



Use this guide and PL595 to repair a Hale VPS power shift for a G or K type gearbox when the valve leaks air or fails to provide the appropriate shift. This guide is intended to be performed as a bench procedure (VPS already removed from the gearbox). All referenced documents and plate (PL) drawings are available on the Hale website (<https://www.haleproducts.com>) from the Tech Resource Center.

- NOTES:**
- Recommended O-ring Lubricant: Synthetic Multi-Purpose Clear O-ring Lubricant (Synthetic NLGI Grade 2 Heavy Duty, Multi-Purpose) (or equivalent)
 - Recommended Grease: Sunoco Ultra Prestige 2EP (or equivalent)
 - Recommended Solvent: Safety Kleen® or Stoddard Solvent (or equivalent)
- This guide does NOT cover VPS power shift removal or replacement, VPS disassembly or reassembly, or shift shaft replacement (located in the gearbox). If the shift shaft requires replacement a gearbox teardown is required to access the shift fork-to-shift shaft retaining bolt. See the Hale maintenance manual for your specific pump for the instructions NOT provided herein.

Table 1. Applicable VPS Kit

Kit Number	Description	Remarks
546-0370-53-0 (See Note Below)	VPS Repair Kit	Kit contains the gasket, seals (and scraper), retaining rings, and screw

Note: The cap screw is provided for use in obsolete (but still in use) push/pull type VPS control valves the screw limits the valve's pull travel. The snap rings are provided for use in obsolete (but still in use) VPS power shift assemblies that utilize a one piece shaft. The snap rings secure the piston on to the shaft.

IMPORTANT ⚠ NOTICE

ADDRESSES PRACTICES NOT RELATED TO PERSONAL INJURY (EQUIPMENT DAMAGE)

Table 2. Tools And Consumables List

Standard Tools	Special Tools	Consumables
Hook End Hose Removal Tool (or Pick)	None	Shop Rag(s) (As Required)
		Safety Kleen® or Stoddard Solvent
		Grease (See Notes)
		O-ring Lubricant (See Notes)

Perform the following bench procedure to remove and replace the seals (see Table 1) in a Hale VPS power shift for a G or K type gearbox.

IMPORTANT ▲ NOTICE DO NOT EXCEED 150 PSI (MAXIMUM INLET PRESSURE) AT CONTROL VALVE.

Inspect all components for corrosion, deposits, abnormal wear, or cracking. Additionally, inspect VPS piston surfaces for cracking, scratches, or marring. Clean all components using Safety Kleen™ or Stoddard Solvent. Replace all unserviceable components. Clean the gearbox and VPS cylinder (gasket mating surfaces), and all bolt threads thoroughly.

NOTES: If the VPS cylinder and/or piston are unserviceable, discard the entire VPS and replace it with a new VPS. The VPS cylinder is unserviceable if it is scarred, cracked, or leaks air. The piston is unserviceable if it is bent, cracked, or leaks air.

Always remove old thread locking compound from used fastener threads before installation as the presence of old thread locking compound negatively affects torque.

1. Remove and replace VPS cover seals and scraper. See Figure 1.
 - a. Place VPS cover on clean stable work surface.
 - b. Remove scraper.
 - 1) Position VPS cover to access inside of shaft bore.
 - 2) Using hook end hose removal tool (or pick), drive end of tool under (or thru) scraper.
 - 3) Pull scraper out of groove in shaft bore of VPS cover.
 - c. Remove seal.



Figure 1.

- 1) Using hook end hose removal tool (or pick), drive end of tool under (or thru) seal.
- 2) Pull seal out of groove in shaft bore in VPS cover.

- d. Remove O-ring. See Figure 2.
 - 1) Using hook end hose removal tool (or pick), drive end of tool under (or thru) O-ring.
 - 2) Pull O-ring out of groove in VPS cover.
- e. Install seal. See Figure 1.
 - 1) Coat seal with O-ring lubricant.
 - 2) Push seal into groove in shaft bore of VPS cover.
 - 3) Use smooth portion of shaft on removal tool (or pick) to seat seal evenly in groove.
- f. Install scraper. See Figure 1.
 - 1) Coat scraper with O-ring lubricant.
 - 2) Push scraper into groove in shaft bore of VPS cover.
 - 3) Use smooth portion of shaft on removal tool (or pick) to seat scraper evenly in groove.



Figure 2.

NOTES: The scraper is located closest to the raised portion (outside) of the VPS cover.
 Gently, remove any bulge, twist, or hump in the seal and/or scraper.
 The seal is located closest to the inside (smooth side) of the VPS cover.

- g. Install O-ring. See Figure 2.
 - 1) Coat O-ring with lubricant.
 - 2) Push O-ring into groove in VPS cover.
- h. Coat inside of VPS cover with grease. See Figure 2.
- 2. Remove and replace piston edge seal. See **Error! Reference source not found..**
 - a. Place VPS piston on clean stable work surface.
 - b. Remove seal.
 - 1) Using hook end hose removal tool (or pick), drive end of tool under (or thru) seal.
 - 2) Pull seal off of edge of VPS piston.
 - c. Install seal.
 - 1) Coat seal with O-ring lubricant.
 - 2) Push new seal into groove in shaft bore of VPS cover.
 - 3) Use smooth portion of shaft on removal tool (or pick) to seat seal evenly in groove.



Figure 3.

3. Remove and replace VPS cylinder seal. See Figure 4.
 - a. Place VPS cylinder on clean stable work surface with closed end of cylinder facing up.
 - b. Remove seal.
 - 1) Using hook end hose removal tool (or pick), drive end of tool under (or thru) seal.
 - 2) Pull seal out of groove in shaft bore in VPS cylinder.



Figure 4.

- c. Install seal.
 - 1) Coat seal with O-ring lubricant.
 - 2) Push new seal into groove in shaft bore of VPS cylinder.
 - 3) Use smooth portion of shaft on removal tool (or pick) to seat seal evenly in groove.

NOTE: Gently, remove any bulge, twist, or hump in the seal.

- d. Lightly coat half of VPS cylinder with grease.
See Figure 5.



Figure 5.

See the Hale maintenance manual for your specific pump for the instructions NOT provided herein.