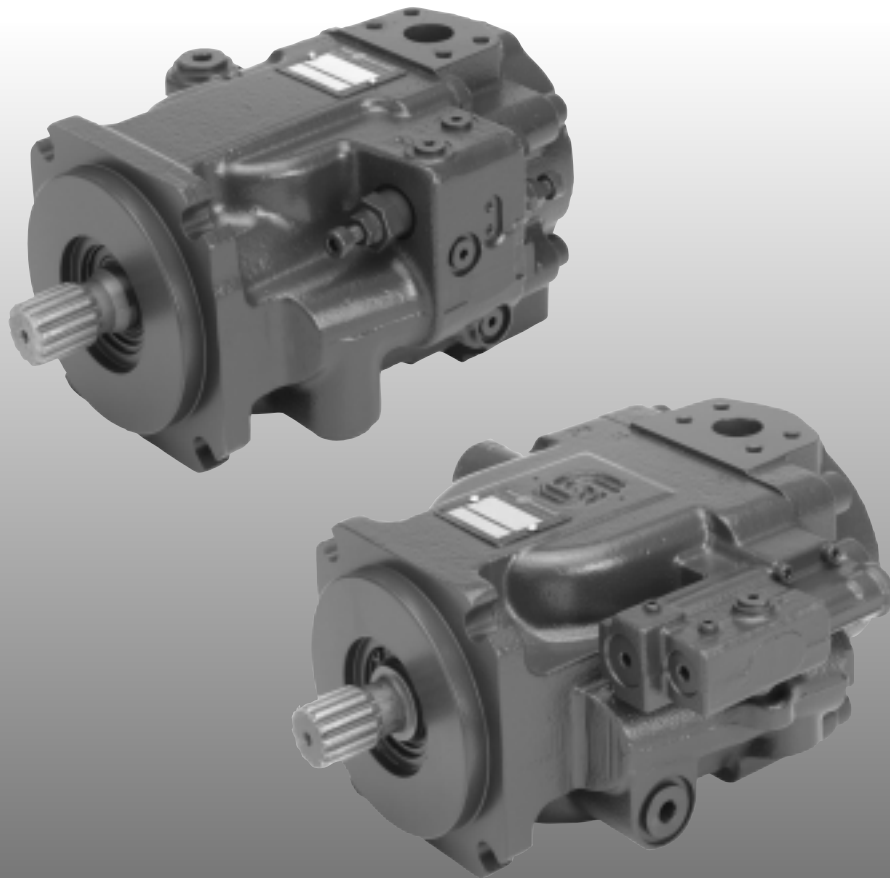


SAUER  SUNDSTRAND

Series 45



Axial Piston

Open Circuit Pumps

Repair Manual

1. Introduction

1.1 Using This Document

This document provides "Major Repair" procedures for Series 45 open circuit pumps.

Minor Repairs can be performed without removing the end cap. These repairs may be performed without affecting the unit warranty. Minor repairs are outlined in the Series 45 Service Information booklet (BLN-10129) and include minor adjustments and servo and bias piston removal.

Major Repairs require the removal of the end cap. These repairs are to be performed only by Sauer-Sundstrand Authorized Service Centers and / or

original equipment manufacturers who have been adequately trained by Sauer-Sundstrand to perform these repairs.

Performing major repairs on the Series 45 products may affect the unit warranty status. The factory should be consulted prior to undertaking such repairs.


Major repair procedures in this document, when used in conjunction with the procedures in the Series 45 Service Information booklet (BLN-10129), provide complete service and repair information for Series 45 products.

1.2 Safety Precautions


Always consider safety precautions before beginning a service procedure. Protect yourself and others from injury. The following general precautions should

be taken into consideration whenever servicing a hydrostatic system.


Disable Work Function

 **WARNING**
Certain service procedures may require the vehicle / machine to be disabled while performing them in order to prevent injury to the technician and bystanders.


Flammable Cleaning Solvents

 **WARNING**
Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present.

Fluid Under High Pressure

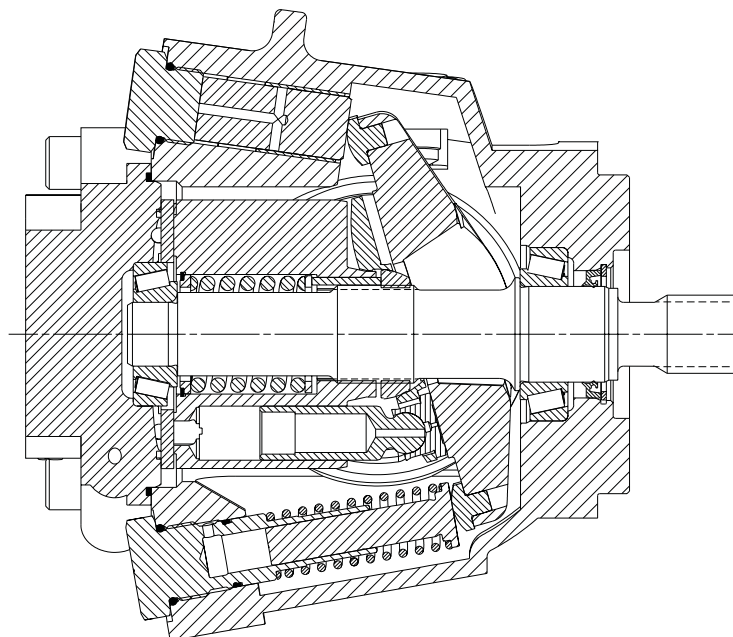
 **WARNING**
Use caution when dealing with hydraulic fluid under pressure. Escaping hydraulic fluid under pressure can have sufficient force to penetrate the skin causing serious injury. This fluid may also be hot enough to burn. Serious infection or reactions can develop if proper medical treatment is not administered immediately.

Personal Safety

 **WARNING**
Proper safety equipment, including safety glasses, should be used at all times.

























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P101 037

1.3 Symbols Used in Sauer-Sundstrand Literature

 DANGER! May result in injury.	 Lubricate with hydraulic fluid.
 May result in immediate or premature damage.	 Apply grease / petroleum jelly.
 Reusable part	 Apply locking compound.
 Nonreusable part, use a new part.	 Inspect for wear or damage.
 Non-removable item	 Clean area or part.
 "OR" in drawing – either option may exist.	 Be careful not to scratch or damage.
 Measurement required.	 Note correct orientation.
 Flatness specification	 Mark orientation for reinstallation.
 Parallelism specification	 Torque specification
 External hex head	 Press in.
 Internal hex head	 Pull out with tool.
 Torx head	 Use installation sleeve / cone "bullet".

1.4 Ordering Replacement Parts and Service

To ensure the best performance, order genuine Sauer-Sundstrand replacement parts. See BLN-2-41689 for a list of available service parts and service kits for 57 cc and 74cc Series 45 units.

Some service parts may be available only in kits, while other parts may be available on an individual basis.

To order parts, contact Sauer-Sundstrand Extended Customer Service (ECS) at (515) 239-6078, fax (515) 239-6230, or your nearest Authorized Service Center.

Sauer-Sundstrand provides complete repair service for its products. Contact any Sauer-Sundstrand Authorized Service Center for details. Sauer-Sundstrand Authorized Service Center locations are listed in BLN-2-40527, or publication SAW (Id. No. 698266).

2. General Instructions

The procedures in this document are for the disassembly, inspection of parts, and reassembly (major repair only) of the Series 45 variable displacement open circuit pumps. For minor repairs, consult BLN-10129.

Remove the Pump!

Prior to performing major repairs on the Series 45 pump, remove the pump from the vehicle/machine. Chock the wheels on the vehicle or lock the mechanism to inhibit movement. Be aware that hydraulic fluid may be under high pressure and / or hot. Inspect the outside of the pump and fittings for damage. Cap hoses after removal to prevent contamination.

Keep it Clean!

Cleanliness is a primary means of assuring satisfactory pump life, on either new or repaired units. Clean the outside of the pump thoroughly before disassembly. Take care to avoid contamination of the system ports. Cleaning parts by using a clean solvent wash and air drying is usually adequate.

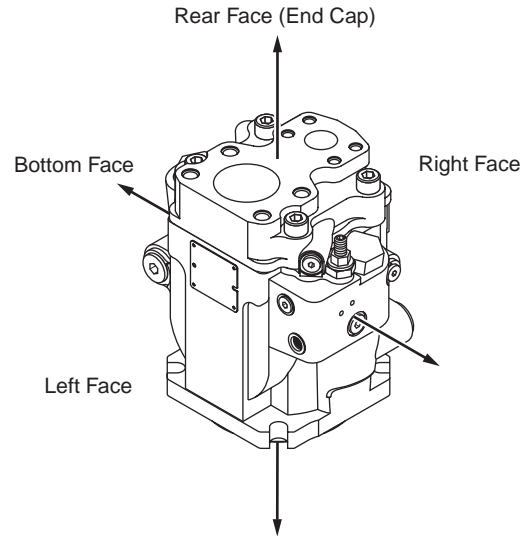
As with any precision equipment, all parts must be kept free of foreign materials and chemicals. Protect all exposed sealing surfaces and open cavities from damage and foreign material. If left unattended, the pump should be covered by a protective layer of plastic.

Mark the Orientation!

Using a permanent or dye marker, make an alignment mark across the end cap / housing interface as shown at upper right to record the end cap orientation. Also place a mark on the servo piston plug and a corresponding mark on the housing to prevent incorrect reassembly of the servo and bias pistons.

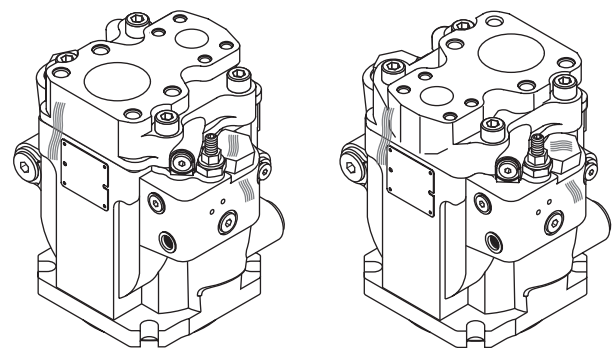
Lubricate Moving Parts!

During the assembly of the Series 45 pump, all parts which have relative motion between two surfaces should be coated with a film of clean hydraulic oil. This will assure that these surfaces will be lubricated during start-up. For fluid quality requirements, refer to bulletin BLN-9887.



P101 064E

Pump Face Orientations



P101 065E

Assembled Unit with Control Face Forward

Replace All O-Rings!

It is recommended that all O-rings be replaced. Lightly lubricate all O-rings with clean petroleum jelly prior to assembly.

Orient the Pump!

For major repair, place the unit in a stable position with the shaft pointing downward. Position the unit so that the control face points toward the operator. It will be necessary to secure the pump to prevent personal injury and allow bolts to be adequately torqued.

3. Disassembly

1. Remove the Second Pump / Auxiliary 'C' Pad.

If a second pump is used, it is necessary to remove the second pump. If an SAE 'C' auxiliary pad (J080, 'C' style shown p. 24) is used, it must be removed before proceeding to the next step. 'A' and 'B' auxiliary pad removal is not necessary to remove the end cap. Remove the auxiliary pad with an 8 mm internal hex wrench. Remove the pump coupling (J140).

2. Remove the End Cap.

Check to see that the end cap orientation is marked as outlined on p. 5. Using a 10 mm internal hex wrench for 57cc and a 12 mm for 74cc, remove the four (4) end cap bolts (J030). Carefully remove the end cap (J020), as it is possible for the attached valve plate (located in the end cap) to fall off and be damaged. Place the end cap and valve plate in a clean area, protecting them from contamination.

Note: Steps 3 and 4 are for 57cc version and steps 3a and 4a are for 74cc version.

3. Remove the Load Sensing (LS) or Pressure Compensating (PC) Spool.

Note the two O-rings (K070a, K070b) that are present at the interface. The O-ring located on the control face side (see p. 5 for face orientations) of the housing surrounds a bore that contains the LS or PC spool (C090). If possible, remove the LS or PC spool and inspect for excessive wear. Note the orientation of the spool for reinsertion. If removal is not possible, be extremely careful when flipping or relocating the housing as not to lose or damage the spool.

3a. Remove the Load Sensing (LS) or Pressure Compensating (PC) Control

Remove the four (4) mounting screws (C300) using a 5 mm internal key wrench. Note the four (4) O-rings (C200) that are present at the interface.

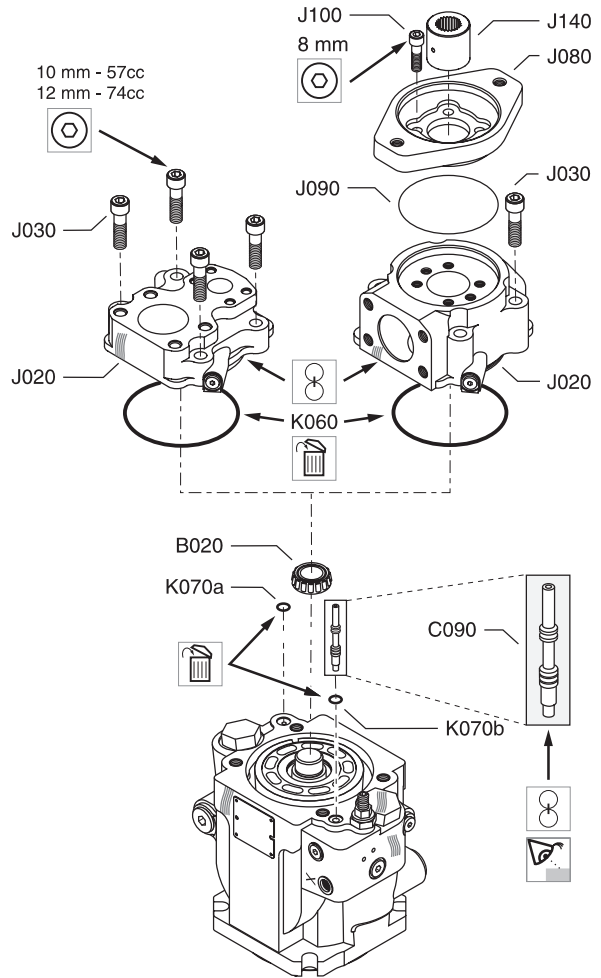
The disassembly and inspection procedure for the Load Sense (LS) or Pressure Compensating (PC) controls can be found in BLN-10129.

4. Remove the Interface O-rings.

Two (2) small O-rings (K070a, K070b) are present at the interface. Remove and discard the O-rings.

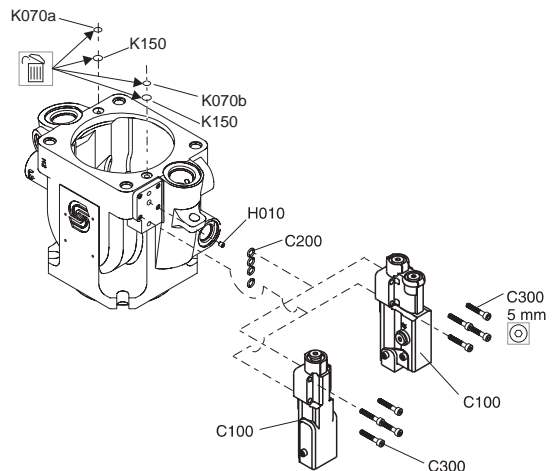
4a. Remove the Interface O-rings.

Four(4) small O-rings (C200), two (2) small O-rings (K070a, K070b), and two split backup rings are present at the interface. Remove and discard these rings.



E101010E

Auxiliary Pad and End Cap Removal (CCW Rotation Shown)

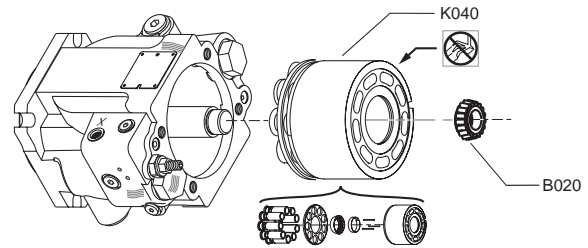


E101 001

Control Removal

5. Remove the Tapered Roller Shaft Bearing.

Slide the tapered roller shaft bearing cone (B020) from the rear end of the shaft. The cup (B010) component of the bearing kit will remain in the end cap.

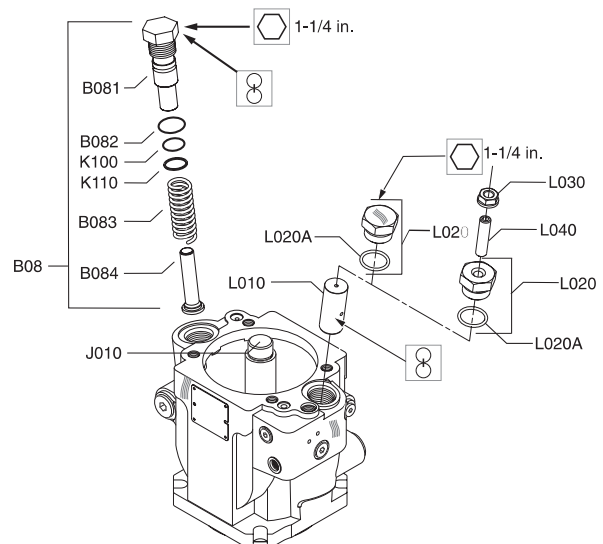


Cylinder Kit Removal

E101011

6. Remove the Cylinder Kit.

Set the pump on its side. Slide the cylinder kit (K040) out by carefully pushing the shaft (J010) out from the bottom. Do not entirely remove the input shaft from the housing at this time. Push the shaft out only far enough so that the cylinder kit may be removed by hand. The pistons (K050), ball guide (K047), and slipper retainer (K049) may come apart. Keep track of the three hold down pins (K046) located on the inside diameter of the cylinder kit, as it is possible for these to fall out. Set the cylinder kit aside, taking special care to ensure that the top and bottom of the kit do not become contaminated or scratched, as this may later lead to poor performance or pump failure. Cylinder kit rework specifications are located on p. 9 - 10.



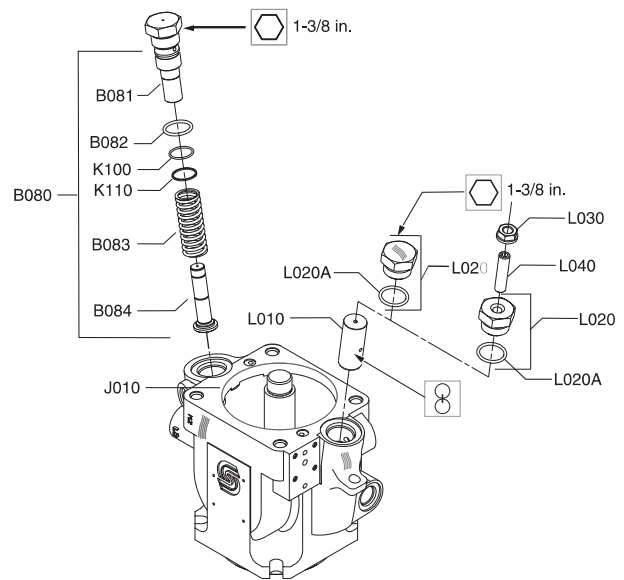
Servo and Bias Piston Removal 57cc

7. Remove the Bias Guide Assembly.

Return the pump to the shaft down disassembly position. Using a 1-1/4 in. socket for 57cc or a 1-3/8 in. socket for 74cc, remove the bias guide assembly (B08) from the housing. The assembly may be identified as the hex plug opposite the control face, located on the rear (end cap) face of the housing. Be sure to remove the bias guide plug (B081), spring (B083), and piston (B084). It may be necessary to remove the piston and spring by reaching through the inside of the unit and pushing them out through the bore.

8. Remove the Servo Piston and Plug.

Using a 1-1/4 in. socket for 57cc or a 1-3/8 in. socket for 74cc, remove the servo piston plug (L020) and servo piston (L010). The plug is located on the rear (end cap) face of the housing, closest to the control face. It may be necessary to remove the piston by reaching through the inside of the housing. Take note of the orientation of the servo piston. The end of the piston with the hole should be facing upward.



Servo and Bias Piston Removal 74cc

E101008

9. Remove the Input Shaft.

Rotate the swash plate until level, the input shaft (J010) should pull out easily from the shaft seal and bearing kit.

Note: Some models may contain servo pistons that have two grooves about the circumference, as illustrated on p. 14.

10. Remove the Swashplate.

Tilt up the far 'ear' of the swashplate (B040) and lift it from the unit. Note the side of the swashplate face exhibiting high wear. It is preferable to reinstall the swash plate in the same orientation, so as to reduce start-up wear.

11. Remove the Journal Bearings.

It is important to record the location **and** orientation of the journal bearings if they are to be reused. To remove the journal bearings (B030), which are located beneath the swash plate, simply lift them from the housing.

12. Remove the Front Shaft Bearing Kit.

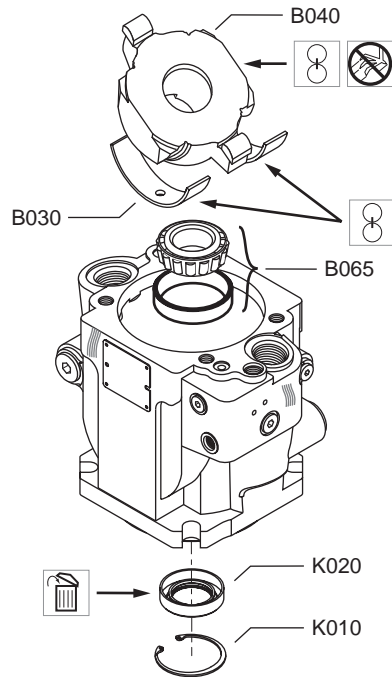
Slide the shaft bearing kit (B065) out of the housing. No special tools should be needed for removal, since the bearing kit is slip fit to the housing and shaft. It may occasionally be necessary to first remove the shaft seal as outlined below in steps 13 and 14 prior to removing the cup (B060).

13. Remove the Snap Ring.

Flip the pump housing shaft side up. Remove the shaft seal snap ring (K010) using internal snap ring pliers.

14. Remove the Shaft Lip Seal.

Return the housing to its original position and remove the shaft lip seal (K020). The seal may be pressed out of the housing, if necessary. The lip seal should be replaced every time the shaft is removed from the unit.



E101 009

Swashplate, Bearing, and Seal Removal

4. Inspection of Parts

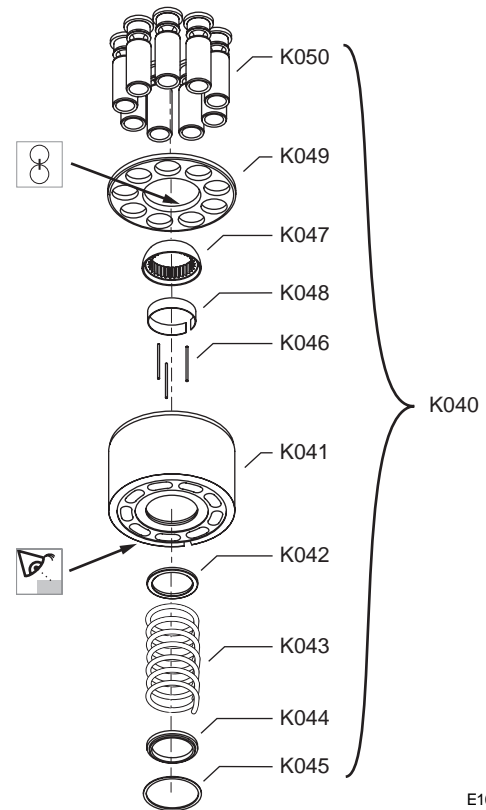
4.1 Cylinder Kit

The cylinder kit (K040), contains nine (9) pistons, with a swiveling brass 'slipper' attached to each piston. The slipper retainer (K049) holds the pistons (K050) upright and aligned with the corresponding cylinder bores. The slipper retainer pivots on a ball guide (K047) which transfers the downward force of the slippers and pistons to three hold down pins (K046). The hold down pins then transfer the downward force to the cylinder block spring (K043), and eventually to the cylinder block (K041).

Disassemble the Cylinder Kit.

Remove the pistons from the cylinder kit. The pistons and bores are not selectively fitted, so it is usually not necessary to replace the pistons in their original bores. However, units with high hourly usage may begin to develop wear patterns, and it is advisable to replace the pistons into the original bores if possible.

Remove the ball guide (K047). The three pins (K046) may now be removed. On 57cc only a retainer ring (K048) is used to hold the pins upright in place. Due to prior assembly, the retainer ring may be resting at the bottom of the cylinder block (K041). It may be necessary to use a packing hook to remove the retainer ring. It is not yet necessary to disassemble the cylinder block.



E101012

Cylinder Kit Disassembly

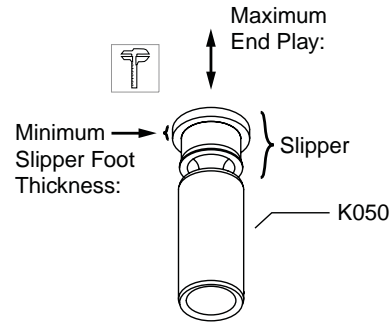
Series 45 Repair Inspection of Parts

Inspect the Rotating Group Pistons / Slippers

Look for discoloration on the pistons. Discolored pistons may indicate that the unit was subjected to excessive temperature and should not be reused. The slippers may now be inspected for signs of excess wear or damage. The minimum slipper foot thicknesses and maximum slipper end play are shown in the table at the right. Replace all piston assemblies if brass slippers are scored, excessively rounded at the edges, or detached from the piston.

	57 CC	74 CC
Slipperfoot Thickness	3.23 (0.127)	4.50 (0.180)
Piston/Slipper End Play	.102 (.004)	.102 (.004)

T101090E



Rotating Group Piston

P101066E

Inspect the Ball Guide, Slipper Retainer, and Hold Down Pins.

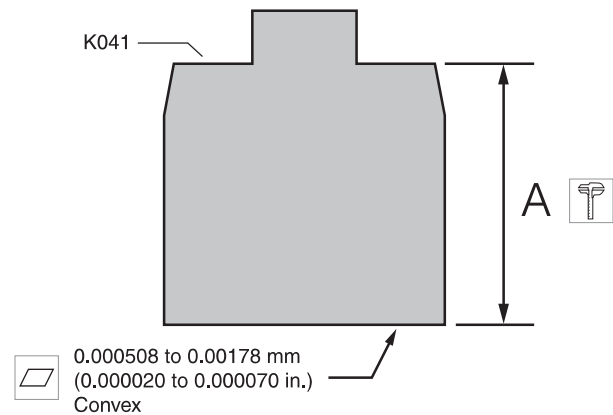
The ball guide should be free of nicks and scratches, and should not be excessively scored. The slipper retainer should be flat, and slippers should fit in the retainer with minimal side play. Place the hold down pins on a flat surface and roll them to make sure they are straight. Discard and replace damaged parts.

Inspect the Cylinder Block.

Look at the bottom of the cylinder block. The running surface, or face which contacts the valve plate (B090, p. 12), should be smooth and free of nicks and burrs. No scratches or grooves should be present, as these may drastically affect the flow of the unit.

		57 CC	74 CC
A	Minimum Cylinder Block Height	62.23 (2.45)	69.0 (2.72)


T101091E




Cylinder Block Minimum Height

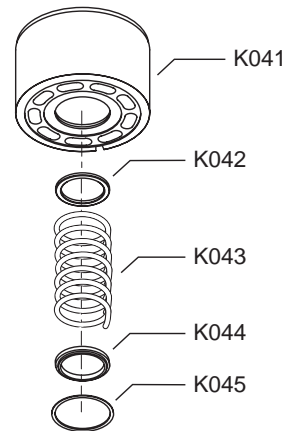
P101067E

If Needed, Fully Disassemble the Cylinder Block.

 *Note: This step is not necessary for most normal repairs and should not be performed unless internal damage is suspected.*

 *Warning: Cylinder block spring is under pressure. To avoid injury use appropriate tools to safely compress spring while removing retaining rings.*

Compress the cylinder block spring (K043) and remove the spiral retaining ring (K045), outer washer (K044), spring (K043), and inner washer (K042). Visual inspection of the cylinder block, spring, and washers should indicate minimal wear. Replace if cracks or damage are present. Reassemble in the reverse order.




Cylinder Block Disassembly

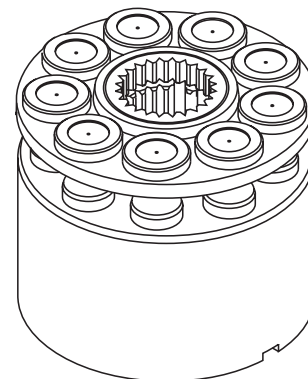
E101 013

Reassemble the Cylinder Kit.

See p. 9 for exploded views.

A light coating of hydraulic fluid should be used to coat all parts prior to reassembly. On 57cc pumps insert the retainer ring (K048) into the cylinder block (K041) so that it sits just below (approximately 1/8 in.) the top surface. Insert the three hold down pins (K046) and make sure that they sit squarely in their respective grooves. Replace the ball guide (K047). Assemble pistons (K050) to slipper retainer (K049). Insert the slipper retainer (K049) containing the slippers and pistons (K050) into the cylinder block. Once the cylinder kit has been completely reassembled, check to be sure that the ball guide sits squarely on all three hold down pins. The retainer ring should still remain just below the top of the cylinder block. The cylinder kit will not slide onto the shaft if any of the hold down pins fall out of place.

 *Note: Be sure to install the slipper retainer so that it mates correctly with the ball guide (concave side of the slipper retainer against the ball guide).*



Reassembled Cylinder Kit

P101 068

4.2 Valve Plate and End Cap Inspection

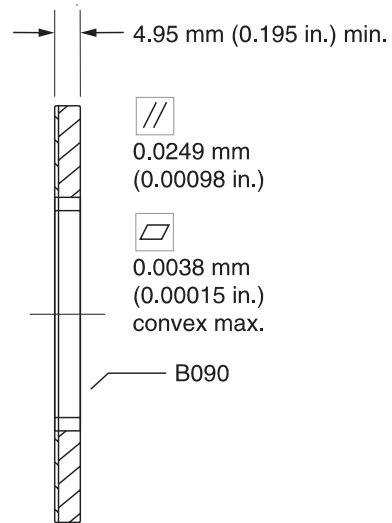
Remove the Components from the End Cap.

It is crucial that the condition of the valve plate (B090) be observed upon major repair. Carefully remove the valve plate from the end cap (J020), being careful not to scratch the finely machined surfaces. Also remove the rear tapered roller bearing cup (B010).

Inspect the Valve Plate.

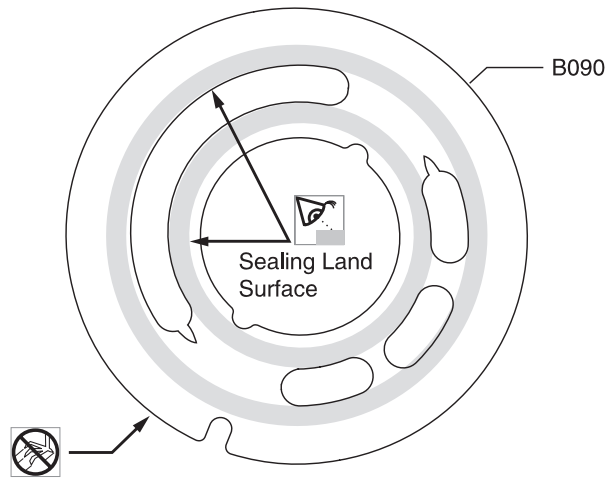
Thickness of the valve plate should be examined. Valve plate parallelism should be 0.0249 mm (0.00098 in.) or less. Appearance should be flat and smooth on both the running face and the bottom surface. The valve plate should be flat to 0.0038 mm (0.00015 in.) convex. A magnetic particle inspection is recommended to detect cracks. Cracks are not allowed on any surface of the part.

Run a fingernail or pencil tip across the diameter of the sealing land surface (see illustration at right). No deep or outstanding grooves should be felt, as these may cause a decrease in pump flow. Lap (to within specification) or replace if grooves or nicks are present. Inspect the mating surfaces of the end cap and valve plate for any possible contamination, as even a few thousandths of an inch of foreign material may cause improper pump operation.



P101 069E

Valve Plate Specifications



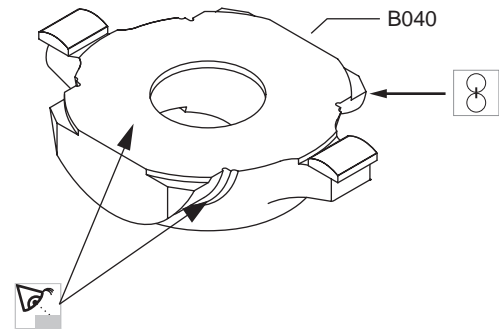
P101 070E

Valve Plate Inspection (CW Rotation Shown)

4.3 Swashplate, Bearings, Shaft, Servo and Bias Piston Inspection

Inspect the Swashplate.

The swashplate (B040) surfaces should appear smooth and even on the journal (curved) surfaces. There should be no raised surfaces that might cause damage to the journal bearings. It is normal for one half of the flat side of the swashplate to appear to have more wear than the other. However, the surface should be smooth and wear depth should not be noticeable to the touch. Inspect the rest of the swashplate for signs of damage or abnormal wear. Replace if necessary.

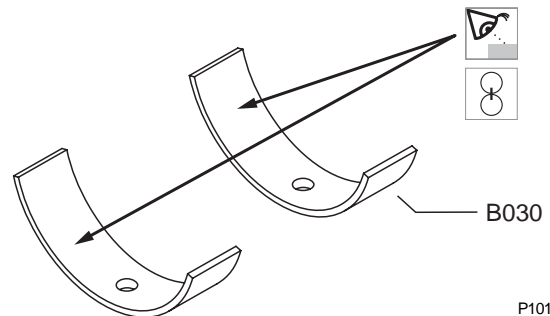


P101071

Swashplate Inspection

Inspect the Journal Bearings.

Inspect the journal bearing (B030) surfaces for abnormal or excessive wear. It is normal for one bearing to receive more wear than the other. Replace if necessary.

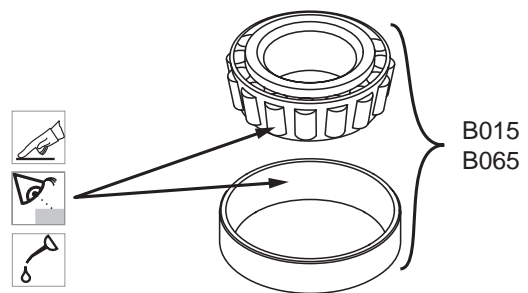


P101072

Journal Bearing Inspection

Inspect the Shaft Bearing Kits.

The tapered roller bearing kits (B015, B065) consist of a cup and cone. Both the cup and cone should be free of excessive wear or contamination. Rotate the bearings to check for smoothness. If a contaminated bearing is suspected, clean with a solvent and re-lubricate with hydraulic fluid. If the problem is not remedied by cleaning, replace the bearing. Also inspect for uneven wear. If abnormal wear is found, replace the bearing kit.

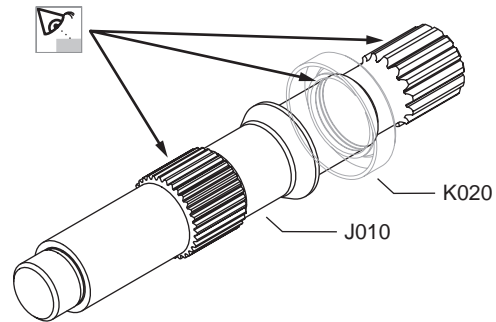


P101073

Cup and Cone Inspection

Inspect the Input Shaft.

Check to see that the shaft (J010) and its splines are straight and free of damage or heavy wear. Inspect the shaft surface where it meets the shaft seal (K020). If a groove that may let dirt into or hydraulic fluid out of the unit has formed, replace the shaft. Clean the sealing area with a nonabrasive material if necessary. Lubricate the shaft with a light coat of hydraulic fluid.

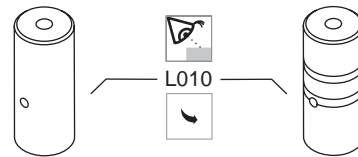


Shaft Inspection

P101 074

Inspect the Servo Piston.

Check the servo piston (L010) for any obvious wear or damage. Check the corresponding housing bore for galling or excessive wear. Replace piston if necessary. Discard and replace the servo plug O-ring.



Servo Piston Inspection

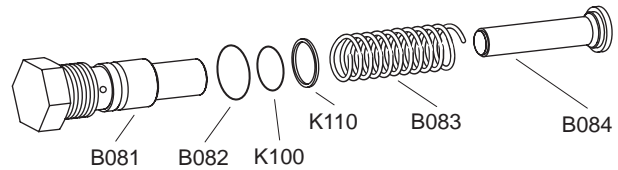
P101 075

Inspect the Bias Piston.

Inspect the bias piston (B084), guide (B081), and spring (B083) for abnormal wear. Replace if necessary. Discard and replace the two O-rings (B082, K100) and the backup ring (K110).



Note: On reassembly, the servo piston backup ring (K110) must be the ring located closest to the center of the pump.



Bias Piston Assembly Inspection

E101 014

5. Reassembly

1. Inspect the Housing.

Inspect the housing to ensure that it is clean and free of foreign material. It should be set in an upright and secure position, as it was for disassembly.

2. Reinstall the Front Bearing Kit.

The front bearing kit (B065) should be reinserted. The cup should produce a slip fit with the housing.

3. Replace the Journal Bearings (B030).



Note: if journal bearings are being reused, reinstall in original orientation and position.

4. Lubricate the Surfaces.

The journal bearings and curved surface of the swashplate should be liberally coated with hydraulic fluid.

5. Reinstall the Swashplate.

The swashplate (B040) should be reinstalled in its original wear orientation. To insert, tilt the swashplate 'ear' located opposite the control face so that it is raised. Insert the opposite side towards the servo piston.

6. Reinstall the Input Shaft.

Seat the input shaft (J010) in the housing. No special tools are needed to insert the shaft into the bearing.

7. Reinstall the Servo Piston Assembly.

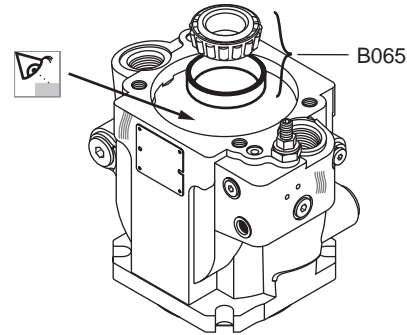
Lubricate all sides of the servo piston (L010) and its respective bore (closest to the control face) liberally with hydraulic oil. Reinstall the servo piston with the 'hole end' up. Reinstall the plug and tighten with a 1-1/4 in. socket to 230 Nm (170 ft•lbf) for 57cc pump. Tighten with a 1 3/8 in. socket to 176-244 Nm (130-180ft•lbf) for 74cc pump.

8. Reinstall the Bias Piston Assembly.

Lubricate the bias piston (B084) and its respective bore (opposite the control face) with a liberal coating hydraulic oil. Reinstall the bias guide assembly (B08) as illustrated at right. For 57cc pumps use a 1-1/4 in. socket, tighten to 230 Nm (170 ft•lbf). For 74cc pumps use a 1 3/8 in. socket, tighten to 176-244 Nm (130-180ft•lbf).

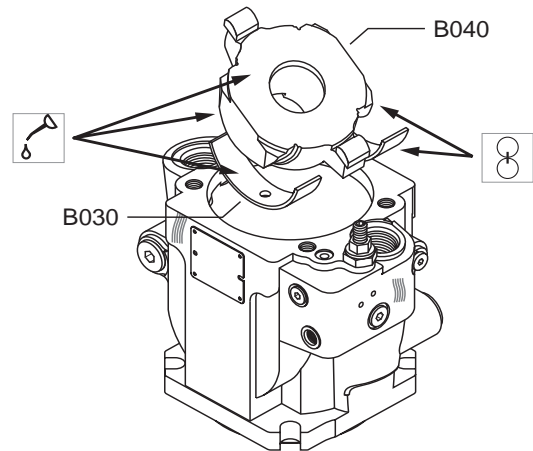


Note: It is extremely important that the bias piston plug (B081) be correctly torqued, as it may back out at lower torques.



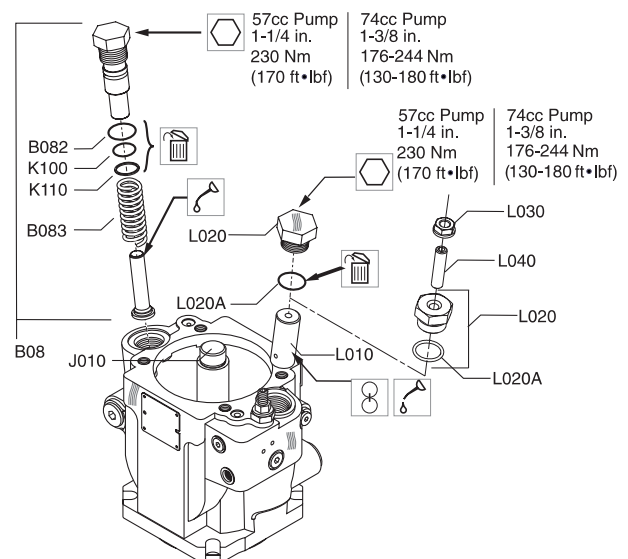
Shaft Bearing Insertion

P101076



Journal Bearing and Swashplate Insertion

P101077



Servo and Bias Piston Insertion

E101015E

9. Lubricate the Swashplate.

Lubricate the flat face of the swashplate with hydraulic oil to prevent premature wear during start-up.

10. Insert the Cylinder Kit.

Set the pump on its side. Check to see that the cylinder kit (K040) is fully assembled (see sec. 4.1). Make sure that the hold down pins (K046) are upright and pressed against the inside of the cylinder block. On 57cc pumps slide the retainer ring (K048) to the top of the block, below the top of the pins. Check to see that the ball guide (K047) sits squarely on top of the pins.

Insert the cylinder kit into the housing with the slippers facing the swashplate. Be careful not to let the kit slide apart during this process. Alignment of the block and hold down pins is crucial. Hold the input shaft and rotate the cylinder kit to align the splines.

11. Check the Cylinder Kit / Shaft Alignment.

Return the pump housing to its original upright position. The bottom of the cylinder kit should be relatively flush with the shoulder of the shaft.


12. Check the Timing Pin Orientation.

A timing pin (J050) located in the end cap orients the valve plate. Check to see that the gap in the timing pin points directly towards or away from the center of the end cap (see right).

13. Replace the Valve Plate and Bearing Cup

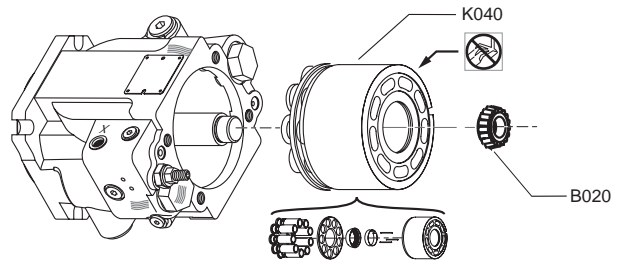
Coat the back (steel) side of the valve plate with clean petroleum jelly to hold it in position on the end cap.

Replace the bearing cup and then the valve plate. The valve plate should 'snap' back into place. Check to see that the valve plate is completely seated. If necessary, use a soft and clean rubber mallet to tap the valve plate back into place. The notch in the valve plate must engage the timing pin. The timing pin, bearing cup, and valve plate should produce a relatively snug fit.

 *Note: To insure proper pump operation, it is extremely important to ensure that there is no contamination between the end cap and valve plate.*

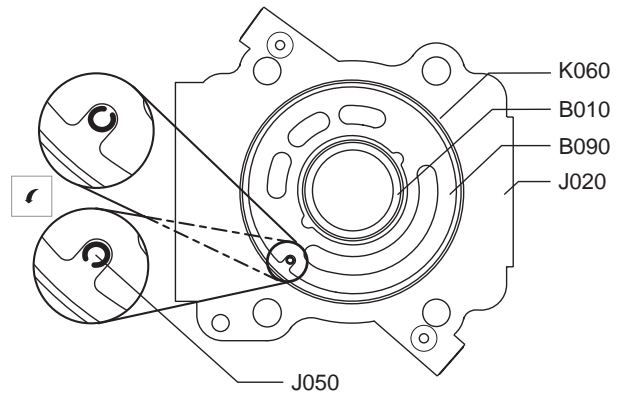
Ensure that the top of the timing pin sits below the surface of the completely seated valve plate.

Discard and replace the end cap O-ring (K060).



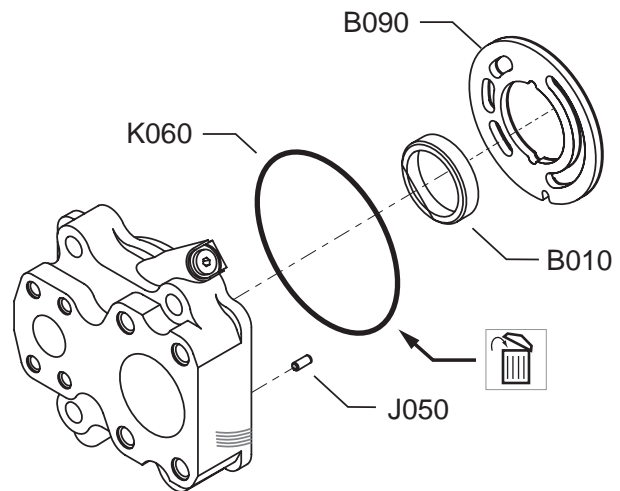
Cylinder Kit Replacement

E101 011



End Cap and Orientation Pin Inspection

P101 078



End Cap Exploded

E101 017

14. Replace the Interface O-Rings.

Lubricate the two interface O-rings (K070a, K070b) with petroleum jelly and place them into their respective grooves on the rear (end cap) face of the housing. On 74cc also add two split backup rings (K150) around the interface O-rings.

Note: Step 15 is for 57cc version and 15a is for 74cc version.

15. Reinstall the LS or PC Spool.

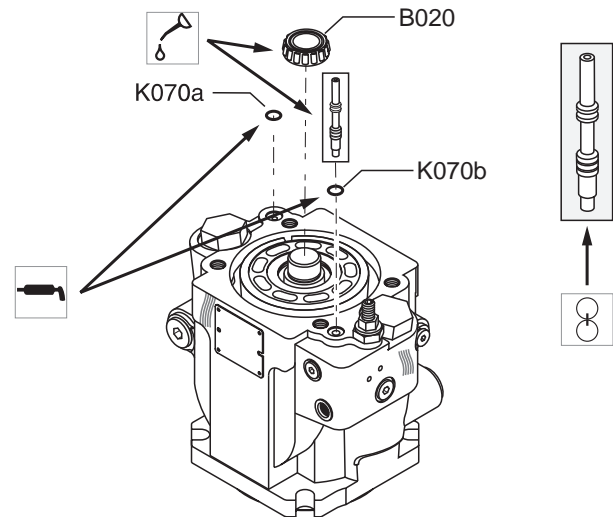
If the LS or PC spool (C090) was previously removed, lubricate and reinsert it in its original orientation. If it was not removed, check to see that it is still present.

15a. Reinstall the LS or PC Control.

If the LS or PC control was previously removed, lubricate and reinsert it in its original orientation. Insert the four (4) mounting screws (C300), snug, and then cross torque the bolts to 5.4 - 7.5 N.m (4-5.5 ft•lbf). With a 5 mm internal hex wrench.

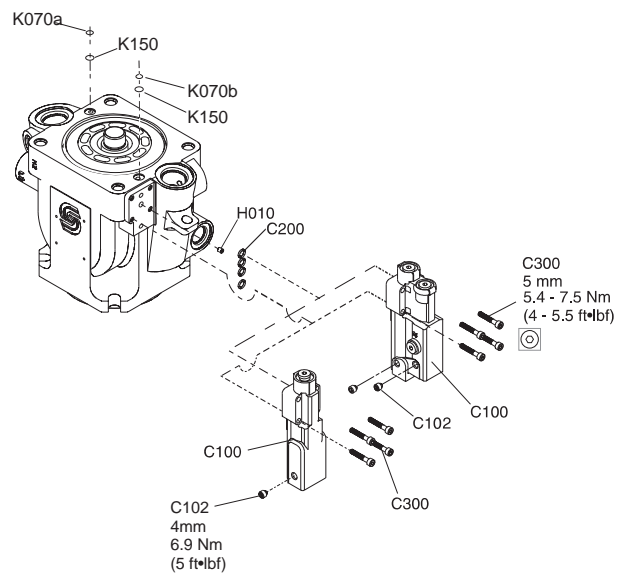
16. Reinstall the Rear Shaft Bearing Cone (B020).

Install bearing cone on to shaft end.



E101 005E

Bearing and LS / PC Spool Replacement



E101 002

LS/PC Control Replacement

Series 45 Repair Reassembly

17. Inspect for Contamination.

Inspect once again to see that there is no contamination on the bottom of the cylinder kit (K040) or valve plate (B090).

18. Lubricate the Internal Parts.

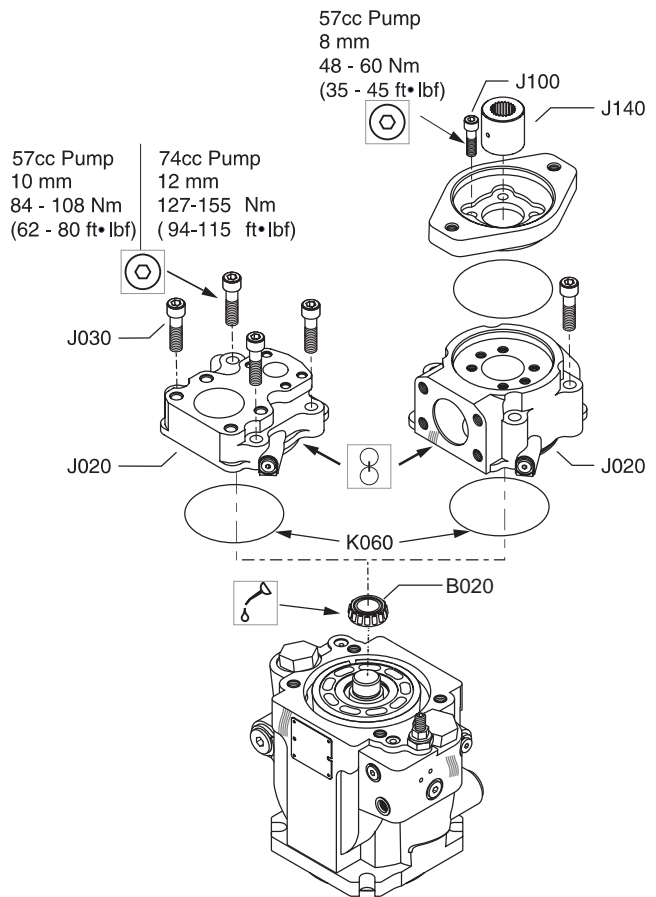
Lubricate the running surface of the cylinder kit, valve plate, and end cap O-ring (K060) with hydraulic oil.

19. Reinstall the End Cap.

Reinstall the end cap as marked (J020) in its original orientation. Make sure that the valve plate is secure in its original position and does not separate from the end cap during installation.

Ensure that the unit control face is pointing towards the technician. For clockwise (right-hand) pumps, the large system inlet port on top (or side) of the end cap should face to the right. For counterclockwise (left-hand) pumps, the large system inlet port on top (or side) of the end cap should face to the left.

Insert the four (4) end cap bolts (J030), snug, and then cross torque the bolts to 84 - 108 Nm (62 - 80 ft•lbf) with a 10 mm internal hex wrench for 57cc pumps. On 74 cc pumps torque bolts to 127-155 Nm (94-115 ft•lbf) with a 12mm internal hex wrench.



E101 006E

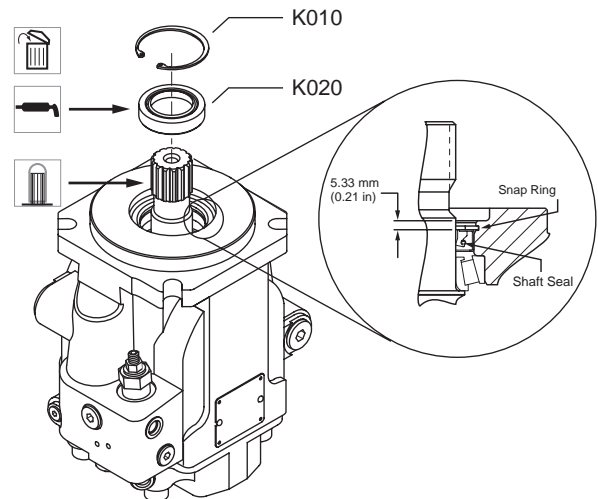
20. Turn the Pump Shaft Side Up.

21. Cover the Input Shaft Splines.

To prevent damage during lip seal installation, use an installation cone or piece of plastic to cover the input shaft splines.

22. Insert a New Shaft Seal.

Replace the shaft seal (K020) with a new shaft seal and reinsert the shaft seal snap ring per diagram at right. Press the shaft seal to the proper depth (see diagram, right). The seal should be perpendicular to the shaft. Be sure that the snap ring is fully seated into the groove.



Shaft Lip Seal Replacement

P100205E

23. Reinstall the Auxiliary Pad.

Rotate the housing shaft end down, and control face towards the technician. If an auxiliary pad (J080) was removed, replace the O-ring (J090). Reinstall the pad and torque the bolts to 48 - 61 Nm (35 - 45 ft•lbf) with an 8 mm internal hex wrench for 57cc and 13.2 - 23.5 Nm (9.75-17.3 ft•lbf) with a 10 mm internal hex wrench for 74cc pumps.

24. Test the 'Torque-to-Turn'.

With the unit assembled (excluding auxiliary pumps), Rotate the input shaft using a torque wrench. With the **swashplate at 0°**, the torque required to turn the shaft (after break-away) **for well oiled assemblies** must be 10.1 - 18.1 Nm (90 - 160 in•lbf) for 57 cc units. Readings outside these values may indicate internal problems. If necessary, disassemble pump and check.

25. Reinstall the Coupling.

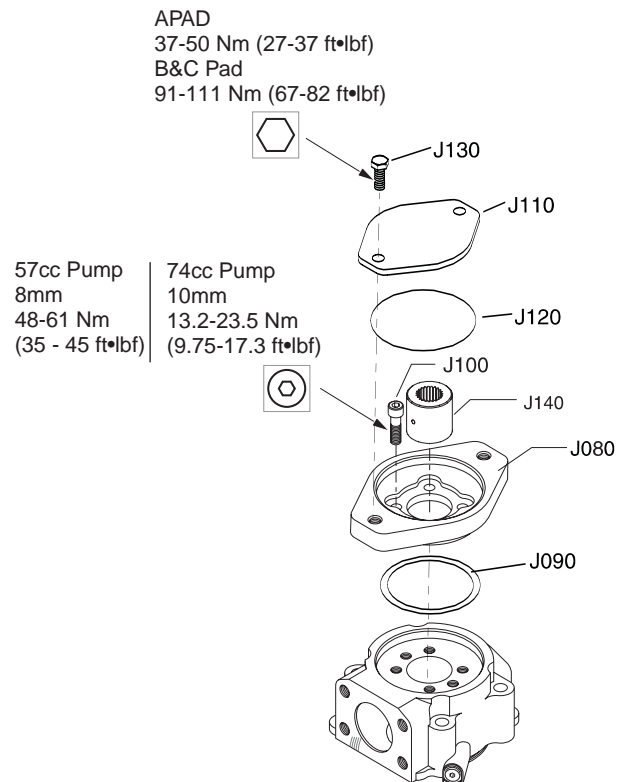
If a auxiliary pump coupling (J140) was present on disassembly, reinstall it at this time.

26. Reinstall the Auxiliary Pad Seal and Pump.

Reinstall the auxiliary pad seal (J120) and auxiliary pump or cover plate (J110), if present. Using a 9/16 in. hex wrench, torque to 37 - 50 Nm (27 - 37 ft•lbf) for 'A' pads or 91 - 111 Nm (67 - 82 ft•lbf) for 'B' and 'C' pads.

27. Reinstall Other Components.

Reinstall any other external components, including the auxiliary pump (if present), that were removed prior to disassembly.

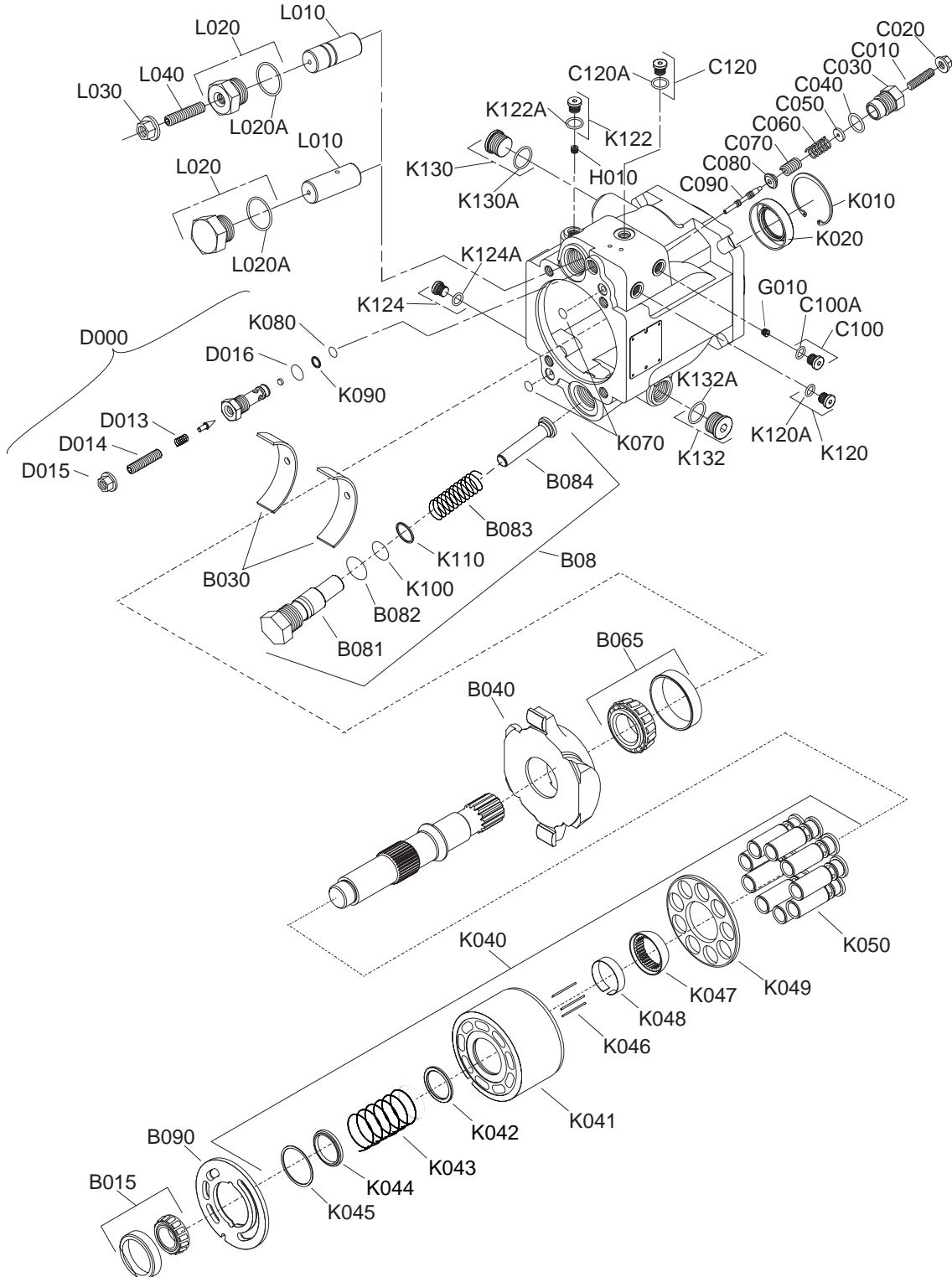


Auxiliary Pad Replacement

E101007E

6. Exploded Views and Parts Lists

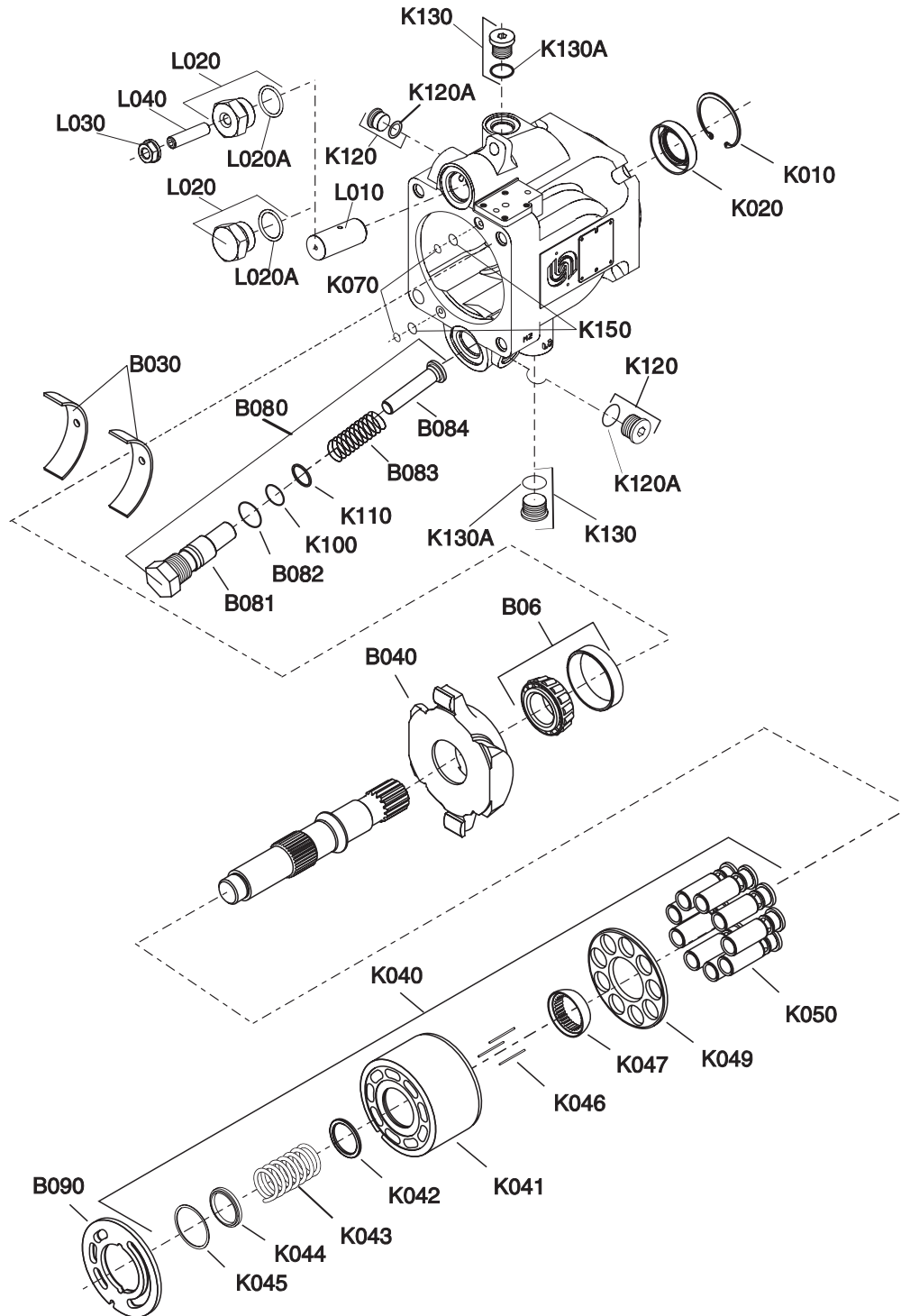
6.1 Internal Parts 57cc



Parts List

Item	Description	Qty.	Shaft Seal/Housing/Speed Sensing	
Control			K010	Snap ring 1
C010	Set screw	1	K020	Lip seal 1
C020	Seal nut	1	K040	Cylinder block kit 1
C030	Plug	1	K041	Cylinder block 1
C040	O-ring	1	K042	Washer 1
C050	Spring seat	1	K043	Cylinder block spring 1
C060	Spring	1	K044	Washer 1
C070	Spring	1	K045	Retaining ring 1
C080	Spring guide	1	K046	Hold down pin 3
C090	Spool, LS or PC	1	K047	Ball guide 1
C100	Plug	1	K048	Hold down pin retainer 1
C100A	O-ring	1	K049	Slipper retainer 1
C110	Set screw	1	K050	Piston assembly 9
C120	Plug	1	K070	O-ring 2
C120A	O-ring	1	K100	O-ring 1
Pressure Compensator Valve			K110	Back up ring 1
D000	PC valve kit, viton	1	K120	Plug 1
D013	Spring	1	K120A	O-ring 1
D014	Set screw	1	K122	Plug 1
D015	Seal nut	1	K122A	O-ring 1
D016	O-ring	1	K124	Plug 1
K080	O-ring	1	K124A	O-ring 1
K090	Back up ring	1	K130	Plug 1
Pilot / Gain Orifice			K130A	O-ring 1
G010	Orifice	1	K132	Plug 1
H010	Orifice	1	K132A	O-ring 1
Displacement Limiter			Common Parts Group	
L010	Servo piston	1	B08	Bias piston kit 1
L020	Plug	1	B010	Tapered roller bearing cup 1
L020A	O-ring	1	B015	Rear bearing kit 1
L030	Seal nut	1	B020	Tapered roller bearing cone 1
L040	Set screw	1	B030	Journal bearing 2
Item	Description	Qty.	B040	Swashplate assembly 1
			B065	Front bearing kit 1
			B081	Bias piston guide 1
			B082	O-ring 1
			B083	Spring 1
			B084	Bias piston 1
			B090	Valve plate 1

6.2 Internal Parts 74cc



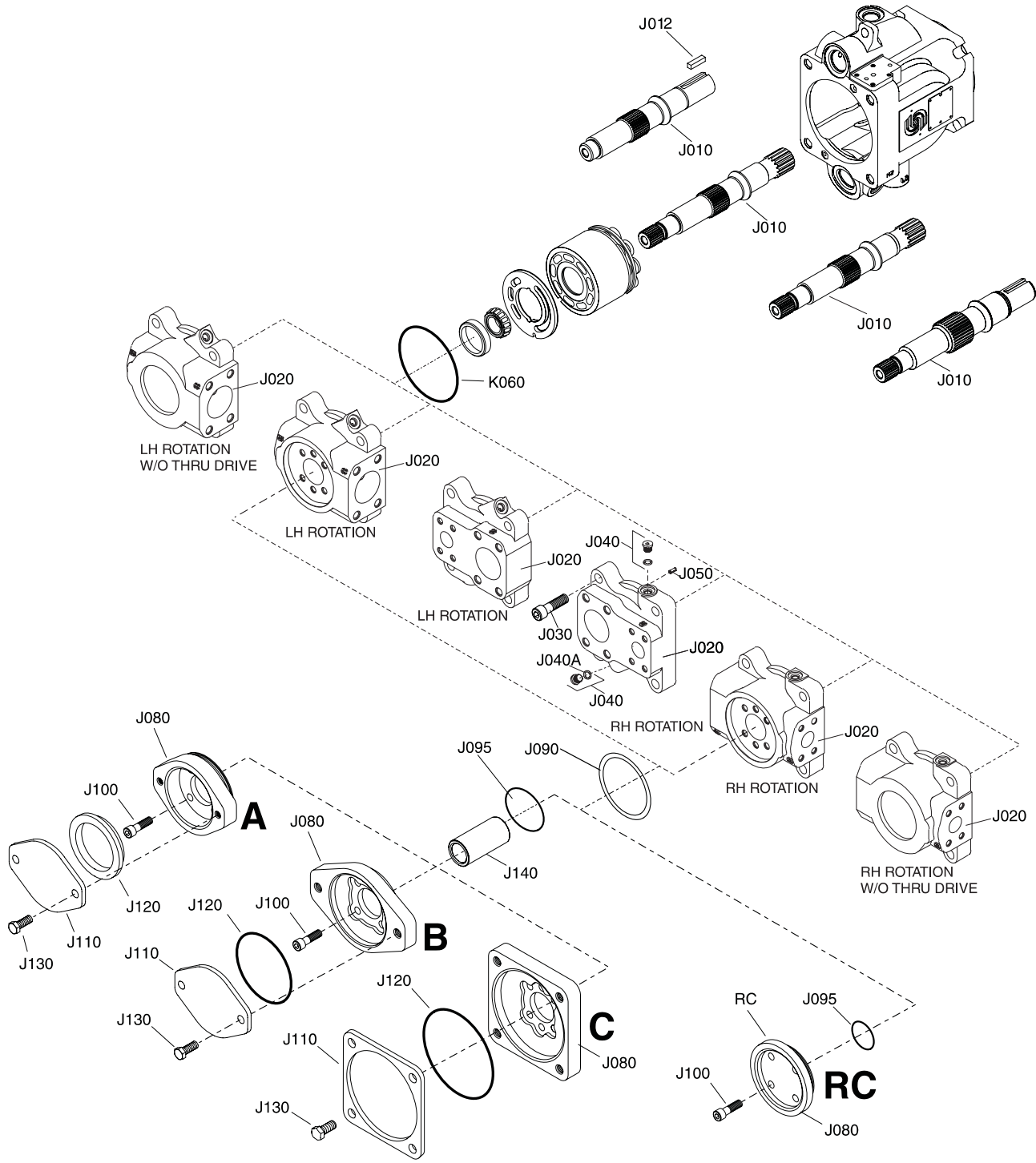
Parts List

Item	Description	Qty.
Displacement Limiter		
L010	Servo piston	1
L020	Plug	1
L020A	O-ring	1
L030	Seal nut	1
L040	Set screw	1
Shaft Seal/Housing/Speed Sensing		
K010	Snap ring	1
K020	Lip seal	1
K040	Cylinder block kit	1
K041	Cylinder block	1
K042	Washer	1
K043	Cylinder block spring	1
K044	Washer	1
K045	Retaining ring	1
K046	Hold down pin	3
K047	Ball guide	1
K049	Slipper retainer	1
K050	Piston assembly	9
K070	O-ring	2
K100	O-ring	1
K110	Back up ring	1
K120	Plug	2
K120A	O-ring	2
K130	Plug	2
K130A	O-ring	2
K150	Split Back-up ring	2
Common Parts Group		
B080	Bias piston kit	1
B030	Journal bearing	2
B040	Swashplate assembly	1
B06	Front bearing kit	1
B081	Bias piston guide	1
B082	O-ring	1
B083	Spring	1
B084	Bias piston	1
B090	Valve plate	1

Parts List

Item	Description	Qty.
Shaft / Auxiliary Flange / End Cap		
J010	Shaft	1
J012	Square key	1
J015	Retaining ring	1
J020	End cap	1
J030	Screw	4
J040	Plug	2
J040A	O-ring	2
J050	Pin	1
J080	Adaptor Flange / Aux. Pad	1
J090	O-ring	1
J100	Screw	4
J110	Cover plate	1
J120	Auxiliary Pad Seal	1
J130	Screw	2
J140	Coupling	1
K060	O-ring	1
RC	Running Cover	1

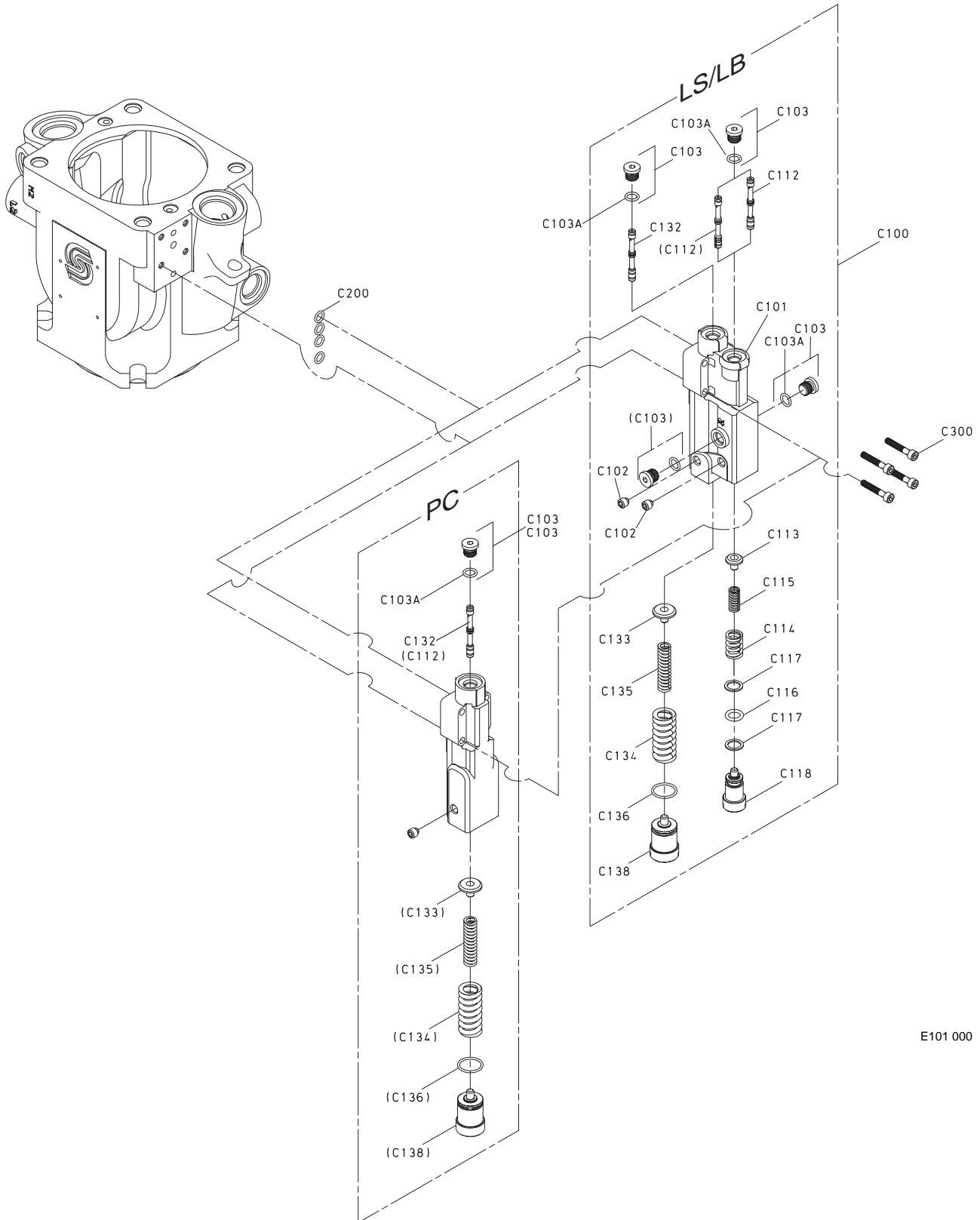
6.4 End Cap and Auxiliary Pads 74cc



Parts List

Item	Description	Qty.
Shaft / Auxiliary Flange / End Cap		
J010	Shaft	1
J012	Square key	1
J020	End cap	1
J030	Screw	4
J040	Plug	2
J040A	O-ring	2
J050	Pin	1
J080	Adaptor Flange / Aux. Pad	1
J090	O-ring	1
J095	O-ring	1
J100	Screw	4
J110	Cover plate	1
J120	Auxiliary Pad Seal	1
J130	Screw	2
J140	Coupling	1
K060	O-ring	1
RC	Running Cover	1

6.5 LS or PC controls Assembly - 74cc

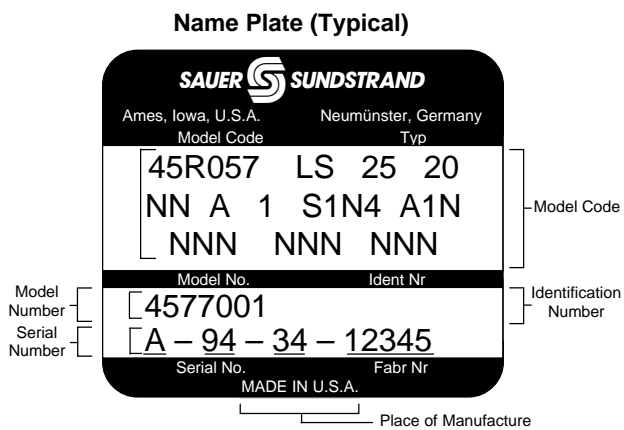


E101 000

Parts List

Item	Description	Qty.
LS / PC Control Assembly		
C100	Control Assembly	1
C101	Housing - Control	1
C102	Set Screw	2
C103	Plug	4
C103A	O-ring	4
C112	Spool - LB/LS	1
C113	Guide - LB/LS Spring	1
C114	Spring - LB/LS Outer	1
C115	Spring - LB/LS Inner	1
C116	O-Ring	1
C117	Ring - Back Up, Packing	2
C118	Plug - LB/LS Adjusting	1
C132	Spool - Control	1
C133	Guide - PC Spring	1
C134	Spring - PC Outer	1
C135	Spring - PC Inner	1
C136	O - Ring	1
C138	Plug - PC Adjusting	1
C200	O - Ring	4
C300	Screw	4

6.6 Name Plate



Series 45 Repair **Exploded Views and Parts Lists**

Notes:

Notes:




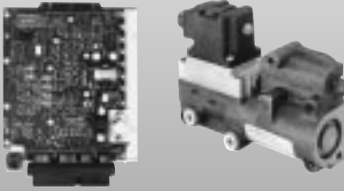


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