSEMBLY, Bearing
2*	1	A48702A	CASING
3.1	1	A48701A	CUTTER HEAD - (RK) RBU 42 (Includes items 3.2a - 3.2i)
3.1a*	16	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.1b	64	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.1c	64	P0043-003	WASHER, Nord-Lock 1/2
3.1d	16	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
3.1e	16	P0003-12-000	NUT, Hex 3/4 UNC
3.1f	6	P0050-010	BIT, Cutter
3.1g	6	P0051-004	HOLDER, Bit
3.1h	2	A49201P	SCOOP, Bottom
3.1i	2	A49200P	SCOOP, Top
3.2	1	A62340A	CUTTER HEAD - (MG) RBU 42 (Includes items 3.2a - 3.2k)
3.2a* ^	15	FA48890F	DISC CUTTER ASSEMBLY 6.63
3.2b^	60	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
3.2c^	60	P0043-003	WASHER, Nord-Lock 1/2
3.2d	8	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
3.2e	8	P0003-12-000	NUT, Hex 3/4 UNC
3.2f	6	P0031-16-008	SCREW, Socket Cap 1 x 2
3.2g	8	P0050-010	BIT, Cutter
3.2h	2	P0050-191	SCRAPER, Bucket
3.2i	8	P0051-004	HOLDER, Bit
3.1j	2	A62441P	SCOOP, Bottom
3.1k	2	A62443P	SCOOP, Top
4	0	A63495A	CRADLE, Shipping
5	1	P0095-127	CANISTER, Small
6	1	1255-083D	KIT, DECAL, RBU 42 (Not Shown)
7	1	P0094-027	STRAP, Ratchet 3 x 12' 5000#

* Refer to this section for parts information.
^ Not part of item 3.2 cutter head assembly
MG - Mixed Ground
RK - Rock

BEARING ASSEMBLY, FA62427F
RBU 36 - 42

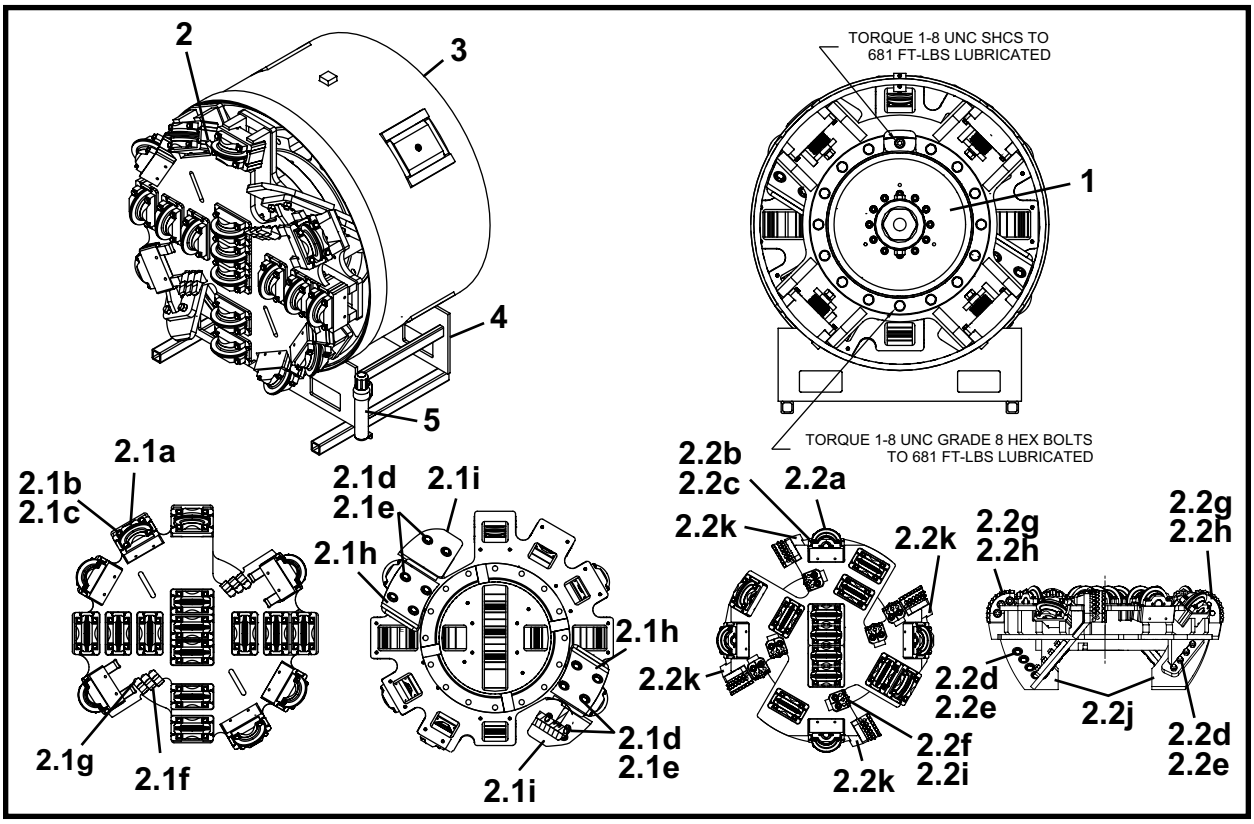


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA62427F	BEARING ASSEMBLY RBU 36 - 42
1	1	A48711P	CONNECTOR, 4
2	1	A49653P	HOUSING
3	1	A49654P	SHAFT, Drive
4	1	A49655P	RETAINER, Bearing
5	1	A63487P	SPACER,
6	1	A63488P	LOCKNUT
7	1	A63489P	RETAINER, Seal
8	16	P0001-16-014	BOLT, Hex 1 UNC x 3.5
9	11	P0001-16-018	BOLT, Hex 1 UNC x 4.5
10	1	P0001-16-032	SCREW, Hex Head Cap 1 UNC x 8
11	1	P0013-16-000	NUT, Nylock 1
12	8	P0031-08-005	SCREW, Socket Head Cap 1/2 UNC x 1.25
13	3	P0033-10-011	SCREW, Socket Set 5/8 x .75
14	27	P0040-016	WASHER, Hardened Flat 1
15	3	P0049-182	PIN, Spring 1/2 x 2.5
16	1	P0065-298	BEARING, Thrust
17	1	P0065-299	BEARING, Thrust
18	1	P0065-303	SEAL, Mechanical Shaft
19	1	P0085-167	ORING
20	1	P0088-231	SEAL, Mechanical
21	8 QT	P0126-014	OIL, Duragard® [SGC® 630] ISO-220 (Not Shown)
22	6	P0300-176	PLUG, 06MB-HHP
23	3	P0300-887	PLUG, 12MB-HHP

QT - Quart

NOTE: Contact your Akkerman Aftermarket representative for torquing, preloading, welding and oil filling instructions.

RBU ASSEMBLY - 48, FA49604F
RBU 48

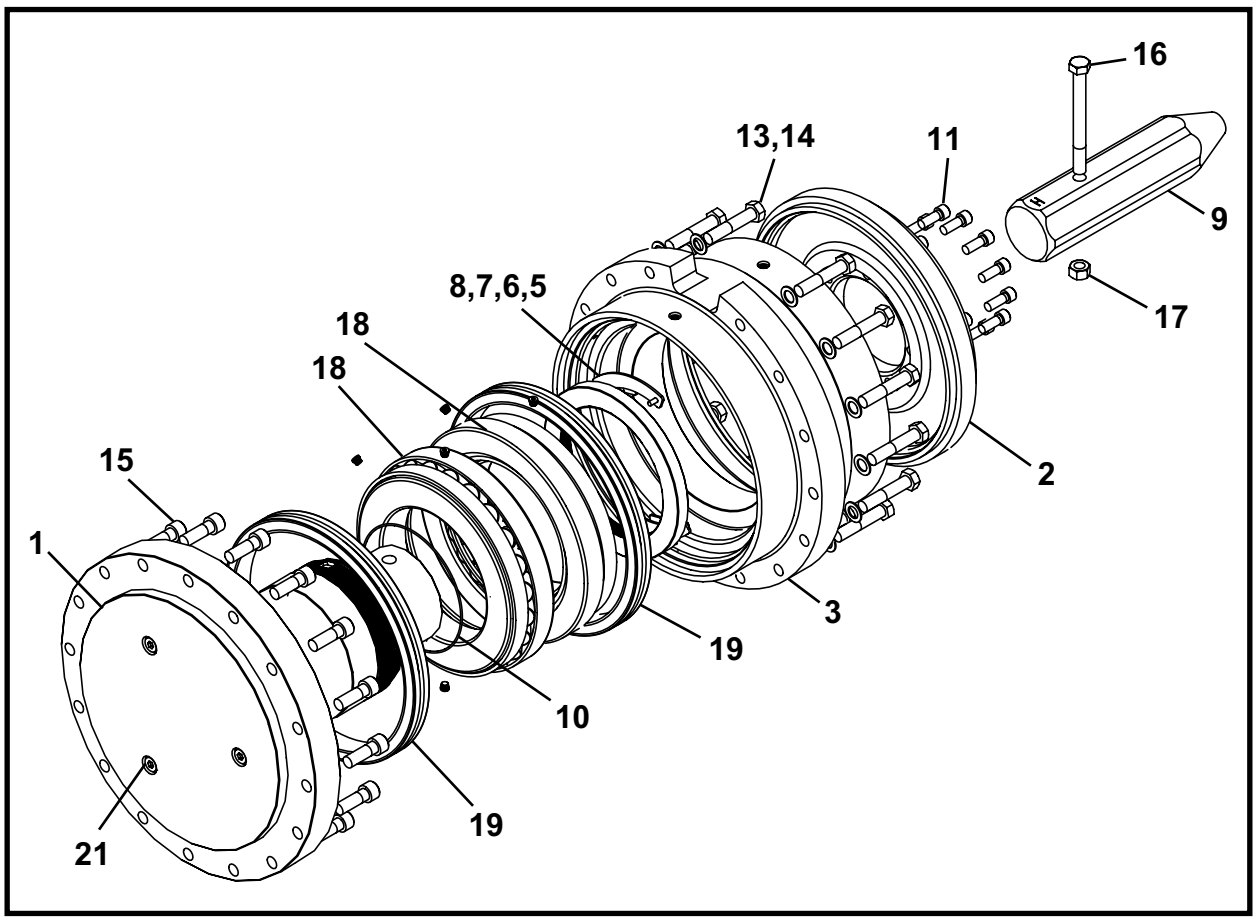


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49604F	RBU ASSEMBLY - 48
1*	1	FA49612F	ASSEMBLY, Bearing
2.1	1	A49624A	CUTTER HEAD - (RK) RBU 48 (Includes items 2.2a - 2.2i)
2.1a*	18	FA48890F	DISC CUTTER ASSEMBLY 6.63
2.1b	72	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
2.1c	72	P0043-003	WASHER, Nord-Lock 1/2
2.1d	12	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
2.1e	12	P0003-12-000	NUT, Hex 3/4 UNC
2.1f	6	P0050-010	BIT, Cutter
2.1g	6	P0051-004	HOLDER, Bit
2.1h	2	A49632P	SCOOP, Bottom
2.1i	2	A49631P	SCOOP, Top
2.2	1	A62524A	CUTTER HEAD - (MG) RBU 48 (Includes items 2.2a - 2.2k)
2.2a* ^	15	FA48890F	DISC CUTTER ASSEMBLY 6.63
2.2b^	60	P0001-08-011B	SCREW, Hex Cap 1/2 UNC x 2.75 Grade 9 Zinc
2.2c^	60	P0043-003	WASHER, Nord-Lock 1/2
2.2d	16	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
2.2e	16	P0003-12-000	NUT, Hex 3/4 UNC
2.2f	12	P0031-12-007	SCREW, Socket Head Cap 3/4 UNC x 1.75
2.2g	12	P0031-16-008	SCREW, Socket Cap 1 x 2
2.2h	4	P0050-191	SCRAPER, Bucket
2.2i	6	P0050-192	SCRAPER, Face
2.2j	4	A63106P	SCOOP, Bottom
2.2k	4	A63108P	SCOOP, Top
3*	1	A49645A	CASING
4	1	A41145A	CRADLE, Shipping
5	1	P0095-127	CANISTER, Small
6	1	1255-083E	KIT, DECAL, RBU 48 (Not Shown)

* Refer to this section for parts information. ^ Not part of item 2.2 cutter head assembly

MG - Mixed Ground RK - Rock

BEARING ASSEMBLY, FA49612F
RBU 48

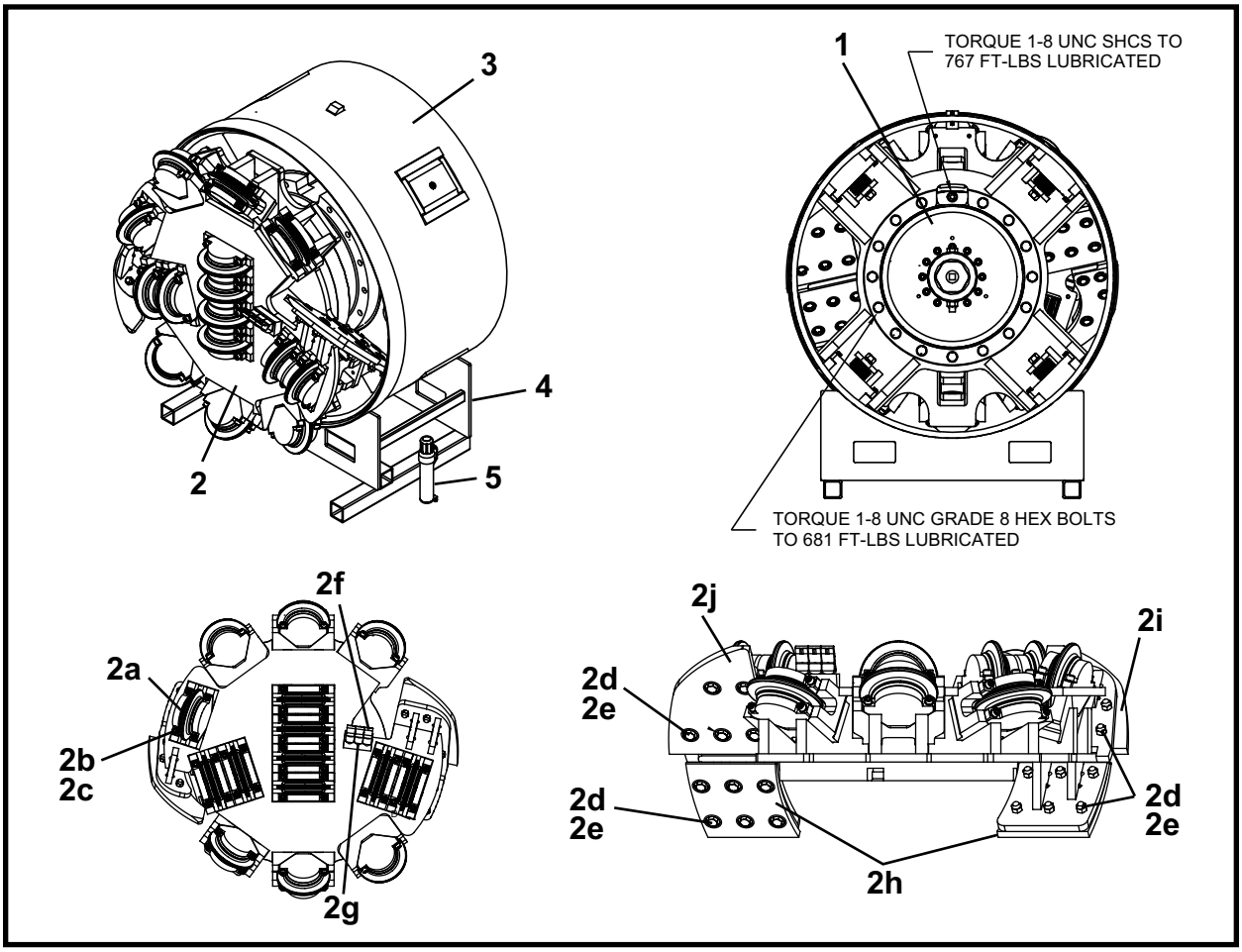


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49612F	BEARING ASSEMBLY RBU 48
1	1	A49618P	SHAFT
2	1	A49619P	RETAINER, Outer Seal
3	1	A49620P	HOUSING
4	1	A49621P	NUT, Shaft
5	2	A49938P	KEEPER
6	2	A49939P	TAB, Keeper
7	4	P0001-06-004	BOLT, Hex 3/8 UNC x 1
8	4	P0040-006	WASHER, Hardened Flat 3/8
9	1	A49644P	CONNECTOR, Hex 5
10	1	P0085-276	ORING
11	12	P0031-12-008	SCREW, Cap 3/4 x 2
12	6	P0300-176	PLUG, 06MB-HHP
13	15	P0001-16-020	BOLT, Hex 1 UNC x 5
14	15	P0040-016	WASHER, Hardened Flat 1
15	16	P0031-16-012	SCREW, Socket Cap 1 x 3
16	1	P0001-16-040	BOLT, Hex 1 UNC x 10
17	1	P0003-16-000	NUT, Hex 1 UNC
18	2	P0065-317	BEARING
19	2	P0088-273	SEAL, Metal Face
20	16 QT	P0126-014	OIL, Duragard® [SGC® 630] ISO-220
21	3	P0300-887	PLUG, 12MB-HHP

QT - Quart

NOTE: Contact your Akkerman Aftermarket representative for torquing, preloading, welding and oil filling instructions.

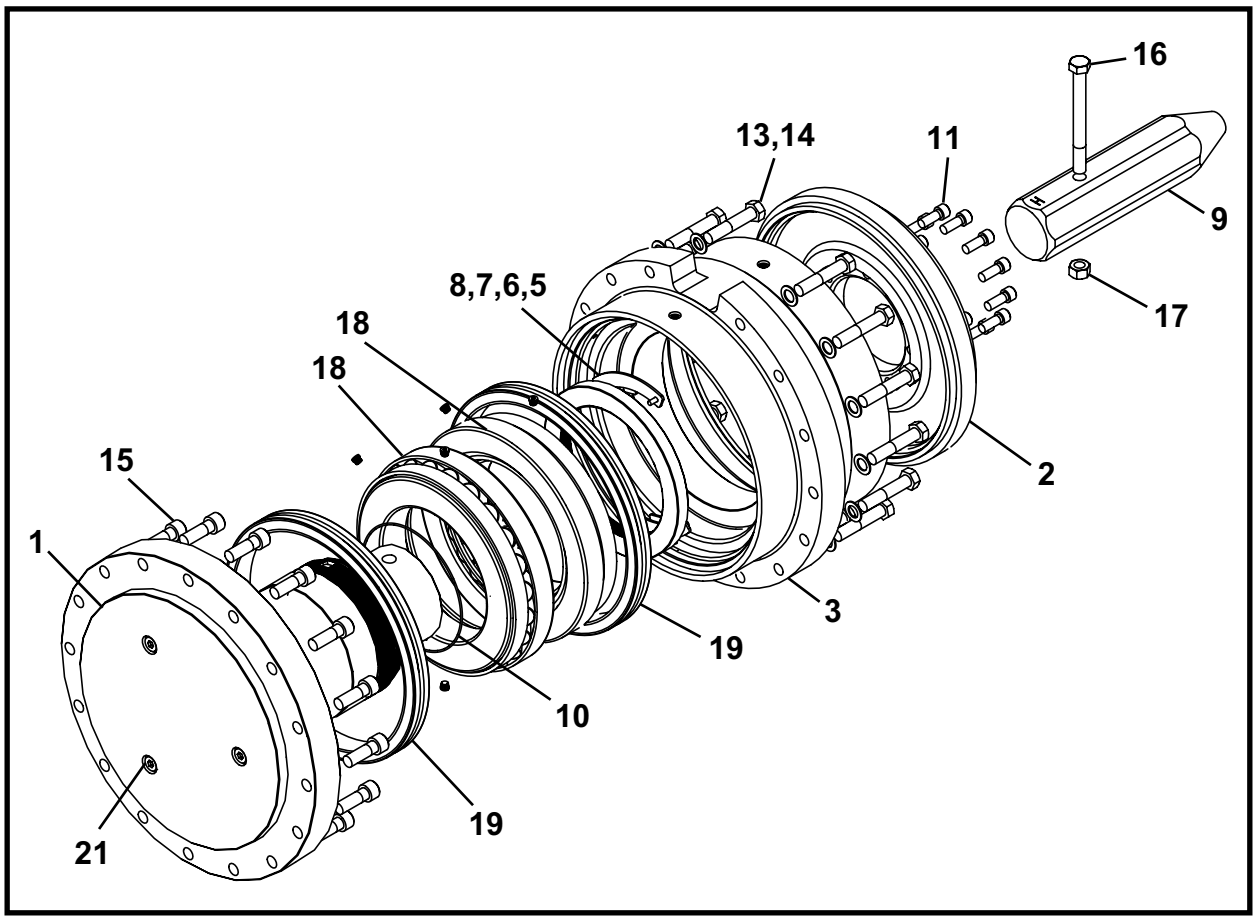
RBU ASSEMBLY - 54, FA64182F
RBU 54



ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA64182F	RBU ASSEMBLY - 54
1*	1	FA49612F	ASSEMBLY, Bearing
2	1	A63790A	CUTTER HEAD - (MG) RBU 54 (Includes items 2a - 2j)
2.a*	15	P0050-212	DISC CUTTER ASSEMBLY 9.5 P
2b	60	P0031-10-016	SCREW, Socket Head Cap 5/8 UNC x 4
2c	60	P0043-012	WASHER, Nord-Lock 5/8
2d	21	P0001-12-011	BOLT, Hex 3/4 UNC x 2.75
2e	21	P0003-12-000	NUT, Hex 3/4 UNC
2f	3	P0050-010	BIT, Cutter
2g	3	P0051-004	HOLDER, Bit
2h	2	A63106P	SCOOP, Bottom
2i	1	A64048P	SCOOP, Top Small
2j	1	A64051P	SCOOP, Top Large
3*	1	A63799A	CASING
4	1	A64197A	CRADLE, Shipping
5	1	P0095-127	CANISTER, Small
6	1	1255-083F	KIT, DECAL, RBU 54 (Not Shown)

* Refer to your disc cutter manufacturer for parts information.
MG - Mixed Ground

BEARING ASSEMBLY, FA49612F
RBU 48 / 54

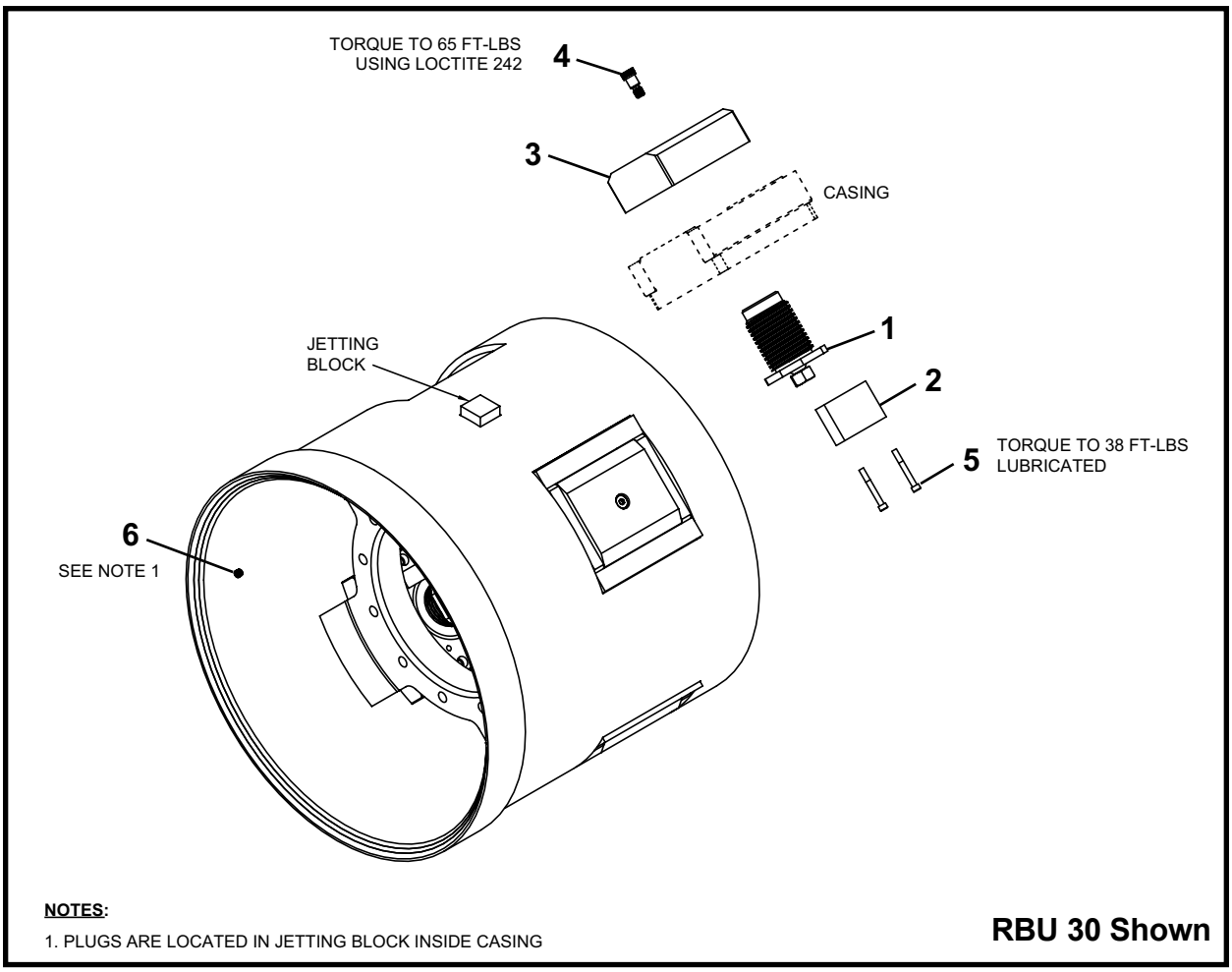


ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA49612F	BEARING ASSEMBLY RBU 48
1	1	A49618P	SHAFT
2	1	A49619P	RETAINER, Outer Seal
3	1	A49620P	HOUSING
4	1	A49621P	NUT, Shaft
5	2	A49938P	KEEPER
6	2	A49939P	TAB, Keeper
7	4	P0001-06-004	BOLT, Hex 3/8 UNC x 1
8	4	P0040-006	WASHER, Hardened Flat 3/8
9	1	A49644P	CONNECTOR, Hex 5
10	1	P0085-276	ORING
11	12	P0031-12-008	SCREW, Cap 3/4 x 2
12	6	P0300-176	PLUG, 06MB-HHP
13	15	P0001-16-020	BOLT, Hex 1 UNC x 5
14	15	P0040-016	WASHER, Hardened Flat 1
15	16	P0031-16-012	SCREW, Socket Cap 1 x 3
16	1	P0001-16-040	BOLT, Hex 1 UNC x 10
17	1	P0003-16-000	NUT, Hex 1 UNC
18	2	P0065-317	BEARING
19	2	P0088-273	SEAL, Metal Face
20	16 QT	P0126-014	OIL, Duragard® [SGC® 630] ISO-220
21	3	P0300-887	PLUG, 12MB-HHP

QT - Quart

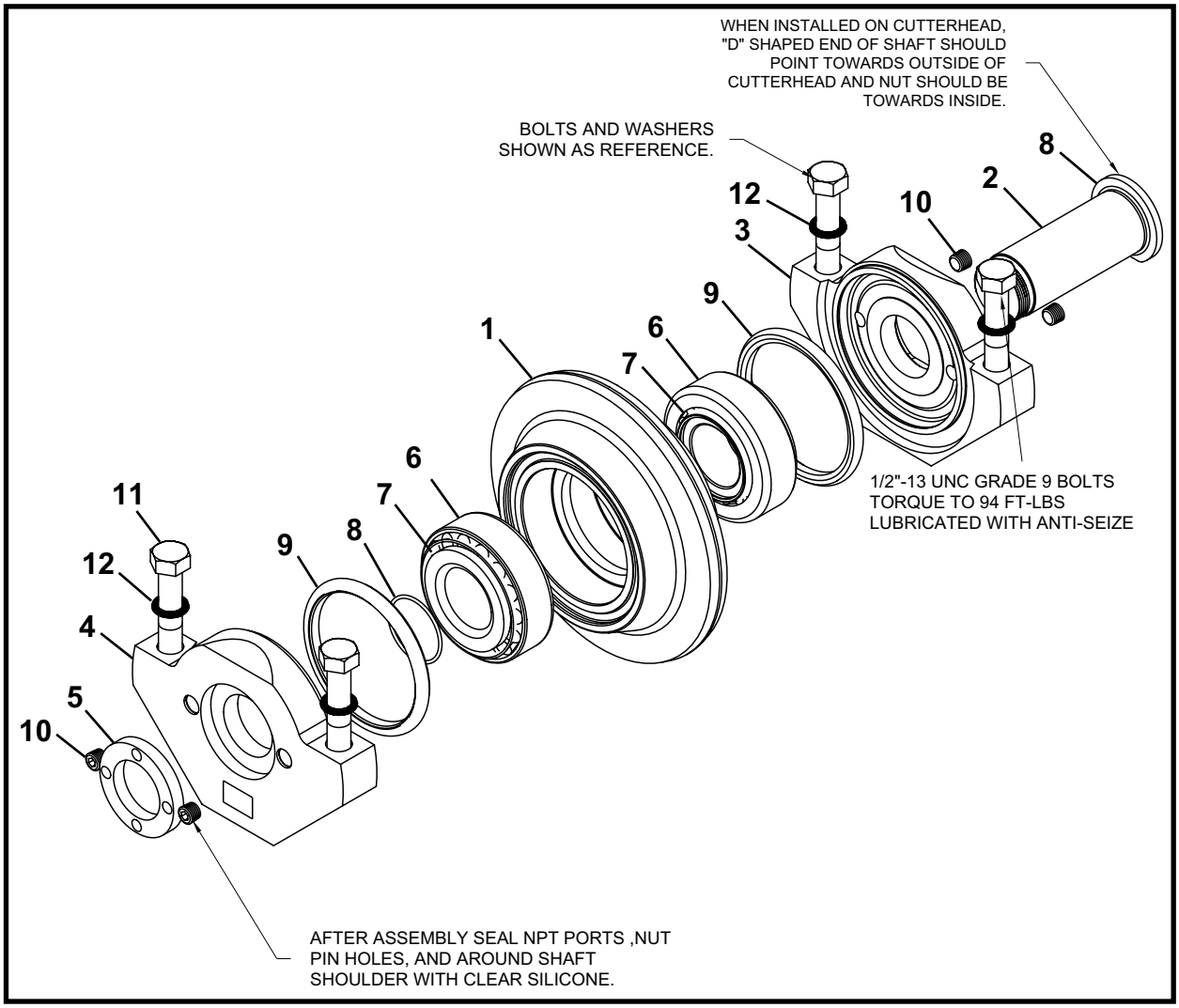
NOTE: Contact your Akkerman Aftermarket representative for torquing, preloading, welding and oil filling instructions.

CASING
RBU 30 THRU 54



ITEM	QTY	PART NO.	DESCRIPTION
1	4	A48722A	SCREW, Stabilizer
2	4	A48724P	KEEPER, Stabilizer
3	4	A48725P	SHOE, Stabilizer
4	4	P0030S-12-003	BOLT, Socket Head Shoulder 3/4 x .75
5	8	P0031-06-012	SCREW, Socket Head Cap 3/8 UNC x 3
6	3	P0300-026	PLUG, 04MP-HHP

DISC CUTTER ASSEMBLY 6.63", FA48890F
RBU



ITEM	QTY	PART NO.	DESCRIPTION
0	1	FA48890F	DISC CUTTER ASSEMBLY 6.63"
1	1	A48891P	DISC CUTTER
2	1	A48892P	SHAFT,
3	1	A48893P	END PLATE 1
4	1	A48894P	END PLATE 2
5	1	A48895P	NUT
6	2	P0065-301	CUP, Tapered Roller Bearing
7	2	P0065-302	CONE, Tapered Roller Bearing
8	2	P0085-028	ORING
9	1	P0088-230	SEAL
10	4	P0300-144	PLUG, 02MP-HHP
11*	4 per Asm	P0001-08-011B	SCREW, Hex Head Cap 1/2 UNC x 2.75 Grade 9 Zinc
12*	4 per Asm	P0043-003	WASHER, Nord-Lock 1/2
13	3	P0126-027	GREASE, Paragon 3000
14*	1	050169A	MANUAL, Disc Cutter Installation & Maintenance

Asm - Assembly

* Not part of assembly. Must be ordered separately.

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