



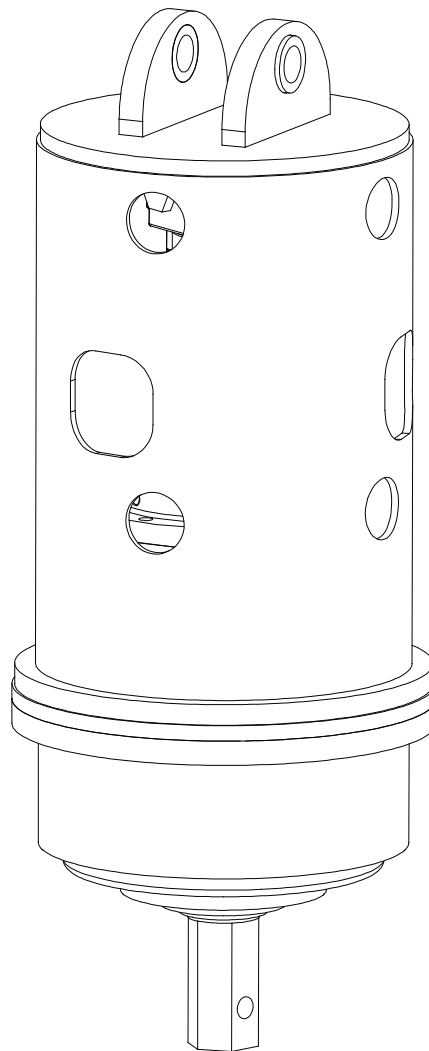
# AUGER DRIVE

(TWO SPEED GEARTEK MOTOR VARIANT)

SA-70 (660983)



**PALADIN** UTILITY



**Instruction Manual**  
**Owner's Manual**  
Safety Precautions  
Operating Instructions  
Maintenance  
Parts Lists

Manual Number: M135776.indd  
Release Date: March 27, 2007

## PREFACE

This manual is used to familiarize you with safety, assembly, operation, adjustment, troubleshooting, and maintenance. Read and follow the recommendations in this manual to ensure safe and efficient operation. The information contained in this manual was current at the time of printing. Some items may change slightly to assure you the customer, the best performance.

We want you to be completely satisfied with your new product, feel free to contact your local Authorized Service Dealer for help with service, replacement parts, or any other information you may require.

Whenever you contact your Authorized Service Dealer or the factory, always have the model number and serial number of your product available. These numbers will help provide exact information about your specific product. You will find the model and serial numbers on an ID plate located on the product.

For your convenience, write the product model number, serial numbers, and date of purchase in the spaces below.

MODEL NO:	_____
SERIAL NO:	_____
DATE of PURCHASE:	_____

## TABLE OF CONTENTS

Preface / Table of Contents .....	2
Safety Statements .....	3
General Precautions .....	4
Safety Decal Locations / Serial Tag Location .....	5
Specifications / Component and Control Locations .....	6
Set-Up Instructions / Operating Procedures / Storage .....	7
General Maintenance / Checking and Changing the Gear Oil .....	8
Maintenance Cont. / Troubleshooting .....	9
SA-70 Drive Parts Breakdown .....	10
SA-70 Drive Parts List .....	11
Auger Drive Warranty Policy / Returned Goods Policy .....	12
Torque Chart for Common Bolt Sizes .....	13

## SAFETY STATEMENTS

### DANGER



THIS STATEMENT IS USED WHERE SERIOUS INJURY OR DEATH WILL RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.

### WARNING



THIS STATEMENT IS USED WHERE SERIOUS INJURY OR DEATH COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.

### CAUTION



THIS STATEMENT IS USED WHERE MINOR INJURY COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.



THIS SYMBOL BY ITSELF OR USED WITH A SAFETY SIGNAL WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

### WARNING



#### READ MANUAL PRIOR TO INSTALL

Improper installation, operation, or maintenance of the equipment could result in serious injury or death. Operators and maintenance personnel should read this manual as well as all manuals related to this equipment. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL.**

### WARNING



#### READ AND UNDERSTAND ALL SAFETY STATEMENTS

Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing or operating this equipment.



#### KNOW YOUR EQUIPMENT

Know your equipment's capabilities, dimensions and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to assure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn and hard to read.

### WARNING



#### DO NOT MODIFY EQUIPMENT

Modifications may weaken the integrity of the equipment and may impair the functions, safety, life, and performance of the equipment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality.

## GENERAL PRECAUTIONS



### PREPARE FOR EMERGENCIES

- Be prepared if a fire starts.
- Keep a first aid kit near by when operating equipment.

### WARNING



### OPERATOR SAFETY

- Protective clothing and equipment should be worn at all times.
- Wear protective clothing and equipment appropriate for the job. Avoid loose fitting clothing.
- Prolonged exposure to excessive noise can cause hearing loss. Wear suitable hearing protection such as ear plugs.
- Operating equipment safely requires the full attention of the operator. Avoid distractions.
- Do not operate the unit when you are tired, ill or under the influence of alcohol, drugs or medication.
- Never let a minor or inexperienced person operate the unit.
- Keep hands away from the drilling bit at all times.
- Inspect the area to be drilled before operation. Remove objects which can be thrown or become entangled.

### CAUTION



### UNIT AND TOOL SAFETY

- Inspect the entire tool before operation.
- Replace parts that are cracked, chipped or damaged in any way before operation.
- Keep others away when making any adjustments to the unit.
- Damage to the Auger Drive and auger bit can result if the prime mover moves while the auger is still in the hole.

### WARNING



### PRACTICE SAFE MAINTENANCE

- Use proper tools and equipment when conducting maintenance, refer to this manual for additional information.
- Work in a clean dry area.
- Inspect all parts. Be sure parts are in good working condition and installed properly.
- Remove build up of grease, oil or any debris.
- Remove all tools and unused parts from equipment before beginning operation.

### WARNING



### BE ALERT ON THE JOB SITE

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to machinery and work activity. Never assume that children will remain where you last saw them. BE ALERT and turn the equipment off if children enter the work area. Keep children out of the work area and under supervision of another responsible adult.

### WARNING



### DRILLING SAFETY

- Inspect the area to be drilled before operation. Remove objects which can be thrown or become entangled.
- Keep all parts of your body away from the drilling bit when operating the unit.
- DO NOT operate the Auger Drive when the auger bit is more than 12" (305mm) above ground. The auger bit may bind and cause injury to the operator and damage to the equipment.
- While the auger bit is rotating, DO NOT attempt to manually guide the auger to a location.

### WARNING



### UNDERGROUND HAZARDS

It is the responsibility of the operator to know where buried power, gas, telephone, and other utilities are at in the work area. This may lead to shock or an explosion. Have the work area marked for buried lines and do not dig in marked areas set by your local municipals. Striking a hard object underground with the auger turning can result in the slowing or stopping of the auger.

# SAFETY DECAL LOCATIONS



## SAFETY DECALS

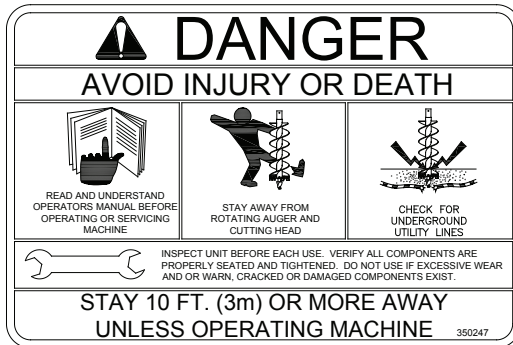
This unit comes equipped with all safety decals in place. They are designed to help you safely operate your unit. Read and follow all safety decals. (Locations shown below in figure 1)

- Keep all safety decals clean and legible at all times.
  - Replace safety decals that are missing or have become illegible.
  - Safety decals are available from your distributor or manufacture.
  - Some parts installed during repair may require safety decals to be affixed to the replacement part.
- When ordering the replacement part(s) be sure the correct safety decal(s) are included in your order.



## INSTALLING SAFETY DECALS

- Clean the desired area with warm soapy water.
- Decide on exact position before you remove the backing paper.
- Peel backing paper from decal. Press firmly on the surface.
- Air pockets can be pierced with a pin and smoothed.



350247

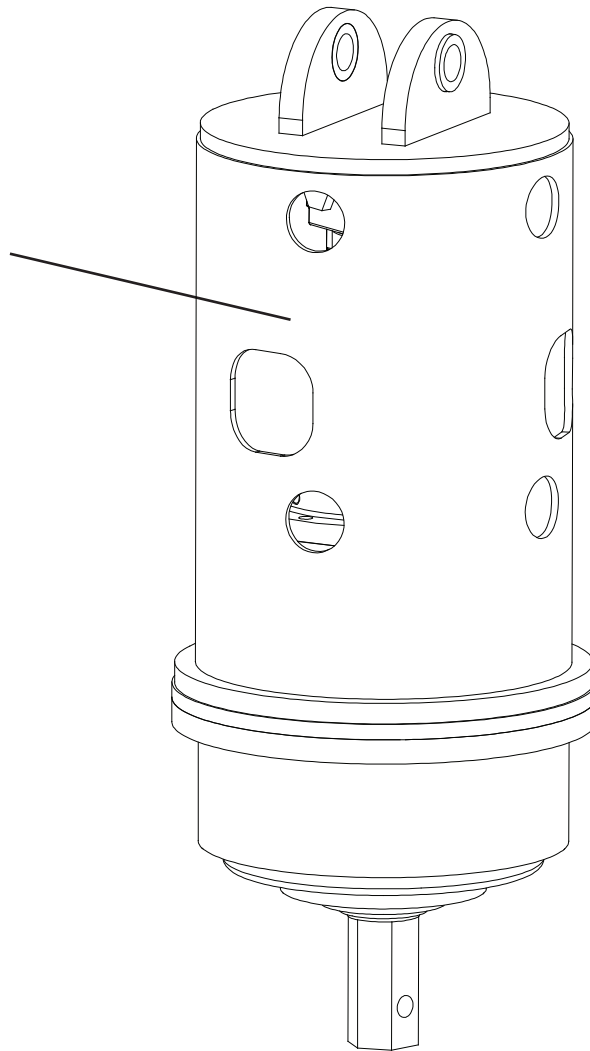


Figure 1

# SPECIFICATIONS / COMPONENT AND CONTROL LOCATIONS

Use the illustration below to help familiarize yourself with the various component, controls, and their locations.

### GENERAL SPECIFICATIONS:

**Application:** Construction & Anchor Equipment  
**Model:** SA-70  
**Weight:** 1520 lbs (690 Kg)

### GEARBOX SPECIFICATIONS:

**Type:** Planetary  
**Reduction Ratio:** 87.23 : 1  
**Output Shaft:** 4" Square  
**Oil Capacity:** -  
**Oil Type:** SAE 80W90 GL-5  
**Shaft Rotation:** Bi-Rotational

### HYDRAULIC MOTOR SPECIFICATIONS:

**Type:** Geartek  
**Displacement:** 15.8 cu in (total)  
**Min Hydraulic Flow:** -  
**Max Hydraulic Flow:** 80 GPM  
**Max Pressure:** 3500 PSI Cont. / 3900 PSI Int.  
**Motor Mount:** SAE "D" 4 Bolt  
**Shaft Spec:** 1-3/4" 13 Tooth Spline  
**Motor Ports:** 2" SAE 4-bolt Flange (Code 61-W46-32-32)  
**Pilot Port:** SAE-6 O-Ring 9/16-18 UNF  
**Rotation:** Bidirectional

### PERFORMANCE SPECIFICATIONS:

OUTPUT SPEED (Low Speed)		OUTPUT TORQUE (High Torque)	
FLOW	SPEED	PRESSURE	TORQUE
GPM (LPM)	RPM	PSI	FT/LBS (Nm)
60 (225)	10.1	2000	32780 (44477)
65 (244)	10.9	2300	37697 (51149)
70 (262)	11.7	2500	40975 (55597)
75 (281)	12.6	2700	44253 (60044)
80 (300)	13.4	2900	47531 (64492)
		3100	50809 (68940)
		3300	54092 (73394)
		3500	57370 (77842)
		3700	60648 (82290)

OUTPUT SPEED (High Speed)		OUTPUT TORQUE (Low Torque)	
FLOW	SPEED	PRESSURE	TORQUE
GPM (LPM)	RPM	PSI	FT/LBS (Nm)
60 (225)	20.1	2000	16390 (22238)
65 (244)	21.8	2300	18848 (25573)
70 (262)	23.5	2500	20487 (27797)
75 (281)	25.1	2700	22126 (30021)
80 (300)	26.8	2900	23765 (32245)
		3100	25404 (34469)
		3300	27046 (36697)
		3500	28685 (38921)
		3700	30324 (41145)

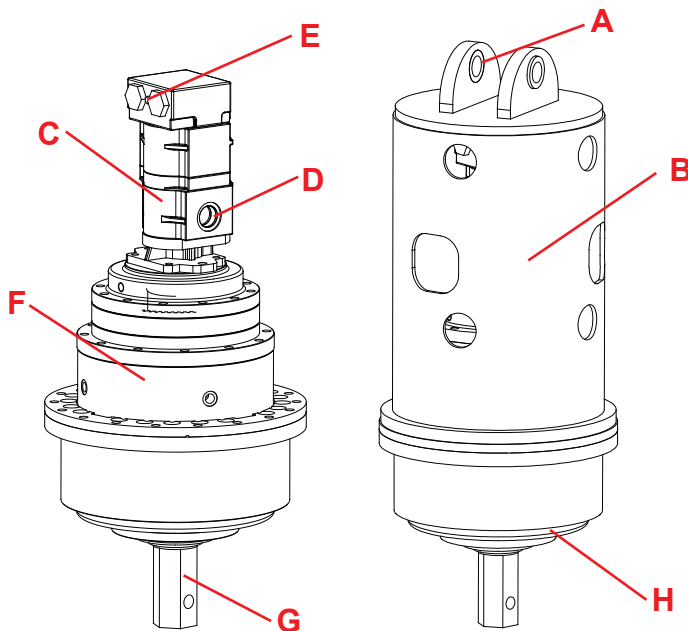


Figure 2

- A - Bail Boss**
- B - Bail Housing**
- C - Hydraulic Motor**
- D - Motor Ports**
- E - Pilot Port**
- F - Gearbox**
- G - Output Shaft**
- H - Oil Drain Plug**

**Note:** Output speed and torque specifications are based on theoretical values and are provided for comparative purposes only.

Pengo continually looks for new ways to improve its products. Therefore, Pengo reserves the right to make changes to our products and specifications without notice.

## SET-UP INSTRUCTIONS

Your Pengo Planetary Auger Drive receives its hydraulic oil flow and pressure from the parent machine through the auxiliary hydraulic circuit via two quick release couplers near the end of the truck boom or excavator arm.

**CAUTION:** Alert yourself to the weight of the Auger Drive. Do NOT exceed the recommended lift capacity of the parent machine. Refer to your machine's owner's manual.

## OPERATING PROCEDURES

Before operating, always ensure that the Auger Drive and auger or anchor are connected correctly to the parent machine.

### DRILLING OPERATION

1. To begin drilling, position the auger or anchor on the ground in the desired location. Engage the parent machine's auxiliary hydraulics to rotate the auger or anchor in a clockwise direction.

2. Lower the parent machine's arm(s) to engage the auger or anchor into the ground. Use only enough down pressure to assure positive penetration of the auger. Ease up on the down pressure if the auger rotation slows down drastically or stalls. Excessive down pressure will cause the auger to stall frequently.

**Note:** Do not continually stall the Auger Drive! Continued stalling may cause excessive heating of the hydraulic system and possible damage to the Auger Drive.

3. As the auger or anchor digs in the ground, the parent machine's arm(s) or boom may travel through an arc. This means the operator may need to continually reposition the auger or anchor to ensure vertical application of the auger or anchor.

4. When the auger has penetrated the ground about 24" (610mm), raise the auger from the hole to clean out the loose material.

5. Once the required hole depth is reached, allow the auger to turn a few seconds at this depth to clean the hole.

6. Stop rotation of the auger and raise the auger out of the hole. Swing the auger away from the newly drilled hole. Spin the loose material off the auger.

**Note:** Do not reverse the auger rotation while the auger is still in the hole. The loose material will back fill the hole.

7. If necessary, repeat steps 4 through 6 to obtain a cleaner hole.

### OPERATIONS TO AVOID

1. In some soil conditions or when excessive down pressure is applied, the auger may "screw" itself into the ground. This can cause the auger to become stuck causing the Auger Drive to stall. If this situation occurs, reverse the auger rotation and slowly raise the auger from the hole.

2. If the auger becomes lodged under rocks, tree roots, or other large obstructions, do not attempt to raise the auger out of the ground. See Step 1 of this section to relieve the auger.

3. Avoid excessive side loading. This can cause damage to both the Auger Drive and the auger.

4. Keep all auger teeth and pilot bits in good condition. Avoid using damaged teeth and holders.

- Following operation, or when unhooking, stop, set brakes, disengage power drives, shut off engine, and remove the ignition key.
- Store the unit in and away from human activity.
- Before long term storage, wash the unit with mild detergent and water to remove any debris and grime.
- Do not permit children to play on or around the stored unit.
- Protect the shafts and ports with a grease or rust-inhibitor.
- Grease bearing seals.
- Check and tighten all bolts, nuts and screws. Repair any part or cutting head components that are damaged.
- Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.
- When storing the unit for any length of time be sure the unit is stored with clean gear oil.

## GENERAL MAINTENANCE

- Good maintenance is your responsibility. Poor maintenance is an invitation to trouble.
- Always use proper tools or equipment for job the at hand.
- Use extreme caution when making adjustments.
- Never use your hands to locate a hydraulic leak on attachments. Use a small piece of cardboard or wood. Hydraulic fluid escaping under pressure can penetrate the skin.
- Hydraulic fluid escaping under pressure can penetrate skin and cause injury.
- Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.
- When disconnecting hydraulic lines, shut off hydraulic supply and relieve all hydraulic pressure.
- Clean hydraulic oil is essential! The majority of all hydraulic component failures are caused by contamination of the hydraulic oil system.
- Always use dust caps and plugs on all quick disconnects when not in use.
- Check hydraulic oil daily for contamination. If contamination is present, determine the source and correct the problem.
- When replacing bolts refer to this manual.
- Clean the exterior of the unit with a mild detergent and water to remove any debris and grime.
- Paint all scratched or bare metal surfaces.
- Check and tighten all bolts, nuts, and screws.
- Repair or replace any cutting head components that are damaged or worn.
- Check the gearbox for sufficient amount of oil.
- Check the Auger Drive output shaft for bends, cracks, breaks or wear. Replace if any of these conditions appear.
- Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore your unit to original specifications. Manufacturer will not claim responsibility for use of unapproved parts or accessories and other damages as a result of their use.
- If equipment has been altered in any way from its original design, manufacturer does not accept any liability for injury or warranty.

## CHECKING AND CHANGING THE GEAR OIL

The Planetary gearbox used on your Drive Head uses a gear oil to keep the internal gears lubricated. To check and or replace the oil, follow the steps below.

### CHECKING THE GEAR OIL:

1. Make sure the Auger Drive unit is in an upright position when checking the oil.
2. Slowly loosen the Oil Fill-Drain plug located on the under side of the gearbox. As you reach the end of the treads on the plug, oil should start to ooze out.
3. If you see oil starting to ooze out of the port, quickly retighten the plug. This is an indication that the oil level is adequate, but in order to correctly measure the amount of oil ,the gearbox should be drained and the correct amount of oil replenished.

### **Lubrication Recommendations:**

SAE 80W90 GL-5 Oil

Density / 15 deg C:	0.895	Viscosity Index:	97
Viscosity @ 40 deg C:	138	Flash Point COC:	200
Viscosity @ 100 deg C:	13.9	Pour Point (deg C):	-30

### CHANGING THE GEAR OIL:

1. Position the Auger Drive unit in a position in which the oil can flow freely from the gearbox once the plug is removed.
2. Place a drain pan under the drain port that will hold at least one gallon.
3. Remove the drain plug and allow the oil to completely drain out.
4. Position the gearbox for filling by orientating the unit so that the same port used for draining can now be used to fill.
5. Fill the gearbox with oil, until full. See oil specifications below:



## MAINTENANCE

Below you will find some general maintenance instructions. For further information contact your authorized service dealer.

- Clean the exterior of the unit with a mild detergent and water to remove any debris and grime.
- Check and tighten all bolts, nuts, and screws.
- Repair or replace any cutting head components that are damaged or worn.
- Clean the exterior and surrounding area near the hydraulic motor.
- Paint all scratched or bare metal surfaces.

## TROUBLESHOOTING

In the event your Pengo Auger Drive unit malfunctions or does not appear to have enough speed or power, please refer to the section below to identify the cause of the problem and possible remedy. If the problem persists, contact your Authorized Service Dealer for assistance.

### SLOW SPEED (RPM) OR INSUFFICIENT DIGGING POWER:

- Low oil flow. *Check parent machine specifications.*
- Auger Drive is too large for machine. *Contact your Authorized Service Dealer.*
- Check auger and teeth for excessive wear. *Replace worn auger components.*

### NO OUTPUT ROTATION:

- Quick release couplers not engaged. *Check connection.*
- Quick release coupler faulty. *Replace faulty coupler.*
- Hydraulic oil tank is low. *Fill oil tank to maximum level.*
- Planetary gear failure. *Contact your Authorized Service Dealer.*
- Machine oil pump failure. *Refer to parent machine manual.*

### BAIL HOUSING LEAKING OIL:

- Hose(s) of Fitting(s) leaking. *Tighten or replace.*
- Motor O-ring failure. *Replace damaged O-ring.*

### OUTPUT SHAFT LEAKING OIL:

- Oil seal failure. *Contact your Authorized Service Dealer.*
- Hydraulic motor failure. *Contact your Authorized Service Dealer.*

### AUGER BIT WILL NOT ENGAGE OR DIG:

- Auger bit is worn or damaged. *Replace cutting head or entire auger bit.*

### NO TORQUE:

- Oil pressure is too low. *Contact your Authorized Service Dealer.*
- Drive unit too small for parent machine. *Contact your Authorized Service Dealer.*
- Hydraulic system is overheating. *See the "Oil Overheating" section below.*

### HYDRAULIC OIL OVERHEATING:

- Oil pressure is too low. *Set relief valve to machine specifications.*
- Hydraulic line is restricted. *Inspect and repair.*
- Auger continually stalling. *Limit down pressure used.*
- Hydraulic oil tank is low. *Fill oil tank to maximum level.*
- Insufficient oil capacity. *Check oil cooler.*
- Parent machine is too small. *Couple Auger Drive to larger machine.*

## SA-70 PARTS BREAKDOWN

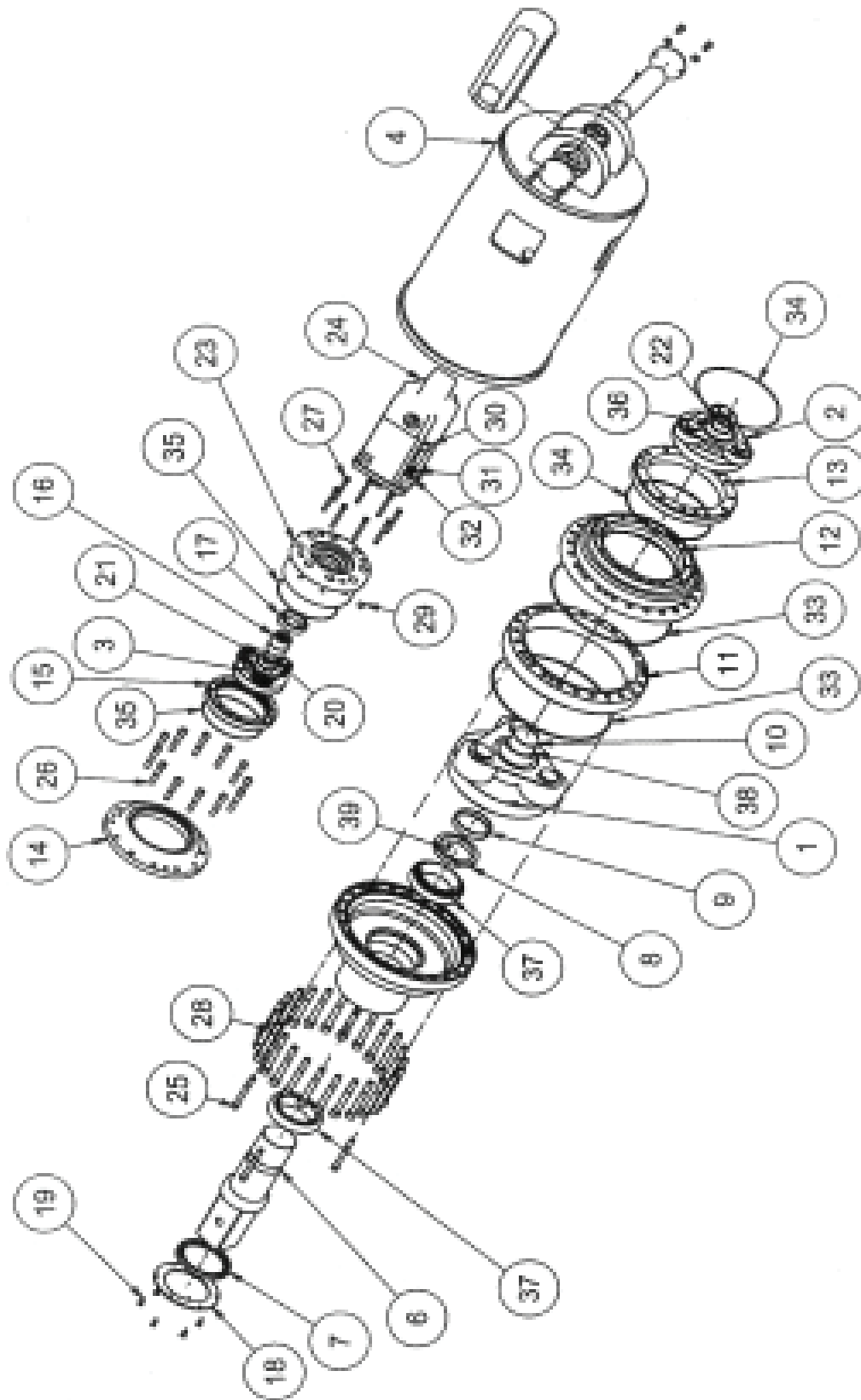


Figure 3

## SA-70 PARTS LIST

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	GS9395	S9 3.95 GEARSET ASSEMBLY
2	1	GS6355	S8 3.55 GEARSET ASSEMBLY
3	1	GS4377S	S4 3.77 GEARSET ASSEMBLY SPECIAL
4	1	SA-964E	SA70 HOOD
5	1	S9-02	S9 OUTPUT HOUSING
6	1	S9-01	S9 OUTPUT SHAFT (SINGLE HOLE)
7	1	TC180-150	SEAL
8	1	KM120	LOCK NUT
9	1	SP09	S9 SPACER
10	1	SG9-3	S9 3.95 SUNGEAR
11	1	RG-09	S9 RING GEAR
12	1	S9-05	S10 - S8 INTERIM - DIGGA GEARS
13	1	RG-06	S8 RINGGEAR
14	1	S6-05	S6 - S4 INTERIM HOUSING
15	1	RG4	S4 RING GEAR
16	1	S2-4-6-8-13	SPLINE ADAPTOR
17	1	B6012-1	INPUT BEARING
18	1	S9SP-1	S9 SEAL PROTECTOR
19	6	M8 x 25	Socket Countersunk Head Screw
20	1	SG4-3S	S4 3.77 SUNGEAR SPECIAL
21	1	S4-D1400-0400	S4 SUNGEAR CIRCLIP
22	1	SG6-3S	S8 3.55 SUNGEAR SPECIAL
23	1	S4I51V	S4 INPUT
24	1	HM7630E	7630 7.6 HD FIXED DISPLACEMENT
25	3	M14x130	Socket Head Cap Screw
26	12	M14x80	Socket Head Cap Screw
27	8	M10x100	Hex-Head Bolt
28	24	M18 X 150	Socket Head Cap Screw
29	1	OP01	OIL PLUG
30	4	3/4 x 2 1/2	Socket Head Cap Screw
31	4	3/4"	Helical Spring Lock Washer
32	4	3/4 FLAT	Washer
33	2	S10 'O' RING	'O' RING
34	2	S6 'O' RING	'O' RING
35	2	BS170	'O' RING
36	1	S8 D14000600	S8 SUNGEAR CIRCLIP
37	2	TRB-120-180-38	Tapered Roller Bearing
38	1	S9-D1400-0900	S9 SUNGEAR CIRCLIP
39	1	LK-09	LOCK KEY

Please order replacement parts by PART NO. and DESCRIPTION.

## **WARRANTY POLICY**

### **LIMITED WARRANTY**

Pengo, warrants its products against faulty design, material, and workmanship for the periods listed below. The warranty starts on the delivery date to the retail owner and is non-transferable.

### **WARRANTY PERIOD**

Gearbox: 24 months or 500 operational hours, whichever occurs first.  
Hyd. Motor: 12 months or 250 operational hours, whichever occurs first.

### **WARRANTY SERVICE**

The original owner must notify the dealer who sold the product after the owner believes a warranty condition exists. Products returned must be shipped prepaid. When a warranty claim exists, Pengo will free of charge, including return freight, repair or replace the product with a new or rebuilt unit at the manufacturer's option. If further warranty help is needed, the owner may contact Pengo Customer Service at: (800) 599-0211

### **WARRANTY EXCLUSIONS**

This warranty is void if field repairs have been made to the motor, gearbox, and controls without written approval. The complete unit must be available for inspection in its original but alleged failed condition. This warranty does not apply to normal wear or to damage resulting from accident, abnormal use, abuse, or neglect.

Pengo will not be responsible for the downtime by the customer, mileage cost, or loss of productivity incurred by the dealer or contractor as a result of any defect in materials or workmanship of its products.

### **PRODUCT IMPROVEMENTS**

Product improvement and modifications is an on going process at Pengo. Pengo reserves the right to make changes or additions to any product or to the warranty without incurring any obligations to make such changes available for previously sold products.

Pengo makes no other warranty. All other warranties, whether expressed or implied, such as warranties of merchantability or fitness for a particular purpose, are hereby excluded and disclaimed to the extent that they exceed the warranties expressly granted in this limited warranty. In no event shall Pengo be liable for consequential or incidental damages.

## **RETURNED GOODS POLICY**







Pengo reserves the right to determine whether products claimed to be defective shall be inspected by our personnel in the field or returned to the factory. If judged by Pengo to be defective in material or workmanship, the product will be replaced or a credit issued at the option of Pengo.

Upon notification of defect, Pengo's Inside Sales Department will issue a Return Materials Authorization (RMA) number. All returns for replacement or credit MUST be accompanied by a RMA number. Products returned without an RMA number will be rejected and returned to the sender freight collect. All returns must be shipped "prepaid". Products shipped "collect" will be refused. Proof of purchase such as invoice number must accompany returns.

All RMA's must be returned within 30 days of the request.

## TORQUE CHART FOR COMMON BOLT SIZES

The chart below lists the correct tightening torque for fasteners. When bolts are to be tightened or replaced, refer to this chart to determine the grade of the bolt and the proper torque. Except when specific torque values are list in a particular application.

													
Bolt Size (In)	Grade 2		Grade 5		Grade 8		Bolt Size (mm)	Class 5.8		Class 8.8		Class 10.9	
tpi	Nm	Ft-Lbs	Nm	Ft-Lbs	Nm	Ft-Lbs	mm x	Nm	Ft-Lbs	Nm	Ft-Lbs	Nm	Ft-Lbs
1/4"-20	7.4	5.6	11	8	16	12	M5 X 0.8	4	3	6	5	9	7
1/4"-28	8.5	6	13	10	18	14	M6 X 1	7	5	11	8	15	11
5/16"-18	15	11	24	17	33	25	M8 X 1.25	17	12	26	19	36	27
5/16"-24	17	13	26	19	37	27	M8 X 1	18	13	28	21	39	29
3/8"-16	27	20	42	31	59	44	M10 X 1.5	33	24	52	39	72	53
3/8"-24	31	22	47	35	67	49	M10 X 0.75	39	29	61	45	85	62
7/16"-14	43	32	67	49	95	70	M12 X 1.75	58	42	91	67	125	93
7/16"-20	49	36	75	55	105	78	M12 X 1.5	60	44	95	70	130	97
1/2"-13	66	49	105	76	145	105	M12 X 1	90	66	105	77	145	105
1/2"-20	75	55	115	85	165	120	M14 X 2	92	68	145	105	200	150
9/16"-12	95	70	150	110	210	155	M14 X 1.5	99	73	155	115	215	160
9/16"-18	105	79	165	120	235	170	M16 X 2	145	105	225	165	315	230
5/8"-11	130	97	205	150	285	210	M16 X 1.5	155	115	240	180	335	245
5/8"-18	150	110	230	170	325	240	M18 X 2.5	195	145	310	230	405	300
3/4"-10	235	170	360	265	510	375	M18 X 1.5	220	165	350	260	485	355
3/4"-16	260	190	405	295	570	420	M20 X 2.5	280	205	440	325	610	450
7/8"-9	225	165	585	430	820	605	M20 X 1.5	310	230	650	480	900	665
7/8"-14	250	185	640	475	905	670	M24 X 3	480	355	760	560	1050	780
1"-8	340	250	875	645	1230	910	M24 X 2	525	390	830	610	1150	845
1"-12	370	275	955	705	1350	995	M30 X 3.5	960	705	1510	1120	2100	1550
1-1/8"-7	480	355	1080	795	1750	1290	M30 X 2	1060	785	1680	1240	2320	1710
1-1/8"-12	540	395	1210	890	1960	1440	M36 X 3.5	1730	1270	2650	1950	3660	2700
1-1/4"-7	680	500	1520	1120	2460	1820	M36 X 2	1880	1380	2960	2190	4100	3220
1-1/4"-12	750	555	1680	1240	2730	2010							
1-3/8"-6	890	655	1990	1470	3230	2380							
1-3/8"-12	1010	745	2270	1670	3680	2710							
1-1/2"-6	1180	870	2640	1950	4290	3160							
1-1/2"-12	1330	980	2970	2190	4820	3560							

tpi = Nominal thread diameter in inches per inch.  
 Nm = Newton Meters.  
 Ft-Lbs = Foot Pounds  
 mm x = Nominal thread diameter in millimeters x thread pitch.

## NOTES

## NOTES



**PALADIN** UTILITY

**Utility Headquarters**

**Iowa**

500 East Highway 10,  
Laurens, IA 50554  
United States of America  
PH: 800-599-0211  
FX: 712-845-2497

**Minnesota**

13369 60th St. S.W.  
Cokato, MN 55321  
PH: 888-286-0982  
FX: 320-286-5583

**California**

1541 M Street  
Newman, CA 95360  
PH: 209-862-1504  
FX: 209-862-1520

[www.paladinbrands.com](http://www.paladinbrands.com)