HY13-1521-M2/US

Parker Product

Effective: January, 2010

UHT
Product Series
Service Procedure

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Parker Hannifin Corporation
Hydraulic Pump/Motor Division
Greeneville, Tennessee USA

Section 1 General Information

Section 2 Reseal & Repair

Section 3 Maintenance

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WARNING **A warning describes hazards or unsafe practices which could result in severe personal injury or death.**

CAUTION A caution describes hazards or unsafe practices which could result in personal injury or product or property damage.

NOTE A note gives key information to make following a procedure easier or quicker.

Disclaimer

This Service Manual has been prepared by Parker Hannifin Corporation for reference and use by mechanics who have been trained to repair and service hydraulic pumps on commercial and non-commercial equipment applications. Parker Hannifin Corporation has exercised reasonable care and diligence to present accurate, clear and complete information and instructions regarding the techniques and tools required for maintaining, repairing and servicing the Parker UHT Series. Since this is a general Service Manual, the photographs and illustrations may not look exactly like the UHT being serviced. The procedures, therefore, must be carefully read and understood before servicing.

If inspection or testing reveals evidence of abnormal wear or damage to the UHT or if you encounter circumstances not covered in the Manual, STOP - CONSULT THE EQUIPMENT MANUFACTURER'S SERVICE MANUAL AND WARRANTY. DO NOT TRY TO REPAIR OR SERVICE A UHT Series WHICH HAS BEEN DAMAGED OR INCLUDES ANY PART THAT SHOWS EXCESSIVE WEAR UNLESS THE DAMAGED AND WORN PARTS ARE REPLACED WITH ORIGINAL PARKER REPLACEMENT AND SERVICE PARTS AND THE UNIT IS RESTORED TO PARKER SPECIFICATIONS FOR THE UHT Series.

It is the responsibility of the mechanic performing the maintenance, repairs or service on a particular UHT Series to (a) inspect the unit for abnormal wear and damage, (b) choose a repair procedure which will not endanger his/her safety, the safety of others, the equipment or the safe operation of the UHT Series, and (c) fully inspect and test the UHT Series and the hydraulic system to ensure that the repair or service of the UHT Series has been properly performed and that the UHT Series and hydraulic system will function properly.

Conversions

Inches	Mm	Inches	mm
.020	.511	1.060	26.92
.021	.531	1.295	32.89
.029	.741	1.297	32.94
.030	.760	1.396	35.46
.111	2.81	1.398	35.51
.119	3.02	1.620	41.15
.152	3.86	1.622	41.20
.160	4.06	1.983	50.37
.296	7.52	1.985	50.42
.304	7.72	2.120	53.85
.460	11.68	2.122	53.90
.470	11.94	2.233	56.72
.500	12.70	2.235	56.77
.585	14.86	2.483	63.07
.595	15.11	2.485	63.12
.660	16.76	2.500	63.5
.675	17.15	2.88	73.2
1.058	26.87		

Introduction

The three-column format used in this Service Manual will help make it easy for you to service a UHT. Column 1 illustrates the procedure with photographs, Column 2 gives a brief key for each step, and Column 3 explains in detail the procedure you should follow. Pay special attention to the notes, cautions, and warnings.

This manual contains troubleshooting information and checklists. With them you can diagnose a hydraulic system problem without removing the entire assembly the checklists will help you to determine where the problem may be.

Item numbers on the exploded view correspond with item numbers used throughout the Service Manual.

As you gain experience in servicing UHT Series, you may find that some information in this Service Manual could be clearer and more complete. If so, let us know about it. Don't try to second-guess the Service Manual; if problems occur that you cannot solve, please contact your local OEM approved distributor. Servicing UHT Series should be safe and productive.

DESIGN FEATURES

UHT

- Large area cooling fins result in a cooler running system
- Top housing and charge pump cover are sturdy, lightweight aluminum, excellent at dispersing heat, resulting in an overall cooler system
- Forged trunnion shaft increases shaft strength and lengthens pump life
- Double caged thrust bearing improve lubrication and vibration absorption, thus lengthening life of pump

Torqmotor

- Roller vane to reduce friction and internal leakage and to maintain efficiency
- A patented orbiting commutator system for less wear and longer life
- A unique high-pressure shaft seal that eliminates the need for case drain
- Manifold designed to improve operating efficiency
- Roller vane and sealed commutation assure high volumetric efficiency and smooth low speed operation

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Troubleshooting Guide

NOTE
Before troubleshooting any system problem, check service literature published by the equipment and/or component manufacturers. Follow their instructions, if given, for checking any component other than the transmission.

Preparation
Make your troubleshooting easier by preparing as follows:

• work in a clean, well-lighted place

• have proper tools and materials nearby

• have an air pressure source.

WARNING
Since solvents are flammable, be extremely careful when using any solvent. Even a small explosion could cause injury or death.

WARNING
Wear eye protection and be sure to comply with OSHA and other maximum air pressure requirements.

Preliminary Checks
Hydraulic systems are often trouble-free. Hence, the problem an operator complains of could be caused by something other than the hydraulic components.

Thus, once you have determined that a problem exists, start with the easy-to-check items, such as:

• Parts damaged from impact that were not properly repaired, or that should have been replaced
• Improper replacement parts used in previous servicing
• Mechanical linkage problems such as binding, broken or loose parts, or slipping belts

Hydraulic Components
If you think the problem is caused by a hydraulic component, start by checking the easy-to-reach items.

Check all belts for cracks, hardening or other signs of wear. Check all pulleys, fans and bolts to make sure they are tightened to specified torque value. Look for leaks, especially at coupling shaft, plugs and fittings.

Next, go to the reservoir and filters. Check fluid level and look for air bubbles. Check external filter(s). A filter with a maximum of 25 - 30 micron filtration is recommended for the UHT system.

Visually check other components to see if they are loosely mounted, show signs of leaks, or other damage or wear.

Excessive heat in a hydraulic system can create problems that can easily be overlooked. Every system has its limitation for the maximum amount of temperature. After the temperature is attained and passed, the following can occur:

• oil seal leaks
• pump loss of efficiency (resulting in lower transmission speeds)
• pump failure
• belts become hard and brittle
• pulley lose

A normal temperature range means an efficient hydraulic system. Consult the manuals published by equipment and/or component manufacturers for maximum allowable temperatures and hydraulic tests that may be necessary to run on the performance of the hydraulic components. The UHT is not recommended for hydraulic systems with maximum temperatures above 280^{o} F (137^{o} C).

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Troubleshooting Checklist

Trouble	Cause	Remedy
Oil Leakage	1. Fitting loose, worn or damaged.	Check & replace damaged fittings or "O" rings. Torque to manufacturers specifications.
	2. Oil seals deteriorated by excess heat.	Replace oil seals by disassembling unit.
Operates Hot	1. Debris buildup	Remove debris
	2. Cooling fan damaged	Replace fan
	3. Oil level low or contaminated	Fill or change filter
	4. Excessive loading	Reduce vehicle load
	5. Air trapped in system	Run vehicle slowly forward and then reverse several times
	6. Mowing conditions	Heavy grass or embankments
No/Low Power	1. Engine speed low	Adjust setting
	2. Oil level low or contaminated	Fill or change filter
	3. Bypass turned	Turn to closed (horizontal) position
	4. Excessive loading	Reduce vehicle load
	5. Air trapped in system	Purge per instructions
	6. Suspect internal	Disassemble and inspect
	7. Pulley or belt loose	Tighten to specifications
Noisy Unit	1. Excessive speed input	Adjust input speed above 1800 rpm and below 3600 rpm
	2. Oil level low or contaminated	Fill or change filter
	3. Excessive loading	Reduce vehicle load
	4. Air trapped in system	Run vehicle slowly forward and then reverse several times
	5. Bypass valve open	Turn to closed (horizontal) position

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Tools and Materials Required for Servicing

- Clean, petroleum-based solvent
- Emery paper
- Vise with soft jaws
- Air-pressure source
- Arbor press
- Flat screwdriver
- Grease pencil or paint pen
- Wheel puller
- 1/4" torque wrench : 155-190 in-lbs, 282-342 in-lbs, 90-110 in-lbs, 160-200 in-lbs
- Sockets: 3/8" drive ratchet, 5/16" hex, 1/4” hex, 3/8” hex, 10mm, 14mm, 16mm
- Allen wrenches: 5mm, 6mm, 1/4" and 3/8”
- Combination wrenches:
- Locking pliers
- Internal & external snap ring pliers
- Loctite ™ 242
- Grease – Mobil Mobilith SHC PM 460
- Oil – Recommended OEM Type Oil
- Four inch adjustable spanner wrench (Armstrong 34-157) or three inch fixed spanner (Armstrong 34-124)

⚠ **CAUTION**
Mixing greases that have different bases can be detrimental to bearing and seal life.

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UHT Flow Test Kit Instructions
SK000251

Parts List				
Item	**Qty**	**Part Number**	**Description**	**Torque**
1	1	414002	SAE Swivel Fitting	525 in lbs.
2	1	411102	Needle Valve	525 in lbs.
3	2	414003	Gauge Fitting “T”	165-525 in lbs.
4	2	411103	3000 PSI Pressure Gauge	165 in lbs.
5	2	411104	Hose Assembly	525 in lbs.
6	2	414005	Reducer Fitting	525-950 in lbs.
7	1	411105	20 GPM Flow Meter	525 in lbs.
8	1	409350	Diagnostic Plug	525 in lbs.
9	1	SAE-J514-8-8-070120CF	Straight Thread Fitting	525 in lbs.
-	1	SK000251	Service Bulletin	N/A

Overview:

The Flow Test Kit allows the dealer to easily determine if UHT pump is faulty by isolating the pump section from the wheel motor. The following information describes how to test the pump by installing the Flow Test Kit and simulating a wheel motor load.

Procedure:

1. Raise the drive tires off the ground and block the remaining tires to prevent movement of the vehicle during testing.

2. Remove wheel from the hub to gain access to motor.

3. Ensure the pump bypass lever is in the “Closed” position (horizontal).

4. Isolate the pump from the wheel motor by removing the two plugs from the top of the wheel motor assembly and installing the Flow Test Kit. Install the Diagnostic Plug in port “A”, and the Straight Thread Fitting in port “B”. Take precautions to ensure no debris gets into the wheel motor system ports.

There is no need to determine the direction of flow with the Parker flow tester. The flow meter may be connected in either direction into the high pressure system lines.

WARNINGS

Portions of this procedure require testing while the vehicle is operated in an elevated position.

Ensure vehicle is properly secured to prevent injury to the service technician or bystanders.

Do not attempt any adjustments with the engine running. When working around vehicle linkages, use extreme caution.

High temperatures can be generated.

Follow all safety procedures in the vehicle owner’s manual.

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CAUTION: All fittings and hoses must be securely attached. The test is accomplished using the vehicle's high pressure system lines. Failure to secure connections could result in bodily injury.

5. Completely open the restriction valve.

6. Start the engine and, if required, engage the drive pulley.

7. Slowly bring engine up to maximum operating speed.

8. Move the vehicle's directional control lever on the pump being tested all the way into the forward position. Lock the control arm into position to prevent false readings.

9. Continue to operate without any load to allow the system oil temperature to rise.

NOTE: Raising the temperature of the oil will make a difference in your readings. To complete the test accurately, the oil temperature should fall between 110˚ and 140˚ F.

10. Tighten the restriction valve until the difference between the pressure gauge readings is 300 psi (21 bar). Record the flow reading from the bi-directional flow meter.

11. Tighten the restriction valve until the difference between the pressure gauge readings is 1000 psi (69 bar) and record the flow reading again.

12. The maximum allowable flow rate change is shown below. If the difference exceeds this level, the pump is unacceptable.

13. When testing is complete, re-install the motor port plugs. Torque to 35 to 50 ft-lb.

Series	Displacement cc/rev (nominal)	Max. Allowable Flow Rate Change* (gpm)
UHT	12 to 16	1.0

** Max. Allowable Flow Rate Change is equal to the flow rate at 300 psi minus the flow rate at 1000 psi.*

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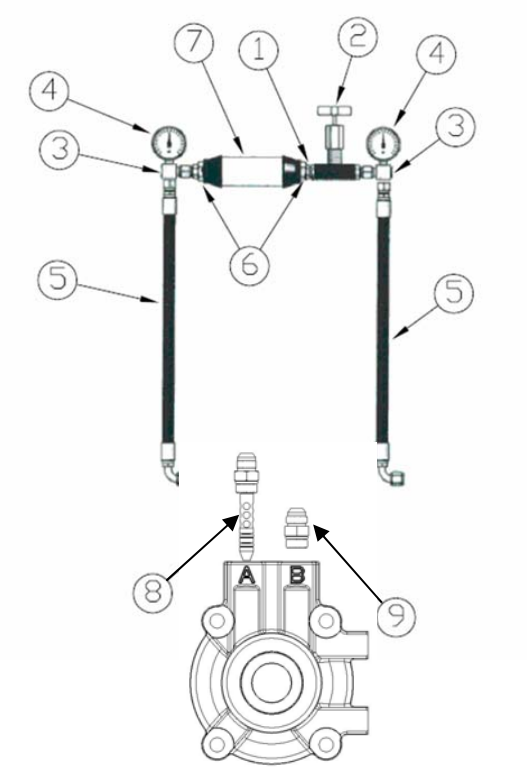

EXAMPLE:

First Reading	300 psi (21 bar)	5 gpm (19 l/min)
Second Reading	1000 psi (69 bar)	- 3 gpm (11 l/min)
Difference		2 gpm (8 l/min)

By subtracting the second reading from the first, a defective pump can be identified. In the example above, 2 gpm indicates a defective pump.

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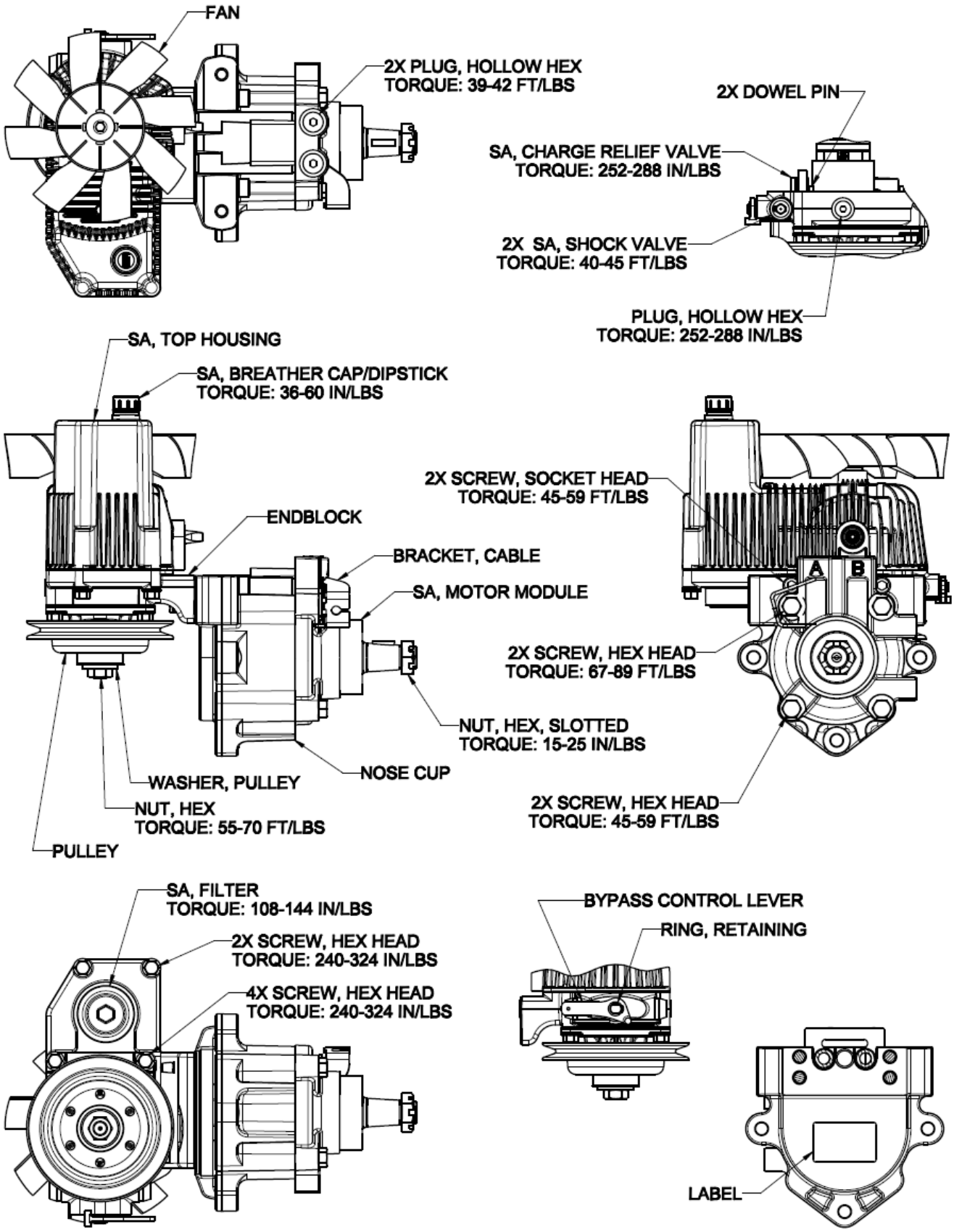

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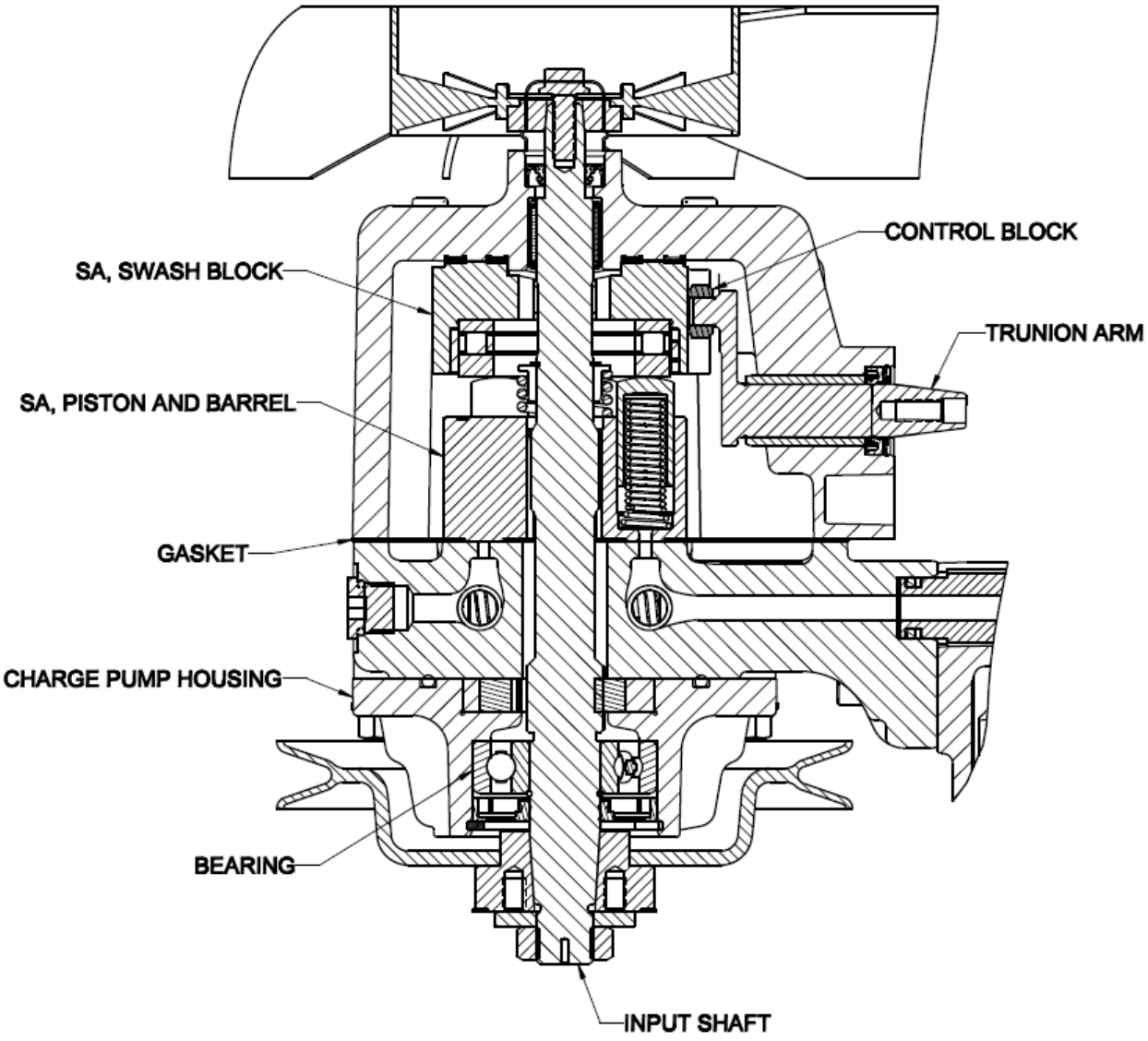

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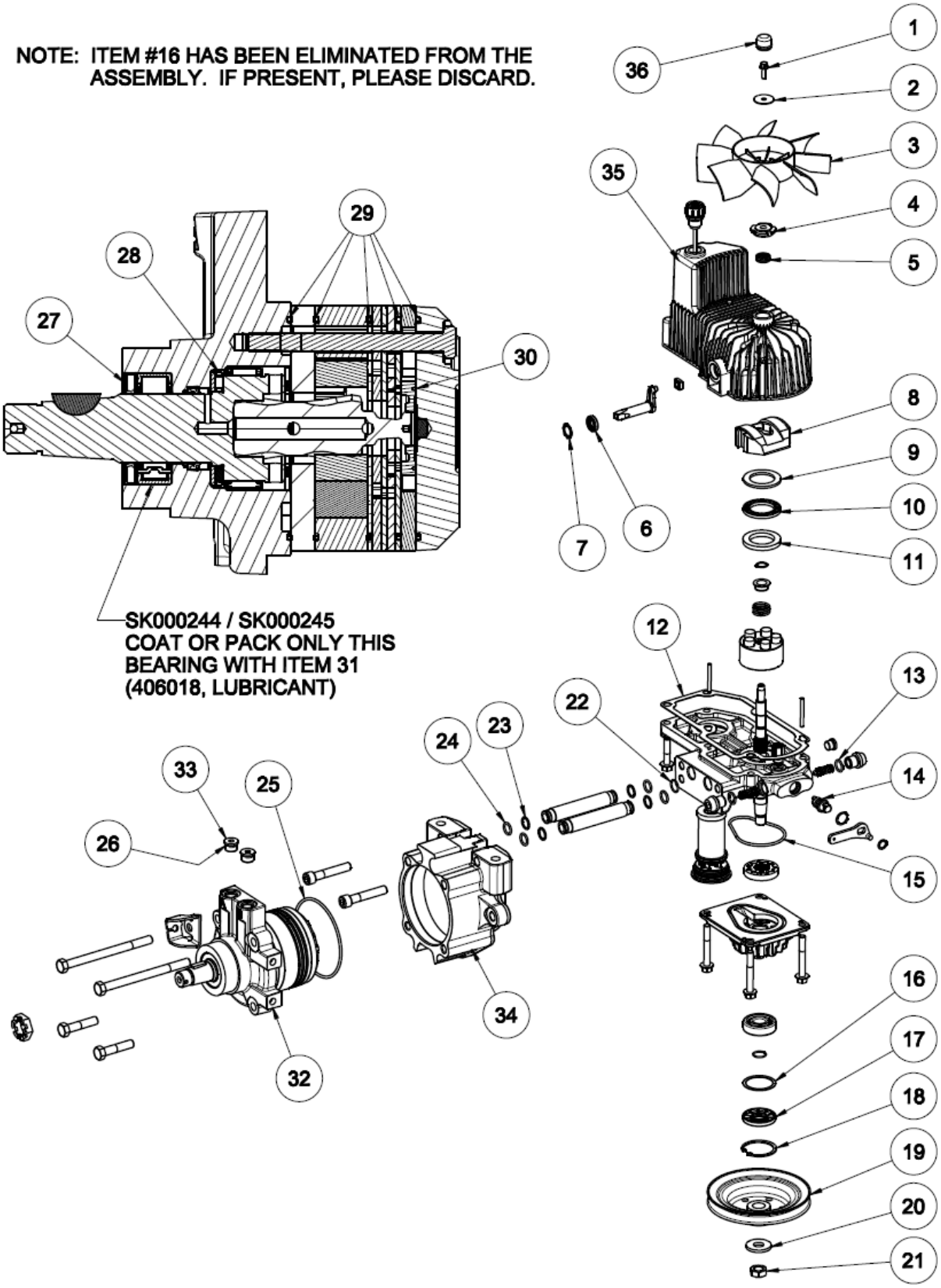

Note: When servicing UHT assemblies with a serial number code of 09256 or earlier, item 29 is not required. When servicing UHT assemblies with a serial number code of 09257 or after, item 25 is not required. Though item 22 is provided in the seal kit, it can be discarded if the endblock does not include a machined seal groove.

SK000243 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
22	4	032202-017	PACKING, PREFORMED, O-RING SEAL	TUBE O-RING KIT 116-1370 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
23	4	032860-001	RETAINER, PACKING BACKUP	
24	1	032203-114	PACKING, PREFORMED, O-RING SEAL	
SK000244 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
27	1	478035	SEAL	MOTOR SHAFT SEAL KIT 116-1371 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
28	1	032818	SEAL, SHAFT	
31	1	406018	LUBRICANT PACK	
SK000245 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
22	1	032202-017	PACKING, PREFORMED, O-RING SEAL	MOTOR TUBE SEAL KIT 116-1369 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
23	4	032860-001	RETAINER, PACKING BACKUP	
24	4	032203-114	PACKING, PREFORMED, O-RING SEAL	
25	1	032203-249	PACKING, PREFORMED, O-RING SEAL	
26	2	032206-018	PACKING, PREFORMED, O-RING SEAL	
27	1	478035	SEAL, (DIRT & WATER)	
28	1	032818	SEAL, SHAFT	
29	6	032820	O-RING SEALS	
30	1	032439	SEAL, COMMUTATOR	
31	1	406018	LUBRICANT PACK	
SK000246 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
8	1	HP2013000-A1	SA, SWASH BLOCK	THRUST BEARING KIT 116-1367 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
9	1	069010	WASHER, THRUST	
10	1	063048	BEARING, THRUST	
11	1	069011	WASHER, THRUST	
SK000247 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRITION	NOTES
5	1	032090	SEAL,FAN DRIVE	PUMP SEAL KIT 116-1368 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
6	1	478087	SEAL, TRUNNION ARM	
7	1	401303	RING, RETAINING	
12	1	034001	GASKET	
13	2	032203-114	PACKING, PREFORMED, O-RING SEAL	
14	1	032202-111	PACKING, PREFORMED, O-RING SEAL	
15	1	032202-239	PACKING, PREFORMED, O-RING SEAL	
16			** WASHER, SEAL (NOT REQUIRED) **	
17	1	478086	SEAL, SHAFT	
18	1	401114	RING, RETAINING	
22	1	032202-017	PACKING, PREFORMED, O-RING SEAL	
23	4	032860-001	RETAINER, PACKING BACKUP	
24	4	032203-114	PACKING, PREFORMED, O-RING SEAL	
SK000249 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
19	1	403855	PULLEY	PULLEY KIT 116-0234 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
20	1	028413	WASHER	
21	1	025164	NUT	
SK000250 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
1	1	100000025-038	SCREW, HEX FLANGE UNRC	FAN KIT 116-0233 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
2	1	028020	WASHER, FAN DRIVE	
3	1	420066	FAN, 8.3 INCH	
4	1	100000032	SPACER, FAN	

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SK000257 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0240ZF080UHTA	SA, MOTOR	REPLACEMENT MOTOR 116-2985 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
25	1	032203-249	PACKING, PREFORMED, O-RING SEAL	
	1	SK000243	SERVICE KIT, SEALS	
SK000258 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0240ZF081UHTA	SA, MOTOR	REPLACEMENT MOTOR 116-2984 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
25	1	032203-249	PACKING, PREFORMED, O-RING SEAL	
	1	SK000243	SERVICE KIT, SEALS	
SK000259 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0280ZF080UHTB	SA, MOTOR	REPLACEMENT MOTOR 116-2987 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
25	1	032203-249	PACKING, PREFORMED, O-RING SEAL	
	1	SK000243	SERVICE KIT, SEALS	
SK000260 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0280ZF081UHTB	SA, MOTOR	REPLACEMENT MOTOR 116-2986 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
25	1	032203-249	PACKING, PREFORMED, O-RING SEAL	
	1	SK000243	SERVICE KIT, SEALS	
SK000261 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0240YF080UHTC	SA, MOTOR	REPLACEMENT MOTOR 116-2989 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
	1	SK000243	SERVICE KIT, SEALS	
SK000262 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0240YF081UHTC	SA, MOTOR	REPLACEMENT MOTOR 116-2988 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
	1	SK000243	SERVICE KIT, SEALS	
SK000263 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0280YF080UHTD	SA, MOTOR	REPLACEMENT MOTOR 116-2991 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
	1	SK000243	SERVICE KIT, SEALS	
SK000264 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0280YF081UHTD	SA, MOTOR	REPLACEMENT MOTOR 116-2990 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
	1	SK000243	SERVICE KIT, SEALS	
SK000265 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0240YF080UHTE	SA, MOTOR	REPLACEMENT MOTOR 116-3051 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
	1	SK000243	SERVICE KIT, SEALS	
SK000266 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
32	1	TL0240YF081UHTE	SA, MOTOR	REPLACEMENT MOTOR 116-3050 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
33	2	036016-008	PLUG, HOLLOW HEX	
	1	SK000243	SERVICE KIT, SEALS	

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SK000267 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
34	1	HB011002	NOSE CUP, MACHINED	REPLACEMENT NOSE CUP 116-2992 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
	1	SK000243	SERVICE KIT, SEALS	

SK000268 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
34	1	HB011003	NOSE CUP, MACHINED	REPLACEMENT NOSE CUP 116-1372 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
25	1	032203-249	PACKING, PREFORMED, O-RING SEAL	
	1	SK000243	SERVICE KIT, SEALS	

SK000271 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
35	1	HB012002-A1	SA, TOP HOUSING	REPLACEMENT TOP HOUSING 116-3287 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
12	1	034001	GASKET	

SK000272 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
35	1	HB012003-A1	SA, TOP HOUSING	REPLACEMENT TOP HOUSING 116-3288 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG
12	1	034001	GASKET	

SK000273 - PART LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTES
36	1	478088	DUST CAP	REPLACEMENT DUST CAP 116-3052 CUSTOMER PART NUMBER TO BE PUT ON OUTSIDE OF BAG

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Before you disassemble the UHT or any of its components, read this entire manual. It provides important information on parts and procedures you will need to know to service the UHT Unit.

The UHT will have a six cross member bolts and four frame mounting bolts.

Remove fan from shaft prior to servicing any portion of UHT unit to prevent from breaking.

Thoroughly clean off all outside dirt, especially from around fittings before disconnecting and removing the UHT transmission. Remove rust or corrosion from the coupling shaft.

Remove shaft connections and immediately plug port holes and fluid lines.

Remove the UHT from the system, drain it of fluid and take it to a clean work surface.

Clean and dry the UHT before you start to disassemble it.

As you disassemble the UHT, clean all parts, except seals, in clean, OSHA approved solvent, and air blow them dry.

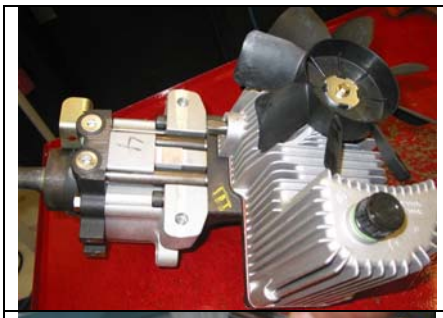
WARNING
Solvents are flammable, be extremely careful when using them. Even a small explosion or fire could cause injury or death.

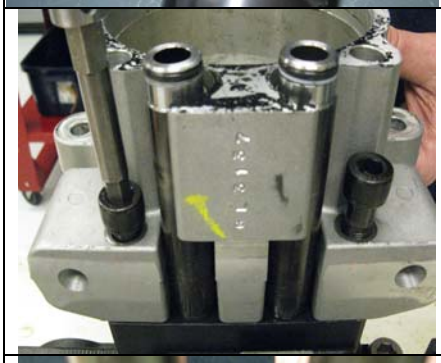
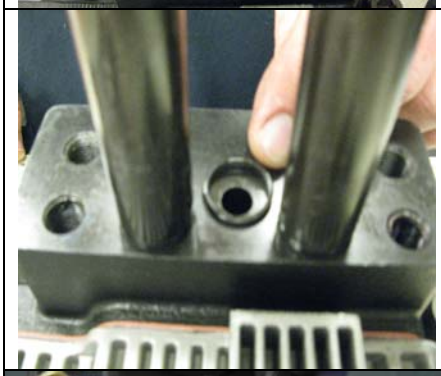
WARNING
Wear eye protection and be sure to comply with OSHA and other maximum air pressure requirements.

WARNING
Never steam or high pressure wash hydraulic components. Do not force or abuse closely fitted parts.

Keep parts separate to avoid nicks and burrs.

Discard all seals and seal rings as they are removed from the UHT Unit. Replace all seal rings and any damaged or worn parts with genuine Parker Hannifin Corporation or OEM approved service parts.

	**Remove unit from vehicle**	Clean unit of grass and other debris; let dry.
	**Drain the oil from the unit**	Remove the breather/dipstick assembly. Place an oil pan under the unit for oil collection. Remove the filter and position the unit as necessary to drain oil into the pan.
	**Remove the fan and fan spacer** **Inspect drive fingers for wear** **Note: Some units may not have a fan. If fan is not present, skip to next step.**	Remove the ¼-20UNC bolt securing the fan to the shaft using a 3/8" socket. Remove the fan washer and fan. Using a small pry bar or flat head screwdriver, gently pry the fan spacer from the taper on the pump shaft.
	**Remove the pulley** **Inspect the pulley for damage or abnormal wear**	While holding the pulley from turning, remove the 5/8-18UNF nut. Remove the flat pulley washer. Use puller with ¼-20 bolts of appropriate length threaded into the face of pulley to remove from shaft.
	**Remove the motor bolts**	Using a ¾" socket remove the (4) ½-20 bolts securing the motor and parking brake cable anchor. The lower two bolts are 2 ¼ "long and the two top bolts are 6 ½" long.

	**Remove the complete drive motor**	Remove the motor from the nosecup by tapping cast iron housing with a soft-face mallet and gently prying on the flange surface of the motor taking care not to damage the aluminum nosecup.
	**Remove the nosecup**	Remove the nosecup from the endblock by removing the two (2) ½-20 x 2 ¾" long socket head caps screws with a 5/16" allen head socket.
	**Remove the transfer tubes**	Remove the transfer tubes by gently pulling the tubes out of the endblock. It may be necessary to rotate the tubes while pulling.
	**Remove the charge pump cover seal snap ring**	Using snap ring pliers remove the charge pump cover snap ring.

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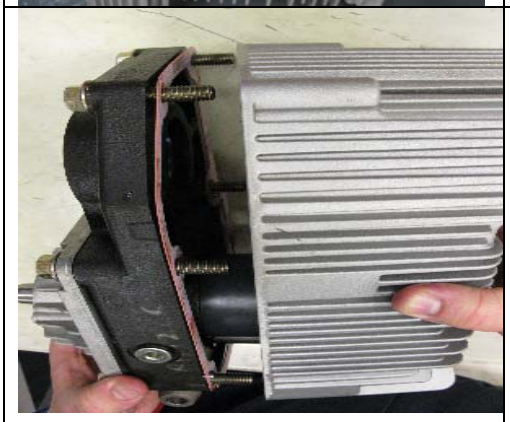
	**Disassemble the pump section** **Note: Two left bolts measure 1 ¾" long the other four are 2 ¾" long.**	Using a 9/16" socket remove the (6) 3/8-16UNC bolts securing the top housing to the endblock. Note two (2) of the bolts are shorter than the other four (4) that secures the charge pump cover to endblock and top housing.
	**Disassemble the pump section**	Note: Before completely removing the top housing, lay pump section on its side so that pistons do not fall out of the bores.
	**Disassemble the pump section**	Remove the top housing from the endblock assembly. Note that the swash block and trunnion arm will remain in the top housing when it is removed from the end block assembly.
	**Remove the swash block assembly**	Remove the swash block assembly from the top housing by lifting it out.

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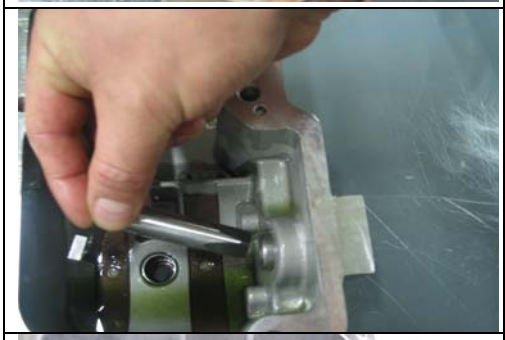
	**Remove bearing cage and thrust washers** **Note: Washers should be re-installed in the same orientation/position they were found – Do not Flip**	Remove the bearing cage and thrust washers from the swash block by lifting them out. Check both washers and bearing for excess wear or pitting damage.
	**Remove the trunnion arm and control block**	Remove the trunnion arm and the control block by sliding the trunnion arm toward the center of the top housing and removing it from the bore.
	**Caution:** ⚠ **Do not remove the two cradle bushings!**	The bushings can have light wear pattern but no other damage. Both bushings must be tight and seated flat against radius.
	**Trunnion arm seal**	Inspect trunnion arm seal for any damage or leakage at or around trunnion arm seal. If replacing the trunnion seal remove retainer clip then trunnion arm seal with a flat head screw driver.

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	**Remove the cylinder block**	Remove the snap ring from the pump shaft with external snap ring pliers. Use care not to over-stretch snap ring. Take special notice not to scratch sealing zone on shaft while removing and replacing snap ring.
	**Remove spring retainer**	Remove the spring retainer and the cylinder block spring from the shaft.
	**Remove the cylinder block assembly** **Inspect pistons, bores and both running surfaces**	Remove the cylinder block from the pump shaft by sliding the cylinder block off the splines on the pump shaft. It may be necessary to rotate the cylinder block by hand while lifting.
	**Check for excessive wear**	Check surface of rotating group and sides of pistons for excessive wear, indicated by scoring. Remove pistons and check bores and springs for signs of scoring. Check top of OD of pistons for pitting or scratch marks. Parts must be replaced if the scoring is deep enough to catch a fingernail.

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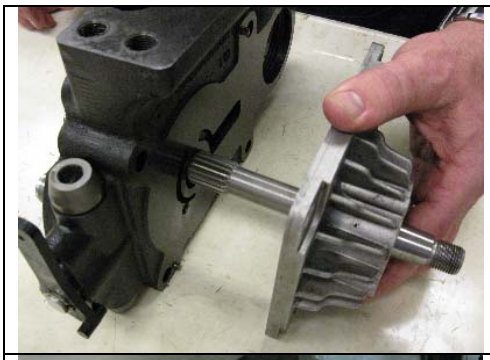
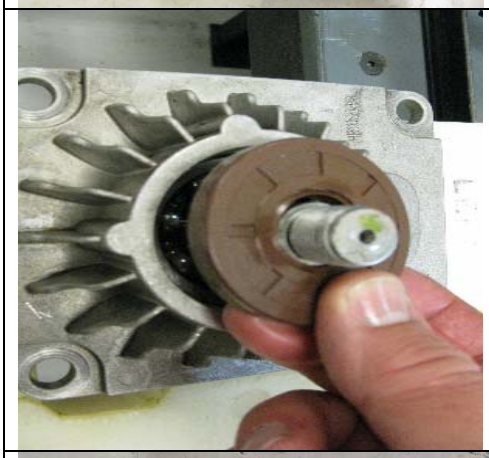
	**Remove the charge pump cover and shaft bearing sub-assembly from end block**	Remove the charge pump cover assembly and shaft bearing sub-assembly by sliding the pump shaft through the central hole in the end block.
	**Remove charge pump seal**	Push out charge pump seal with shaft.
	**Remove shaft bearing sub-assembly from charge pump cover**	Pull shaft bearing sub-assembly from charge pump cover.
	**Pump shaft and bearing sub-assembly**	Inspect shaft and bearing assembly for any heavy scoring or damage around seal area. Do not attempt to remove bearing from shaft this is a sub-assembly.

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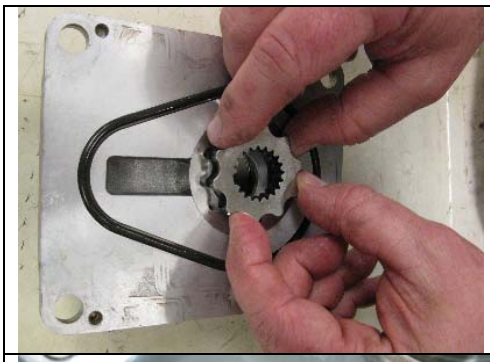
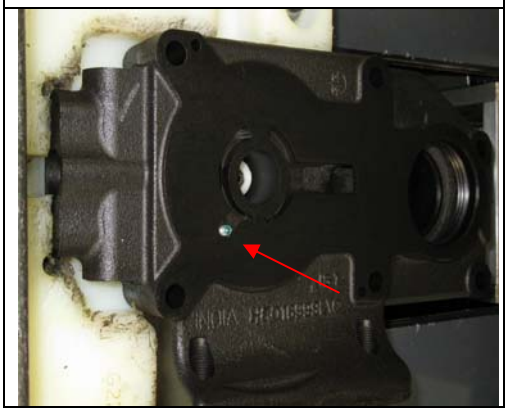
	**Remove charge pump rotor and stator**	Remove charge pump rotor, stator and o-ring. Inspect for scoring or any damage to rotor and stator. Inspect the O-ring, it should be flexible and conform to the o-ring groove in the charge pump cover.
	**Remove two dowel pins**	Remove the dowel pins by sliding the pins out of the bores in the end block.
	**Remove the charge pump pressure relief valve**	Remove with ¼" allen head socket or appropriate hex wrench as necessary.
	**Orifice Plug**	Do not remove the orifice plug! Make sure the orifice is free from debris by blowing low pressure shop air through orifice to ensure clean passage.

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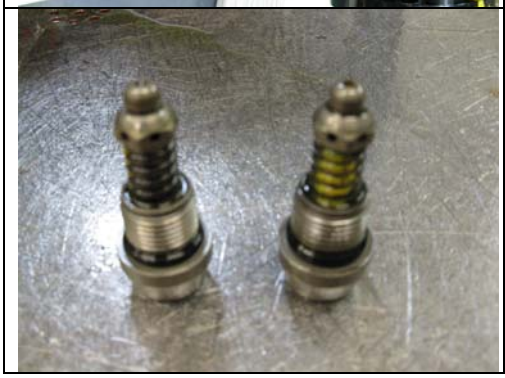
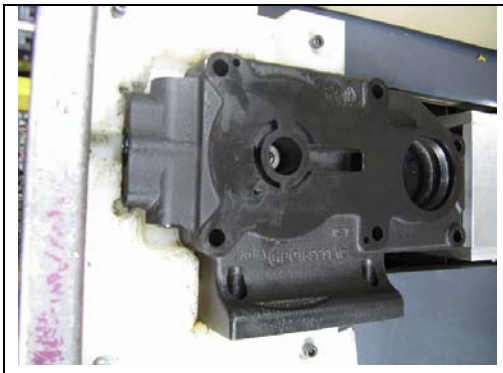
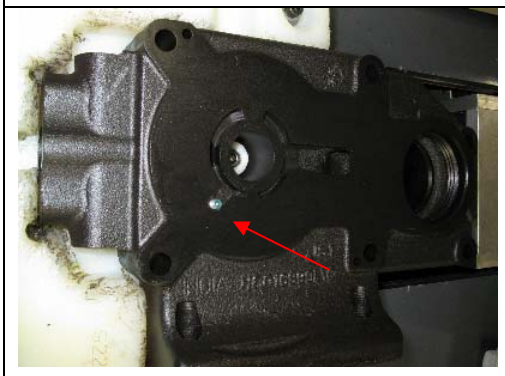
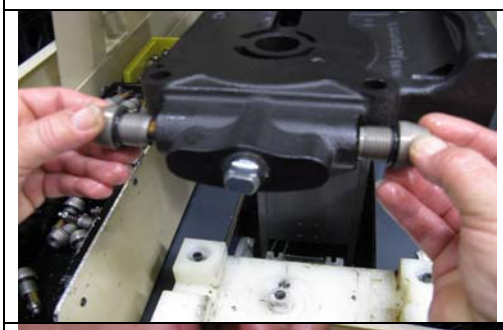
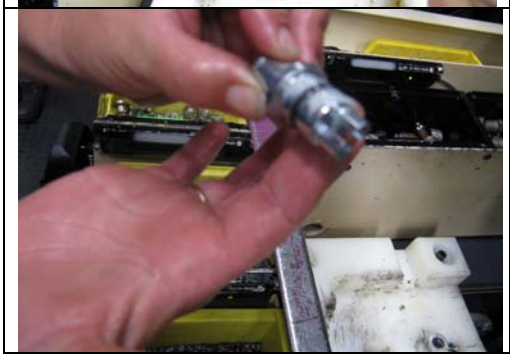
	**Remove the bypass valve snap ring**	Remove the snap ring securing the bypass valve in the bore with internal snap ring pliers.
	**Remove the bypass valve**	Remove the bypass valve from the bore by pulling the valve directly out of the bore in the end block.
	**Remove the shock / check valves**	Remove shock valve with 3/8” allen head socket 16cc – 280 will have 241 number on the outside of shock valve. 12cc – 240 will have 275 number on the outside of shock valve.
	**Shock Valves**	16cc – 280 will have 241 number on the outside of shock valve. 12cc – 240 will have 275 number on the outside of shock valve.

	**Check Valves**	Remove check valve with 5/16” allen head socket . Check valves will not have any numbers on the outside. Please refer to picture to determine if you have either check or shock valves.

	**End block assembly**	Key factor in the successful repair is cleanliness. Prior to assembly make sure all exposed surfaces are thoroughly clean and free of foreign material and chemicals. Replace all seals, o-rings, oils and gaskets with original OEM parts.
	**Orifice plug is clean**	Do not remove the orifice plug! Make sure the orifice is free from debris by blowing low pressure shop air through orifice to ensure clean passage.
	**Install the shock / check valves** 16cc – 280 will have 241 number on the outside of shock valve 12cc – 240 will have 275 number on the outside of shock valve	Engage threads manually hand start several threads to prevent cross threading. Torque shock valve to specifications 480 - 540 in. lbs. Torque check valves to 252 – 288 in lbs.
	**Install the bypass valve**	Lube the bypass valve O-ring and position in bypass port.

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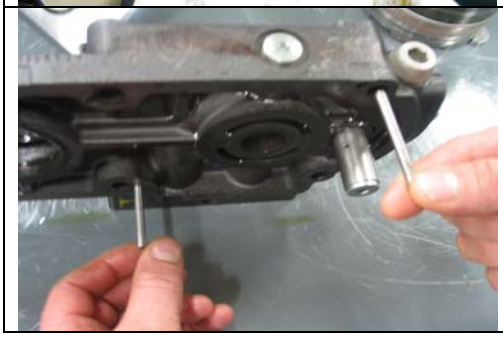
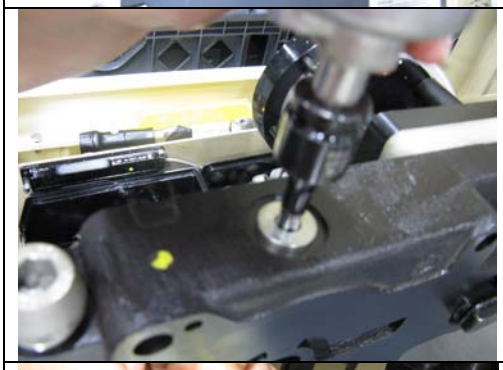
	**Install bypass valves**	Install the bypass valve. Push valve directly in the bore of the end block as far as it will go.
	**Install the bypass valve retaining ring, pliers required**	Install the snap ring securing the bypass valve in the bore. Place retaining ring on bypass valve shaft and position into the groove on the inside of the bypass valve port.
	**Install the bypass valve snap ring**	Use the tip on the pliers to make sure the retaining ring is seated in the groove around the entire circumference of hole.
	**Install two dowel pins**	Install the dowel pins by sliding the pins into the bores in the end block.

	**Install ¼ SAE hex plug into port on side of end block**	Install the ¼ SAE hex plug. Hand start several threads to prevent cross threading.
	**Torque to specifications**	Torque ¼ SAE hex plug on side of end block 252 – 288 in lbs.
	**Install charge relief cartridge**	Install the charge relief cartridge hand start several threads to prevent cross threading. Using a ¼ " allen head socket torque to 252 – 288 in lbs. *If a hex type valve is present, use an 11/16"hex socket to apply torque.
	**Install O-ring**	Lube case drain O-ring and install in end block. Note: Certain models may or may not have this o ring. If your end block has this O-ring replace if end block does not have this o ring then it will not be required.

	**Polish I.D. with emery cloth paper**	Remove any burrs with emery cloth paper from the I.D. of trunnion seal area. Clean area with a lint free cloth after polishing I.D.
	**Replacement Trunnion seal**	With the flat side of seal facing up push seal in flush to top housing.
	**Place socket on top of seal**	Place 11/16 deep well socket over seal.
	**Tap seal into place**	Gently tap socket with rubber hammer driving seal into place.

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	**Install retainer clip**	Place retainer clip with the tongs pointed away from seal.
	**Seat retainer clip**	Gently tap socket with rubber hammer driving retainer clip.
	**Visual check**	See that the seal retainer is flush with the top of the housing.
	**Loctite ™ 242 Threadlocker**	Apply Loctite ™ 242 Threadlocker to the O.D. of seal bore Use of Loctite ™ 242 eliminates the need for a snap ring.

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	**Apply Loctite ™ 242 Threadlocker to the O.D. of the fan seal**	Note**:** Loctite ™ 242 should not contact rubber I.D. on seal.
	**Press fan seal into top housing bore Look for rubber scraped off by snap ring groove replace seal if it has been damaged**	Place a rubber hammer on top of seal. Use second rubber hammer drive seal into cavity flush. Place a 5/8 socket over seal using rubber hammer drive seal either below snap ring groove in bore or .200” deep.
	**Top housing in now complete sub assembly**	Note: By adding Loctite to the O.D. of fan seal the snap ring will not be required.
	**Install trunnion arm**	Lubricate trunnion arm shaft and insert into and through the trunnion arm seal.
	**Install control block**	Install control block onto trunnion arm inside of top housing.

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	**Apply Oil**	Apply OEM recommended oil to cradle bushings.
	**Install swash block**	Install swash block subassembly onto cradle bearing in top housing. Verify that swash block moves freely back and forth on bushing without binding or dragging
	**Apply Oil into swash block**	Apply OEM recommended oil prior to installing thin washer into swash block
	**Install thrust washer**	Install thin (.143”) thrust washer into swash block.
	**Install thrust bearing**	Install thrust bearing on top of thrust washer.

	**Install top washer**	Install thick (.261”) thrust washer into swash block.
	**Apply Oil to top washer**	Apply OEM recommended oil to top of thrust washer.
	**Install charge pump shaft and bearing assembly into charge pump cover.**	Place charge pump cover face down with the extended shaft through hole in table. Be careful as you insert shaft assembly into charge pump cover not to damage I.D. of cover.
	**After bearing installation ensure there is room for the seal.** **Note: Flat washer not used after mid 2009 in production.**	Push shaft and bearing assembly to the bottom of the cover. Note: Flat washer not required if present.

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	**Install charge pump seal**	Place seal over output shaft requires pushing down on seal below snap ring groove of cover. Ade of a socket that fits flush to the face of seal lightly tap until seal is below snap ring groove.
	**Install snap ring**	Use internal snap ring pliers and insert snap ring into groove of charge pump cover.
	**Install charge pump O-ring**	Lightly oil O-ring, flip charge pump cover over and install O-ring into charge pump cover groove.
	**Install charge pump stator and rotor**	Lightly oil both parts, place the stator into charge pump cover followed by the rotor inside of stator.

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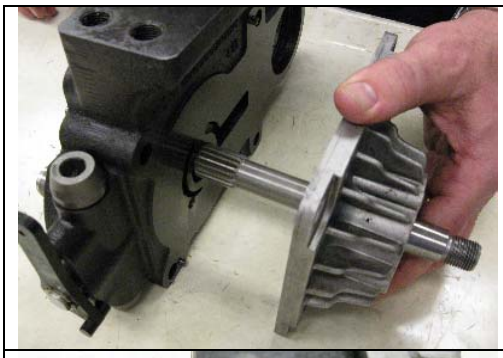
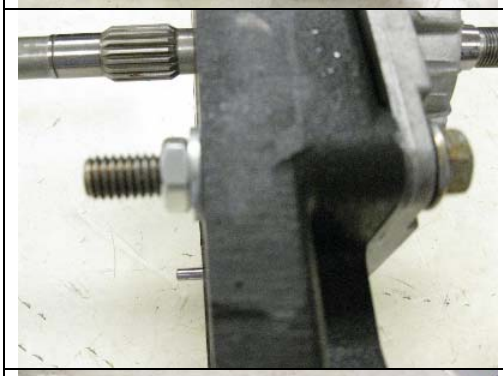
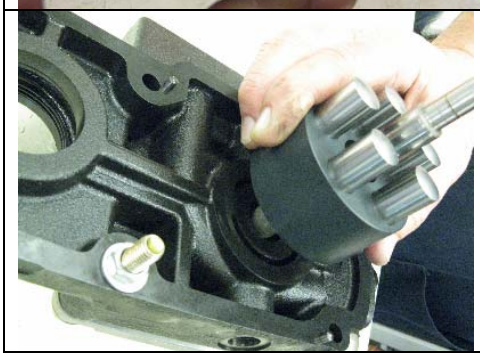
	**Install charge pump shaft into end block**	With the end block sitting on edge insert the charge pump shaft until face of charge pump cover mates to end block.
	**Temporarily bolt charge pump cover to end block**	Use two charge pump cover bolts, flat washers and nuts, finger tighten to temporarily hold the charge pump cover to end block.
	**Rotating group assembly**	
	**Install rotating group over the charge pump shaft**	Flip end block over with charge pump shaft up. Lightly oil face of end block place rotating group over shaft resting on face of end block.

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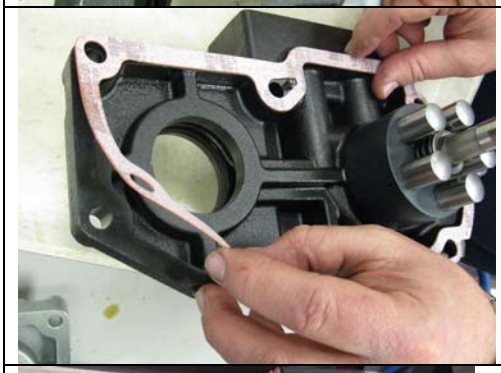
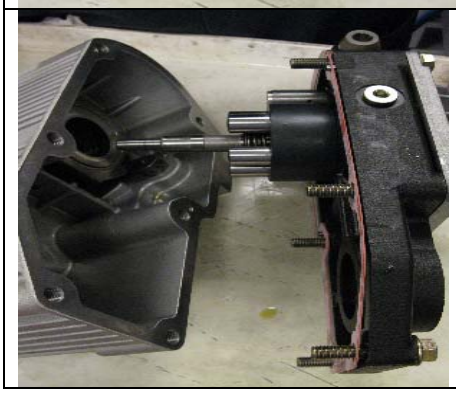
	**Central spring and bushing**	Place central spring and bushing onto pump shaft on top of barrel.
	**Install snap ring onto shaft**	Using internal snap ring pliers, put retaining snap ring over pump shaft and place on top of the central spring bushing.
	**Place 16mm socket over shaft**	Place a 16mm deep well socket 3 ½” long over shaft resting on the snap ring.
	**Compress snap ring**	By pushing down on socket compress the central spring until snap ring locks into snap ring groove of shaft.

	**Remove two nuts and washers**	Remove the two nuts and washers.
	**Install face gasket**	Install gasket onto sealing surface of top of end block.
	**Install all six bolts**	Install the two hex bolts that are (1.75”) long in the end block install the other four hex head bolts that are (2.75”) long through charge pump cover and through end block.
	**Carefully position top housing to end block**	Take special care not to allow the swash block or the internal bearing and washers to fall out of position.

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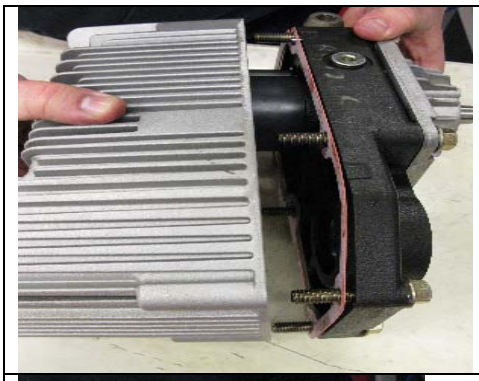
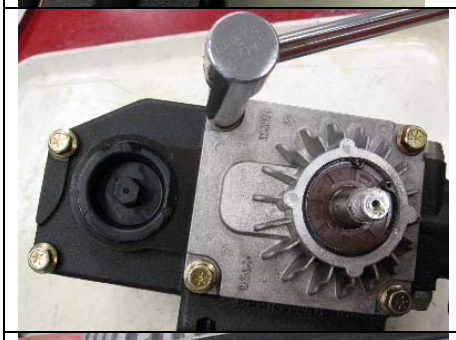
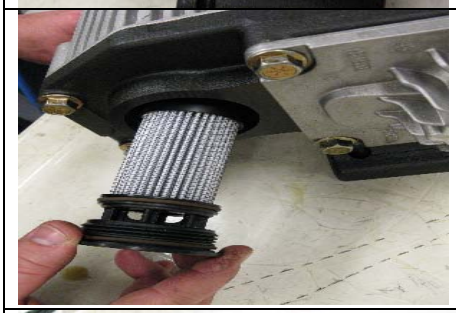
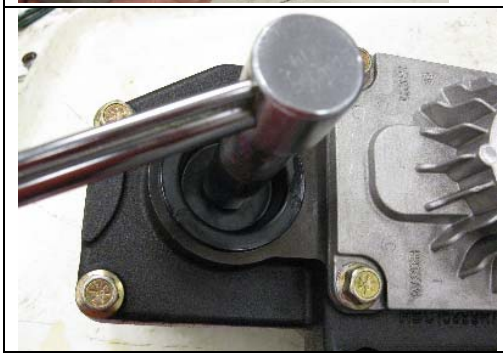
	**Carefully assembly top housing to end block**	Slip pump shaft through the center hole of swash block
	**Hand tighten bolts**	While holding the top housing level to end block hand start each of the six bolts with socket to secure both the top housing and end block together.
	**Torque all six hex head bolts**	Going diagonal from each bolt torque to 300 – 336 in lbs.
	**Install filter**	Lightly oil filter O- ring and insert into end block hand start until snug.
	**Torque filter**	Torque filter to 108 – 114 in lbs.

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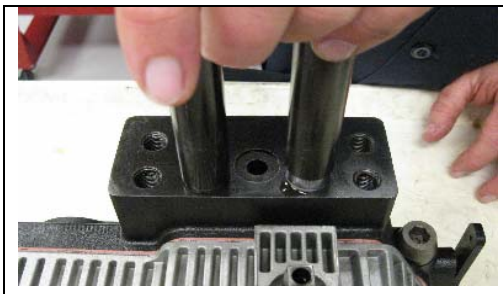
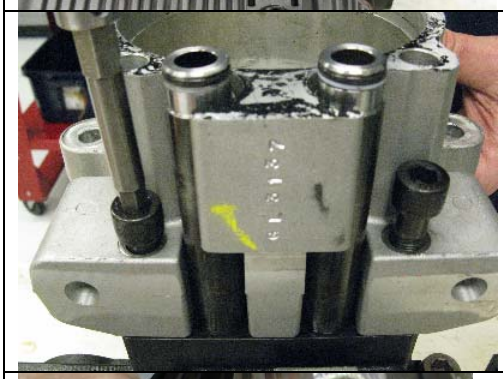
	**Install both pipe tubes** **Inspect interface for slivers of backup ring replace if sheared**	Oil all O-rings on both ends of pipe tubes. First slightly rotate pipe into end block tube holes. With the palm of your hand slightly compress tubes down pass O-rings.
	**Install O-Ring if hole is present**	Oil O-ring and place into position.
	**Install nose cup**	Position nose cup over both tube pipes.
	**Install both allen head screws**	Hand start each one of the two allen head screws that measure 2.750” long, torque to 540 – 708 in lbs.
	**Install motor O-ring** **Note:** When servicing UHT assemblies with a serial number code of 09257 or earlier, this O-ring (item 25) is not required.	Slip O-ring over the end cover of motor down to the O.D. of motor housing base. Then install motor into nose cup. Press down on motor mounting flange to seat the oil pipes in the ports until the ends of the pipes rest on the oil port shoulders.

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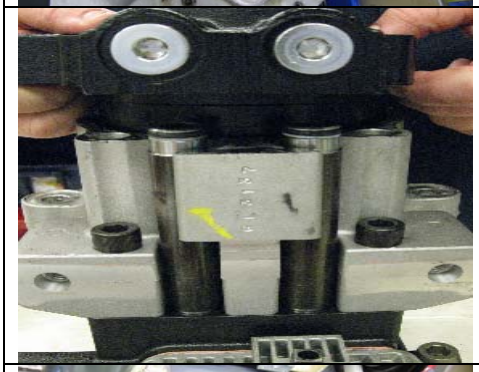
	**Oil nose cup ID** **Note: If assembly does not have motor o-ring skip this process.**	Use OEM recommended oil to lube the ID of the nose cup where the motor O-ring will be located.
	**Install wheel motor into nose cup**	Position the motor tube holes of the wheel motor casting over the two oil pipes. Press down on motor mounting flange to seat the oil pipes in the ports until the ends of the pipes rest on the oil port shoulders.
	**Install pump pulley**	Place pulley onto pump shaft as shown.
	**Washer**	Place washer on top of pulley.
	**Lock nut**	Use Loctite ™ 242 on threads of nut. Hand start the lock nut onto shaft.

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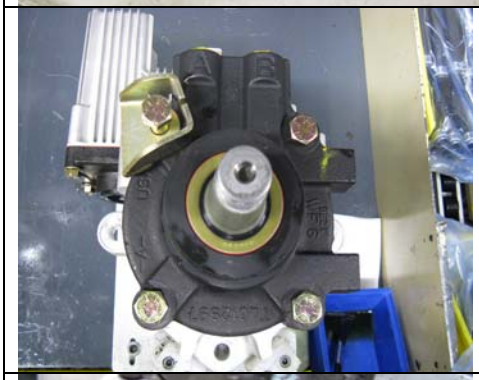
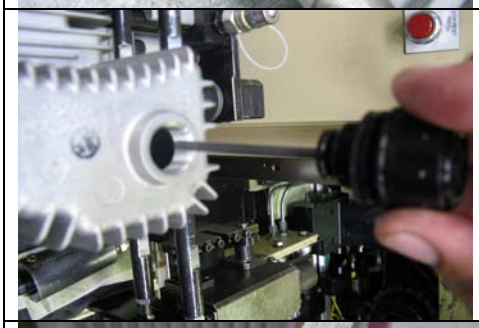
	**Torque nut**	While holding the pulley in place with a adjustable spanner wrench tighten the nut to 55-70 ft lbs.
	**Install brake cable bracket nearest to “A” port as shown.**	Orient the slot opening towards “A” & “B” ports. Insert long hex head bolt through brake cable bracket motor flange hole and nose cup install the other three large hex head bolts.
	**Position brake cable**	While holding the brake cable bracket in position tighten the hex nut to specification. Visually inspect bracket through-hole flange is flat against the housing and bolt head. Tighten the other three bolts to specification.
	**Fill with OEM recommend oil capacity level of 2.7 quarts**	Add 2.7 quarts of OEM recommend oil. Secure dipstick hand tight. Fill to correct height on dipstick. Hand tighten to 36 – 60 in lbs.
	**Install pump fan spacer**	Place spacer over pump shaft with the taper of washer to fit the taper of the pump shaft

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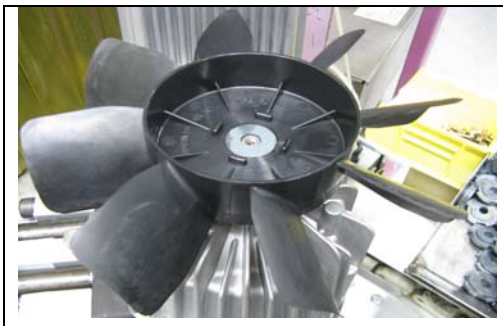
Greeneville, Tennessee USA

	**Install fan** **Note:** If assembly does not have Fan. Install shaft cover by applying Loctite ™ 242 to bottom edge and tap (gently) into top housing bore until seated.	Place fan on top of pump washer with the blades face down as shown in picture.
	**Install fan washer**	Place fan washer with the tangs in-between fan tabs
	**Install bolt to secure fan**	Apply Loctite ™ 242 to the threads of bolt. Start fan bolt by hand and torque to 108 – 144 in lbs.
	**By pass lever**	Slide the by pass lever over the by pass valve knob handle pointing towards the motor out put shaft
	**Install snap ring**	Place snap ring over the by pass arm and release snap ring into groove

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	**Secure snap ring in groove**	Make sure snap ring is secure in groove keep the by pass lever position towards output shaft of drive motor
	**Assembly complete**	
	Start up and purge vehicle	With the rear tires jacked up off the ground cycle transmissions full speed for 30 seconds each direction. Recheck reservoir dipstick to make sure reservoir level is full.

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System Maintenance Tips

- Adjust fluid level in reservoir as necessary.
- Encourage all operators to report any malfunction or accident that may have damaged the hydraulic system or component.
- Do not attempt to weld any broken component. Replace the component with original OEM equipment only.
- Do not cold straighten, hot straighten, or bend any part.
- Prevent dirt or other foreign matter from entering the hydraulic system. Clean the area around the oil dipstick cap before checking oil level.
- Investigate and correct any external leak in the hydraulic system, no matter how minor the leak.
- Comply with manufacturer's specifications for cleaning or replacing the filter.

CAUTION Do not weld, braze, solder or in any way alter any UHT component.

CAUTION Maximum operating pressure must not exceed recommended pressure capacity.

CAUTION Always carefully inspect any system component that may have been struck or damaged during operation or in an accident. Replace any component that is damaged or that is questionable.

CAUTION Do not force any coupling onto the UHT coupling shaft as this could damage the unit internally.

CAUTION Do not mix oil types. Any mixture, or an unapproved oil could deteriorate the seals. Maintain the proper fluid level in the reservoir. When changing fluid, completely drain old oil from the system. It is suggested also that you flush the system with clean oil.

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