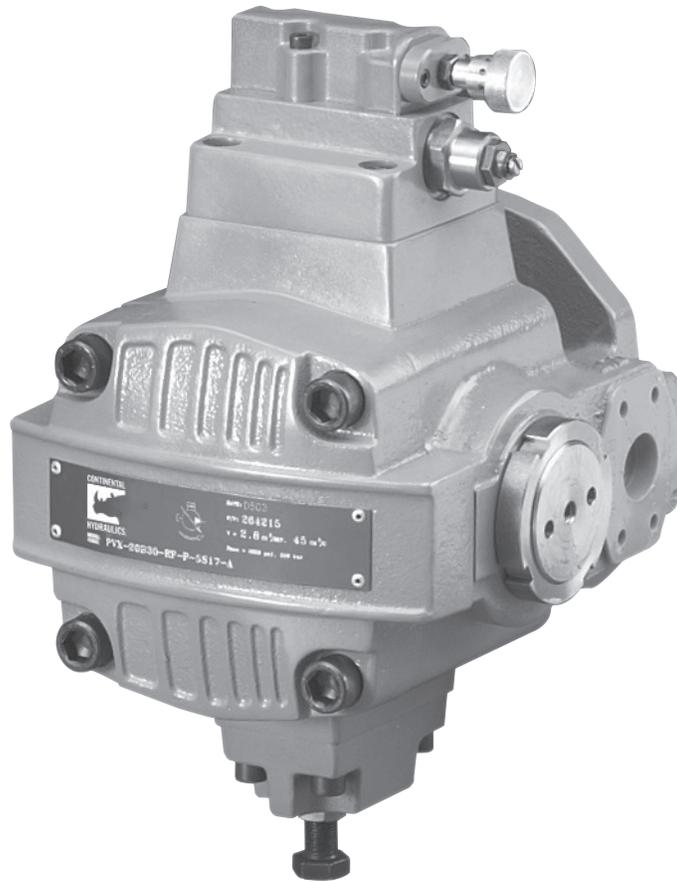




REPAIR PROCEDURES MANUAL

PVX Series Vane Pumps "A" Design Series



Step-by-Step Guide to Troubleshooting and Repairing PVX Series Vane Pumps

Introduction

Thank you for choosing Continental Hydraulics PVX Vane Pumps for your application.

PVX Pumps are designed to provide reliable performance, and to be easily repaired should the need arise. The procedures in this repair manual will show you how to repair virtually any part of your pump.

To assure that your repaired PVX Pump performs reliably, please follow all steps carefully. It is also very important that your work area be kept clean to prevent introducing contaminants into the pump.

In many cases, dirt or contaminants in the hydraulic system lead to pump wear and failure. If your PVX pump failed due to dirt or contamination, be sure to thoroughly clean and flush all parts of the system, paying special attention to power unit reservoirs. You may want to provide additional filtering to keep your pumps and system operating at peak performance.



NOTE: All procedures in this manual are to be performed on a service bench. Do not disassemble, or attempt to repair a pump that is connected to a hydraulic system.



CAUTION – Before attempting to remove the PVX Vane Pump, be sure that all pressure has been relieved from BOTH SIDES of the system.



CAUTION – Before attempting to remove the PVX Vane Pump, disconnect or lock off power supply.



CAUTION – Before manually actuating any PVX Vane Pump, be sure that any resulting machine function will not endanger persons or equipment.

PRODUCT IDENTIFICATION

Each PVX Vane Pump has a Model Code stamped on its nameplate. See Figure 1 for the location of the Model Code.

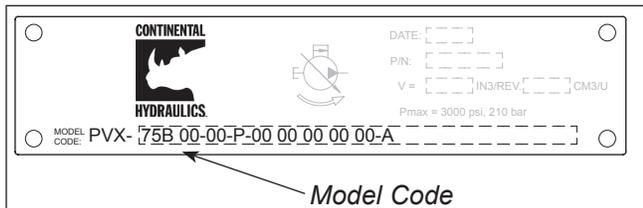


Figure 1

This Repair Manual applies to products with Ordering Codes like the sample in Figure 2.

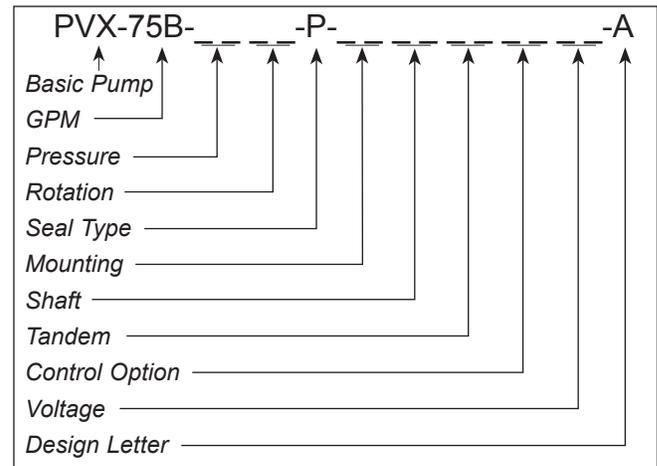


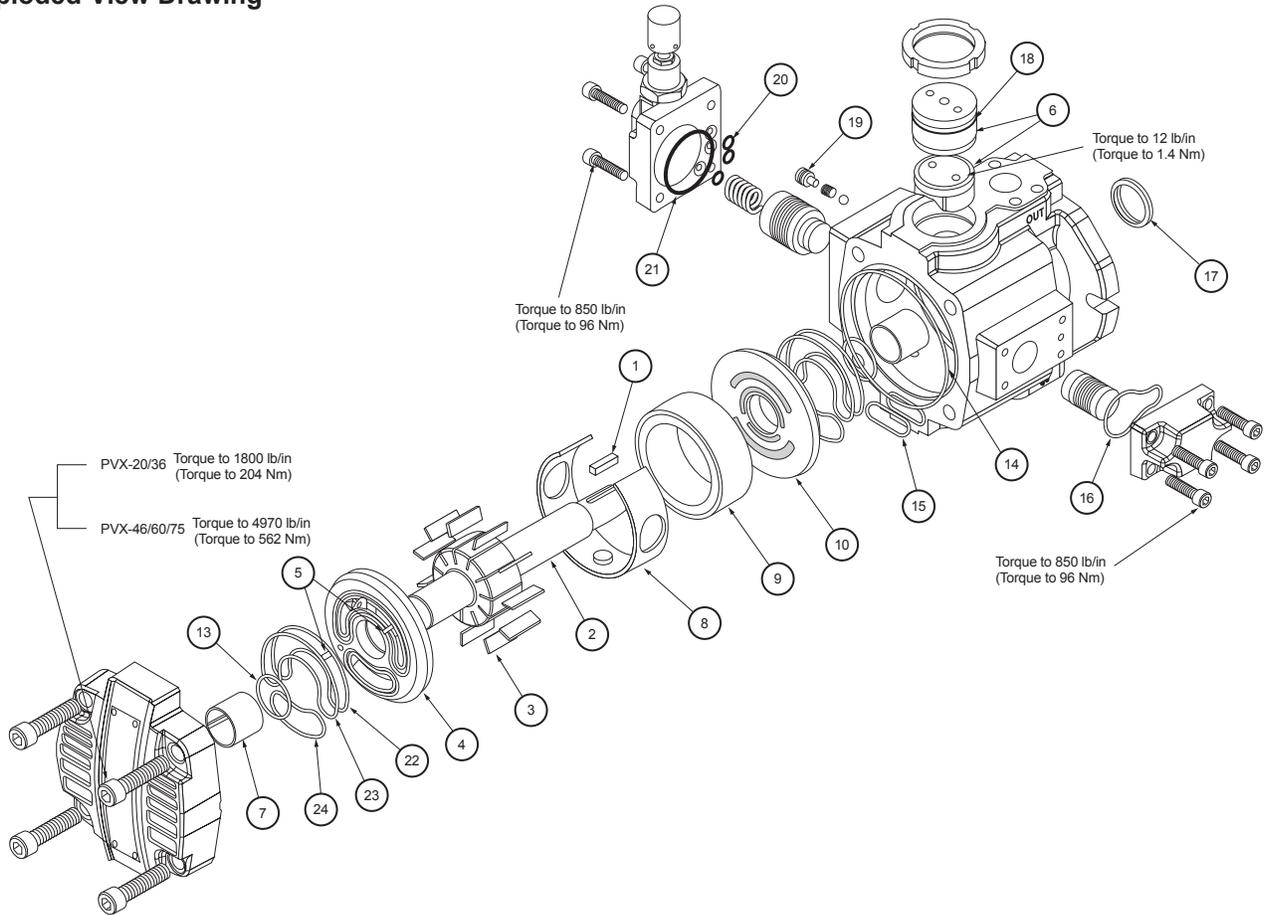
Figure 2

Table of Contents

Part Identification		Adjustment Procedure – Single Stage Compensator	
Exploded View Drawing	2	General	23-24
Parts List	2		
Disassembly Procedures – Pumps		Adjustment Procedure – Two-Stage Compensator	
General.....	3	General	25
Getting Started	3		
Disassembly Instructions	3-6	Multi-Pressure Compensator	
Assembly Procedures – Pumps		General Information	26
General	7	Solenoid Two-Pressure Control	26
Getting Started - Kits	7	Solenoid Vented	27
Getting Started - Tools	8	Load Sense	27-29
Assembly instructions	8-13	Torque Limiter	29-30
Disassembly Procedure – Two-Stage Compensator		Setting the Maximum Deadhead Pressure (Second Stage Setting)	31
General	14	Setting the Torque Limiter	31
Disassembly Instructions	14-15	Application Notes	31
		Maximum Flow Limiter	31
Assembly Procedure – Two-Stage Compensator		Fluids, Filters and System Preparation	
Assembly Instructions	16-18	General Information	32
Disassembly Procedure – Single Stage Compensator		Fluid Recommendations	32
General	19	Fluid Temperature	32
Disassembly Instructions	19	Filtration	32
Assembly Procedure – Single Stage Compensator		Pump Installation Procedure	
General	20	Installation Instructions	33
Getting Started - Kits	20	System Start-Up Procedure	
Assembly Instructions	20-21	Start-Up Instructions	34
Proper Setting of the Thrust Screw		Trouble Shooting	
Adjustment Instructions	22	Trouble, Potential Cause, Remedy	35-37
		Dimensions for Double Pumps	
		Dimension Drawing	38
		Possible Size Combinations	38

Part Identification

Exploded View Drawing



Parts List

REFERENCE	DESCRIPTION	QTY			
1	Key	1	15	O-ring, ASA-130 / (ASA-229)	1
2	Rotor shaft	1	16	O-ring, ASA-146 / (ASA-146)	1
3	Vane kit	1	17	Shaft seal	1
4	Port plate, cover side	1	18	O-ring, ASA-332 / (ASA-340)	1
5	Roll pin	4	19	O-ring, ASA-110 / (ASA-110)	1
6	Thrust block	1	20	O-ring, ASA-111 / (ASA-111)	3
7	Bearing	2	21	O-ring, ASA-143 / (ASA-143)	1
8	Spacer ring	1	22	O-ring, ASA-157 / (ASA-160)	2
9	Pressure ring	1	23	Back up ring	2
10	Port plate, body side	1	24	O-ring, ASA-139 / (ASA-152)	1
13	O-ring, ASA-031 / (ASA-035)	2	24	O-ring, ASA-237 / (ASA-237)	1
14	O-ring, ASA-162 / (ASA-265)	1			
REFERENCE	DESCRIPTION	QTY			

Disassembly Procedures – Pumps

General

The disassembly procedure shown on the following pages covers the Continental Hydraulics PVX-8 thru 75 variable volume vane pumps. The complete disassembly procedures are similar for all pumps. Any differences between the pump models are described in additional notes.

The step number corresponds to the photo or illustration of the same number.
Any dimensions or values stated will have the English value first followed by the metric equivalent in parenthesis.

Getting Started - Tools

PVX Model	8	11/15	20/29/36	46/60/75
Cover				
Allen Wrench	8 mm	10 mm	14 mm	17mm
4 Soc. Cap Screws				
Cover - Removal	2 Flat Blade Screwdrivers			
Plates - Removal	Tweezers or Pair of Long Needle Nose Pliers			
Vanes - Removal	11 Vanes		22 Vanes	
Compensator & Bias Cover	6 mm		8 mm	
Allen Wrench				
2 x 4 Soc. Cap Screws	PVX-8/11/15 - 8 mm Allen Wrench PVX-20/29/36/46/60/75 - Non-Slip Spanner Wrench			
Thrust Screw	Adjustable Face Spanner Wrench			
Thrust Screw Lock Nut	Blind Hole Bearing Puller			
Bearing - Removal	Hammer & Round Head Punch			
Shaft Seal - Removal				

As an aid for repairing the PVX pump, we recommend building a wooden fixture. Please see the different inside diameters for each pump size in the chart below.

PVX Model	8	11/15	20/29/36	46/60/75
Diameter	3.38 (86)	4.13 (105)	5.13 (131)	6.13 (156)
Min. Height	2 (51)	2.63 (67)	3 (77)	3.88 (99)

Wooden Fixture.



Disassembly Instructions

1. Remove the straight key from the keyway of the shaft and place the pump side down into the wooden fixture. See above for details for the fixture.

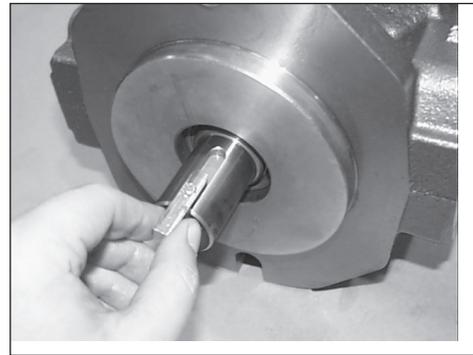


Figure 1.

2. Remove the four (4) socket hd cap screws on the cover by using the appropriate size Allen wrench.

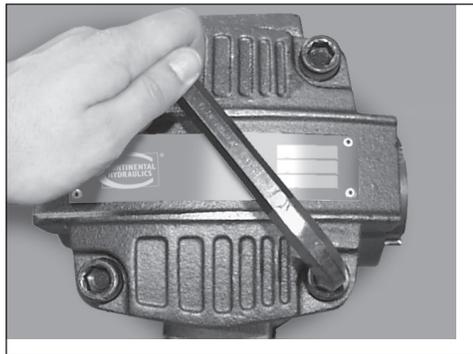


Figure 2.

Note: For disassembling the larger pumps, a great amount of torque will be needed to loosen the cover bolts. Therefore, we recommend loosening the bolts before removing the pump from the motor-unit. Use a socket or extend the length of the allen wrench and make sure to clamp the pump securely and safely.

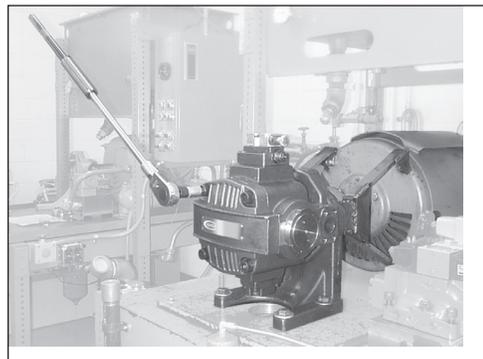


Figure 2a.

Disassembly Instructions – Pumps (continued)

3. Insert flat blade screwdriver into the slots provided on each side of the cover. Pry the cover assembly loose using equal force on each screwdriver. After the cover is loose, carefully remove it by hand and set aside in a clean area.

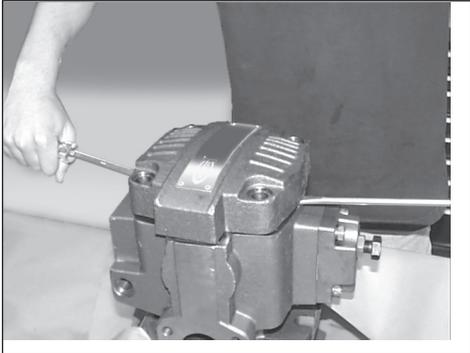


Figure 3.

4. In order to remove the port plate from the cover, insert flat blade screwdriver into the slots between the port plate and cover and pry the port plate loose. After the port plate is loose, carefully remove it by hand.

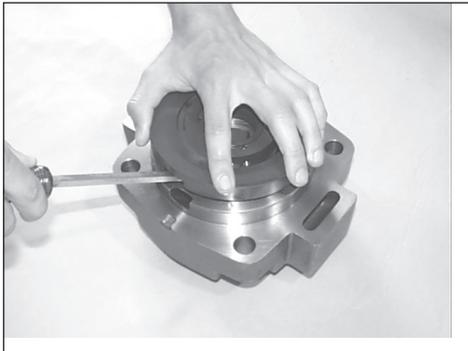


Figure 4.

NOTE: When disassembling a PVX-20 thru 75 pump, please pay close attention not to loosen the ratio valve cartridge that is located in the cover and the ratio valve sealing assembly that is located on the back of the cover port plate. The ratio valve cartridge is an essential part of the pump and is not a wear item, so it is not part of the repair kit.



Figure 4a.

5. Remove the cover o-ring.

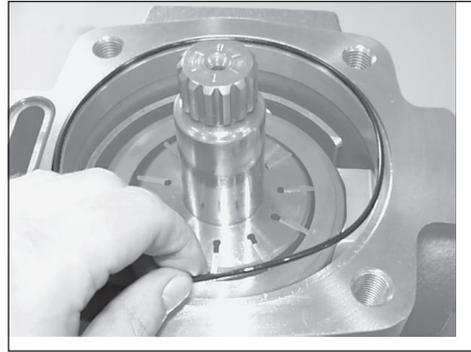
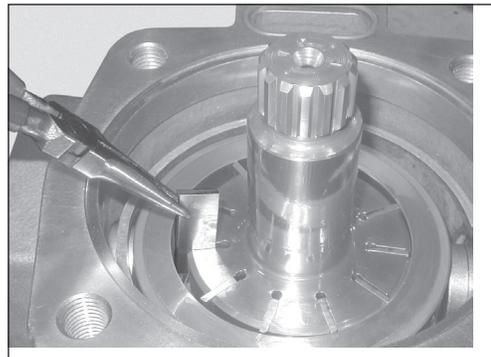


Figure 5.

6. Remove the vanes from the rotor by using a small pair of tweezers or long needle nose pliers. Caution should be taken not to nick or score the vanes, pressure ring and rotor.



Figure

6.

7. Remove the rotor shaft.

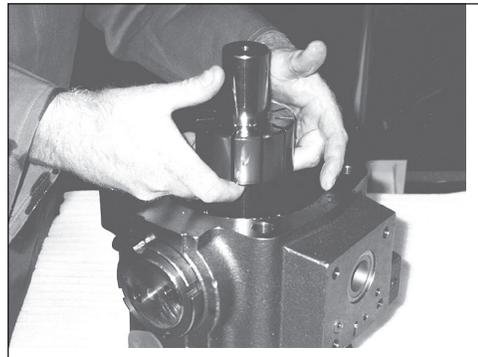


Figure 7.

Disassembly Instructions – Pumps (continued)

8. Remove the four (4) socket head cap screws on the compensator by using the appropriate Allen wrench and remove the compensator.

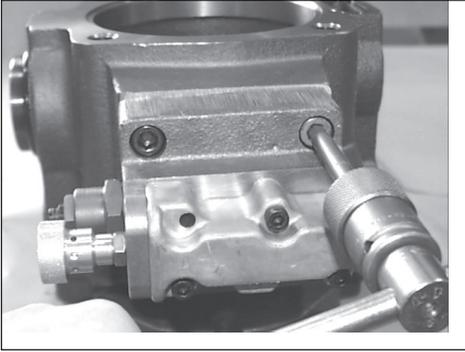


Figure 8.

9. Carefully remove the control piston and spring. Caution should be taken not to nick or scratch the piston or the piston bore.

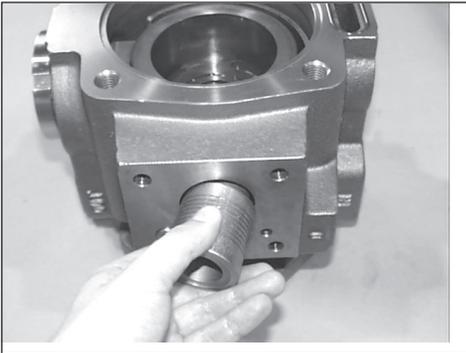


Figure 9.

10. Remove the four (4) socket head cap screws on the bias cover by using the appropriate Allen wrench and remove the bias cover. The bias cover is over the bias piston or the smaller piston opposite the control piston. Carefully remove the bias piston ensuring that the bias piston and the piston bore are not scratched or nicked.

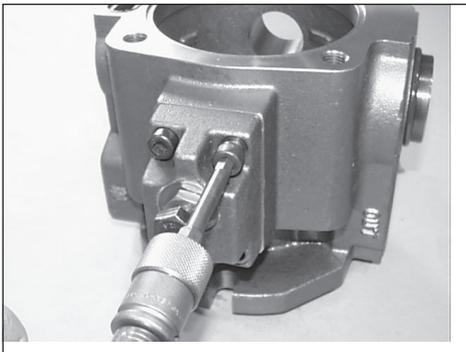


Figure 10.

11. For the PVX-8/11/15 pumps, loosen the locknut with adjustable wrench (not pictured). For the PVX-20 thru 75 pumps, loosen the thrust screw lock ring by using a spanner wrench.

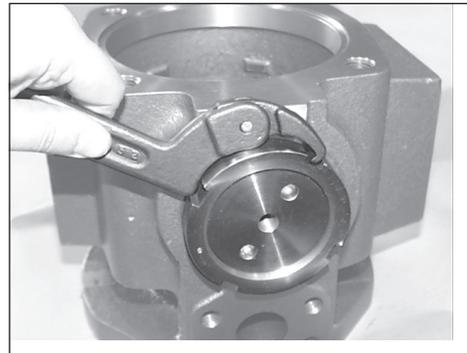


Figure 11.

12. Remove the thrust screw by using the appropriate spanner socket or Allen wrench.



Figure 12.

NOTE: The PVX-20 thru 75 pumps has a thrust block in addition to the thrust screw. Remove the thrust block also.

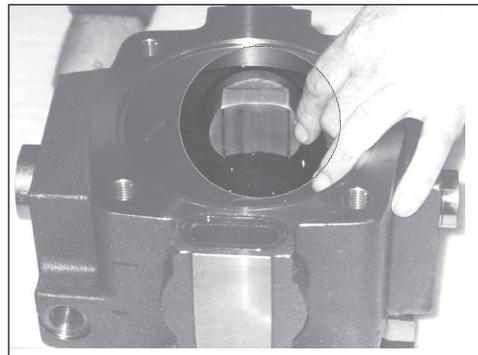


Figure 12a.

Disassembly Instructions – Pumps (continued)

13. Remove the pressure ring.



Figure 13.

14. Remove the spacer ring.



Figure 14.

15. Remove the port plate from the body by carefully grabbing the port plate at the thru-hole location. After the plate has been lifted out, set it aside. Be careful not to scratch or nick the coating on the port plates. Leave the seals in the port plate.

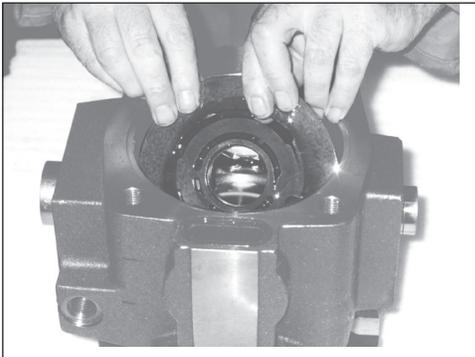


Figure 15.

16. If the bearings are damaged and need to be replaced, remove the bearings in the body and the cover by using a blind hole bearing puller.

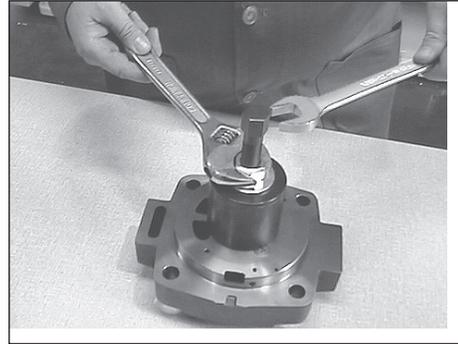


Figure 16.

17. To drive out the shaft seal, take a round head punch and carefully tap out from the cover side of the pump. Remove the shaft seal.

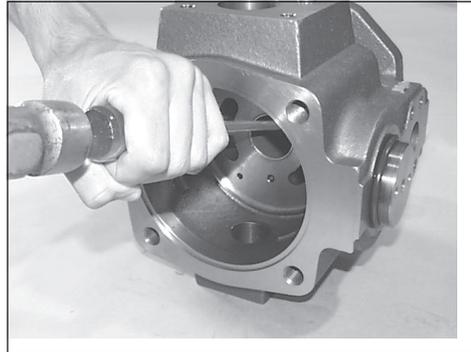


Figure 17.

18. After the pump has been completely disassembled, all parts must be thoroughly cleaned with clean solvent. At this time, inspect and determine which parts need to be replaced. In a major overhaul, it is recommended that both bearings and all seals be replaced regardless of their condition. Kits containing all seals are available for use in the repair of this pump.

When ordering repair parts, it is necessary to provide the alpha-code and appropriate design letter describing the pump. This information can be found on the nameplate attached to the rear cover of the pump body.

Assembly Procedures – Pumps

General

To guarantee proper operation of your PVX pump, Continental Hydraulics recommends relacing all important pump parts by using the CHD Repair Kit and the CHD Seal Kit. The complete assembly procedures are similar for all pumps. Any differences between the pump models are described in additional notes.

The step number corresponds to the photo or illustration of the same number. Any dimensions or values stated will have the English value first followed by the metric equivalent in parenthesis.

Getting Started - Kits

Repair Kits

MODEL	SAE	SAE - "P1"
PVX-8	264288	264289
PVX-11/15	264292	264293
PVX-20	264296	264297
PVX-29	264296	264297
PVX-36	264300	264301
PVX-46	264304	264305
PVX-60	264304	264305
PVX-75	264308	264309

Repair Kits consists of:

REF	DESCRIPTION	QTY
1	Key	1
2	Rotor Shaft	1
3	Vane Kit	1
4	Port Plate - Cover	1
5	Roll Pin	4
6	Thrust Screw Assembly (PVX-8/11/15)	1
6	Thrust Block Assembly (PVX-20-75)	1
7	Bearing	2
8	Spacer Ring	1
9	Pressure Ring	1
10	Port Plate - Body	1

Seal Kits

MODEL	SAE
PVX-8	264275
PVX-11/15	264276
PVX-20/29/36	264277
PVX-46/60/75	264278

Seal Kits consists of:

REF	DESCRIPTION	QTY
13	O-Ring - Root Seal	2
14	O-Ring - Cover	1
15	O-Ring - Secondary Inlet (PVX-20-75)	1
16	O-Ring - Bias Cover	1
17	Shaft Seal	1
18	O-Ring - Thrust Screw	1
19	O-Ring - Check	1
20/21	O-Ring - Compensator * (PVX-20-75)	1
22/24	O-Ring - Port Plate **	2
23	Back-Up Ring - Port Plate	2

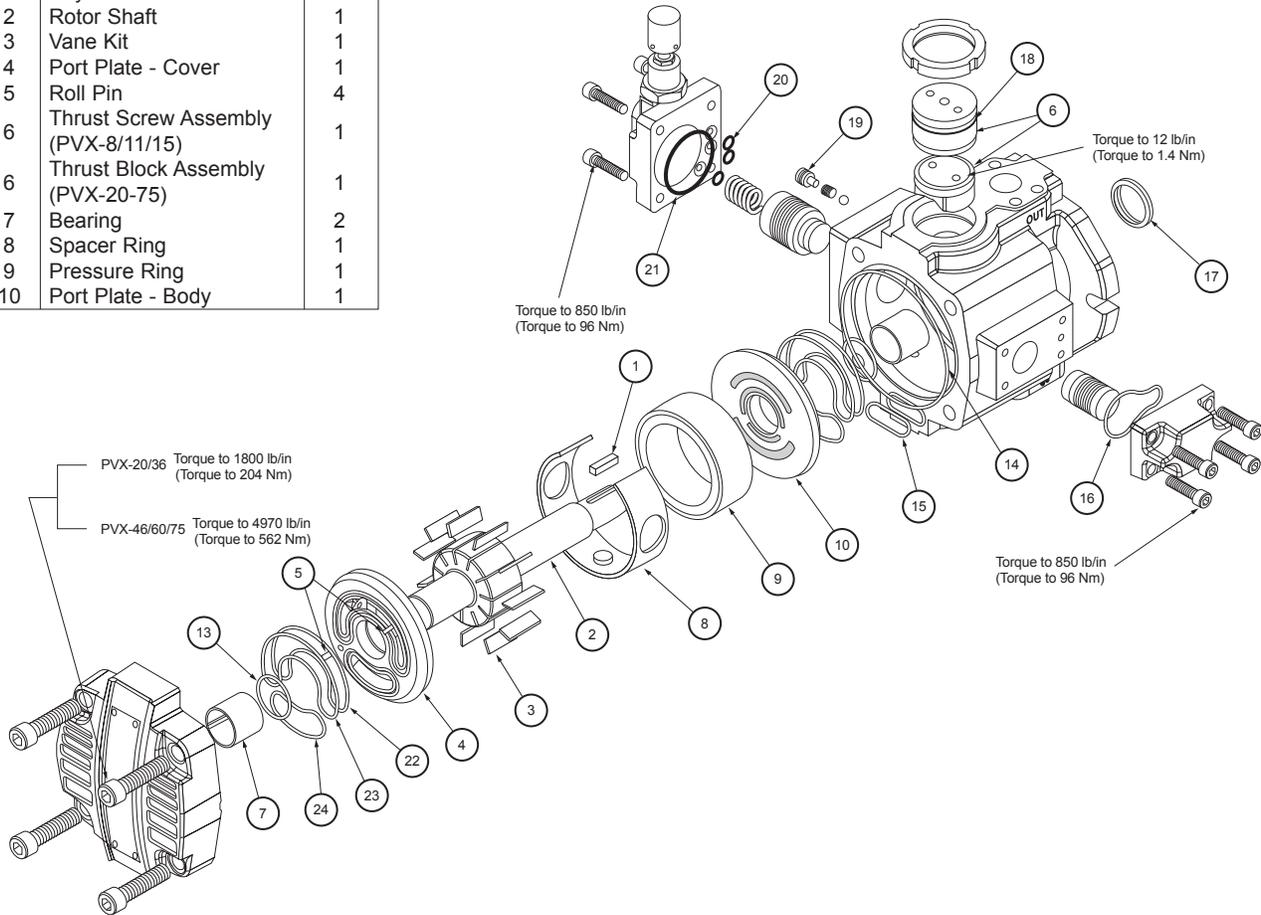
* See instructions for Single or Two-Stage Compensators later in this manual.

** Quantities may vary depending on pump model.

Overview Torque Rates

PVX in.-lbs. (Nm)	8	11/15	20/29/36	46/60/75
Cover	700 (82)	1200 (140)	1800 (210)	4970 (580)
Bias Cover	350 (41)	350 (41)	680 (80)	680 (80)
Compensator	350 (41)	350 (41)	680 (80)	680 (80)
Thrust Screw Nut	960 (112)	960 (112)	* See Note	

* NOTE: On PVX-20 thru 75 pumps, tighten the Thrust Screw Locking Ring as tight as possible.



Assembly Procedures – Pumps (continued)

Getting Started - Tools

PVX Model	8	11/15	20/29/36	46/60/75
Cover	8 mm	10 mm	14 mm	17mm
Allen Wrench				
Installation Pins into Port Plates	Hammer			
Compensator & Bias Cover	6 mm		8 mm	
Allen Wrench				
Thrust Screw	Spanner Socket - 8 mm Allen Wrench			
Thrust Screw Lock Nut	Adjustable Face Spanner Wrench			
Bearing and Shaft	Press, Loctite 7070 Cleaner and			
Seal Installation	Loctite 569 Hydraulic Sealant			
Lubrication	Clean Hydraulic Oil			

Assembly Instructions

1. Before installing the shaft seal, clean the seal bore and seal O.D. with Loctite 7070 cleaner and place some hydraulic sealant (Loctite 569) on the O.D. surface of the shaft seal as shown.

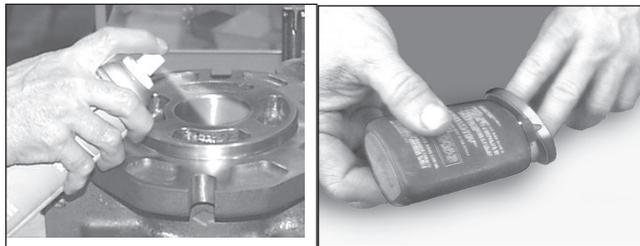


Figure 1.

2. Press the shaft seal into the pump body to the depths (± 0.5 mm tolerance) recommended in the following chart with the depth being measured from the pump housing surface. Insure that the shaft seal is installed properly in the pump body or leakage will occur.

Shaft Seal Depths (± 0.5 mm)

PVX Model	8	11/15	20/29/36	46/60/75
Depth (mm)	2.0 mm	4.3 mm	10.0 mm	



Figure 2.

3. Replace the bearing for the body and cover. The bearings for both are identical. Place the bearings into the bearing bores and thoroughly lubricate the bearing's I.D. with clean hydraulic fluid. **Pay close attention to the correct orientation of the bearing prior to installing the bearings in the pump body and cover as shown.**

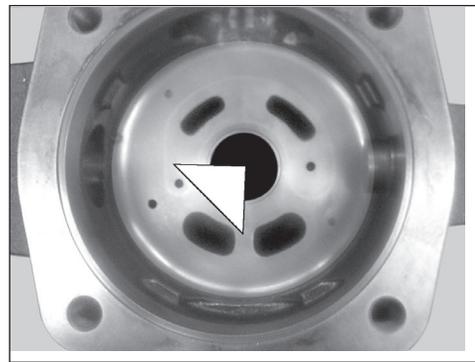


Figure 3.

NOTE: It is recommended that a guide tool be used to properly install the bearings in the bores. After the bearing is installed, make sure the bearing is flush to 0.020" (0.5 mm) below the machined surface. Using a new rotor shaft, check the fit of the shaft to the installed bearings and assure that the shaft enters the bearing without drag. Replace the bearing if any drag is noticed.

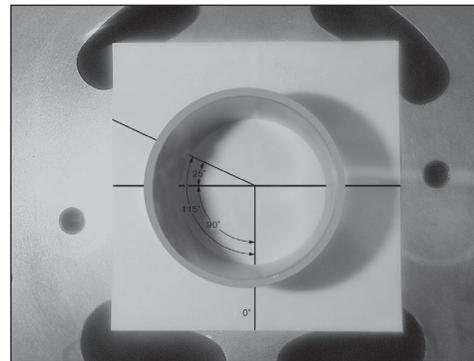


Figure 3a.

4. Drive the roll pins into the holes on the back side of each port plate so they protrude .3" (7.6 mm). Replace the port plates.



Figure 4.

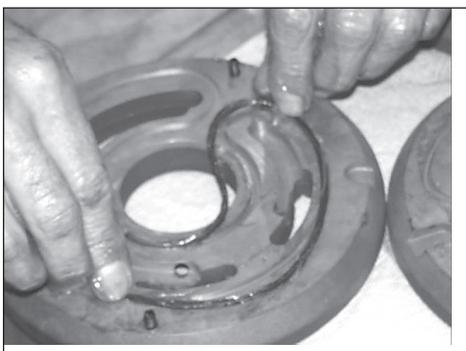
Assembly Procedures – Pumps (continued)

5. Replace the seals and back-up rings on the backside of both port plates. Install seals on each port plate.



Figure 5.

6. If necessary, use a light grease or petroleum jelly to help retain the seals during placement of the port plates into the body. Avoid applying too much grease on the seals during assembly since this condition can cause the O-rings to dislodge when the port plates are installed in the pump.



Figure

6.

Cover Port Plates

Ref.	Description	Quantity	
		8/11/15	20/29/36 46/60/75
15	Back-up Seal (white) in lg. race track	1	1
15	Back-up Seal (white) in sm. c'bore	0	1
18	O-Ring in large race track	1	1
18	O-Ring in small race track	1	1
19	O-Ring in counterbore	1	1
21	O-Ring in small counterbore	0	1

Body Port Plates

Ref.	Description	Quantity	
		8/11/15	20/29/36 46/60/75
15	Back-up Seal (white) in lg. race track	1	1
18	O-Ring in large race track	1	1
18	O-Ring in small race track	1	1
19	O-Ring in counterbore	1	1

7. Place the port plate into the body. Note that the pins fit in the provided holes. Completely lubricate the port plate's wear surface with clean hydraulic fluid.

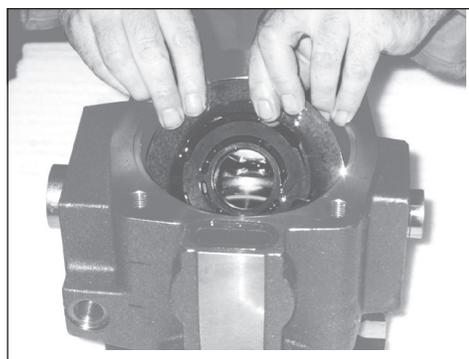


Figure 7.

NOTE: Be certain to ensure that the correct port plates are installed in the body and cover. If unsure, compare the arrows on the port plates with the arrow on the pump. The arrow on the pump can be found below the open segment for the control piston on the pump body. Both arrows must point in the same direction. All PVX pumps operate in a clockwise only direction of rotation as viewed from the shaft end of the pump.

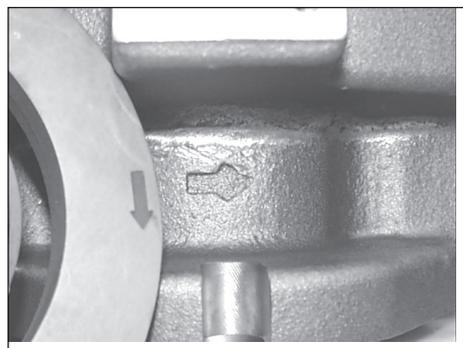


Figure 7a.

8. Install the spacer ring in the pump body.

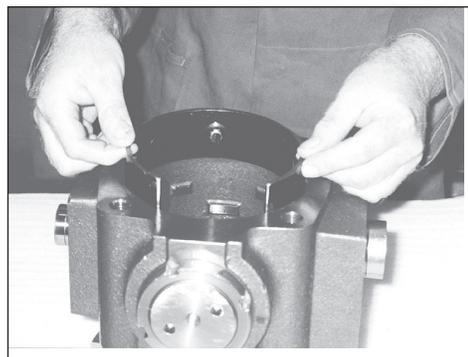


Figure 8.

NOTE: On the PVX-8/11/15 pumps, there is no break in the spacer ring. Align the break with the thrust screw. On the PVX-20 thru 75 pumps, the open segment on the spacer ring aligns with the thrust block bore.

Assembly Procedures – Pumps (continued)

9. Assemble the bias piston into the body through the clearance hole in the spacer ring. Lubricate the piston with clean hydraulic fluid.

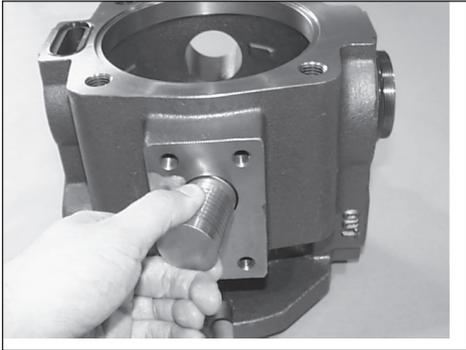


Figure 9.

10. Assemble the control piston and spring through the clearance hole in the spacer ring. Lubricate the piston before installing.

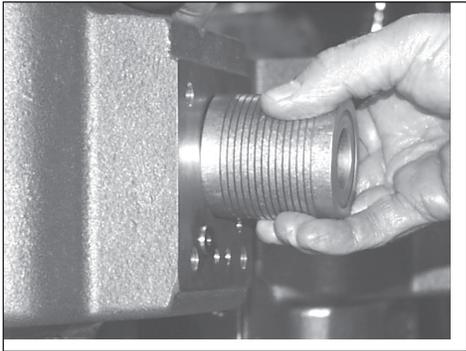


Figure 10.

11. Thoroughly lubricate the pressure ring with clean hydraulic fluid. Place the pressure ring in the pump body.

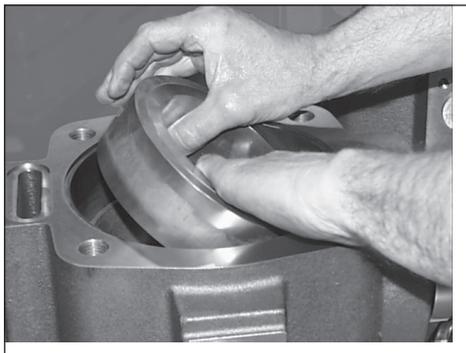


Figure 11.

12. For PVX-8/11/15 pumps, install the thrust screw in the body by using an Allen head wrench. For PVX-20 thru 75 pumps, prior to installing the thrust screw assembly, lightly coat the bearing surface on the thrust block assembly with clean hydraulic fluid.



Figure 12.

12a. For PVX-20 thru 75 pumps, install the thrust screw with O-ring by using a spanner wrench and socket. Install the thrust block with plastic pad in the body. The contoured end has to align with the pressure ring.

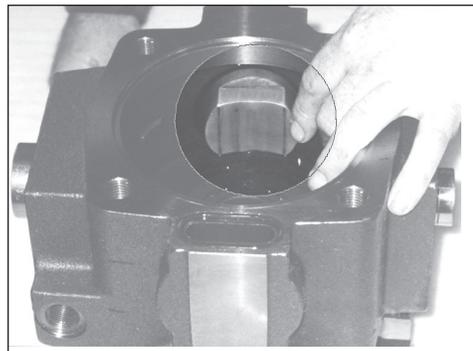


Figure 12a.

For preliminary adjustment of the thrust screw, tighten it all the way and then turn out a 3/4 turn counterclockwise. Take care not to over-tighten the thrust screw as damage to the pump can occur. See the section "Proper Setting of the Thrust Screw" later in this manual for further adjustments.

Assembly Procedures – Pumps (continued)

13. For PVX-8/11/15 pumps, use an Allen wrench to tighten the thrust screw to the torque rates shown. For PVX-20 thru 75 pumps, install the thrust screw lock ring and tighten it by using the adjustable face spanner wrench.

Torque Rates in.-lbs. (Nm)

PVX Model	8/11/15	20/29/36/46/60/75
Thrust Screw	960 (112)	Tighten with Spanner Wrench

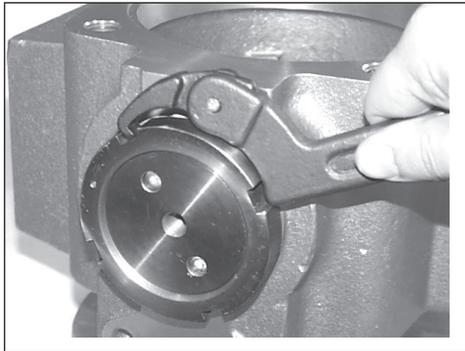


Figure 13.

14. Prior to replacing the rotor shaft, lubricate it with clean hydraulic fluid. Replace the rotor shaft. Care must be taken not to damage the shaft seal while inserting the shaft.

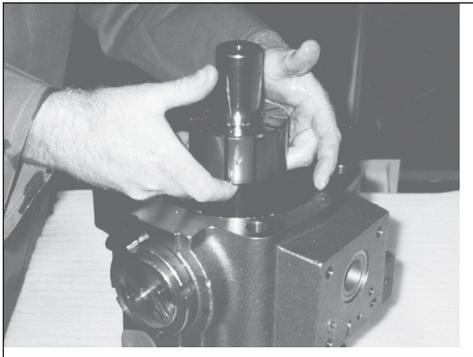


Figure 14.

15. Lubricate the vanes with clean hydraulic fluid and place the vanes in the rotor vane slots. The rounded tips of the vanes must contact the I.D. of the pressure ring.

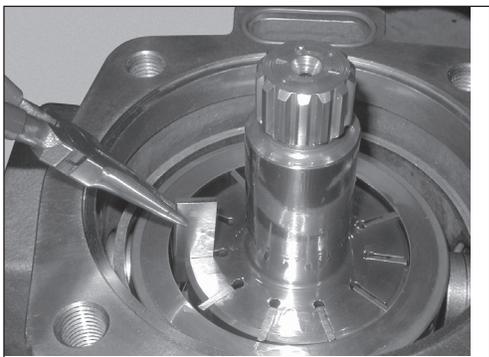


Figure 15.

15a. Make sure that the direction of the rounded vane tips matches the direction of pump rotation. The pump rotation is shown on the pump body and the port plates. Make sure the vanes slide freely in the rotor vane slots.

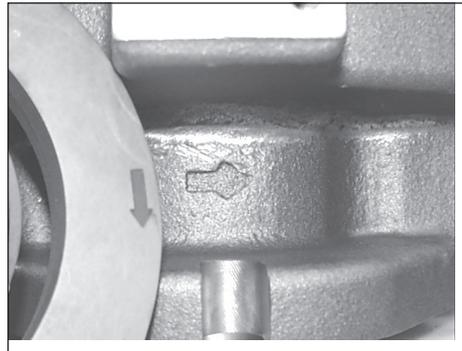


Figure 15a.

16. Prior to mounting the compensator to the pump body, install all o-rings on the mating surface of the compensator's first stage. A minimum amount of grease or petroleum jelly may be used to retain the o-rings during placement. Keep the mating interface of the compensator and the pump housing free of grease.

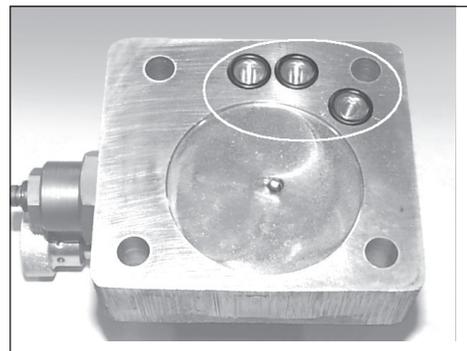


Figure 16.

Figure 17.

Assembly Procedures – Pumps (continued)

17. Mount the compensator to the pump and torque the four (4) socket head cap screws by using the appropriate Allen wrench.

Torque Rates in.-lbs. (Nm)

PVX Model	8/11/15	20/29/36/46/60/75
Compensator	350 (41)	680 (80)

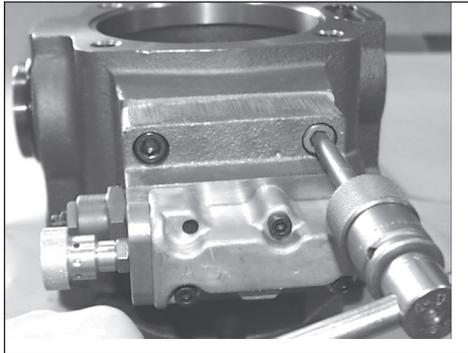


Figure 17.

18. Install the O-ring on the mating surface of the bias cap/volume control. A minimum amount of grease or petroleum jelly may be used to retain the O-ring in its groove. Torque the four (4) socket head cap screws by using the appropriate Allen wrench.

Torque Rates in.-lbs. (Nm)

PVX Model	8/11/15	20/29/36/46/60/75
Bias Cover	350 (41)	680 (80)

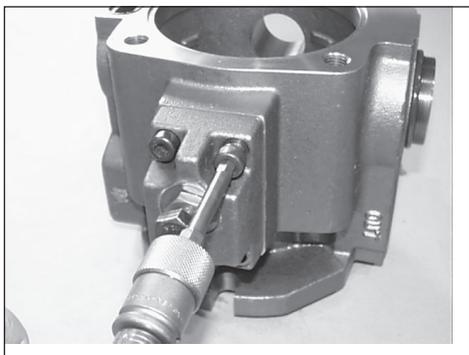


Figure 18.

19. Insert O-ring onto the body pilot bore. A minimum amount of grease or petroleum jelly may be used to hold the O-ring in place while installing the cover.



Figure 19.

19a. For PVX-20 thru 75 pumps, insert a second O-ring into the secondary inlet.

Assemble the port plate on to the cover. Assure that the orientation of the port plate is correct on the PVX-20 thru 75 pumps, such that the secondary inlet passages in the cover line up with the small O-ring in the back of the cover port plate.



Figure 19a.

Assembly Procedures – Pumps (continued)

20. Install the cover by inserting the four (4) socket head cap screws with the appropriate Allen wrench or socket. Torque the screws from the chart below. Keep the mating surfaces of the pump body and cover free of oil, dirt and/or grease before assembling the cover.

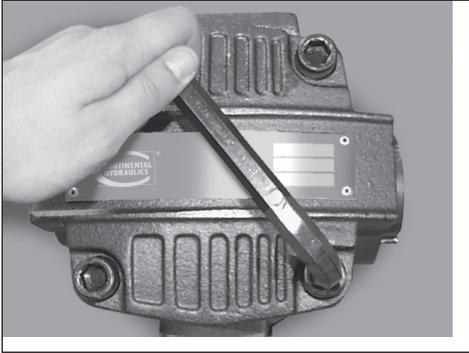


Figure 20.

21. Insert the straight key into the keyway of the shaft.

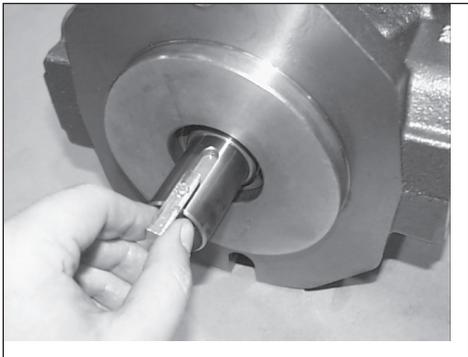


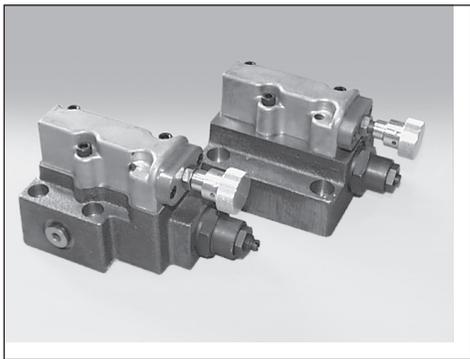
Figure 21.

Disassembly Procedures – Two-Stage Compensator

General

Shown below are the Continental Hydraulics two-stage compensators rated at 3000 psi (210 bar). On the left is for PVX-8/11/15; on the right, PVX-20 thru 75. Following that are the complete disassembly procedures. Any differences between the compensator models are described in additional notes.

The step number corresponds to the photo or illustration of the same number. Any dimensions or values stated will have the English value first followed by the metric equivalent in parenthesis.



Left: PVX-8/11/15; Right: PVX-20 thru 75

Disassembly Instructions

1. Remove the two (2) socket head cap screws attaching the pressure adjustment cap to the body of the second stage by using the appropriate wrench. Remove the pressure adjustment cap and the adjusting screw as one assembly.

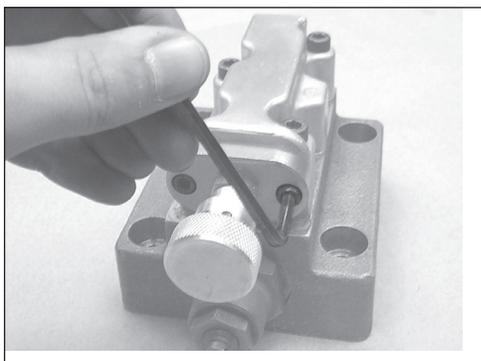


Figure 1.

2. Remove the spring and the seat from the second stage body.

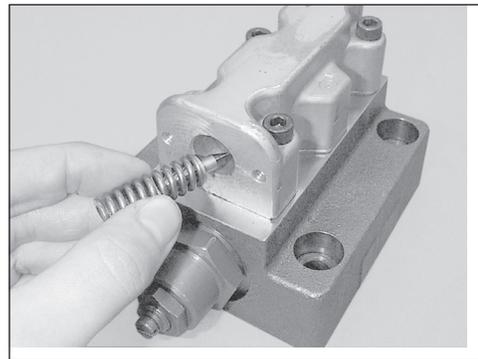


Figure 2.

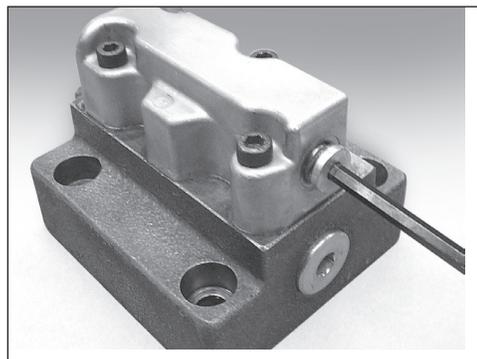
3. In order to remove the guided poppet, take a large flat blade screwdriver and unscrew the guided poppet from the second stage of the compensator.



Figure

3.

4. Remove the plug from the second stage by using the appropriate Allen wrench.



Figure

4.

Disassembly Procedures – Two-Stage Compensator (continued)

5. Remove the three (3) socket head cap screws that attach the second stage to the first stage body by using the appropriate Allen wrench.

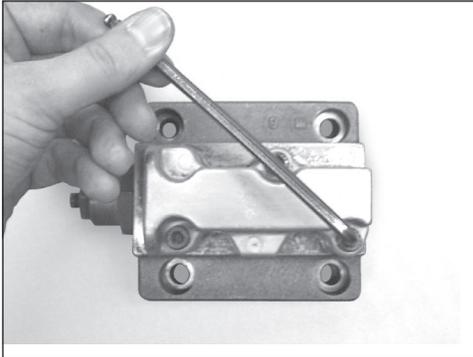


Figure 5.

6. Remove the plug from the first stage compensator by using the appropriate Allen wrench.

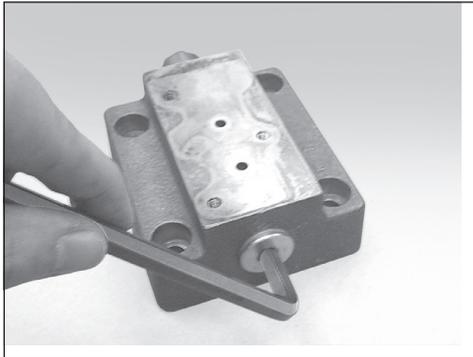


Figure 6.

6a. The two-stage compensator for the PVX-8/11/15 pumps has a shock clipper which is located on the side of the first stage body. Remove the plug by using the appropriate Allen wrench.

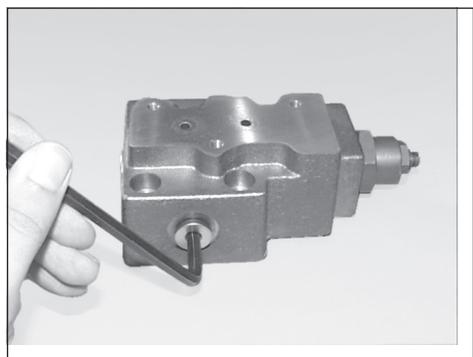


Figure 6a.

by using an adjustable wrench. Remove the differential spring, spring seat, external washer and snap ring.

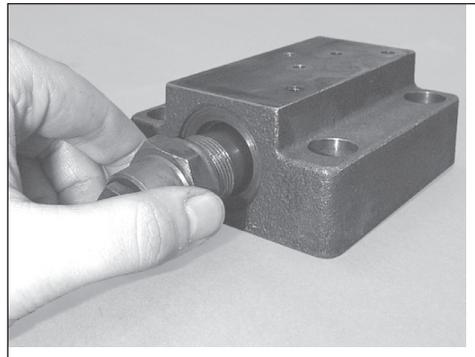


Figure 7.

8. Loosen the locknut on the adjustment housing and disassemble the adjustment stem with a screwdriver.

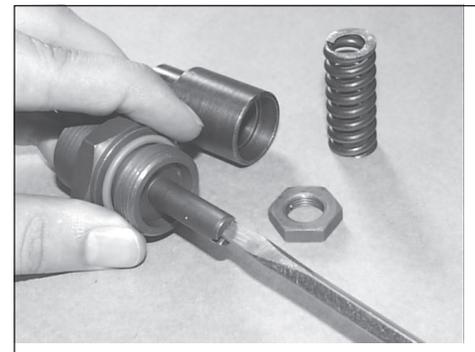


Figure 8.

9. Remove the compensator spool. Caution should be taken not to nick or mar the spool's surface.

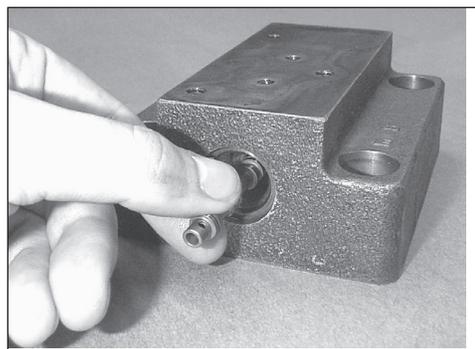


Figure 9.

7. Remove the first stage adjustment screw adapter

Assembly Procedures – Two-Stage Compensator

Assembly Instructions

1. Thoroughly lubricate the compensator spool with clean hydraulic fluid. Make sure there are no burrs on the spool and insure that the spool has no residual magnetism. Spools that are magnetic will attract metallic particles and damage the compensator body or spool. Insert the compensator spool into the smaller opening of the first stage body by holding the squared end and inserting the round end first.

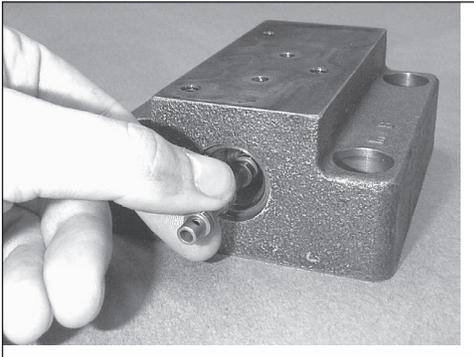


Figure 1.

2. Replace the O-ring and the back-up ring on the adjustment stem.



Figure 2.

2a. Replace the O-ring on the adjustment housing. Assemble the adjustment stem into the adjustment housing with a flat blade screwdriver.

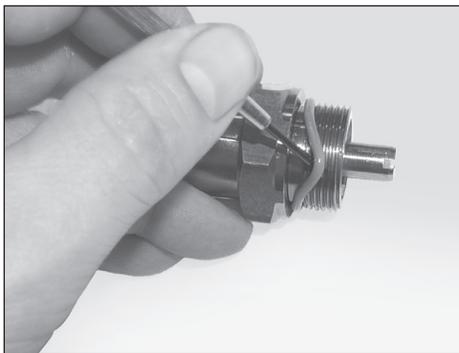


Figure 2a.

3. Place the spring seat on the spring, then insert the spring and spring seat into the adjustment housing.

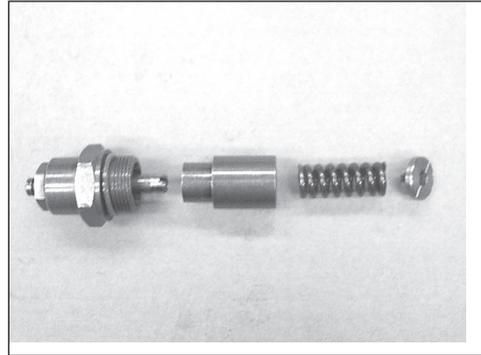


Figure 3.

4. Install the first stage differential spring adjustment screw adapter as one (1) assembly into first stage. Torque to 708-888 in.-lbs. (80-100 Nm).

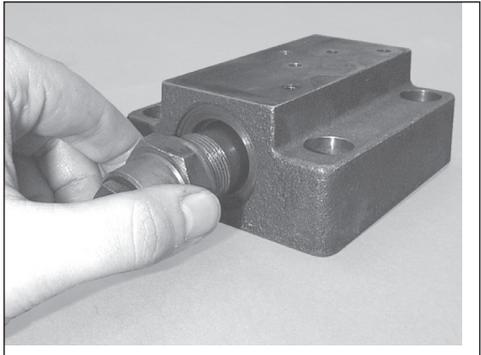


Figure 4.

5. Replace the back plug with the O-ring and insert it into the first stage compensator body. Torque to 442-531 in.-lbs. (50-60 Nm).

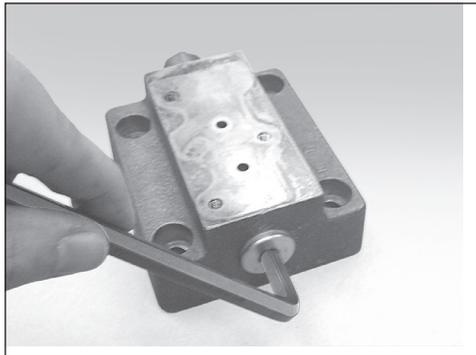


Figure 5.

Assembly Procedures – Two-Stage Compensator (continued)

5a. For PVX-8/11/15 pumps, replace the plug with the O-ring for the shock clipper on the first stage compensator and torque to 144-180 in.-lbs. (17-21 Nm).

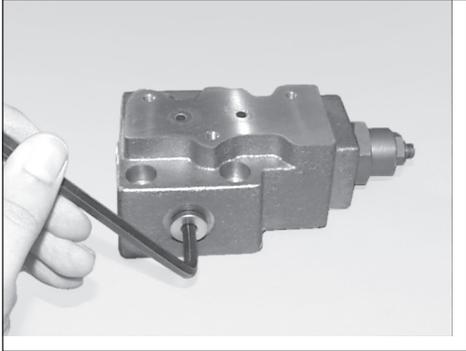


Figure 5a.

6. Replace the plug with the O-ring on the backside of the second stage compensator. Torque to 150-186 in.-lbs. (17-21 Nm).

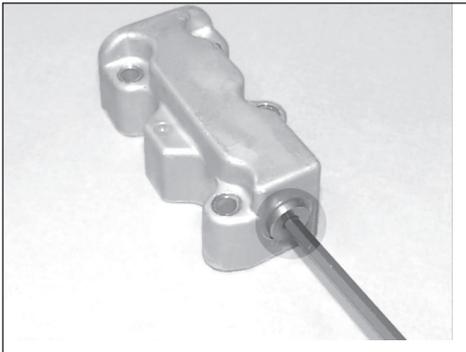


Figure 6.

7. Replace the poppet seat with the O-ring and insert it into the second stage compensator body using a large screwdriver. Avoid damaging any of the O-ring sealing surfaces. Torque to 168 in.-lbs. (19 Nm).



Figure 7.

8. You may place the compensator upright to insert the guided poppet into the second stage compensator. Make sure that the poppet and poppet seat are not damaged or nicked or the compensator will not function properly.

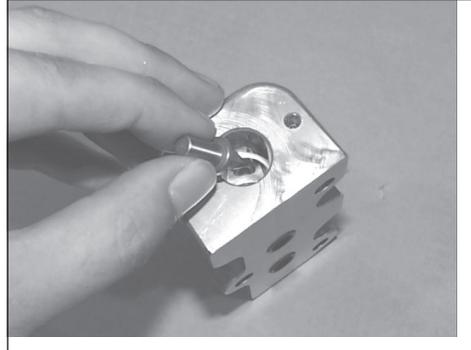


Figure 8.

8a. Place the spring into the second stage compensator.

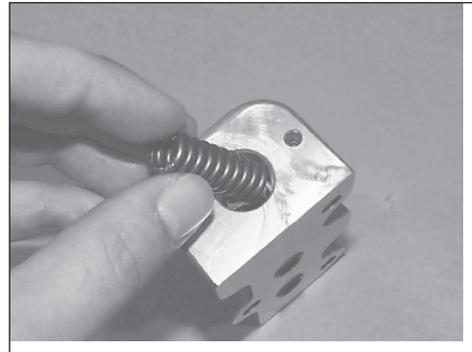


Figure 8a.

9. Replace the O-ring and the back-up ring of the pressure adjustment locknut.

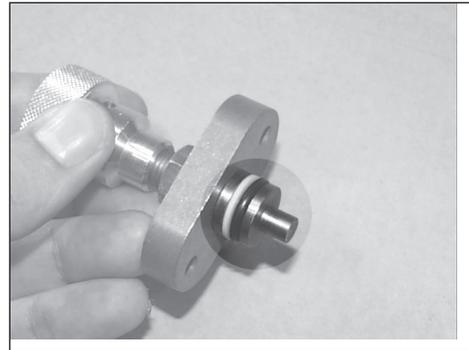


Figure 9.

**Assembly Procedures – Two-Stage Compensator
(continued)**

9a. Mount the pressure adjustment assembly to the second stage compensator.

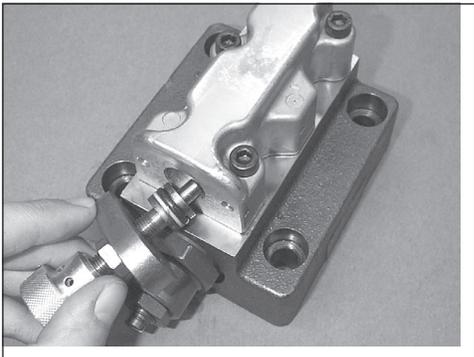


Figure 9a.

10. Torque the two (2) socket head cap screws to 44-62 in.-lbs. (5-7 Nm).

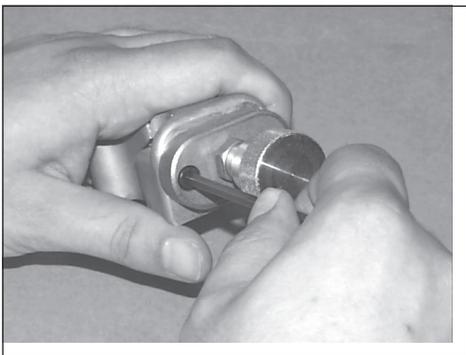


Figure 10.

11. Prior to mounting the second stage to the first stage body, insure that all O-rings are in place on the mating surface of the second stage body. A minimum amount of grease or petroleum jelly may be used to retain the O-rings during placement.

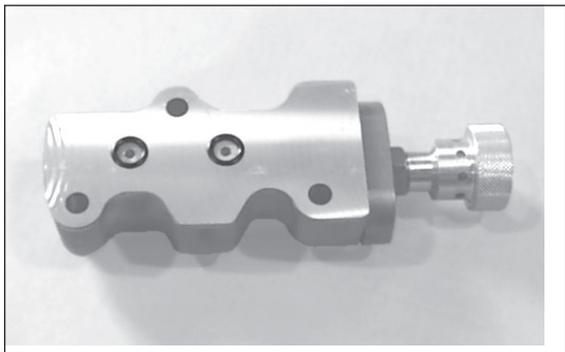


Figure 11.

11a. Mount the first stage to the second stage body. Torque the three (3) socket head cap screws to 129-171 in.-lbs. (15-20 Nm).

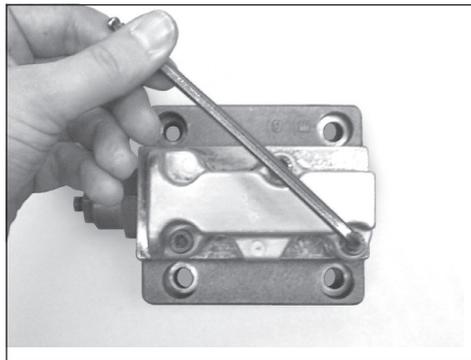


Figure 11a.

12. Replace the O-rings on the backside of the compensator.

O-Ring Quantities

Ref.	PVX Model	
	8/11/15	20/29/36/46/60/75
4	2 small O-ring	3 small O-ring
5	1 large O-ring	1 large O-ring

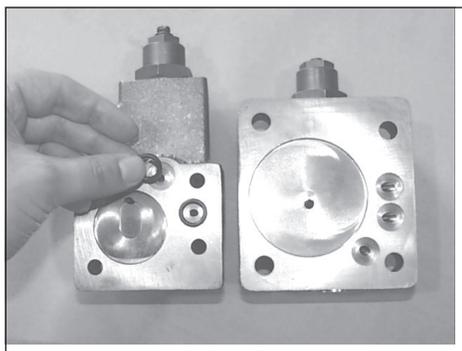


Figure 12.