OILGEAR TYPE “PVM” PUMPS -
-011/-014/-022/-025/-034/-046/
-064/-065/-075/-076/-098/-130
SERVICE INSTRUCTIONS

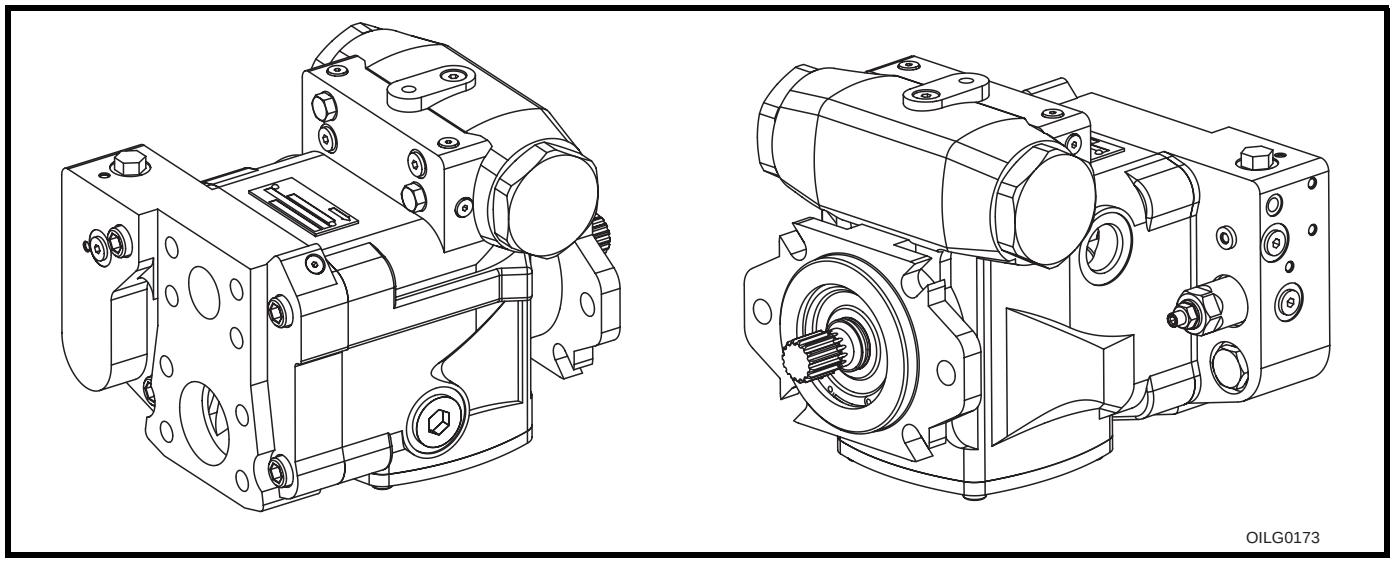

Figure 1. Typical Oilgear “PVM” Open Loop Pump

PURPOSE OF INSTRUCTIONS

These instructions will simplify the installation, operation, maintenance and troubleshooting of Oilgear type “PVM” pumps.

Become familiar with the construction, principle of operation and characteristics of your pump to help you attain satisfactory performance, reduce shut-down and increase the pump's service life. Some pumps have been modified from those described in this bulletin and other changes may be made without notice.

REFERENCE MATERIAL

Fluid Recommendations .....Bulletin 90000
Contamination Evaluation Guide.....Bulletin 90004
Filtration Recommendations .....Bulletin 90007
Piping Information .....Bulletin 90011
Installation of Vertically Mounted Axial Piston Units .....Bulletin 90014
PVM Open Loop Pumps Sales Brochure.....Bulletin 47070-B

THE OILGEAR COMPANY
2300 South 51st Street
Milwaukee, Wisconsin 53219

Safety First

Read and understand this entire instruction sheet before repairing, or adjusting your Oilgear product.

Those who use and maintain this equipment must be thoroughly trained and familiar with the product. If incorrectly used or maintained, this product and its equipment can cause severe injury.

SAFETY SYMBOLS

The following signal words are used in this instruction sheet to identify areas of concern where your safety may be involved. Carefully read the text and observe any instructions provided to ensure your safety.

⚠ DANGER ⚠

THIS SIGNAL WORD INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

⚠ WARNING

This signal word indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

This signal word indicates that a potentially hazardous situation exists which, if not avoided, may result in damage to equipment or minor personal injury.

NOTE *While not directly relevant to the topic being discussed, the NOTE is used to emphasize information provided, or provide additional information which may be of benefit.*

⚠ WARNING

This service information is designed for the maintenance of your Oilgear product. It contains the information on the correct procedures determined by Oilgear for the safe manner of servicing. Always keep this instruction sheet in a location where it is readily available for the persons who use and maintain the product. Additional copies of this instruction sheet are available through the Oilgear Company. Or visit our website: www.oilgear.com. Please contact us if you have any questions regarding the information in this instruction bulletin.

NOTE *The cleanliness of working on this pump or the hydraulic system is extremely important to the safety and reliability of the pump and the system. Always make sure the fittings are clean on the outside before removing them from their connections, are capped and plugged when removed and placed in a clean rag or container until they are reinstalled.*

⚠ WARNING

Some service operations may require special tools or equipment. If you require information on these items, please contact Oilgear before attempting these repairs and service operations.

⚠ WARNING

Read, understand, and follow the safety guidelines, dangers, and warnings contained in this instruction sheet to promote reliable operation and prevent serious personal injury.

⚠ WARNING

DO NOT attempt to service this machinery in an environment where safety regulations are not established and in place.

⚠ WARNING

DO NOT operate the hydraulic system if a leak is present. Serious injury may result.

⚠ WARNING

Hydraulic systems operate under very high pressure. Hydraulic fluid escaping from a pressurized system can penetrate unprotected body tissue. DO NOT inspect for hydraulic leaks with bare hands or other exposed body parts. As a minimum, wear leather gloves prior to inspecting for leaks and use cardboard or wood. If leaks are present, relieve pressure and allow system to cool prior to servicing. If injured by escaping hydraulic oil, contact a physician immediately. Serious complications may arise if not treated immediately. If you have questions regarding inspecting for hydraulic leaks, please contact Oilgear prior to servicing.

⚠ WARNING

Hydraulic hoses and tubing must be inspected on a daily basis for leaks, cuts, abrasions, damage and improper clearance along any mounting frame for hidden damage before the unit is put into service. Replace damaged hoses or hoses you suspect are damaged before the system is returned to service! Hoses must be replaced every two years. Failure to properly inspect and maintain the system may result in serious injury.

⚠ WARNING

Hydraulic systems are hot. DO NOT TOUCH! Serious personal injury may result from hot oil. When you have completed working on the hydraulic system, thoroughly clean any spilled oil from the equipment. Do not spill any hydraulic fluids on the ground. Clean any hydraulic fluids from your skin as soon as you have completed maintenance and repairs. Dispose of used oil and system filters as required by law.

⚠ WARNING

Use correct hoses, fittings, and adapters with the correct SAE rating when replacing hoses to prevent possible serious injury. Always replace hoses, fittings, and adapters with replacements that have a proper, suitable, working pressure rating. Replacement hoses must be of the correct length and must comply with the hose manufacturer's and Oilgear's installation guidelines and recommendations.

⚠ WARNING

Hydraulic hoses have the SAE ratings marked on the hose to assist you in selecting the correct hose. The same manufacturer must supply any replacement hydraulic hoses and fitting assemblies. As an example: Brand "X" hose and brand "Y" fitting will not normally be compatible. No "Twist" is allowed in the hydraulic hoses. "Twist" may result in premature hose failure. This can cause serious injury. Please contact Oilgear for assistance when required.

⚠ WARNING

Hydraulic cylinders can be holding a function in a certain position when thepump is OFF. An example of this is a function being held in the lift or partial lift position by the cylinders. If a hydraulic line is removed or the hydraulic circuits or controls are being worked on, gravity may allow the function being held in position to drop. All workers and personnel must remain clear of these areas when working on or operating the hydraulic system. Block and secure all devices and functions which apply before beginning work or operation. Failure to comply with this can result in serious injury or death.

⚠ WARNING

Any hydraulic pipe which is replaced must conform to SAE J1065 specifications. If incorrect hydraulic pipe is installed, the hydraulic system may fail, causing serious injury. Damaged or leaking fittings, pipes or hoses must be replaced before the system is returned to service.

⚠ WARNING

DO NOT heat hydraulic pipe. The carbon content of this steel tube is such that if heated for bending, and either water or air quenched, the pipe may lose its ductility and thereby be subject to failure under high pressure or hydraulic chock conditions. Serious injury can result. Damaged or leaking pipes must be replaced before the system is returned to service. Please contact Oilgear if you require assistance or have questions.

⚠ WARNING

All hydraulic pressure must be relieved from the hydraulic system prior to removing any components from the system. To relieve the hydraulic pressure from the hydraulic system, turn off the motor and operate the control panel with the key in the ON position. Failure to comply can result in serious injury. If you have any questions concerning relieving the hydraulic pressure from the system, please contact Oilgear.

⚠ WARNING

Hydraulic components can be heavy. Use caution while lifting these components. Serious personal injury can be avoided with proper handling of the components.

⚠ WARNING

Please contact Oilgear if you require assistance, when performing hydraulic test procedures, use the proper hydraulic gauges. Installing an incorrect test gauge could result in serious injury if the gauge fails. Use properly rated hydraulic hoses to allow the test gauge to be read away from moving parts and functions.

⚠ WARNING

Increasing hydraulic pressure beyond the recommendations may result in serious damage to the pump and system or serious personal injury and may void the Oilgear Warranty. If you have questions concerning hydraulic pressures or testing procedures, please contact Oilgear before attempting the test procedures or making adjustments.

⚠ WARNING

An Oilgear pump must not be modified in any way without authorization from Oilgear. Modifications may not comply with safety standards, including ANSI safety standards, and may result in serious personal injury. Please contact Oilgear if you require assistance.

⚠ WARNING

DO NOT enter under hydraulic supported equipment unless they are fully supported or blocked. Failure to follow this procedure can result in serious injury or death.

⚠ WARNING

Any Oilgear pump safety decals must be replaced anytime they are damaged, missing, or cannot be read clearly. Failure to have proper decals in place can result in serious injury or death. (If you require safety decals, please contact Oilgear for replacement safety decals, at no charge.)

⚠ WARNING

Be sure everyone is clear of the area around the hydraulic system before operating after servicing. Remain attentive at all times when operating to check your work until you are completely sure it is safe to return to service. Failure to heed this warning may result in serious personal injury or death.

⚠ WARNING

Wear the proper protective clothing when operating, servicing or maintaining the hydraulic system or the Oilgear pump. Wear the correct protective gear, safety glasses, gloves, and safety shoes. Serious injury can result without proper protective gear.

⚠ WARNING

Make sure to keep hands and feet and other parts of your body clear of revolving or moving parts. Failure to comply can cause serious injury.

⚠ WARNING

DO NOT wear watches, rings, or jewelry while working with electrical and mechanical equipment. These items can be hazardous and can cause serious and painful injuries if they come into contact with electrical wires, moving parts, or hydraulic equipment.

PREPARATION AND INSTALLATION

MOUNTING

Pump Without Reservoir - The pump can be mounted in any position. But, the recommended mounting position is with the driveshaft on a horizontal plane. Secure the pump to a rigid mounting surface.

Pump With Reservoir - These pumps are usually fully piped and equipped. It may be necessary to connect to a super-charge circuit when used. Mount reservoir on level foundation with the reservoir bottom at least six inches above floor level to facilitate fluid changes.

PIPING AND FITTINGS

Refer to the referenced Oilgear Piping Information Bulletin 90011 and individual circuit diagram before connecting the pump to the system. Inlet velocity must not exceed 5 fps (1,5 mps). Inlet should be unrestricted and have a minimum of fittings.

NOTE *DO NOT use an inlet strainer.*

Horizontal Mounting - Arrange line from the highest “case drain” or “alternate case drain” so the case remains full of fluid (non-siphoning). Case pressure must be less than 25 psi (1,7 bar). For higher case pressures and the special shaft seals required, contact our Customer Service. Each drain line must be a separate line, unrestricted, full sized and connected directly to the reservoir below the lowest fluid level. Make provisions for opening this line without draining (siphoning) reservoir.

Vertical Mounting - Refer to referenced Oilgear “Installation of Vertically Mounted Axial Piston Units,” Bulletin 90014.

⚠ WARNING

Running the pump in NEUTRAL position (zero delivery) for extended periods without a supercharge circuit can damage the pump. The system and pump must be protected against overloads by separate high pressure relief valves. Install bleed valve(s) at the highest point(s) in system.

POWER

Power is required in proportion to volume and pressure used. Motor size recommendations for specific applications can be obtained from The Oilgear Company. Standard low starting torque motors are suitable for most applications.

CAUTION

DO NOT start or stop unit under load unless system is approved by Oilgear. It may be necessary to provide delivery bypass in some circuits.

DRIVE

Verify rotation direction plate on the pump's housing. Clockwise pumps must be driven clockwise and counterclockwise pumps must be driven counterclockwise. Use direct drive coupling. Size and install coupling per manufacturer's instructions.

CAUTION

DO NOT drive the coupling onto the pump driveshaft. If it is too tight, it may be necessary to heat coupling for installation. Refer to manufacturer's instructions.

Misalignment of pump shaft to driver's shaft should not exceed 0.005 inches (0,13 mm) Total Indicator Readout (TIR) in any plane.

FILTRATION

Keep the fluid clean at all times to ensure long life from your hydraulic system. Refer to the referenced Oilgear Filtration Recommendations bulletin 90007 and Oilgear Contamination Evaluation Guide Bulletin 90004. Oilgear recommends use of a filter in the pressure or return line. Replace filter element(s) when the filter condition indicator reaches change area at normal fluid temperature. Drain and thoroughly clean filter case. Use replacement element(s) of same beta 10 ratio (normally a ratio of 4 with hydraulic oils).

FLUID COOLING

When the pump is operated continuously at the rated pressure or frequently at peak load, auxiliary cooling of the fluid may be necessary. Fluid temperature should not exceed limits specified in the referenced Oilgear Fluid Recommendations Bulletin 90000.

AIR BREATHER

On most installations, an air breather is mounted on top of fluid reservoir. It is important for the breather to be the adequate size to allow air flow in and out of reservoir as fluid level changes. Keep the breather case filled to the “fluid level” mark. About once every six months, remove cover, wash screen in solvent and allow screen to dry, clean and refill case to level mark and install screen. Refer to the manufacturer's recommendations.

FLUID, FILLING AND STARTING RECOMMENDATIONS

Refer to instruction plate on the unit, reservoir, machine and/or reference, Fluid Recommendations bulletin. Fire resistant fluids and phosphate ester fluids can be used in accordance with fluid manufacturer's recommendations.

1. Pump all fluid into reservoir through a clean (beta 10 ratio of 4 or more) filter. Fill reservoir to, but not above, “high level” mark on the sight gauge.
2. **Remove case drain line and fill pump case with hydraulic fluid.**
3. Turn driveshaft a few times by hand with a spanner wrench to make sure parts rotate.

With pump under “no load” or with pump control at NEUTRAL:

4. Turn drive unit ON and OFF several times before allowing pump to reach full speed. The system can usually be filled by running the pump and operating the control.
5. The fluid level in the reservoir should decrease. Stop the pump. **DO NOT** allow the fluid level to go beyond the “low level.” If the level reaches “low level” mark, add fluid and repeat step.

NOTE *With differential (cylinder) systems, the fluid must not be above “high level” when the ram is retracted or below “low level” when extended. Bleed air from the system by loosening connections or opening petcocks at the highest point in the system. Close connections or petcocks tightly when solid stream of fluid appears.*

Unit	PVM-011/-014/-022	PVM-025/-034/-046/-065/-075	PVM-064/-076/-098/-130
Approximate torque to turn driveshaft	15-25 in•lb (1,7-2,8 N•m)	120-180 in•lb (13,7-20,5 N•m)	180-260 in•lb (20,5-29,6 N•m)

Table 1. Torque to Turn Shaft

CONSTRUCTION

See **Figures 11, 12** and **13**.

1. A driveshaft **(21)** runs through the center line of pump housing and valve plate **(45)** with the pump cylinder barrel **(38)** splined to it.
2. A bearing **(26)** supports the outboard end of the driveshaft and a bushing supports the inboard end. (The bushing is part of valve plate assembly.)
3. The pump cylinder barrel is carried in a hydrodynamic (journal type) cylinder bearing **(35)**.
4. The port plate **(43)** has two crescent shaped ports and is located on a valve plate **(45)** that has matching crescent shaped ports.
5. The pumping piston/shoe assemblies **(39)** in the cylinder barrel are held against a swashblock **(29)** by a shoe retainer **(40)**.
6. The shoe retainer is held in position by the fulcrum ball **(41)** which is forced outward by the shoe retainer spring **(42)**.
7. The spring acts against the pump cylinder barrel, forcing it against the valve plate while also forcing the piston shoes against the swashblock.
8. The semi-cylindrical shaped swashblock limits the piston stroke and can be swiveled in arc shaped saddle bearings **(30)**.
9. The swashblock is swiveled by a control piston **(19)**. Refer to **PRINCIPLE OF OPERATION**.

SPECIFICATIONS

NOTE *Refer to reference material, pump control material and individual application circuit for exceptions.*

UNIT	THEORETICAL MAXIMUM DISPLACEMENT		RATED CONTINUOUS PRESSURE		MAXIMUM PRESSURE		FLOW RATE at 1800 rpm rated continuous pressure and 14,7 psia (bar abs) inlet condition		MINIMUM INLET PRESSURE psia (bar abs)			MAXIMUM SPEED	POWER INPUT at rated continuous pressure & 1800 rpm	
	in 3/rev	ml/rev	psi	bar	psi	bar	gpm	l/mi	1800 rpm	2400 rpm	3600 rpm	rpm	hp	kw
011	0.66	10,8	3750	258,6	4250	293,1	4.3	16,3	5.6 (0,39)	8.1 (0,56)	17.2 (1,19)	3600	12.8	9,5
014	0.86	14,1	3750	258,6	4250	293,1	5.8	22,0	5.5 (0,38)	7.8 (0,54)	17.2 (1,19)	3600	16.4	12,1
022	1.35	22,1	3750	258,6	4250	293,1	9.5	36,0	8.6 (0,60)	11.4 (0,79)	23.7 (1,63)	3600	26.1	19,5
025	1.55	25,4	3750	258,6	4250	293,1	10.1	38,2	6.5 (0,45)	11.5 (0,80)	-	2700	28.8	21,5
034	2.06	33,8	3750	258,6	4250	293,1	14.1	53,4	5.7 (0,40)	11.0 (0,76)	-	2700	37.7	28,1
046	2.83	46,4	3750	258,6	4250	293,1	19.7	74,6	5.7 (0,40)	8.1 (0,56)	-	2400	51.9	38,7
064	3.88	63,6	3750	258,6	4250	293,1	26.6	100,7	7.3 (0,50)	11.4 (0,79)	-	2400	70.2	52,4
065	4.00	65,5	3750	258,6	4250	293,1	27.9	105,6	6.2 (0,43)	10.2 (0,70)	-	3000	71.0	53,0
075	4.61	75,5	3750	258,6	4250	293,1	31.3	118,5	6.5 (0,45)	10.6 (0,73)	-	3000	83.8	62,5
076	4.67	76,5	3750	258,6	4250	293,1	32.4	122,6	8.2 (0,57)	13.4 (0,92)	-	2400	85.7	63,9
098	6.00	98,3	3750	258,6	4250	293,1	41.2	156,0	8.3 (0,57)	12.1 (0,83)	-	2400	109.2	81,4
130	7.94	130,2	3750	258,6	4250	293,1	57.8	218,8	8.7 (0,60)	14.9 (1,03)	-	2400	150.8	112,5

Case pressure should be less than 25 psi (1,7 bar). For higher pressure, consult factory. Higher speeds available - consult factory.

Table 2. All data is for ISO 46 mineral-based oil at 125°F (160 SSU).

Unit	Length		Width		Height		Weight*		Face Mounting
	inches	mm	inches	mm	inches	mm	lbs.	kg	
PVM-011 PVM-014 PVM-022	7.95	201,9	7.28	184,9	6.63	168,4	37.5	17,0	SAE "A" 2 Bolt
PVM-025 PVM-034 PVM-046	9.51	241,5	9.00	228,6	8.88	225,6	73.0	33,1	SAE "B" 2/4 Bolt
PVM-065 PVM-075	10.00	254,0	9.03	229,4	8.88	225,6	75.0	34,0	SAE "B" 2/4 Bolt
PVM-064 PVM-076 PVM-098 PVM-130	11.91	302,5	10.73	272,5	10.45	265,4	136.0	61,7	SAE "C" 2/4 Bolt

For detailed dimensions, contact your Oilgear Representative.
* Weight with rear port valve plate and without maximum volume stop.

Table 3. Nominal Dimensions and Weights.

Refer to installation drawings for more detailed dimensions and port configurations.

TROUBLESHOOTING

PROBLEM	CAUSES	REMEDY
Unresponsive or Sluggish Control	Plugged stability orifice (OP2).	Inspect. Clean out if contaminated.
	PC control cartridge **(55)** damaged.	Inspect components. Replace.
	Swashblock saddle bearings **(30)** worn or damaged.	
	Control piston **(19)** or sequence spool **(54)** binding in bore.	
	Control piston spring **(20)** broken, sequence valve spool spring **(53)** broken.	
Insufficient Pump Volume	High load sense differential pressure.	Verify that load sense differential pressure is less than pump control setting.
	PC control cartridge damaged, stuck open.	Inspect. Clean out if contaminated. Replace if necessary.
	Delivery limited by stroke limiter screw **(70)**.	Adjust stroke limiter CCW.
	Obstructed suction circuit or insufficient supercharge volume.	Inspect for obstruction and verify supercharge.
	Insufficient drive motor speed.	Check drive speed.
	Worn or grooved cylinder barrel **(38)** and/or port plate **(43)** mating surfaces.	Inspect components. Replace.
	Worn or damaged piston shoe or swashblock **(29)**.	
	Worn or sticking control piston **(19)**.	
	Port plate not seated against valve plate.	
	Worn hydrobearing **(35)**.	
	Worn or broken saddle bearing **(30)**.	
	O-rings leaking on plug **(84)** or control cartridges **(55)** or **(83)**.	
	Worn or damaged piston and shoe assemblies **(39)** or piston bores in cylinder **(38)**.	

TROUBLESHOOTING

PROBLEM	CAUSES	REMEDY
Irregular or Unsteady Operation	Fluctuating load sense differential pressure.	Check system flow control valve/orifice.
	Faulty control piston **(19)**, sequence valve **(54)** or PC control cartridge **(55)** operation.	Inspect components. Replace.
	Fluid level in reservoir is low or supercharge is insufficient.	Verify fluid level and/or supercharge.
	Air entering hydraulic system.	Inspect system for leak.
	Low viscosity fluid used.	Increase size of OP2. Refer to Table 4.
	Remote PC setting close to pump PC setting.	Increase pump PC setting.
	Worn axial piston pump.	Inspect components. Replace.
	Faulty output circuit components (cylinder, motors, valves or other related components).	Inspect components. Replace.
Loss of Pressure	Worn piston pump.	Inspect components. Replace.
	Worn hydrobearing.	
	Worn or grooved cylinder barrel **(38)** and/or port plate **(43)** mating surfaces.	
	Worn piston/shoe assemblies **(39)** or piston bores in cylinder.	
	Worn or broken saddle bearing **(30)**.	
	Faulty output circuit components.	
Excessive or High Peak Pressure	Faulty output circuit components.	Check the relief valves.
	Faulty PC control cartridge **(55)** operation.	Inspect components. Replace.
	Seized control piston **(19)**.	
	Worn or broken saddle bearing **(30)**.	Inspect components. Replace.
Excessive Noise	Pump stopped or started incorrectly under load.	Verify operation procedure of pump.
	Low fluid level in reservoir or insufficient supercharge causing cavitation.	Verify fluid level and/or supercharge.
	Air entering hydraulic system.	Inspect system for leak.
	Fluid too cold or viscosity too high.	Verify fluid temperature and/or type.
	Suction line problem i.e.; obstructions in line, line too long, line diameter too small or too many bends and/or loops in line.	Inspect line and for obstruction.
	Broken or worn piston/shoe assembly **(39)**.	Inspect components. Replace.
	Pump rotating in wrong direction.	Inspect operation direction of pump.
Excessive Heating	Operating pump above rated or peak pressure.	Verify pump limitations.
	Low fluid level in reservoir or insufficient supercharge.	Verify fluid level and/or supercharge.
	Air entering hydraulic system.	Inspect system for leak.
	Worn piston pump.	Inspect components. Replace.
	Worn or grooved cylinder barrel **(38)** and/or port plate **(43)** mating surfaces.	
	Faulty output circuit components (continuous blowing relief valves or "slip" through valves, cylinder or other components.	
	Insufficient cooling provision or clogged coolers.	Inspect for obstruction.
	Insufficient case fluid level (wrong drain port).	Use highest drain port.
	OP2 too big or missing causing excessive case drain.	Decrease size of OP2.
	Sequence spool seized.	Inspect, replace spool and valve plate if necessary.
	Sequence spool leaking (if heating occurring during compensating).	

Table shows the orifice plugs OP2 (item 68).

Unit	Application	Standard Orifice Size*	Oilgear Part Number
PVM-011 PVM-014 PVM-022	Standard (fluid viscosity of 100 SSU or greater)	0.032 dia.	240971-018
	High Temperature or thin oil (fluid viscosity less than 100 SSU)	0.040 dia.	240971-002
PVM-025 PVM-034 PVM-046 PVM-065 PVM-075	Standard (fluid viscosity of 100 SSU or greater)	0.047 dia.	240971-022
	High Temperature or thin oil (fluid viscosity less than 100 SSU)	0.062 dia.	240971-003
PVM-064 PVM-076 PVM-098 PVM-130	Standard (fluid viscosity of 100 SSU or greater)	0.062 dia.	240971-003
	High Temperature or thin oil (fluid viscosity less than 100 SSU)	0.076 dia.	240971-004

* Pumps delivered from the factory are equipped with the standard application orifice unless specified for high temperature or thin oil.

Table 4. PVM Stability Orifice Sizing

PRINCIPLE OF OPERATION

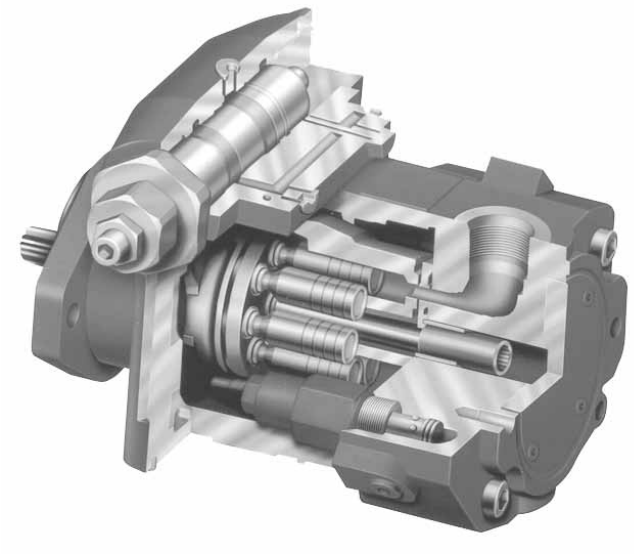

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Figure 2. Cut-a-way of a Typical "PVM" Pump (01010)

Full Stroke Operation - Figure 3

NOTE *Numbers in parentheses represent item number in parts list and drawings.*

The control piston **(19)** positions the control pin **(31)** and pump swashblock **(29)** so the pump will deliver maximum volume to raise pressure in the system.

Raising Pressure

Pump delivery (and resultant pressure) is fed to both sides of the control piston **(19)**. Pressure to the unloading side **(C)** of the control piston is direct. Pressure to the bias side **(D)** of the control piston is maintained by the respective control.

Note that the flow through the PC control cartridge **(3-1)** is blocked.

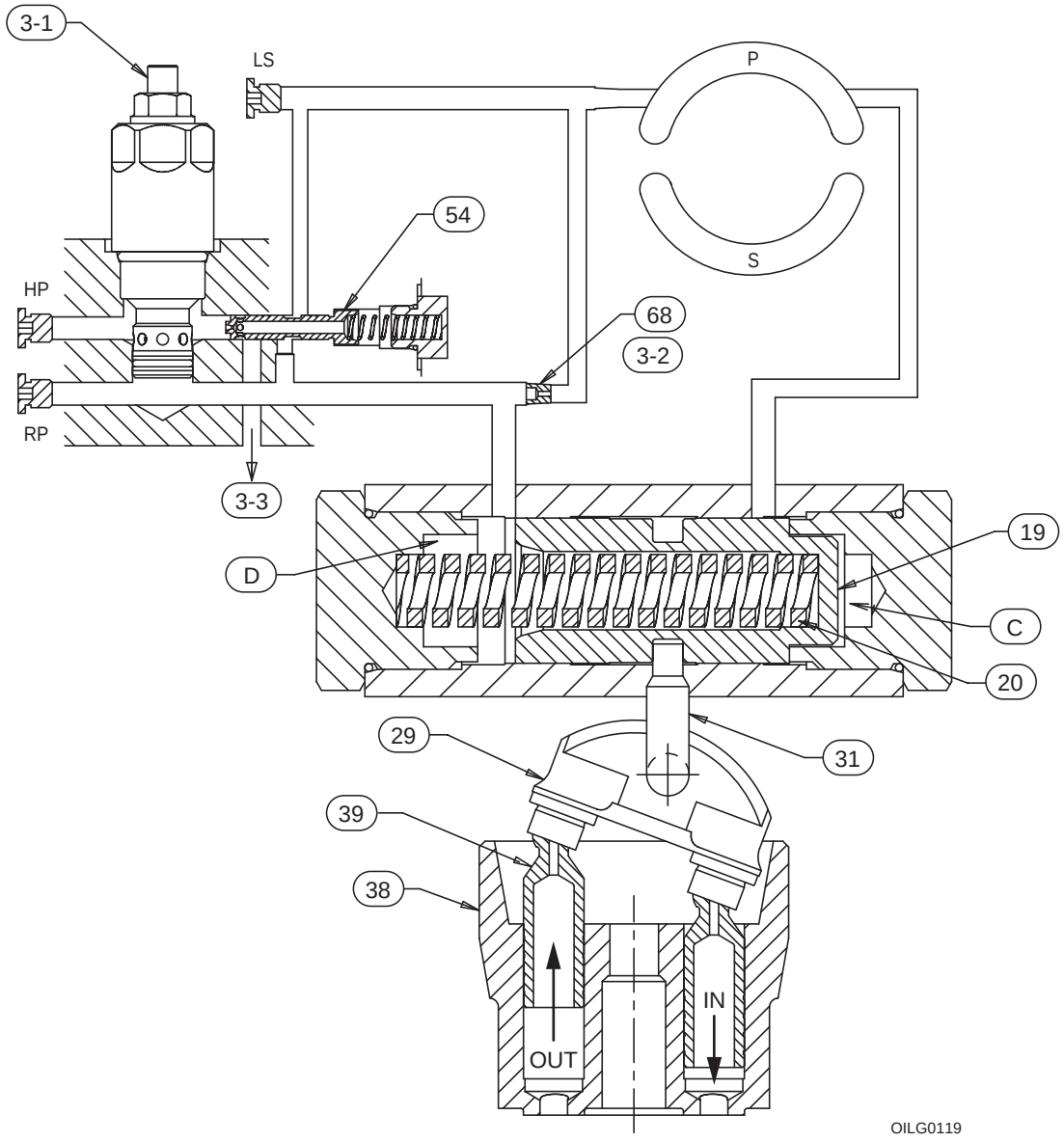
The areas on either end of the control piston are the same and the pressure acting on either end is the same. The resultant hydraulic forces on the ends of the control piston cancel each other out (the control piston is balanced), and the force of the control piston spring **(20)** controls the control piston position **(19)**.

Rotating the driveshaft turns the splined cylinder **(38)**, which contains the pumping pistons **(39)**. When the cylinder rotates, the pistons move in and out within their bores as the shoes ride against the angled swashblock **(29)**.

As the cylinder rotates, the individual piston bores are connected, alternately, to the crescent shaped upper **(P)** and lower **(S)** in the valve plate. While connected to the lower side (suction) **S**, each piston moves outward **OUT**, drawing fluid from **S** into the piston bore until its outermost stroke is reached. At this point, the piston bore passes from the lower crescent **S** to the upper crescent **P**.

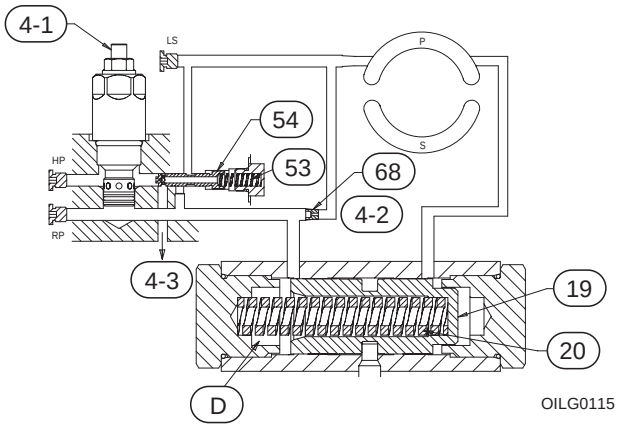
While rotating across the upper crescent port, each piston moves across the angled swashblock face and then each piston is forced inward **IN**. Each piston then displaces fluid through the upper crescent to **P** until its innermost stroke is reached. At this point, the piston bore passes from the upper to the lower crescent again and the cycle is repeated.

The angle of the swashblock determines the length of the piston stroke, (the difference between outermost and innermost position) which determines the amount of delivery from the pump. If the stroke angle is one-half of the stroke, the piston stroke is one-half and the pump delivery is one-half.



(3-1)	PC Control Cartridge
(3-2)	Stability Orifice
(3-3)	Into Case

Figure 3. Full Stroke Operation



(4-1)	PC Control Cartridge
(4-2)	Stability Orifice
(4-3)	Into Case

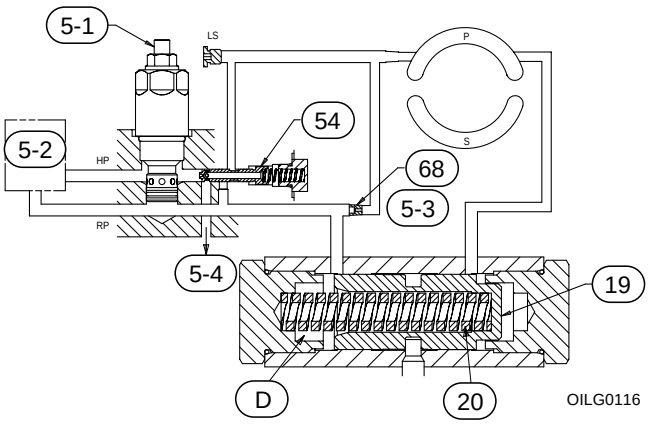
Figure 4. Pressure Compensating

Pressure Compensating - Figure 4

When pump outlet pressure reaches the preset pressure setting of the PC Control Cartridge, bias pressure **D** (pressure on the spring side of the control piston) is relieved by the PC Control Cartridge. Exhaust flow from the PC Control Cartridge is ported to the pump case via the sequence spool **(54)**. The resulting pressure drop across the sequence spool due to the exhaust flow moves the spool to block the flow path. All flow to the PC Control Cartridge is now provided via the stability orifice OP2 **(68)**.

Blocking the flow path and requiring all control flow to pass through OP2 minimizes case drain leakage and provides a means of stability adjustment for a wide range of system requirements. The decrease in bias pressure results in a pressure differential across the control piston **(19)**. The control piston is no longer balanced and the pressure on the unloading side of the control piston forces the control piston to compress the control piston spring **(20)**. The control piston moves the control pin and shifts the swashblock to a position that provides less flow output from the pump. Flow output from the pump is then controlled to maintain the preset pressure setting of the PC Control Cartridge. When the outlet port of the pump is blocked, the swashblock is positioned so the pump delivers just enough volume to provide for internal losses and required control flow.

Relatively small variations in system flow requirements can be accommodated for in the mentioned operational mode. When pump outlet pressure decreases below the preset pressure setting of the PC Control Cartridge, the PC Control Cartridge closes. The sequence spool spring **(53)** repositions the sequence spool to open the flow path. This provides for an unobstructed flow path to the bias side of the control piston so the pump will be responsive to increased system flow demand.



(5-1)	PC Control Cartridge
(5-2)	Remote Pressure Control Valve
(5-3)	Stability Orifice
(5-4)	Into Case

Figure 5. Remote Pressure Compensating

Remote Pressure Compensating - Figure 5

Principal of operation for remote pressure compensating is the same as the integral pressure compensating except another pressure control valve is placed in parallel with the PC Control Cartridge.

The supply port of the remote pressure control valve needs to be ported to the **RP** port on the valve plate **(43)**. The exhaust from the remote pressure control valve needs to be ported to the **HP** port on the valve plate. When pump outlet pressure reaches the preset pressure setting of the remote control valve, bias pressure **D** [pressure on the spring side of the control piston **(19)**] is relieved by the remote control valve. Exhaust flow from the remote control valve is ported to the pump case via the sequence spool **(54)**. The resulting pressure drop across the sequence spool due to the exhaust flow moves the spool to block the flow path. All flow to the remote control valve is now provided via the stability orifice OP2 **(68)**. Blocking the flow path and requiring all control flow to pass through OP2

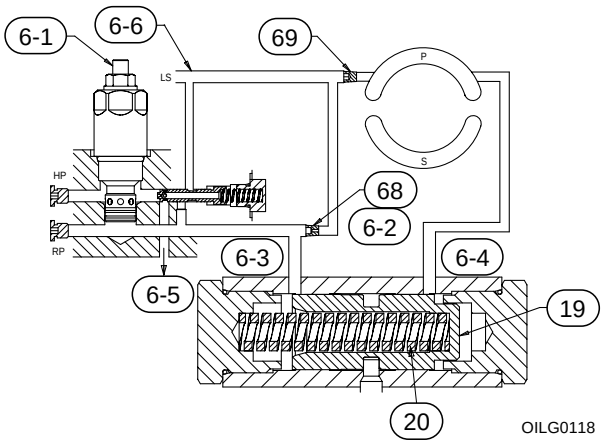
minimizes case drain leakage and provides a means of stability adjustment for a wide range of system requirements.

The decrease in bias pressure results in a pressure differential across the control piston **(19)**. The control piston is no longer balanced and the pressure on the unloading side of the control piston forces the control piston to compress the control piston spring **(20)**. The control piston moves the control pin and shifts the swashblock to a position that provides less flow output from the pump. Flow output from the pump is then controlled to maintain the preset pressure setting of the remote pressure control valve. When the outlet port of the pump is blocked, the swashblock is positioned so the pump delivers just enough volume to provide for internal losses and required control flow.

Relatively small variations in system flow requirements can be accommodated for in the mentioned operational mode, but, when pump outlet pressure decreases below the preset pressure setting of the remote control valve, the remote control valve closes. The sequence spool spring **(53)** repositions the sequence spool to open the flow path. This provides for an unobstructed flow path to the bias side of the control piston so the pump will be responsive to increased system flow demand. If the setting of the remote pressure control valve exceeds the setting of the PC Control Cartridge, the pump will control to the setting of the PC Control Cartridge.

NOTE *Failure to port the exhaust of the remote pressure control valve to the HP port will result in significantly higher case drain leakage.*

NOTE *The RP lines of multiple pumps cannot be tied together for unloading or controlling with a common remote pressure control valve. Each pump requires a dedicated valve.*



(6-1)	PC Control Cartridge
(6-2)	Stability Orifice
(6-3)	Bias **D**
(6-4)	Outlet **C**
(6-5)	Into Case
(6-6)	Load Sense Port

Figure 6. Standard Load Sensing with Pressure Compensating Override

Standard Load Sensing with Pressure Compensator Override - Figure 6

The parts configuration for the Standard Load Sense control is similar to the Pressure Compensator control except for the installation of a plug. All other components are unchanged. A 1/16 inch pipe plug is supplied with all new pumps. The plug is installed in a blind hole next to the **LS** port for all pumps originally shipped as a Pressure Compensator control or Adjustable Load Sense control. The plug **(69)** is already installed in the correct location (and the blind hole is empty), if the pump was originally shipped as a Standard Load Sense.

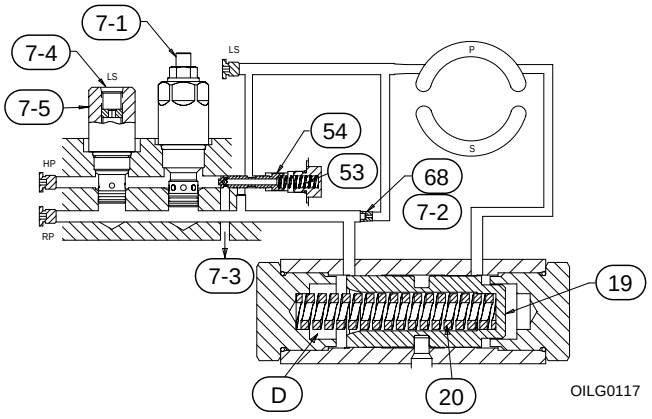
To convert to a Standard Load Sense from a Pressure Compensator control, install the pipe plug **(69)** deep into the **LS** port of the valve plate as shown in Figure 6.

NOTE *The pipe plug threads start approximately 1.7 inch (0.043 mm) from the port spotface.*

Standard Load Sense control requires the load sense line (pressure signal from downstream of an orifice or flow control valve) be attached at the LS port on the valve plate assembly. Load sense pressure is ported via the sequence spool and stability orifice to the bias side of the control piston **(19)**. The pressure differential across the system

flow control is therefore equal to the pressure differential across the control piston; when the pressure differential reaches the non-adjustable preload force of the control spring, the control piston moves toward the neutral position. The control piston moves the control pin and shifts the swashblock to a position that reduces pump delivery to maintain a constant, preset pressure differential across the flow control valve. The preset pressure differential is 150 to 210 psi (10,3 to 14,5 bar). If the pressure differential across the flow control valve is decreased, the control piston spring **(20)** moves the control piston in the full stroke direction until pump delivery is increased sufficiently to reach the preset load sense differential pressure. When the pump outlet is blocked and the load sense pressure is allowed to go to drain pressure, the swash is positioned so that the pump delivers just enough volume to provide for internal losses and required control flow at a standby pressure equal to the preset pressure differential of 150 to 210 psi (10,3 to 14,5 bar).

The pressure compensating function will override the load sense control and, if necessary, further reduce pump delivery when the load sense pressure reaches the preset pressure of the PC Control Cartridge.



(7-1)	PC Control Cartridge
(7-2)	Stability Orifice
(7-3)	Into Case
(7-4)	Load Sense Port
(7-5)	Adjustable Load Sense Cartridge

Figure 7. Adjustable Load Sensing with Pressure Compensating Override

Adjustable Load Sensing w/ Pressure Compensator Override - Figure 7

The Adjustable Load Sense control functions similar to the Standard Load Sense control except it is adjustable from 150 to 600 psi (10,3 to 41,4 bar).

The Adjustable Load Sense Cartridge is located adjacent to the PC Control Cartridge on the valve plate. The Adjustable Load Sense does not require the installation of the 1/16 inch pipe plug in the standard load sense port as previously described. The standard load sense port should be plugged with an SAE #4 plug. Adjustable Load Sense control requires the load sense line [pressure signal from downstream of an orifice or flow control valve] be attached to the end of the Adjustable Load Sense Cartridge.

When load sense pressure differential reaches the preset pressure setting of the Adjustable Load Sense Cartridge, bias pressure **D** [pressure on the spring side of the control piston **(19)**] is relieved by the Adjustable Load Sense Cartridge. Exhaust flow from the Adjustable Load Sense Cartridge is ported to the pump case via the sequence spool. The resulting pressure drop across the sequence spool **(54)** due to the exhaust flow moves the spool to block the flow path. All flow to the Adjustable Load Sense Cartridge is now provided via the stability orifice OP2 **(68)**. Blocking the flow path and requiring all control flow to pass through OP2 minimizes case drain leakage and provides a means of stability adjustment for a wide range of system requirements.

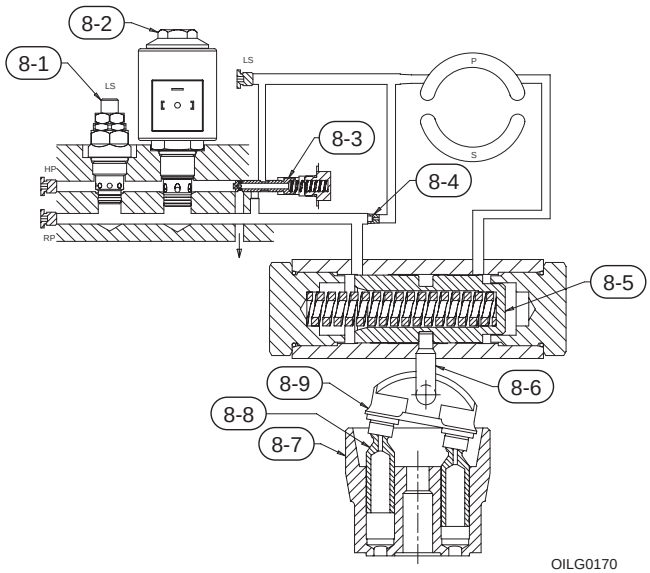
The decrease in bias pressure results in a pressure differential across the control piston **(19)**. The control piston is no longer balanced and the pressure on the unloading side of the control piston forces the control piston to compress the control piston spring **(20)**. The control piston moves the control pin and shifts the swashblock to a position that provides less flow output from the pump. Flow output from the pump is then controlled to maintain the preset pressure differential setting of the Adjustable Load Sense Cartridge. When the outlet port of the pump is blocked, the swashblock is positioned so the pump delivers just enough volume to provide for internal losses and required control flow at a standby pressure equal to the differential pressure setting of the Adjustable Load Sense Cartridge.

Relatively small variations in system flow requirements can be accommodated for in the mentioned operational mode, but, when pump outlet pressure decreases below the preset differential pressure setting of the Adjustable Load Sensing Cartridge, the Adjustable Load Sensing Cartridge closes. The sequence spool spring **(53)** repositions the sequence spool to open up the flow path. This provides for an unobstructed flow path to the bias side of the control piston so the pump will be responsive to increased system flow demand. The pressure compensating function will override the load sense control and, if necessary, further reduce pump delivery when the load sense pressure reaches the preset pressure of the PC Control Cartridge.

NOTE *An Adjustable Load Sense control is also available with a bleed-off feature. This cartridge internally vents load sensing pressure to case via an orifice in the cartridge and the sequence spool when the control is not active or the system is shutdown.*

Electronic Proportional Pressure Compensator with Override - Figure 8

The Electronic Proportional Pressure Compensator functions the same as the Pressure Compensating Control (refer to **Figure 4**) except the PC Control Cartridge is electrically controlled. An electrical signal is used to proportionally increase or decrease the pressure compensator setting with increasing current. A manually adjustable PC Override Valve enables the user to set the maximum desired pressure compensator setting.



(8-1)	PC Override Cartridge
(8-2)	Electronic Proportional Control Cartridge
(8-3)	Sequence Spool
(8-4)	Stability Orifice (OP2)
(8-5)	Control Piston
(8-6)	Control Pin
(8-7)	Cylinder Barrel
(8-8)	Piston
(8-9)	Swashblock
(8-10)	Into Case

Figure 8. Electronic Proportional Pressure Compensator with Override

TESTING AND ADJUSTING

⚠ WARNING

Shut the pump OFF and release pressure from the system before disassembling components. Failure to comply with these instructions could result in personal injury or death. Blocking the pressure line between the pump and the system (or pump) high pressure relief valve will result in damage and could result in serious personal injury.

PISTON PUMP

To check for a worn piston pump, make a leak measurement test from the case drain while the pump is under pressure. After the unit is warm, either install a flow meter in the drain line or have the flow from the drain line directed into a large container or reservoir. The pump case must remain full of fluid during this test.

CAUTION

DO NOT run a pump on stroke against a blocked output unless it is protected by a high pressure relief valve and then run no longer than necessary to check slip. Limit discharge to prevent dropping reservoir fluid below low level.

With an accurate high pressure gauge in the pressure line, start the pump and stall (or block) output device to raise system pressure to maximum (as set by system relief valve). Read the measurement on the flow meter or time and measure the case drain flow used to fill a known size container and calculate the flow rate in terms of cubic inches per minute (cipm). The leakage should conform to **Table 5**.

NOTE *Additional leakage indicates wear, but does not become critical until it impairs performance.*

DISASSEMBLY

Refer to **Figures 9 through 15** for your series of pump.

NOTE *The cleanliness of working on this pump or the hydraulic system is extremely important to the safety and reliability of the pump and the system.*

When disassembling or assembling the pump, choose a clean, dry, dust and sand free area where no traces of abrasive particles are in the air which can damage the pump and system. DO NOT work near welding, sandblasting, grinding benches or similar conditions.

Always make sure the fittings are clean on the outside before removing them from their connections. Make sure they are capped and plugged when removed. Place them on a clean surface and in a clean rag or container until they are reinstalled. When cleaning parts which have been disassembled, it is important to use CLEAN cleaning solvents and parts are allowed to dry. All tools and gauges should be clean prior to working with the system and use new, CLEAN lint free rags to handle and dry parts.

⚠ WARNING

DO NOT attempt to remove or install any components or assembly while the pump and system is running. Always stop the pump, shut OFF the power and release pressure from the system before servicing or testing. Be sure provisions have been made so the case drain line can be disconnected from the unit without causing the line to drain (siphon) the reservoir.

1. Disconnect case drain line(s).
2. Drain pump case. If drain pump case plugs are inaccessible, it may be necessary to remove the pump from the mounting and drive motor before draining it.

(continued)

WARNING

Seek assistance from others and use of a hoist and/or proper lifting techniques to prevent personal injury.

NOTE *Tag similar parts (particularly screws, plugs and O-rings) during disassembly to make sure they don't become confused with similar parts and to ensure they will be returned to their original location. Do not remove (locator) roll pins unless they are deformed or need to be replaced.*

3. After removing the pump from the mounting and before disassembly, cap or plug all ports and clean the outside of unit thoroughly to prevent dust from entering the system.

NOTE *Depending on what part or parts are to be inspected, it may not be necessary to completely take apart all assemblies.*

VALVE PLATE GROUP

If another pump is coupled with a thru-shaft pump or other device coupled to the rear of the pump, it will be necessary to remove that unit and O-ring **(59)**. If thru-shaft convertible cover **(63)** is used, remove the socket head cap screws **(64)** and O-ring **(62)**. Also remove screw **(61)** and thru-shaft coupling spacer **(60)**.

CAUTION

Do not damage the faces of the port plate and the matching faces of both the valve plate and cylinder barrel.

1. Block the unit on bench with driveshaft horizontal.

2. Remove valve plate assembly **(45)** by removing four socket head cap screws **(50** and **56)** and the valve plate assembly. When used, shaft coupling **(57)** with retaining rings **(58)**, if used, will come with valve plate assembly. The port plate **(43)** is located on the valve plate assembly by a dowel pin. Remove the port plate from the valve plate assembly.

The control sequence valve can be removed, if necessary by:

(A) Removing the sequence valve spool plug **(51)** with the O-ring **(52)**.
(B) Withdrawing sequence valve spool spring **(53)** and sequence valve spool **(54)**.

The PC control cartridge **(55)** can also be unscrewed from the valve plate if necessary. The rear shaft bearing **(67** or **77)** is pressed into the valve plate.

Frame Unit - Size		Case Slip at Full Stroke and Indicated Pressure				
		500 psi	1000 psi	2000 psi	3000 psi	3750 psi
SAE “A” PVM-011	cipm	25.0	40.0	75.0	110.0	160.0
	lpm	0,41	0,66	1,23	1,80	2,62
SAE “A” PVM-014	cipm	35.0	50.0	80.0	120.0	170.0
	lpm	0,57	0,82	1,31	1,97	2,79
SAE “A” PVM-022	cipm	55.0	90.0	145.0	210.0	300.0
	lpm	0,90	1,47	2,38	3,44	4,92
SAE “B” PVM-025	cipm	75.0	115.0	185.0	270.0	360.0
	lpm	1,23	1,88	3,03	4,42	5,90
SAE “B” PVM-034	cipm	70.0	105.0	175.0	255.0	340.0
	lpm	1,15	1,72	2,87	4,18	5,57
SAE “B” PVM-046	cipm	70.0	105.0	180.0	280.0	365.0
	lpm	1,15	1,72	2,95	4,59	5,98
SAE “B” PVM-065	cipm	95.0	135.0	205.0	300.0	400.0
	lpm	1,56	2,21	3,36	4,92	6,55
SAE “B” PVM-075	cipm	140.0	190.0	290.0	450.0	650.0
	lpm	2,29	3,11	4,75	7,37	10,65
SAE “C” PVM-064	cipm	90.0	135.0	230.0	345.0	460.0
	lpm	1,47	2,21	3,77	5,65	7,54
SAE “C” PVM-076	cipm	90.0	145.0	245.0	390.0	580.0
	lpm	1,47	2,38	4,01	6,39	9,50
SAE “C” PVM-098	cipm	125.0	180.0	280.0	560.0	860.0
	lpm	2,08	2,95	4,59	9,18	14,09
SAE “C” PVM-130	cipm	135.0	210.0	370.0	580.0	810.0
	lpm	2,21	3,44	6,06	9,50	13,27

Table 5. NOMINAL CASE SLIP versus High Pressure at 1800 rpm
[All data is for ISO 46 mineral-based oil at 125°F (160 SSU)]

ROTATING GROUP

⚠ WARNING

The rotating group may be heavy. Be careful not to damage cylinder wear surface which mates against the valve plate, bearing diameters or piston shoes. Use proper lifting techniques and assistance from others to prevent personal injury.

1. Remove O-rings **(13** and **14)** from the pump housing **(1)**. Do not remove roll pins **(12)** unless they are damaged.
2. Remove the rotating group by turning the driveshaft **(21)** slowly, while pulling the cylinder barrel **(38)** from the housing.
3. Identify (number) each pump piston shoe assembly **(39)** and its respective bore in the cylinder barrel **(38)** and shoe retainer plate **(40)** for easy reassembly.
4. See **Figure 9**. Lift out shoe retainer **(40)** with pistons **(39)** and remove the fulcrum ball **(41)** and shoe retainer spring **(42)**.

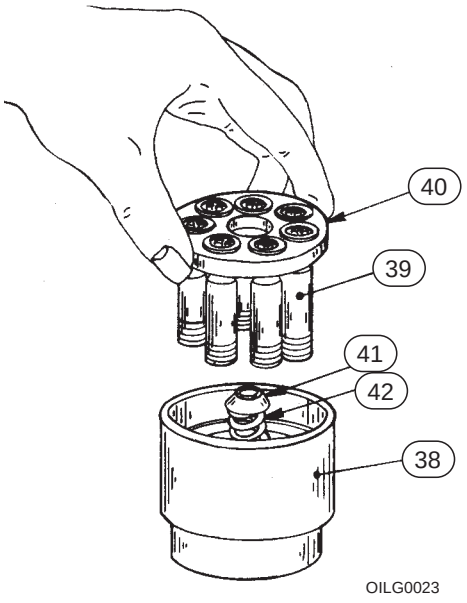


Figure 9. Rotating Group Disassembly

-011/-014/-022

5. Remove cylinder barrel retaining ring **(37)** and pull the hydrodynamic cylinder bearing **(35)** and roll pins, if necessary, from the housing.

-025/-034/-046/-064/-065/-075/ -076/-098/-130

5. Remove the hydro-bearing retaining ring **(37)**.
6. Remove socket head screw **(36)** and lock washer **(5)**.
7. Pull hydrodynamic cylinder bearing **(35)** from housing.

DRIVESHAFT GROUP

1. Remove the drive key **(22** or **23)**, if used and the driveshaft bearing retainer ring **(28)**.
2. Grasp outboard end of driveshaft **(21)** and pull it out of the pump housing.
3. Remove shaft seal retainer **(25)**. Remove driveshaft seal **(24)** from housing ONLY if necessary.

NOTE *If the seal is removed it can not be reused. It must be replaced.*

SWASHBLOCK GROUP

1. Remove the socket head cap screws **(34)**, the housing cover **(33)** and O-ring **(32)**.
2. Reach into the housing through the opening and pull out the swashblock **(29)**, along with control pin **(31)**.

The saddle bearing **(30)** is seated in the housing by an integral pintle that engages a hole in the housing.

3. Pull the saddle bearing **(30)** back (parallel to driveshaft axis) until the pintle disengages from the housing, then pull the saddle bearing out in the same manner the swashblock was removed.

CONTROL GROUP

NOTE *Refer to CONVERSIONS for flow reversal procedure. If used, note which side of the control cylinder the stroke limiter assembly is on, if used. The control piston spring **(20)** may be under compression.*

1. Remove flow reversing plugs **(8)**.
2. Slowly turn the control end plugs **(17)** with O-rings **(18)** out of the control piston cylinder in the unit housing. If used, remove maximum volume stop assembly **(70** through **76**, and **18)**. Before removing the control piston **(19)** and the control piston spring **(20)**, note which side of the control cylinder they were in.
3. Remove the control piston spring **(20)** and the control piston **(19)** from the control cylinder bore.

INSPECTION

Clean all parts thoroughly and allow them to dry. Inspect all seals and O-rings for hardening, cracking or deterioration. Replace if necessary or if you suspect damage. Check all locating pins for damage and springs for cracking or signs of cracking or signs of wear.

⚠ WARNING

Wear proper protective gear when using solvents or compressed air, servicing or maintaining the hydraulic system or the Oilgear pump. Wear correct protective gear, safety glasses, gloves, and safety shoes. Serious injury can result without proper protective gear.

CONTROL GROUP

Be sure to carefully check control piston spring **(20)** for cracks and/or signs of excessive wear, make sure it does not bind in the control piston **(19)**. Make sure the control piston does not show signs of excessive wear and it slides smoothly in the control cylinder bore. Check **OP2 (68)** to make sure the orifice is not blocked. Replace if necessary or if you suspect damage.

VALVE PLATE GROUP

Inspect the valve plate **(45)** and port plate **(43)** surfaces which mate with each other, and the rear of the cylinder barrel **(38)** for excessive wear (scuffing and polishing are normal). Remove minor defects by lightly stoning the surface with a hard stone which is flat to within 0.001. (0,03 mm).

NOTE *Be sure to stone lightly. Any excessive stoning will remove the hardened surface. If wear or damage is extensive, replace the component(s).*

Check:

- the fit of the control sequence valve spool **(51)** in the port plate. It should move smoothly and freely in the bore.
- the sequence valve spool spring **(53)** for cracks or signs of fatigue. It should also be able to move (compress and decompress) smoothly and freely in the bore.
- and inspect and flush out the PC control cartridge assembly **(55)**. Make sure plunger operates smoothly and the orifices in bottom of plunger is clean and clear.

- adjustable load sense cartridge (if applicable).
- the rear shaft bearing in the valve plate for signs of excessive wear. These bearings are not sold separately. If they are worn, replace the valve plate.

ROTATING GROUP

Inspect cylinder barrel **(38)** piston bores and the face which mate with the port plate **(43)** for wear and scoring. Remove minor defects on the face by lightly stoning or lapping the surface.

Inspect the hydrodynamic cylinder bearing **(35)** for damage and replace if necessary. Check all piston and shoe assemblies **(38)** to be sure they ride properly on the swashblock **(29)**.

NOTE *Be sure to stone lightly. Any excessive stoning will remove the hardened surface. If wear or damage is extensive and defects cannot be removed, replace the cylinder barrel.*

See **Figure 10**. Check each shoe face for nicks and scratches, and the shoe for smooth pivot action on the piston.

NOTE *If one or more piston/shoe assembly needs to be replaced, replace all the piston/shoe assemblies. When installing new piston/ shoe assemblies or the rotating group, make sure the pistons move freely in their respective bores.*

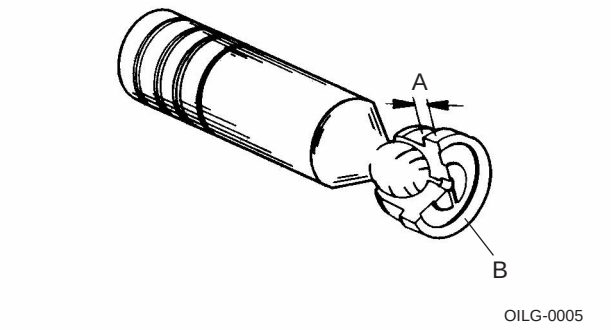


Figure 10. Piston and Shoe Inspection

(A) All shoes must be equal within 0.001 inches (0,025 mm) at this dimension.
(B) All shoe faces must be free of nicks.

NOTE *End play should not to exceed 0.003 inches (0,076 mm) when new or 0.006 inches (0,152 mm) when worn.*

SWASHBLOCK GROUP

Inspect the swashblock **(29)** for wear and scoring. If defects are minor, stone the swashblock lightly. If damage is extensive, replace the swashblock.

NOTE *Be sure to stone lightly. Any excessive stoning will remove the hardened surface. If wear or damage is extensive and defects cannot be removed, replace the swashblock.*

Compare the saddle bearing **(30)** thickness in a worn area to thickness in an unworn area. Replace saddle bearings if the difference is greater than 0.015 inches (0,4 mm).

Check the mating surface of swashblock for cracks or excessive wear. The swashblock movement in the saddle bearings must be smooth. Replace if necessary.

There is a small hole in the swashblock of the saddle bearing (where saddle bearing plugs into pump housing). This hole “ports” fluid through the swashblock to the face of the saddle bearing (providing lubrication). Check this hole to make sure it is open.

NOTE *Be sure to stone lightly. Any excessive stoning will remove the hardened surface. If wear or damage is extensive and defects cannot be removed, replace if necessary or if you suspect them of being bad.*

DRIVESHAFT GROUP

Check:

- the shaft seal **(24)** for deterioration, cracks or its ability to seal. (It should hold its shape when it is pressed.) Replace if necessary (press-out).
- the shaft bearing **(26)** for galling, pitting, binding or roughness.
- the rear shaft bearing **(67** or **77)**.
- the shaft and its splines for wear. Replace any parts necessary.

NOTE *If the driveshaft seal is removed, it can not be reused. It must be replaced.*

ASSEMBLY

NOTE *During reassembly, torque fasteners and plugs to specifications in Table 6. Refer to* ***Table 6, Fasteners and Plugs Torque****.*

See **Figures 11, 12** and **13**. Follow the disassembly procedures in reverse for re-assembling the pump.

During assembly, install new gaskets, seals and O-rings. Apply a thin film of CLEAN grease or hydraulic fluid to sealing components to ease assembly. If a new rotating group is used, lubricate thoroughly with CLEAN hydraulic fluid. Apply fluid generously to all wear surfaces.

CONTROL GROUP

If used,

1. Install control piston **(19)** into control cylinder bore.
2. Install control piston spring **(20)** into control piston.
3. Install spring side of control end plugs **(17)** into housing with O-ring **(18)** installed. Start with one to two turns.
4. If used, assemble the maximum volume stop components.
5. Complete installation of control end plugs: torque piston side plug and then torque plugs to 350 ft•lbs (475 N•m).

SWASHBLOCK GROUP

If removed,

1. Press new driveshaft seal **(24)** flush and flat into pump housing.
2. Working through the bore for the housing cover (33), insert the saddle bearing **(30)** in the pump housing so the integral pintle engages the hole in the housing.
3. Place the control pin **(31)** in the swashblock **(29)** in a position to engage the slot in the control piston. Again, reaching through the bore for the housing cover, insert the pin into the control piston slot. Make sure the raised surface of the swashblock is received by the indented surface of the saddle bearing as you push the swashblock **(29)** against the saddle bearing. Visually, be sure the holes (to receive the driveshaft) are aligned with the center of the hole in the pump housing for the driveshaft.
4. Place housing cover **(33)** with O-ring **(32)** in place and secure with socket head cap screws **(34)**.

DRIVESHAFT GROUP

1. Place seal retainer **(25)** in its bore.
2. Lubricate the driveshaft assembly **(21)** and the shaft seal **(24)**.
3. Insert the driveshaft assembly **(21)** through the shaft seal **(24)**, into the case, through the hole in the saddle bearing and swashblock until the front driveshaft bearing bottoms in its bore. Lock in place with bearing retainer ring **(28)**.

ROTATING GROUP

1. Install the hydrodynamic cylinder bearing **(35)** into the pump housing. Lock in place with cylinder bearing retainer ring **(37)** and socket head cap screw **(36)** and lock washer **(5)** if used.

NOTE *The ends of retaining ring must be in the groove machined in housing* ***(1)****.*

See **Figure 9.**

2. Place the cylinder barrel **(38)**, wear surface down, on a clean cloth.
3. Place the shoe retainer spring **(42)** in the center of the barrel with the fulcrum ball **(41)** on top of it.
4. Insert the identified pistons **(39)** into their corresponding identified holes of the shoe retainer plate **(40)**. As a unit, fit the pistons into their corresponding, identified bores in the cylinder barrel. **DO NOT FORCE.** If everything is aligned properly, the pistons will fit smoothly.

⚠ WARNING

The rotating group weight may be heavy. Be careful not to damage cylinder wear surface which mates against the valve plate, bearing diameters or piston shoes. Use proper lifting techniques and assistance from others to prevent personal injury.

The rotating group can now be carefully installed over the tail of the driveshaft **(21)** and into the pump housing **(1)**.

NOTE *When installing the rotating group, support the weight of the cylinder barrel **(38)**, as cylinder spline is passed over the tailshaft, to avoid scratching or damage.*

5. Push cylinder forward until the cylinder spline reaches the driveshaft spline and rotate slightly to engage shaft splines. Continue to slide cylinder forward until it encounters the hydrodynamic cylinder bearing **(35)**. Lifting the tailshaft slightly helps the cylinder barrel **(38)** and the hydrodynamic cylinder bearing **(35)** engagement. Continue pushing the cylinder forward until the piston shoes assemblies **(39)** contact the swashblock, the back of the cylinder should be located approximately 0.15 inches (3,8 mm) outside the back of the pump housing.

The pump housing assembly is now ready to receive the valve plate group.

VALVE PLATE GROUP

CAUTION

Use extreme care not to damage the faces of the valve plate and matching faces of both the valve plate and cylinder barrel.

1. If removed, install roll pins **(12)** in pump housing **(1)**. Install O-rings **(13** and **14)** in pump housing.

2. Install the PC control cartridge **(55)** and adjustable load sense cartridge (if used) into the valve plate. Torque as specified in Table 5.

NOTE *The PC control cartridge and adjustable load sense cartridge must be torqued as specified in Table 6. Refer to **Table 6, Fasteners and Plugs Torque**.*

3. Slide (narrow end first) of the control sequence spool **(54)** into its bore in the valve plate.

4. Place sequence valve spool spring **(53)** into the counter bore of the control sequence valve and secure by screwing the sequence valve spool plug **(51)** with the O-ring **(52)** into place.

When used, install rear shaft coupling **(57)** with retainer rings **(58)**, if used, in place on the driveshaft before installing valve plate group assembly to pump housing **(1)**.

5. Place port plate **(43)** on the face of the valve plate **(45)**. The port plate will be located by the rear shaft bearing and “clocked” by a dowel pin (pressed into the valve plate face).

6. Apply oil on port plate **(43)**.

⚠ WARNING

Seek assistance from others and use of a hoist and/or proper lifting techniques to prevent personal injury.

NOTE *Make sure O-rings **(13)** and **(14)** are in place.*

7. The valve plate **(45)** group can now be carefully installed over the tail of driveshaft **(21)** and slide up to mate with the pump housing **(1)**. The roll pins **(12)** should engage matching bores in the valve plate assembly.

8. Finger tighten the socket head cap screws **(50** and or **56)** and then alternately tighten down.

For convertible thru-shaft units,

9. Place thru-shaft coupling spacer **(60)** and washer **(58)** if used on the end of shaft and secure with screw **(61)**.

10. Install O-ring **(62)** in thru-shaft convertible cover **(63)** and tighten to backside of valve plate with screw **(64)**.

For thru-shaft coupled units,

9. Place the rear shaft-coupling and other components on the rear of the driveshaft.

10. Install O-rings and adaptors as required. Secure rear unit to the valve plate group with screws **(78)** and lock washers **(79)**.

CONVERSIONS

Left Hand to Right Hand Drive or Vice Versa

Refer to **Figures 11 through 14** for the proper positions for either left hand or right hand rotation.

To convert a pump built for right hand (clockwise) driven rotation to a pump for left hand (counter-clockwise) drive, or vice versa, follow these four steps:

1. The position of the two flow reversing plug assemblies **(8, 9, 10** and **11)**, and the two SAE plugs **(6)** with O-rings **(7)**, will have to be interchanged.
2. Reverse the orientation of the control piston **(19)** and control piston spring **(20)**.

NOTE *If an optional maximum volume stop assembly **(70, 71, 72, 73, 74,75, 76** and **18)** is used, it must be switched with control plug assembly **(17** and **18)**.*

3. The valve plate assembly **(45)** must be removed and the port plate **(43)** replaced with a port plate manufactured for the new rotation direction.
4. Change the type designation on the unit's nameplate **(65)** accordingly.

Unit	Fastener or Plug	Torque	Head Type/Size
SAE “A” Frame PVM-011 PVM-014 PVM-022	Valve Plate Screws (items 50 and 56)	45 ft•lb (61 N•m)	8mm Internal Hex
	Housing Cover Screws (item 34)	140 in•lb (16 N•m)	5mm Internal Hex
	Control End Plugs (items 17 and 73)	350 ft•lb (475 N•m)	1-7/8” External Hex
	Max Volume Stop Bonnet (item 74)	85 ft•lb (115 N•m)	1-1/4” External Hex
	SAE #2 Plug (item 3)	45 in•lb (5 N•m)	1/8” Internal Hex
	SAE #4 Plug (items 6 and 48)	120 in•lb (13,5 N•m)	3/16” Internal Hex
	Flow Reversing Plug (item 8)	220 in•lb (25 N•m)	9/16” External Hex
	Sequence Spool Plug (item 51)	220 in•lb (25 N•m)	9/16” External Hex
	Pressure Compensator Control Cartridge (item 55)	35-40 ft•lb (47-54 N•m)	24mm External Hex
	Load Sense Control Cartridge (item 83)	35-40 ft•lb (47-54 N•m)	22mm External Hex
	Electronic Proportional Control Cartridge (item 94)	20-25 ft•lb (27-34 N•m)	1” External Hex
	Pressure Overridge Control Cartridge (item 93)	22-26 ft•lb (30-35 N•m)	21mm External Hex
	Tandem Cover Screws (item 64)	87 in•lb (10 N•m)	4mm Internal Hex
SAE “B” Frame PVM-025 PVM-034 PVM-046 PVM-065 PVM-075	Valve Plate Screws (items 50 and 56)	75 ft•lb (102 N•m)	10mm Internal Hex
	Housing Cover Screws (item 34)	220 in•lb (25 N•m)	6mm Internal Hex
	Control End Plugs (items 17 and 73)	350 ft•lb (475 N•m)	2-1/2” External Hex
	SAE #2 Plug (item 3)	45 in•lb (5 N•m)	1/8” Internal Hex
	SAE #4 Plug (items 6 and 48)	120 in•lb (13,5 N•m)	3/16” Internal Hex
	Flow Reversing Plug (item 8)	220 in•lb (25 N•m)	9/16” External Hex
	Sequence Spool Plug (item 51)	260 in•lb (30 N•m)	5/8” External Hex
	PC Pressure Cartridge (item 55)	35-40 ft•lb (47-54 N•m)	24mm External Hex
	Load Sense Control Cartridge (item 83)	35-40 ft•lb (47-54 N•m)	22mm External Hex
	Cavity Plug (item 84)	35-40 ft•lb (47-54 N•m)	22mm External Hex
	Electronic Proportional Control Cartridge (item 94)	20-25 ft•lb (27-34 N•m)	1” External Hex
	Pressure Overridge Control Cartridge (item 93)	22-26 ft•lb (30-35 N•m)	21mm External Hex
	Hydrobearing Anti-Rotation Screw (item 36)	140 in•lb (16 N•m)	3/16” Internal Hex
	Tandem Cover Screws (item 64)	220 in•lb (25 N•m)	6mm Internal Hex
	SAE “A” Adaptor Screws (item 81)	220 in•lb (25 N•m)	6mm Internal Hex
SAE “C” Frame PVM-064 PVM-076 PVM-098 PVM-130	Valve Plate Screws (items 50 and 56)	130 ft•lb (176 N•m)	14mm Internal Hex
	Housing Cover Screws (item 34)	45 ft•lb (61 N•m)	8mm Internal Hex
	Control End Plugs (items 17, 73, and 91)	350 ft•lb (475 N•m)	2-3/4” External Hex
	SAE #2 Plug (item 3)	45 in•lb (5 N•m)	1/8” Internal Hex
	SAE #3 Plug (item 46)	45 in•lb (5 N•m)	1/8” Internal Hex
	SAE #4 Plug (items 6 and 48)	120 in•lb (13,5 N•m)	3/16” Internal Hex
	Flow Reversing Plug (item 8)	220 in•lb (25 N•m)	9/16” External Hex
	Sequence Spool Plug (item 51)	320 in•lb (36 N•m)	11/16” External Hex
	PC Pressure Cartridge (item 55)	35-40 ft•lb (47-54 N•m)	24mm External Hex
	Load Sense Control Cartridge (item 80)	35-40 ft•lb (47-54 N•m)	22mm External Hex
	Cavity Plug (item 84)	35-40 ft•lb (47-54 N•m)	22mm External Hex
	Electronic Proportional Control Cartridge (item 94)	20-25 ft•lb (27-34 N•m)	1” External Hex
	Pressure Overridge Control Cartridge (item 93)	22-26 ft•lb (30-35 N•m)	21mm External Hex
	Hydrobearing Anti-Rotation Screw (item 36)	220 in•lb (25 N•m)	6mm Internal Hex
	Tandem Cover Screws (item 64)	220 in•lb (25 N•m)	6mm Internal Hex
	SAE “A” Adaptor Screws (item 81)	220 in•lb (25 N•m)	6mm Internal Hex

Table 6. Fasteners and Plugs Torque

O-Ring Sizes

Item Number	ARP 568 Size Number	Applies to PVM Model(s):
4	902-90	All
7	904-90	All
9	904-90	All
10	008-90	All
13	242-90 252-90 260-90	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075 PVM-064/-076/-098/-130
14	010-90 012-90 013-90	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075 PVM-064/-076/-098/-130
15	908-90 912-90	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075/-064/-076/-098/-130
18	920-90 138-90 See Note	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075 PVM-076/-098/-130
32	151-90 156-90 159-90	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075 PVM-064/-076/-098/-130
47	902-90 903-90	PVM-011/-014/-022/-025/-034/-046/-065/-075 PVM-064/-076/-098/-130
52	904-90 905-90 906-90	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075 PVM-064/-076/-098/-130
59	042-70 042-70 155-70 042-70 155-70 049-70	PVM-011/-014/-022 to SAE “A” Tandem PVM-025/-034/-046/-065/-075 to SAE “A” Tandem PVM-025/-034/-046/-065/-075 to SAE “B” Tandem PVM-064/-076/-098/-130 to SAE “A” Tandem PVM-064/-076/-098/-130 to SAE “B” Tandem PVM-064/-076/-098/-130 to SAE “C” Tandem
62	028-70 138-70	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075/-064/-076/-098/-130
67	912-90	PVM-011/-014/-022
72	014-90 117-90 121-90	PVM-011/-014/-022 PVM-025/-034/-046/-065/-075 PVM-064/-076/-098/-130
82	153-70 158-70 153-70 158-70	PVM-025/-034/-046/-065/-075 to SAE “A” Tandem PVM-025/-034/-046/-065/-075 to SAE “B” Tandem PVM-064/-076/-098/-130 to SAE “A” Tandem PVM-064/-076/-098/-130 to SAE “B” Tandem
85	910-90	All
86	014-90	All
88	908-90	All
89	012-90	All
92	932-90	PVM-064

NOTE: Metric O-ring, 55 mm ID x 2.5 mm, 75 durometer

PARTS LIST

Parts used in these assemblies are per Oilgear specifications. Use only Oilgear parts to ensure compatibility with assembly requirements. When ordering replacement parts, be sure to include pump type and serial number, bulletin number and item number. Specify type of hydraulic fluid to assure seal and packing compatibility.

NOTE *Parts drawings may not be identical to Oilgear drawings referenced.*

Item	Qty.	Description
		HOUSING ASSEMBLY GROUP
1	1	Housing, Pump
3	*	Plug ①
4	*	O-Ring ②
5	1	Washer, Lock
6	3	Plug
7	3	O-Ring
8	2	Plug, Flow Reversing
9	2	O-Ring
10	2	O-Ring
11	4	Ring, Backup
12	2	Pin, Roll
13	1	O-Ring
14	2	O-Ring
15	1	Plug
16	1	O-Ring
17	2	Plug, Control End w/o Volume Stop
18	2	O-Ring
19	1	Piston, Control
20	1	Spring, Control Piston
24	1	Seal, Shaft
30	1	Bearing, Saddle
32	1	O-Ring
33	1	Cover, Housing
34	4	Screw, Socket Head
35	1	Bearing, Hydrodynamic
36	1	Screw, Socket Head
37	1	Retaining Ring, Hydrobearing
65	1	Nametag
66	2	Screw
67	1	O-Ring
70	1	Stem, Max. Volume Stop
71	1	Ring, Backup
72	1	O-Ring
73	1	Plug, Control End w/ Volume Stop
74	1	Spacer, Max. Volume Stop
75	1	Screw, Socket Head
76	1	Nut, Jam
77	1	Bonnet, Max. Volume Stop
91	1	Plug, Control End
92	1	O-Ring

* Quantity as noted

① -011/-014/-022 2
-025/-034/-046/-065/-075 4
-064/-076/-098/-130 4

② -011/-014/-022 2
-025/-034/-046/-065/-075 4
-064/-076/-098/-130 4

Item	Qty.	Description
		ROTATING GROUP ASSEMBLY
38	1	Barrel, Cylinder
39	*	Assembly, Piston/Shoe ①
40	1	Retainer, Shoe
41	1	Ball, Fulcrum
42	1	Spring, Shoe Retainer
		SWASHBLOCK ASSEMBLY GROUP
29	1	Swashblock
31	1	Pin, Control

① -011/-014/-022 7
-025/-034/-046/-065/-075 9
-064/-076/-098/-130 9

* Quantity as noted

PARTS LIST, Figures 11 through 15.

Parts are common between pumps. Only the differences are shown.

Item	Qty.	Description
		DRIVESHAFT ASSEMBLY GROUP
21	1	Shaft
22	1	Key
23	1	Key
25	1	Retainer, Seal
26	1	Bearing, Front Driveshaft
27	1	Retaining Ring, Shaft
28	1	Retaining Ring, Bearing
		VALVE PLATE ASSEMBLY GROUP
3	*	Plug ①
4	*	O-Ring ①
43	1	Port Plate
44	1	Pin, Dowel
45	1	Valve Plate
46	1	Plug
47	1	O-Ring
48	3	Plug
49	3	O-Ring
50	3	Screw, Socket Head
51	1	Plug, Sequence Spool
52	1	O-Ring
53	1	Spring, Sequence Spool
54	1	Spool, Sequence
55	1	PC Control Cartridge
56	1	Screw, Socket Head
57	1	Coupling
58	1	Bushing Retainer
59	1	O-Ring
60	1	Washer, Lock
61	1	Screw, Socket Head
62	1	O-Ring
63	1	Cover, Convertible
64	4	Screw, Socket Head
68	1	Plug, Orifice (OP2) Refer to Table 6.
69	1	Plug, NPTF 0.062
78	2	Screw, Socket Head
79	2	Washer
80	1	Adaptor
81	4	Screw, Socket Head
82	1	O-Ring
83	1	Cartridge, Adjustable LS
84	1	Plug, Cavity
85	1	O-Ring
86	1	O-Ring
87	1	Backup Ring
88	1	O-Ring
89	1	O-Ring
90	1	Backup Ring

① -011/-014/-022/-025/-034/-046/-065/-075 . . . 0
-064/-076/-098/-130 8

* Quantity as noted

PARTS LIST, Figures 11 through 15.

Parts are common between pumps. Only the differences are shown.

Parts used in this assembly are per Oilgear specifications. Use only Oilgear parts to ensure the compatibility with the assembly requirements. When ordering replacement parts, be sure to include pump type and serial number, bulletin number and item number. To assure seal and packing compatibility, specify type of hydraulic fluid.

SERVICE KITS

Document Number: 519272-SK1

Revision: 2 (12/21/04)

PVM-011/-014/-022 Service Kits

Reference 519272-104 Ass'y Drwg
SERVICE KIT, Figures 11 and 15

Description	Kit No.	Items Included in Kit
Housing Kits		
Standard (Nitrile Seals)	L519064-120	1, 3(2), 4(2), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
High Temp. (Viton Seals)	L519064-121	1, 3(2), 4(2), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Skydrol (EPR Seals)	L519064-122	1, 3(2), 4(2), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Control Piston Kits		
w/o Max. Volume Stop (Standard or High Temp.)	L319976-101	17(2), 18(2), 19, 20, 31
w/ Max. Volume Stop (Standard or High Temp.)	L319976-102	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 74, 75, 76
w/o Max. Volume Stop (Skydrol)	L319976-103	17(2), 18(2), 19, 20, 31
w/ Max. Volume Stop (Skydrol)	L319976-104	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 74, 75, 76
Note: Viton seals are used for both standard & high temperature units for the Control Piston Kits		
Shaft & Bearing Kits		
Standard or High Temp.		
3/4" Dia. Keyed (Code Y) Standard	K408362-113	21C, 23, 25, 26, 27, 28
7/8" Dia. Keyed (Code B) Standard	K408362-111	21A, 22, 25, 26, 27, 28
9T, 16/32 Spline (Code S) Standard	K408362-115	21E, 25, 26, 27, 28
13T, 16/32 Spline (Code C) Standard	K408362-117	21G, 25, 26, 27, 28
3/4" Dia. Keyed (Code Y) T-S	K408362-114	21D, 23, 25, 26, 27, 28
7/8" Dia. Keyed (Code B) T-S	K408362-112	21B, 22, 25, 26, 27, 28
9T, 16/32 Spline (Code S) T-S	K408362-116	21F, 25, 26, 27, 28
13T, 16/32 Spline (Code C) T-S	K408362-118	21H, 25, 26, 27, 28
Skydrol		
3/4" Dia. Keyed (Code Y) Standard	K408362-133	21C, 23, 25, 26, 27, 28
7/8" Dia. Keyed (Code B) Standard	K408362-131	21A, 22, 25, 26, 27, 28
9T, 16/32 Spline (Code S) Standard	K408362-135	21E, 25, 26, 27, 28
13T, 16/32 Spline (Code C) Standard	K408362-137	21G, 25, 26, 27, 28
3/4" Dia. Keyed (Code Y) T-S	K408362-134	21D, 23, 25, 26, 27, 28
7/8" Dia. Keyed (Code B) T-S	K408362-132	21B, 22, 25, 26, 27, 28
9T, 16/32 Spline (Code S) T-S	K408362-136	21F, 25, 26, 27, 28
13T, 16/32 Spline (Code C) T-S	K408362-138	21H, 25, 26, 27, 28
Standard = Rear ported or Side ported w/o thru-shaft, T-S = Side ported w/ thru-shaft		
Swashblock & Control Pin Kit		
All	L408361-106	29, 31
Saddle Bearing		
Standard	408355-105	30
High Temp. & Skydrol	408355-104	30
Hydrodynamic Bearing Kit		
All	L51296-001	35, 36, 37
Rotating Group		
PVM-011	L50052-8C	38, 39, 40, 41, 42
PVM-014	L50052-7C	38, 39, 40, 41, 42
PVM-022	L50053-7C	38, 39, 40, 41, 42
Control Pin		
All	251624-101	31

PVM-011/-014/-022 Service Kits

Reference 519272-104 Ass'y Drwg
SERVICE KIT, Figures 11 and 15

Document Number: 519272-SK1

Revision: 2 (12/21/04)

Description	Kit No.	Items Included in Kit
Valve Plate Kits		
PVM-011 Rear Port		
Standard (Nitrile Seals)	K519095-101	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-102	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-103	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-011 Side Port		
Standard (Nitrile Seals)	K519095-104	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-105	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-106	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-011 Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-107	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-108	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-109	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-014 Rear Port		
Standard (Nitrile Seals)	K519095-110	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-111	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-112	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-014 Side Port		
Standard (Nitrile Seals)	K519095-113	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-114	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-115	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-014 Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-116	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-117	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-118	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-022 Rear Port		
Standard (Nitrile Seals)	K519095-119	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-120	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-121	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-022 Side Port		
Standard (Nitrile Seals)	K519095-122	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-123	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-124	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-022 Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-125	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-126	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-127	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-011 Rear Port w/ Adj LS		
Standard (Nitrile Seals)	K519095-128	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-129	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-130	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-011 Side Port w/ Adj LS		
Standard (Nitrile Seals)	K519095-131	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-132	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-133	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-011 Side Port, Thru-Shaft w/ Adj LS		
Standard (Nitrile Seals)	K519095-134	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-135	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-136	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-014 Rear Port w/ Adj LS		
Standard (Nitrile Seals)	K519095-137	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-138	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-139	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69

PVM-011/-014/-022 Service Kits

Reference 519272-104 Ass'y Drwg
SERVICE KIT, Figures 11 and 15

Document Number: 519272-SK1

Revision: 2 (12/21/04)

Description	Kit No.	Items Included in Kit
PVM-014 Side Port w/ Adj LS		
Standard (Nitrile Seals)	K519095-140	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-141	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-142	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-014 Side Port, Thru-Shaft w/ Adj LS		
Standard (Nitrile Seals)	K519095-143	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-144	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-145	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-022 Rear Port w/ Adj LS		
Standard (Nitrile Seals)	K519095-146	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-147	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-148	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-022 Side Port w/ Adj LS		
Standard (Nitrile Seals)	K519095-149	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-150	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-151	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-022 Side Port, Thru-Shaft w/ Adj LS		
Standard (Nitrile Seals)	K519095-152	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-153	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-154	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Port Plate		
PVM-011 LH	519069-115	43
PVM-011 RH	519069-116	43
PVM-014 LH	519069-117	43
PVM-014 RH	519069-118	43
PVM-022 LH	519069-119	43
PVM-022 RH	519069-120	43
Max. Volume Stop		
Standard or High Temp. (Viton Seals)	L319987-105	18, 70, 71, 72, 73, 74, 75, 76
Skydrol (EPR Seals)	L319987-106	18, 70, 71, 72, 73, 74, 75, 76
Housing Cover Kits		
Standard (Nitrile Seals)	L319977-101	32, 33, 34(4)
High Temp. (Viton Seals)	L319977-102	32, 33, 34(4)
Skydrol (EPR Seals)	L319977-103	32, 33, 34(4)
Basic Seal Kit		
Standard (Nitrile Seals)	L250667-104	4(2), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
High Temp. (Viton Seals)	L250667-105	4(2), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
Skydrol (EPR Seals)	L250667-106	4(2), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
Seal Kits for Options		
Pressure Compensator Cartridge		
Standard (Nitrile Seals)	L250667-004	81, 82, 83(2)
High Temp. (Viton Seals)	L250667-005	81, 82, 83(2)
Skydrol (EPR Seals)	L250667-006	81, 82, 83(2)
Adjustable Load Sense Cartridge		
Standard (Nitrile Seals)	L250667-007	84, 85, 86
High Temp. (Viton Seals)	L250667-008	84, 85, 86
Skydrol (EPR Seals)	L250667-009	84, 85, 86

PVM-011/-014/-022 Service Kits

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SERVICE KIT, Figures 11 and 15

Document Number: 519272-SK1

Revision: 2 (12/21/04)

Description	Kit No.	Items Included in Kit
Max. Volume Stop Option		
Standard or High Temp.	L250667-107	71, 72, 75
Skydrol (EPR Seals)	L250667-108	71, 72, 75
Standard Cover Plate		
Standard (Nitrile Seals)	233370-028	62
High Temp. (Viton Seals)	238270-028	62
Skydrol (EPR Seals)	242080-028	62
SAE "A" Adaptor		
Standard (Nitrile Seals)	233370-042	59
High Temp. (Viton Seals)	238270-042	59
Skydrol (EPR Seals)	242080-042	59
Shaft Seal		
Standard (Nitrile Seals)	251674-101	24
High Temp. (Viton Seals)	51154-5	24
Skydrol (EPR Seals)	51154-9	24
Cover Plate Kit		
Standard (Nitrile Seals)	L319990-110	57A, 58(2), 60, 61, 62, 63, 64(4)
High Temp. (Viton Seals)	L319990-113	57A, 58(2), 60, 61, 62, 63, 64(4)
Skydrol (EPR Seals)	L319990-116	57A, 58(2), 60, 61, 62, 63, 64(4)
SAE "A" Adaptor Kit		
Standard (Nitrile Seals)	L319990-111	57A, 58(2), 59, 78(2), 79(2)
High Temp. (Viton Seals)	L319990-114	57A, 58(2), 59, 78(2), 79(2)
Skydrol (EPR Seals)	L319990-117	57A, 58(2), 59, 78(2), 79(2)
SAE "AA" Adaptor Kit		
Standard (Nitrile Seals)	L319990-112	57B, 59, 78(2), 79(2)
High Temp. (Viton Seals)	L319990-115	57B, 59, 78(2), 79(2)
Skydrol (EPR Seals)	L319990-118	57B, 59, 78(2), 79(2)
Piston & Shoe Sub-Assembly		
PVM-011	L51363-900	39(7)
PVM-014	L50021-900	39(7)
PVM-022	L50021-901	39(7)
Shoe Retainer & Fulcrum Ball		
PVM-011& -014	L50002-3	40, 41
PVM-022	L50019-3	40, 41
Sequence Spool & Spring		
All	L319959-101	53, 54
Rotation Conversion Plug		
Standard (Nitrile Seals)	L251640-101	8, 9, 10, 11(2)
High Temp. (Viton Seals)	L251640-102	8, 9, 10, 11(2)
Skydrol (EPR Seals)	L251640-103	8, 9, 10, 11(2)
Name Tag & Screws		
All	L50921	65, 66(2)

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SERVICE KIT, Figures 11 and 15

Document Number: 519272-SK1

Revision: 2 (12/21/04)

Description	Kit No.	Items Included in Kit
Pressure Compensator Cartridge		
Standard or High Temp.	320067-001	55, 81, 82, 83(2)
Skydrol	320067-014	55, 81, 82, 83(2)
Load Sense Cartridge		
Standard or High Temp.	320067-002	80, 84, 85, 86
Skydrol	L320067-002	80, 84, 85, 86
Electronic Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-007	85, 86, 87(2), 94
24 VDC Coil	320067-011	85, 86, 87(2), 94
Electronic Inverse Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-008	85, 86, 87(2), 94
24 VDC Coil	320067-012	85, 86, 87(2), 94
Load Sense Cartridge (w/ Internal Bleed-Off)		
Standard or High Temp.	320067-005	83, 88, 89, 90
Electronic Proportional Override Cartridge		
Standard or High Temp.	320067-006	88, 89, 90, 93

PVM-025/-034/-046 Service Kits

Reference 519272-201 Ass'y Drwg
SERVICE KIT, Figures 12 and 15

Document Number: 519272-SK2

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Housing Kits		
Standard (Nitrile Seals)	L519064-204	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
High Temp. (Viton Seals)	L519064-205	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Skydrol (EPR Seals)	L519064-206	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Control Piston Kits		
w/o Max. Volume Stop (Standard or High Temp.)	L319976-201	17(2), 18(2), 19, 20, 31
w/ Max. Volume Stop (Standard or High Temp.)	L319976-202	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 75, 76
w/o Max. Volume Stop (Skydrol)	L319976-203	17(2), 18(2), 19, 20, 31
w/ Max. Volume Stop (Skydrol)	L319976-204	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 75, 76
Note: Viton seals are used for both standard & high temperature units for the Control Piston Kits		
Shaft & Bearing Kits		
Standard & High Temp.		
0.875" Dia. Keyed (Code Y) Standard	K408362-201	21C, 23, 25, 26, 27, 28
1.00" Dia. Keyed (Code B) Standard	K408362-205	21A, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) Standard	K408362-203	21E, 25, 26, 27, 28
15T, 16/32 Spline (Code C) Standard	K408362-207	21G, 25, 26, 27, 28
0.875" Dia. Keyed (Code Y) T-S	K408362-202	21D, 23, 25, 26, 27, 28
1.00" Dia. Keyed (Code B) T-S	K408362-206	21B, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) T-S	K408362-204	21F, 25, 26, 27, 28
15T, 16/32 Spline (Code C) T-S	K408362-208	21H, 25, 26, 27, 28
Skydrol		
0.875" Dia. Keyed (Code Y) Standard	K408362-211	21C, 23, 25, 26, 27, 28
1.00" Dia. Keyed (Code B) Standard	K408362-215	21A, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) Standard	K408362-213	21E, 25, 26, 27, 28
15T, 16/32 Spline (Code C) Standard	K408362-217	21G, 25, 26, 27, 28
0.875" Dia. Keyed (Code Y) T-S	K408362-212	21D, 23, 25, 26, 27, 28
1.00" Dia. Keyed (Code B) T-S	K408362-216	21B, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) T-S	K408362-214	21F, 25, 26, 27, 28
15T, 16/32 Spline (Code C) T-S	K408362-218	21H, 25, 26, 27, 28
Standard = Rear ported or Side ported w/o thru-shaft, T-S = Side ported w/ thru-shaft		
Rotating Group		
PVM-025	L50167-14	38, 39, 40, 41, 42
PVM-034	L50167-7	38, 39, 40, 41, 42
PVM-046	L50168-7	38, 39, 40, 41, 42
Swashblock & Control Pin Kit		
All	L408361-201	29, 31
Saddle Bearing		
Standard	408355-202	30
High Temp. & Skydrol	408355-201	30
Hydrodynamic Bearing Kit		
All	L51297-001	5, 35, 36, 37
Control Pin		
All	251624-201	31

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SERVICE KIT, Figures 12 and 15

Description	Kit No.	Items Included in Kit
Valve Plate Kits		
PVM-025 Flange Rear Port		
Standard (Nitrile Seals)	K519095-201	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-202	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-203	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-025 Flange Side Port		
Standard (Nitrile Seals)	K519095-204	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-205	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-206	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-025 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-207	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-208	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-209	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-025 SAE Rear Port		
Standard (Nitrile Seals)	K519095-210	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-211	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-212	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-025 SAE Side Port		
Standard (Nitrile Seals)	K519095-213	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-214	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-215	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-025 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-216	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-217	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-218	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-034 Flange Rear Port		
Standard (Nitrile Seals)	K519095-219	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-220	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-221	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-034 Flange Side Port		
Standard (Nitrile Seals)	K519095-222	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-223	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-224	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-034 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-225	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-226	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-227	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-034 SAE Rear Port		
Standard (Nitrile Seals)	K519095-228	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-229	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-230	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-034 SAE Side Port		
Standard (Nitrile Seals)	K519095-231	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-232	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-233	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-034 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-234	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-235	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-236	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-046 Flange Rear Port		
Standard (Nitrile Seals)	K519095-237	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-238	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-239	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69

PVM-025/-034/-046 Service Kits

Reference 519272-201 Ass'y Drwg
SERVICE KIT, Figures 12 and 15

Document Number: 519272-SK2

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
PVM-046 Flange Side Port		
Standard (Nitrile Seals)	K519095-240	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-241	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-242	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-046 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-243	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-244	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-245	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-046 SAE Rear Port		
Standard (Nitrile Seals)	K519095-246	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-247	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-248	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-046 SAE Side Port		
Standard (Nitrile Seals)	K519095-249	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-250	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-251	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-046 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-252	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-253	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-254	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Basic Seal Kit		
Standard (Nitrile Seals)	L250667-201	4(4), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
High Temp. (Viton Seals)	L250667-202	4(4), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
Skydrol (EPR Seals)	L250667-203	4(4), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
Seal Kits for Options		
Pressure Compensator or Electronic Proportional Pressure Compensator Cartridge		
Standard (Nitrile Seals)	L250667-004	85, 86, 87(2)
High Temp. (Viton Seals)	L250667-005	85, 86, 87(2)
Skydrol (EPR Seals)	L250667-006	85, 86, 87(2)
Adjustable Load Sense Cartridge or Electronic Proportional Override Cartridge		
Standard (Nitrile Seals)	L250667-007	88, 89, 90
High Temp. (Viton Seals)	L250667-008	88, 89, 90
Skydrol (EPR Seals)	L250667-009	88, 89, 90
Cavity Plug		
Standard (Nitrile Seals)	L250667-010	88, 89, 90(2)
High Temp. (Viton Seals)	L250667-011	88, 89, 90(2)
Skydrol (EPR Seals)	L250667-012	88, 89, 90(2)
Max. Volume Stop Option		
Standard or High Temp. (Viton Seals)	L250667-204	71, 72
Skydrol (EPR Seals)	L250667-205	71, 72
Standard Cover Plate		
Standard (Nitrile Seals)	233370-138	62
High Temp. (Viton Seals)	238270-138	62
Skydrol (EPR Seals)	242080-138	62
SAE "A" Adaptor		
Standard (Nitrile Seals)	L250667-013	59A, 82A
High Temp. (Viton Seals)	L250667-014	59A, 82A
Skydrol (EPR Seals)	L250667-015	59A, 82A

PVM-025/-034/-046 Service Kits

Reference 519272-201 Ass'y Drwg
SERVICE KIT, Figures 12 and 15

Document Number: 519272-SK2

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
SAE "B" Adaptor		
Standard (Nitrile Seals)	L250667-016	59B, 82B
High Temp. (Viton Seals)	L250667-017	59B, 82B
Skydrol (EPR Seals)	L250667-018	59B, 82B
SAE "C" Adaptor		
Standard (Nitrile Seals)	233370-049	59C
High Temp. (Viton Seals)	238270-049	59C
Skydrol (EPR Seals)	242080-049	59C
Shaft Seal		
Standard (Nitrile Seals)	51155-7	24
High Temp. (Viton Seals)	51155-5	24
Skydrol (EPR Seals)	51155-9	24
Port Plate		
PVM-025 LH	519069-201	43
PVM-025 RH	519069-202	43
PVM-034 LH	519069-203	43
PVM-034 RH	519069-204	43
PVM-046 LH	519069-205	43
PVM-046 RH	519069-206	43
Housing Cover Kits		
Standard (Nitrile Seals)	L319977-201	32, 33, 34(4)
High Temp. (Viton Seals)	L319977-202	32, 33, 34(4)
Skydrol (EPR Seals)	L319977-203	32, 33, 34(4)
Cover Plate Kit		
Standard (Nitrile Seals)	L319990-207	57C, 58, 60, 61, 62, 63, 64(4)
High Temp. (Viton Seals)	L319990-208	57C, 58, 60, 61, 62, 63, 64(4)
Skydrol (EPR Seals)	L319990-209	57C, 58, 60, 61, 62, 63, 64(4)
SAE "A" Adaptor Kit		
Standard (Nitrile Seals)	L319990-201	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
High Temp. (Viton Seals)	L319990-202	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
Skydrol (EPR Seals)	L319990-203	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
SAE "B" Adaptor Kit		
Standard (Nitrile Seals)	L319990-204	57B, 59B, 78B(2), 79B(2), 80B, 82B
High Temp. (Viton Seals)	L319990-205	57B, 59B, 78B(2), 79B(2), 80B, 82B
Skydrol (EPR Seals)	L319990-206	57B, 59B, 78B(2), 79B(2), 80B, 82B
Piston & Shoe Sub-Assembly		
PVM-025	L51349-900	39(9)
PVM-034	L50146-900	39(9)
PVM-046	L50175-900	39(9)
Shoe Retainer & Fulcrum Ball		
All	L50132	40, 41
Sequence Spool & Spring		
All	L319959-201	53, 54

PVM-025/-034/-046 Service Kits

Reference 519272-201 Ass'y Drwg
SERVICE KIT, Figures 12 and 15

Document Number: 519272-SK2

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Rotation Conversion Plug		
Standard (Nitrile Seals)	L251640-101	8, 9, 10, 11(2)
High Temp. (Viton Seals)	L251640-102	8, 9, 10, 11(2)
Skydrol (EPR Seals)	L251640-103	8, 9, 10, 11(2)
Name Tag & Screws		
All	L50921	65, 66(2)
Pressure Compensator Cartridge		
Standard or High Temp.	320067-001	55, 85, 86, 87(2)
Skydrol	320067-014	55, 85, 86, 87(2)
Load Sense Cartridge		
Standard or High Temp.	320067-002	83, 88, 89, 90
Skydrol	L320067-002	83, 88, 89, 90
Cavity Plug		
Standard or High Temp.	320067-003	84, 88, 89, 90(2)
Skydrol	L320067-003	84, 88, 89, 90(2)
Max. Volume Stop		
Standard or High Temp. (Viton Seals)	L319987-205	18, 70, 71, 72, 73, 75, 76
Skydrol (EPR Seals)	L319987-206	18, 70, 71, 72, 73, 75, 76
Electronic Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-007	85, 86, 87(2), 94
24 VDC Coil	320067-011	85, 86, 87(2), 94
Electronic Inverse Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-008	85, 86, 87(2), 94
24 VDC Coil	320067-012	85, 86, 87(2), 94
Load Sense Cartridge (w/ Internal Bleed-Off)		
Standard or High Temp.	320067-005	83, 88, 89, 90
Electronic Proportional Override Cartridge		
Standard or High Temp.	320067-006	88, 89, 90, 93

PVM-065/-075 Service Kits

Reference 519272-202 Ass'y Drwg
SERVICE KIT, Figures 13 and 15

Document Number: 519272-SK4

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Housing Kits		
Standard (Nitrile Seals)	L519064-224	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
High Temp. (Viton Seals)	L519064-225	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Skydrol (EPR Seals)	L519064-226	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Control Piston Kits		
w/o Max. Volume Stop (Standard or High Temp.)	L319976-201	17(2), 18(2), 19, 20, 31
w/ Max. Volume Stop (Standard or High Temp.)	L319976-202	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 75, 76
w/o Max. Volume Stop (Skydrol)	L319976-203	17(2), 18(2), 19, 20, 31
w/ Max. Volume Stop (Skydrol)	L319976-204	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 75, 76
Note: Viton seals are used for both standard & high temperature units for the Control Piston Kits		
Shaft & Bearing Kits		
Standard & High Temp.		
1.00" Dia. Keyed (Code Y) Standard	L517104-301	21A, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) Standard	L517104-305	21E, 25, 26, 27, 28
15T, 16/32 Spline (Code C) Standard	L517104-302	21G, 25, 26, 27, 28
1.00" Dia. Keyed (Code Y) T-S	L517104-303	21B, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) T-S	L517104-306	21F, 25, 26, 27, 28
15T, 16/32 Spline (Code C) T-S	L517104-304	21H, 25, 26, 27, 28
Skydrol		
1.00" Dia. Keyed (Code Y) Standard	L517104-313	21A, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) Standard	L517104-315	21E, 25, 26, 27, 28
15T, 16/32 Spline (Code C) Standard	L517104-317	21G, 25, 26, 27, 28
1.00" Dia. Keyed (Code Y) T-S	L517104-312	21B, 22, 25, 26, 27, 28
13T, 16/32 Spline (Code S) T-S	L517104-314	21F, 25, 26, 27, 28
15T, 16/32 Spline (Code C) T-S	L517104-316	21H, 25, 26, 27, 28
Standard = Rear ported or Side ported w/o thru-shaft, T-S = Side ported w/ thru-shaft		
Rotating Group		
PVM-065	L517104-103	38, 39, 40, 41, 42
PVM-075	L517105-103	38, 39, 40, 41, 42
Swashblock & Control Pin Kit		
All	L408361-201	29, 31
Hydrodynamic Bearing Kit		
All	L51297-001	5, 35, 36, 37
Saddle Bearing		
Standard	408355-202	30
High Temp. & Skydrol	408355-201	30
Control Pin		
All	251624-201	31
Valve Plate Kits		
PVM-065 Flange Rear Port		
Standard (Nitrile Seals)	K519095-255	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-256	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-257	13, 14(2), 44, 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 67, 68, 69

PVM-065/-075 Service Kits

Reference 519272-202 Ass'y Drwg
SERVICE KIT, Figures 13 and 15

Document Number: 519272-SK4

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
PVM-065 Flange Side Port		
Standard (Nitrile Seals)	K519095-258	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-259	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-260	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-065 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-261	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-262	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-263	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-065 SAE Rear Port		
Standard (Nitrile Seals)	K519095-264	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-265	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-266	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-065 SAE Side Port		
Standard (Nitrile Seals)	K519095-267	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-268	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-269	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-065 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-270	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-271	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-272	13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-075 Flange Rear Port		
Standard (Nitrile Seals)	K519095-273	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-274	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-275	13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-075 Flange Side Port		
Standard (Nitrile Seals)	K519095-276	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-277	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-278	13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-075 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-279	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-280	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-281	13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-075 SAE Rear Port		
Standard (Nitrile Seals)	K519095-282	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-283	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-284	13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-075 SAE Side Port		
Standard (Nitrile Seals)	K519095-285	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-286	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-287	13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-075 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-288	13, 14(2), 44, 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-289	13, 14(2), 44, 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-290	13, 14(2), 44, 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Basic Seal Kit		
Standard (Nitrile Seals)	L250667-201	4(4), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
High Temp. (Viton Seals)	L250667-202	4(4), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
Skydrol (EPR Seals)	L250667-203	4(4), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52

PVM-065/-075 Service Kits

Reference 519272-202 Ass'y Drwg
SERVICE KIT, Figures 13 and 15

Document Number: 519272-SK4

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Seal Kits for Options		
Pressure Compensator or Electronic Proportional Pressure Compensator Cartridge		
Standard (Nitrile Seals)	L250667-004	85, 86, 87(2)
High Temp. (Viton Seals)	L250667-005	85, 86, 87(2)
Skydrol (EPR Seals)	L250667-006	85, 86, 87(2)
Adjustable Load Sense Cartridge or Electronic Proportional Override Cartridge		
Standard (Nitrile Seals)	L250667-007	88, 89, 90
High Temp. (Viton Seals)	L250667-008	88, 89, 90
Skydrol (EPR Seals)	L250667-009	88, 89, 90
Cavity Plug		
Standard (Nitrile Seals)	L250667-010	88, 89, 90(2)
High Temp. (Viton Seals)	L250667-011	88, 89, 90(2)
Skydrol (EPR Seals)	L250667-012	88, 89, 90(2)
Max. Volume Stop Option		
Standard or High Temp. (Viton Seals)	L250667-204	71, 72
Skydrol (EPR Seals)	L250667-205	71, 72
Standard Cover Plate		
Standard (Nitrile Seals)	233370-138	62
High Temp. (Viton Seals)	238270-138	62
Skydrol (EPR Seals)	242080-138	62
SAE "A" Adaptor		
Standard (Nitrile Seals)	L250667-013	59A, 82A
High Temp. (Viton Seals)	L250667-014	59A, 82A
Skydrol (EPR Seals)	L250667-015	59A, 82A
SAE "B" Adaptor		
Standard (Nitrile Seals)	L250667-016	59B, 82B
High Temp. (Viton Seals)	L250667-017	59B, 82B
Skydrol (EPR Seals)	L250667-018	59B, 82B
Shaft Seal		
Standard (Nitrile Seals)	51155-7	24
High Temp. (Viton Seals)	51155-5	24
Skydrol (EPR Seals)	51155-9	24
Port Plate		
PVM-065 LH	519069-207	43
PVM-065 RH	519069-208	43
PVM-075 LH	519069-209	43
PVM-075 RH	519069-210	43
Housing Cover Kits		
Standard (Nitrile Seals)	L319977-201	32, 33, 34(4)
High Temp. (Viton Seals)	L319977-202	32, 33, 34(4)
Skydrol (EPR Seals)	L319977-203	32, 33, 34(4)
Cover Plate Kit		
Standard (Nitrile Seals)	L319990-210	57C, 58, 60, 61, 62, 63, 64(4)
High Temp. (Viton Seals)	L319990-211	57C, 58, 60, 61, 62, 63, 64(4)
Skydrol (EPR Seals)	L319990-212	57C, 58, 60, 61, 62, 63, 64(4)

PVM-065/-075 Service Kits

Reference 519272-202 Ass'y Drwg
SERVICE KIT, Figures 13 and 15

Document Number: 519272-SK4

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
SAE "A" Adaptor Kit		
Standard (Nitrile Seals)	L319990-213	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
High Temp. (Viton Seals)	L319990-214	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
Skydrol (EPR Seals)	L319990-215	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
SAE "B" Adaptor Kit		
Standard (Nitrile Seals)	L319990-216	57B, 59B, 78B(2), 79B(2), 80B, 82B
High Temp. (Viton Seals)	L319990-217	57B, 59B, 78B(2), 79B(2), 80B, 82B
Skydrol (EPR Seals)	L319990-218	57B, 59B, 78B(2), 79B(2), 80B, 82B
Piston & Shoe Sub-Assembly		
PVM-065	L407905-R65	39(9)
PVM-075	L407905-A75	39(9)
Shoe Retainer & Fulcrum Ball		
PVM-065	L319221-365	40, 41
PVM-075	L319221-375	40, 41
Sequence Spool & Spring		
All	L319959-201	53, 54
Rotation Conversion Plug		
Standard (Nitrile Seals)	L251640-101	8, 9, 10, 11(2)
High Temp. (Viton Seals)	L251640-102	8, 9, 10, 11(2)
Skydrol (EPR Seals)	L251640-103	8, 9, 10, 11(2)
Name Tag & Screws		
All	L50921	65, 66(2)
Pressure Compensator Cartridge		
Standard or High Temp.	320067-001	55, 85, 86, 87(2)
Skydrol	320067-014	55, 85, 86, 87(2)
Load Sense Cartridge		
Standard or High Temp.	320067-002	83, 88, 89, 90
Skydrol	L320067-002	83, 88, 89, 90
Cavity Plug		
Standard or High Temp.	320067-003	84, 88, 89, 90(2)
Skydrol	L320067-003	84, 88, 89, 90(2)
Max. Volume Stop		
Standard or High Temp. (Viton Seals)	L319987-205	18,70, 71, 72, 73, 75, 76
Skydrol (EPR Seals)	L319987-206	18,70, 71, 72, 73, 75, 76
Electronic Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-007	85, 86, 87(2), 94
24 VDC Coil	320067-011	85, 86, 87(2), 94

PVM-065/-075 Service Kits

Reference 519272-202 Ass'y Drwg
SERVICE KIT, Figures 13 and 15

Document Number: 519272-SK4

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Electronic Inverse Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-008	85, 86, 87(2), 94
24 VDC Coil	320067-012	85, 86, 87(2), 94
Load Sense Cartridge (w/ Internal Bleed-Off)		
Standard or High Temp.	320067-005	83, 88, 89, 90
Electronic Proportional Override Cartridge		
Standard or High Temp.	320067-006	88, 89, 90, 93

PVM-064/-076/-098/-130 Service Kits

Reference 519272-302 Ass'y Drwg
SERVICE KIT, Figures 14 and 15

Document Number: 519272-SK3
Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Control Piston Kits		
PVM-064 w/o Max. Volume Stop (Standard or High Temp.)	L319976-305	17, 18, 19, 20, 31, 90, 91
PVM-064 w/ Max. Volume Stop (Standard or High Temp.)	L319976-306	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 74, 75, 76
PVM-064 w/o Max. Volume Stop (Skydrol)	L319976-307	17, 18, 19, 20, 31, 90, 91
PVM-064 w/ Max. Volume Stop (Skydrol)	L319976-308	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 74, 75, 76
PVM-076/-098/-130 w/o Max. Volume Stop (Standard or High Temp.)	L319976-301	17(2), 18(2), 19, 20, 31
PVM-076/-098/-130 w/ Max. Volume Stop (Standard or High Temp.)	L319976-302	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 75, 76
PVM-076/-098/-130 w/o Max. Volume Stop (Skydrol)	L319976-303	17(2), 18(2), 19, 20, 31
PVM-076/-098/-130 w/ Max. Volume Stop (Skydrol)	L319976-304	17, 18(2), 19, 20, 31, 70, 71, 72, 73, 75, 76
Note: Viton seals are used for both standard & high temperature units for the Control Piston Kits		
Shaft & Bearing Kits		
Standard & High Temp.		
1 1/4" Dia. Keyed (Code Y) Standard	K408362-315	21C, 23, 25, 26, 27, 28
1 1/2" Dia. Keyed (Code B) Standard	K408362-311	21A, 22, 25, 26, 27, 28
14T, 12/24 Spline (Code S) Standard	K408362-313	21E, 25, 26, 27, 28
17T, 12/24 Spline (Code C) Standard	K408362-317	21G, 25, 26, 27, 28
1 1/4" Dia. Keyed (Code Y) T-S	K408362-316	21D, 23, 25, 26, 27, 28
1 1/2" Dia. Keyed (Code B) T-S	K408362-312	21B, 22, 25, 26, 27, 28
14T, 12/24 Spline (Code S) T-S	K408362-314	21F, 25, 26, 27, 28
17T, 12/24 Spline (Code C) T-S	K408362-318	21H, 25, 26, 27, 28
Skydrol		
1 1/4" Dia. Keyed (Code Y) Standard	K408362-335	21C, 23, 25, 26, 27, 28
1 1/2" Dia. Keyed (Code B) Standard	K408362-331	21A, 22, 25, 26, 27, 28
14T, 12/24 Spline (Code S) Standard	K408362-333	21E, 25, 26, 27, 28
17T, 12/24 Spline (Code C) Standard	K408362-337	21G, 25, 26, 27, 28
1 1/4" Dia. Keyed (Code Y) T-S	K408362-336	21D, 23, 25, 26, 27, 28
1 1/2" Dia. Keyed (Code B) T-S	K408362-332	21B, 22, 25, 26, 27, 28
14T, 12/24 Spline (Code S) T-S	K408362-334	21F, 25, 26, 27, 28
17T, 12/24 Spline (Code C) T-S	K408362-338	21H, 25, 26, 27, 28
Standard = Rear ported or Side ported w/o thru-shaft, T-S = Side ported w/ thru-shaft		
Valve Plate Kits		
PVM-064/-076 Flange Rear Port		
Standard (Nitrile Seals)	K519095-301	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-302	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-303	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-064/-076 Flange Side Port		
Standard (Nitrile Seals)	K519095-304	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-305	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-306	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-064/-076 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-307	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
High Temp. (Viton Seals)	K519095-308	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Skydrol (EPR Seals)	K519095-309	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69

PVM-064/-076/-098/-130 Service Kits

Document Number: 519272-SK3

Revision: 1 (11/17/04)

Reference 519272-302 Ass'y Drwg
SERVICE KIT, Figures 14 and 15

Description	Kit No.	Items Included in Kit
PVM-064/-076 SAE Rear Port		
Standard (Nitrile Seals)	K519095-310	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-311	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-312	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-064/-076 SAE Side Port		
Standard (Nitrile Seals)	K519095-313	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-314	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-315	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-064/-076 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-316	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
High Temp. (Viton Seals)	K519095-317	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Skydrol (EPR Seals)	K519095-318	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
PVM-098 Flange Rear Port		
Standard (Nitrile Seals)	K519095-319	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-320	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-321	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-098 Flange Side Port		
Standard (Nitrile Seals)	K519095-322	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-323	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-324	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-098 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-325	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
High Temp. (Viton Seals)	K519095-326	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Skydrol (EPR Seals)	K519095-327	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
PVM-098 SAE Rear Port		
Standard (Nitrile Seals)	K519095-328	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-329	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-330	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-098 SAE Side Port		
Standard (Nitrile Seals)	K519095-331	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-332	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-333	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-098 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-334	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
High Temp. (Viton Seals)	K519095-335	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Skydrol (EPR Seals)	K519095-336	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
PVM-130 Flange Rear Port		
Standard (Nitrile Seals)	K519095-337	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-338	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-339	3(8), 4(8), 13, 14(2), 45B, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-130 Flange Side Port		
Standard (Nitrile Seals)	K519095-340	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-341	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-342	3(8), 4(8), 13, 14(2), 45D, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-130 Flange Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-343	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
High Temp. (Viton Seals)	K519095-344	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Skydrol (EPR Seals)	K519095-345	3(8), 4(8), 13, 14(2), 45F, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69

PVM-064/-076/-098/-130 Service Kits

Reference 519272-302 Ass'y Drwg
SERVICE KIT, Figures 14 and 15

Document Number: 519272-SK3

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
PVM-130 SAE Rear Port		
Standard (Nitrile Seals)	K519095-346	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-347	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-348	3(8), 4(8), 13, 14(2), 45A, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-130 SAE Side Port		
Standard (Nitrile Seals)	K519095-349	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
High Temp. (Viton Seals)	K519095-350	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
Skydrol (EPR Seals)	K519095-351	3(8), 4(8), 13, 14(2), 45C, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56, 68, 69
PVM-130 SAE Side Port, Thru-Shaft		
Standard (Nitrile Seals)	K519095-352	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
High Temp. (Viton Seals)	K519095-353	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Skydrol (EPR Seals)	K519095-354	3(8), 4(8), 13, 14(2), 45E, 46, 47, 48(3), 49(3), 50(3), 51, 52, 53, 54, 56(4), 68, 69
Housing Kits		
Standard (Nitrile Seals)	L519064-301	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
High Temp. (Viton Seals)	L519064-302	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Skydrol (EPR Seals)	L519064-303	1, 3(4), 4(4), 6(3), 7(3), 8(2), 9(2), 10(2), 11(4), 12(2), 24
Rotating Group		
PVM-064/-076	L519066-302	38, 39, 40, 41, 42
PVM-098	L516175-001	38, 39, 40, 41, 42
PVM-130	L516275-102	38, 39, 40, 41, 42
Swashblock & Control Pin Kit		
All	L408361-301	29, 31
Hydrodynamic Bearing Kit		
All	L51298-002	5, 35, 36, 37
Saddle Bearing		
Standard	408355-302	30
High Temp. & Skydrol	408355-301	30
Control Pin		
All	251624-301	31
Port Plate		
PVM-064/-076 LH	519069-312	43
PVM-064/-076 RH	519069-313	43
PVM-098 LH	519069-314	43
PVM-098 RH	519069-315	43
PVM-130 LH	519069-316	43
PVM-130 RH	519069-317	43
Housing Cover Kits		
Standard (Nitrile Seals)	L319977-301	32, 33, 34(4)
High Temp. (Viton Seals)	L319977-302	32, 33, 34(4)
Skydrol (EPR Seals)	L319977-303	32, 33, 34(4)

PVM-064/-076/-098/-130 Service Kits

Reference 519272-302 Ass'y Drwg
SERVICE KIT, Figures 14 and 15

Document Number: 519272-SK3

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Piston & Shoe Sub-Assembly		
PVM-064/-076	L51107-900	39(9)
PVM-098	K407812-800	39(9)
PVM-130	K407837-800	39(9)
Shoe Retainer & Fulcrum Ball		
PVM-064/-076	L50071-900	40, 41
PVM-098	L318925-001	40, 41
PVM-130	L318926	40, 41
Sequence Spool & Spring		
All	L319959-301	53, 54
Rotation Conversion Plug		
Standard (Nitrile Seals)	L251640-101	8, 9, 10, 11(2)
High Temp. (Viton Seals)	L251640-102	8, 9, 10, 11(2)
Skydrol (EPR Seals)	L251640-103	8, 9, 10, 11(2)
Name Tag & Screws		
All	L50921	65, 66(2)
PVM-076/-098/-130 Basic Seal Kit		
Standard (Nitrile Seals)	L250667-304	4(12), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
High Temp. (Viton Seals)	L250667-305	4(12), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
Skydrol (EPR Seals)	L250667-306	4(12), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18(2), 24, 32, 47, 49(3), 52
PVM-064 Basic Seal Kit		
Standard (Nitrile Seals)	L250667-309	4(12), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18, 24, 32, 47, 49(3), 52, 92
High Temp. (Viton Seals)	L250667-310	4(12), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18, 24, 32, 47, 49(3), 52, 92
Skydrol (EPR Seals)	L250667-311	4(12), 7(3), 9(2), 10(2), 11(4), 13, 14(2), 16, 18, 24, 32, 47, 49(3), 52, 92
Seal Kits for Options		
Pressure Compensator or Electronic Proportional Pressure Compensator Cartridge		
Standard (Nitrile Seals)	L250667-004	85, 86, 87(2)
High Temp. (Viton Seals)	L250667-005	85, 86, 87(2)
Skydrol (EPR Seals)	L250667-006	85, 86, 87(2)
Adjustable Load Sense Cartridge or Electronic Proportional Override Cartridge		
Standard (Nitrile Seals)	L250667-007	88, 89, 90
High Temp. (Viton Seals)	L250667-008	88, 89, 90
Skydrol (EPR Seals)	L250667-009	88, 89, 90
Cavity Plug		
Standard (Nitrile Seals)	L250667-010	88, 89, 90(2)
High Temp. (Viton Seals)	L250667-011	88, 89, 90(2)
Skydrol (EPR Seals)	L250667-012	88, 89, 90(2)
Max. Volume Stop Option		
Standard or High Temp. (Viton Seals)	L250667-307	71, 72
Skydrol (EPR Seals)	L250667-308	71, 72

PVM-064/-076/-098/-130 Service Kits

Reference 519272-302 Ass'y Drwg
SERVICE KIT, Figures 14 and 15

Document Number: 519272-SK3

Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
Standard Cover Plate		
Standard (Nitrile Seals)	233370-138	62
High Temp. (Viton Seals)	238270-138	62
Skydrol (EPR Seals)	242080-138	62
SAE "A" Adaptor		
Standard (Nitrile Seals)	L250667-013	59A, 82A
High Temp. (Viton Seals)	L250667-014	59A, 82A
Skydrol (EPR Seals)	L250667-015	59A, 82A
SAE "B" Adaptor		
Standard (Nitrile Seals)	L250667-016	59B, 82B
High Temp. (Viton Seals)	L250667-017	59B, 82B
Skydrol (EPR Seals)	L250667-018	59B, 82B
SAE "C" Adaptor		
Standard (Nitrile Seals)	233370-049	59C
High Temp. (Viton Seals)	238270-049	59C
Skydrol (EPR Seals)	242080-049	59C
Shaft Seal		
Standard (Nitrile)	251674-301	24
High Temp. (Viton)	51156-5	24
Skydrol (EPR)	51156-9	24
Cover Plate Kit		
Standard (Nitrile Seals)	L319990-310	57D, 58, 60, 61, 62, 63, 64(4)
High Temp. (Viton Seals)	L319990-311	57D, 58, 60, 61, 62, 63, 64(4)
Skydrol (EPR Seals)	L319990-312	57D, 58, 60, 61, 62, 63, 64(4)
SAE "A" Adaptor Kit		
Standard (Nitrile Seals)	L319990-301	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
High Temp. (Viton Seals)	L319990-302	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
Skydrol (EPR Seals)	L319990-303	57A, 59A, 78A(2), 79A(2), 80A, 81(4), 82A
SAE "B" Adaptor Kit		
Standard (Nitrile Seals)	L319990-304	57B, 59B, 78B(2), 79B(2), 80B, 82B
High Temp. (Viton Seals)	L319990-305	57B, 59B, 78B(2), 79B(2), 80B, 82B
Skydrol (EPR Seals)	L319990-306	57B, 59B, 78B(2), 79B(2), 80B, 82B
SAE "C" Adaptor Kit		
Standard (Nitrile Seals)	L319990-307	57C, 59C, 78C(2), 79C(2)
High Temp. (Viton Seals)	L319990-308	57C, 59C, 78C(2), 79C(2)
Skydrol (EPR Seals)	L319990-309	57C, 59C, 78C(2), 79C(2)
Pressure Compensator Cartridge		
Standard or High Temp.	320067-001	55, 85, 86, 87(2)
Skydrol	320067-014	55, 85, 86, 87(2)
Load Sense Cartridge		
Standard or High Temp.	320067-002	83, 88, 89, 90
Skydrol	L320067-002	83, 88, 89, 90
Cavity Plug		
Standard or High Temp.	320067-003	84, 88, 89, 90(2)
Skydrol	L320067-003	84, 88, 89, 90(2)

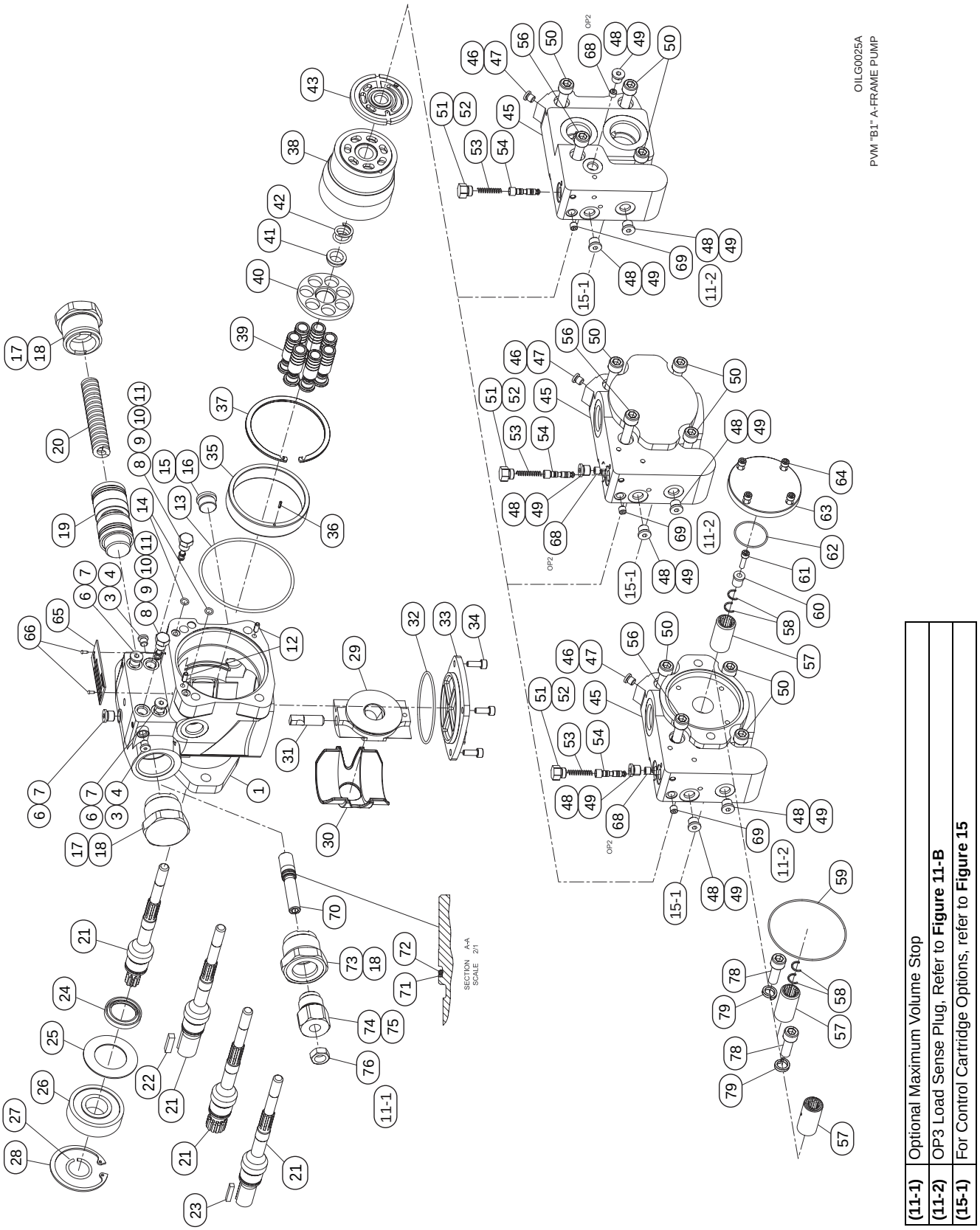
PVM-064/-076/-098/-130 Service Kits

Reference 519272-302 Ass'y Drwg
SERVICE KIT, Figures 14 and 15

Document Number: 519272-SK3

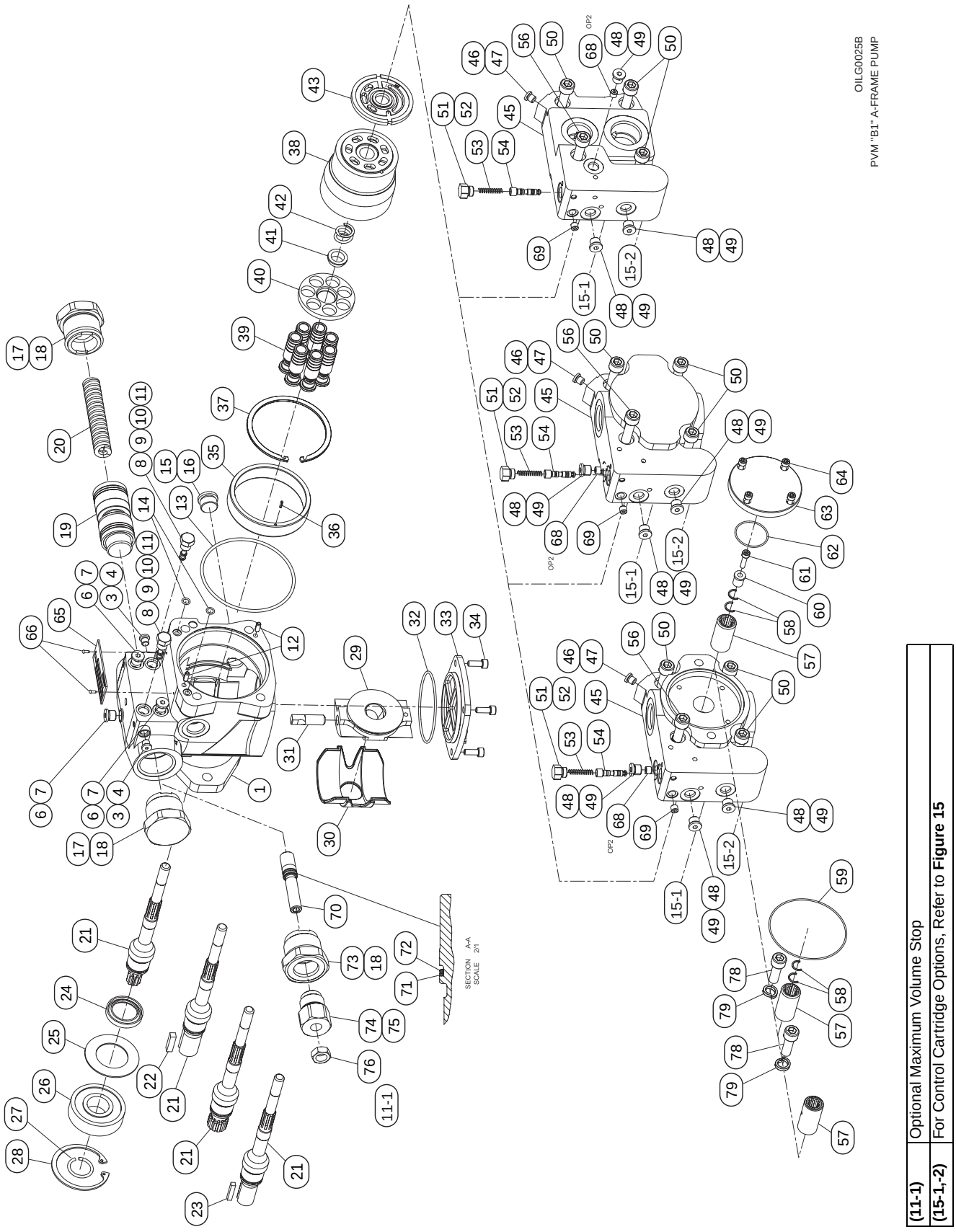
Revision: 1 (11/17/04)

Description	Kit No.	Items Included in Kit
PVM-076/-098/-130 Max. Volume Stop		
Standard or High Temp. (Viton Seals)	L319987-303	18, 70, 71, 72, 73, 75, 76
Skydrol (EPR Seals)	L319987-304	18, 70, 71, 72, 73, 75, 76
PVM-064 Max. Volume Stop		
Standard or High Temp. (Viton Seals)	L319987-309	18, 70, 71, 72, 73, 74, 75, 76
Skydrol (EPR Seals)	L319987-310	18, 70, 71, 72, 73, 74, 75, 76
Electronic Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-007	85, 86, 87(2), 94
24 VDC Coil	320067-011	85, 86, 87(2), 94
Electronic Inverse Proportional Pressure Compensator Cartridge		
12 VDC Coil	320067-008	85, 86, 87(2), 94
24 VDC Coil	320067-012	85, 86, 87(2), 94
Load Sense Cartridge (w/ Internal Bleed-Off)		
Standard or High Temp.	320067-005	83, 88, 89, 90
Electronic Proportional Override Cartridge		
Standard or High Temp.	320067-006	88, 89, 90, 93



(11-1)	Optional Maximum Volume Stop
(11-2)	OP3 Load Sense Plug, Refer to **Figure 11-B**
(15-1)	For Control Cartridge Options, refer to **Figure 15**

Figure 11-A. Exploded Parts Drawing for PVM-011/-014/-022 A-Frame (519272-104 sheet 1)
For Control Cartridge Options, refer to **Figure 15.**

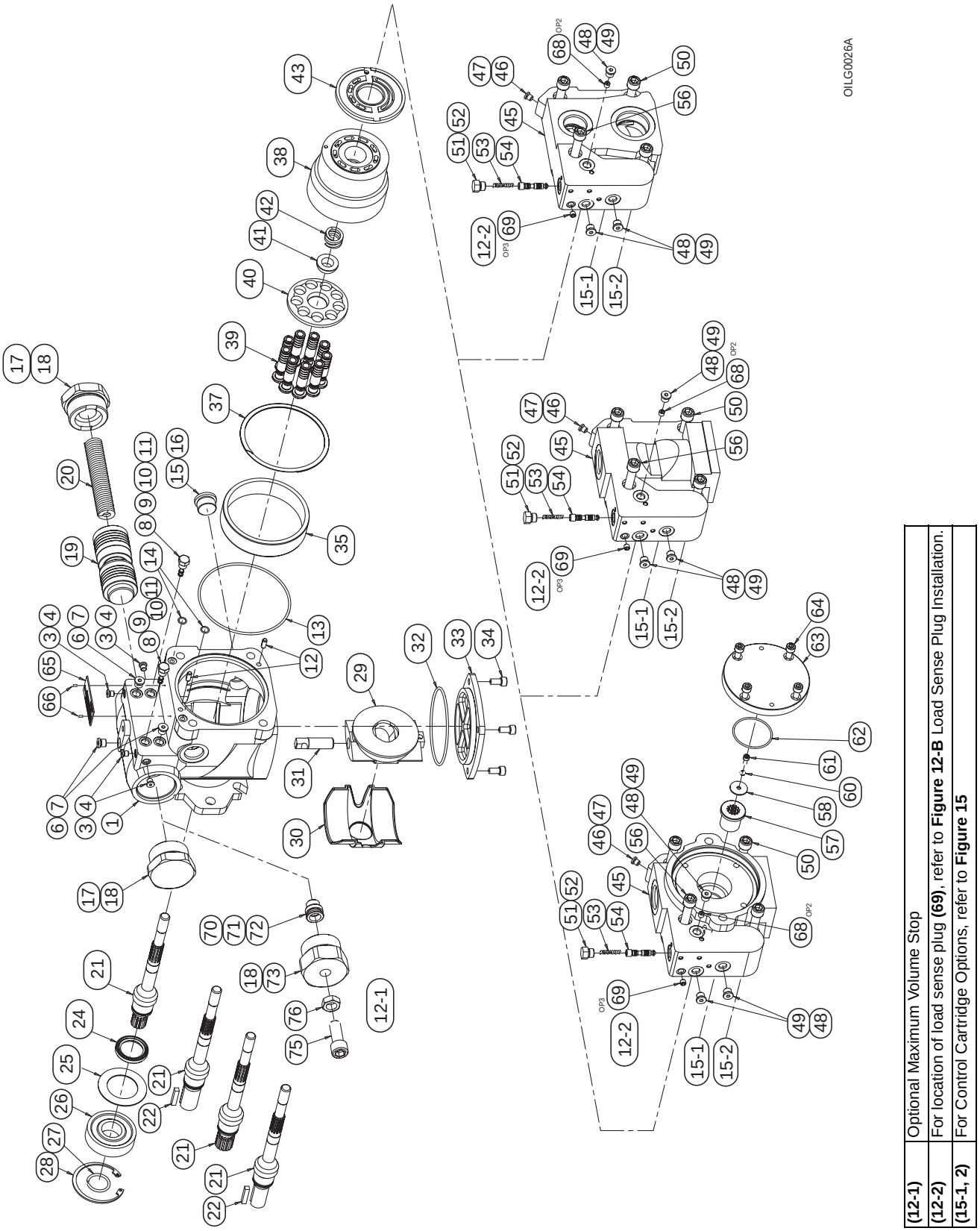


(11-1)	Optional Maximum Volume Stop
(15-1,-2)	For Control Cartridge Options, Refer to **Figure 15**

Figure 11-B. Exploded Parts Drawing for PVM-011/-014/-022 A-Frame (519272-104 sheet 2)
For Control Cartridge Options, refer to **Figure 15.**

(11-3)	Shown with optional maximum volume stop.
(11-4)	Left hand rotation, configuration shown unloading.
(11-5)	Right hand rotation, configuration shown unloading.
(11-6)	Load Sense Plug installed here if not used (pressure compensator and adjusting load sensing options).
(11-7)	Load Sensing Port. Install **(69)** here for standard load sensing option.
(11-8)	Load Sense Plug Installation.
(11-9)	Valve Plate, non thru-shaft.
(11-10)	Side Port Valve Plate, thru-shaft with cover plate.
(11-11)	Side Port Valve Plate, thru-shaft for tandem pump.
(11-12)	Flow Reversing Plug Assembly.

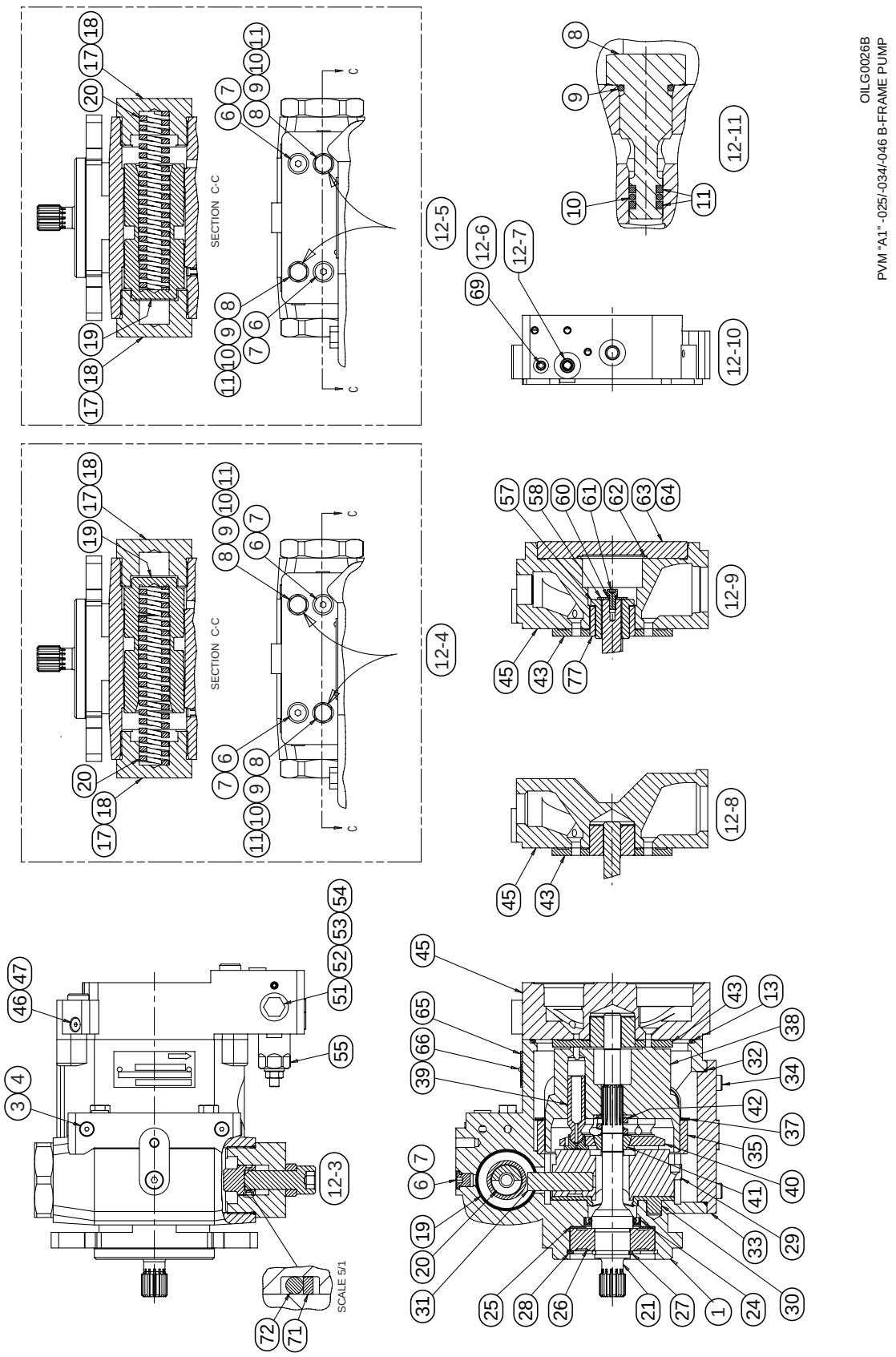
Figure 11-C. Exploded Parts Drawing for PVM-011/-014/-022 A-Frame (519272-104 sheet 4)



(12-1)	Optional Maximum Volume Stop
(12-2)	For location of load sense plug **(69)**, refer to **Figure 12-B** Load Sense Plug Installation.
(15-1, 2)	For Control Cartridge Options, refer to **Figure 15**

Figure 12-A. Exploded Parts Drawing for PVM-025/-034/-046 B-Frame (519272-201 sheet 1)
Right Hand Shown

For Control Cartridge Options, refer to **Figure 15** and for Thru-shaft Options, refer to **Figure 12-C.**



(12-3)	Shown with optional maximum volume stop.
(12-4)	Left hand rotation, configuration shown loading.
(12-5)	Right hand rotation, configuration shown loading.
(12-6)	Load Sense Plug installed here if not used (pressure compensator and adjusting load sensing options).

(12-7)	Load Sensing Port. Install **(69)** here for standard load sensing option.
(12-8)	Valve Plate, non thru-shaft.
(12-9)	Side Port Valve Plate, thru-shaft with cover plate.
(12-10)	Load Sense Plug Installation.
(12-11)	Flow Reversing Plug.

Figure 12-B. Exploded Parts Drawing for PVM-025/-034/-046 B-Frame (519272-201 sheet 2)

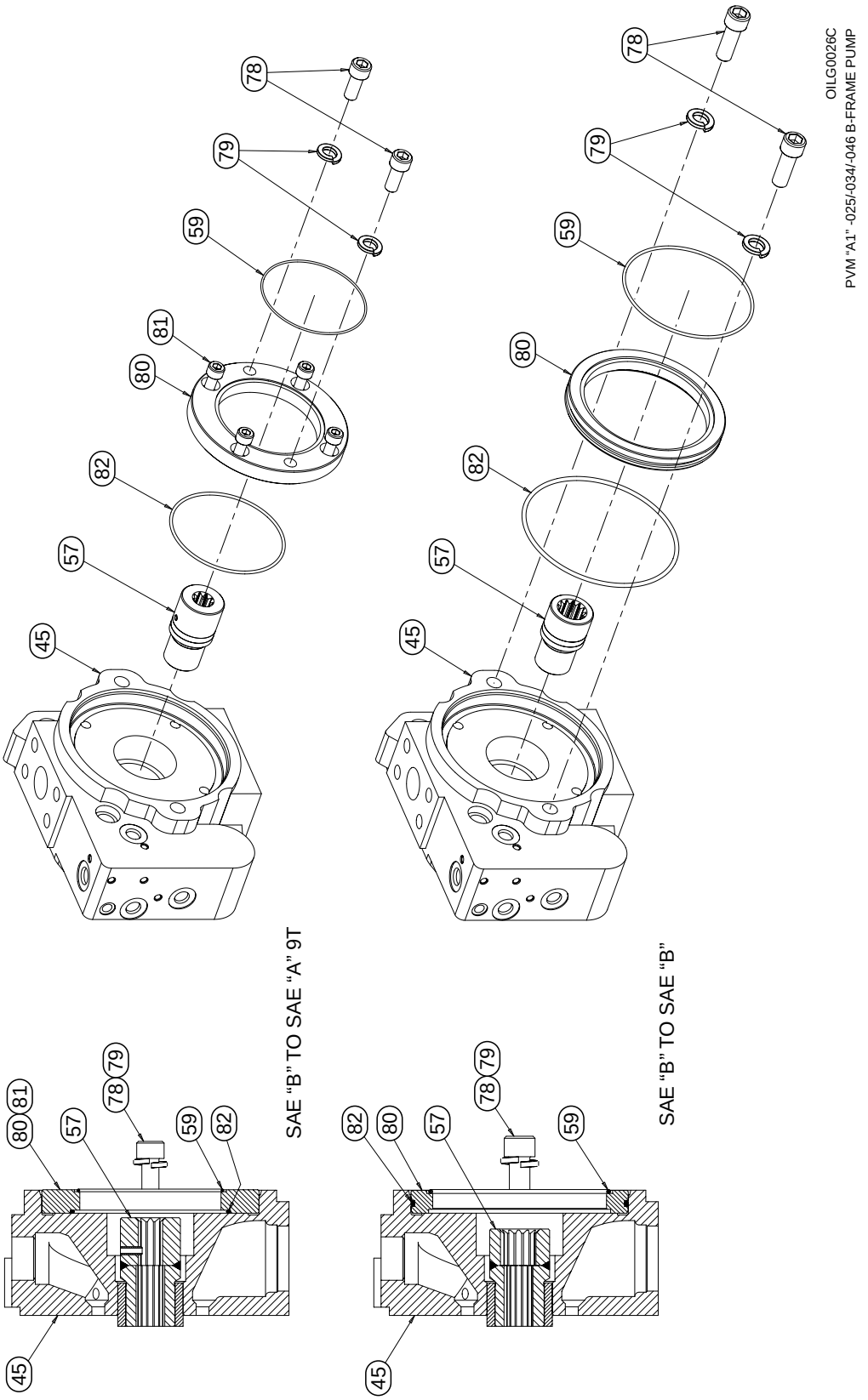
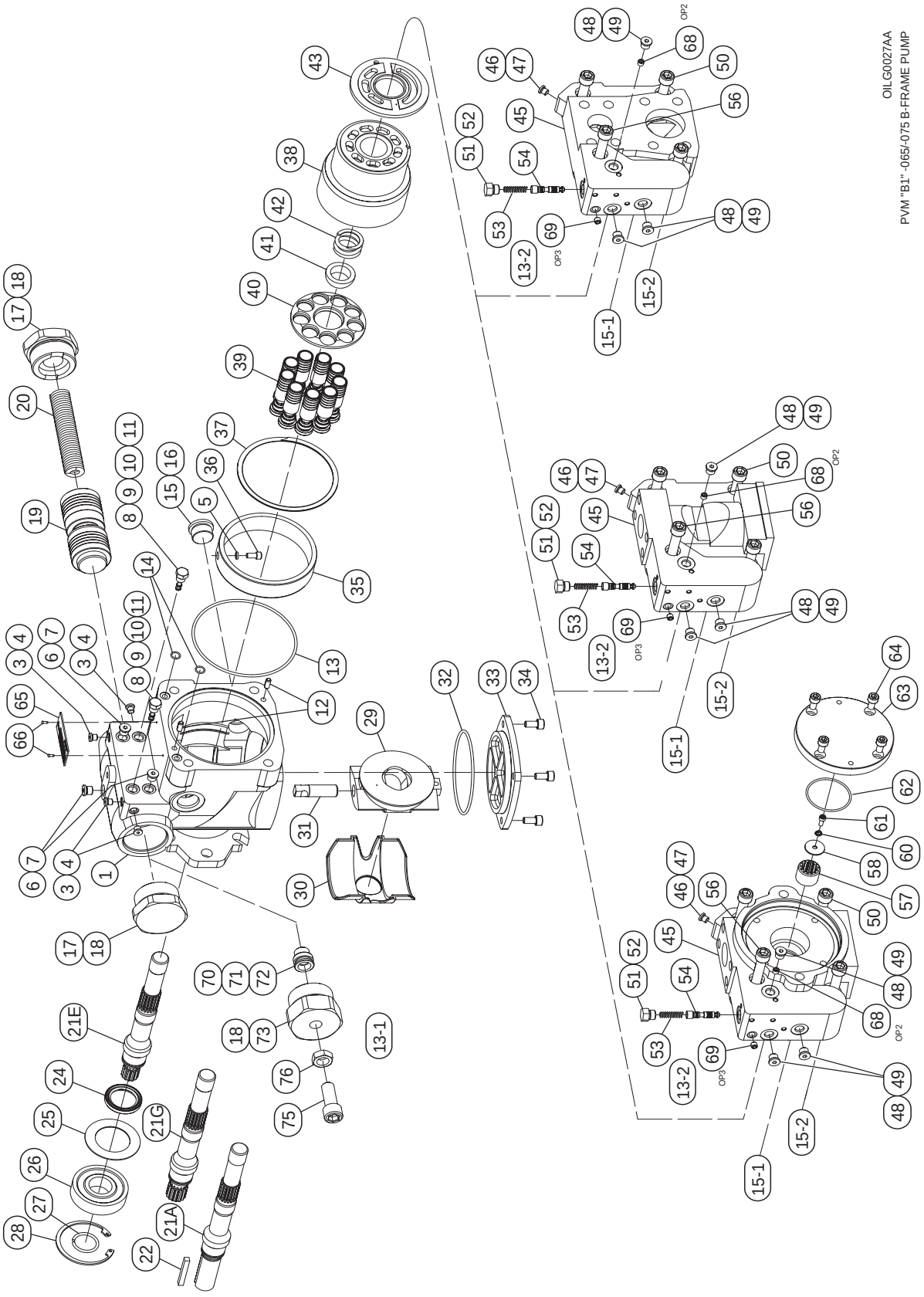


Figure 12-C. Exploded Parts Drawing for PVM-025/-034/-046 B-Frame (519272-201 sheet 3)
Thru-Shaft Options



(13-1)	Optional Maximum Volume Stop
(13-2)	For location of load sense plug **(69)**, refer to **Figure 13-B** Load Sense Plug Installation.
(15-1, 2)	For Control Cartridge Options, refer to **Figure 15**

Figure 13-A. Exploded Parts Drawing for PVM-065/-075 B-Frame (519272-202 sheet 1)
Right Hand Shown

For Control Cartridge Options, refer to **Figure 15** and for Thru-shaft Options, refer to **Figure 13-C**.

(13-3)	Shown with optional maximum volume stop.
(13-4)	Left hand rotation, configuration shown loading.
(13-5)	Right hand rotation, configuration shown loading.
(13-6)	Load Sense Plug installed here if not used (pressure compensator and adjusting load sensing options).

(13-7)	Load Sensing Port. Install **(69)** here for standard load sensing option.
(13-8)	Valve Plate, non thru-shaft.
(13-9)	Side Port Valve Plate, thru-shaft with cover plate.
(13-10)	Load Sense Plug Installation.
(13-11)	Flow Reversing Plug.

Figure 13-B. Exploded Parts Drawing for PVM-065/-075 B-Frame (519272-202 sheet 2)

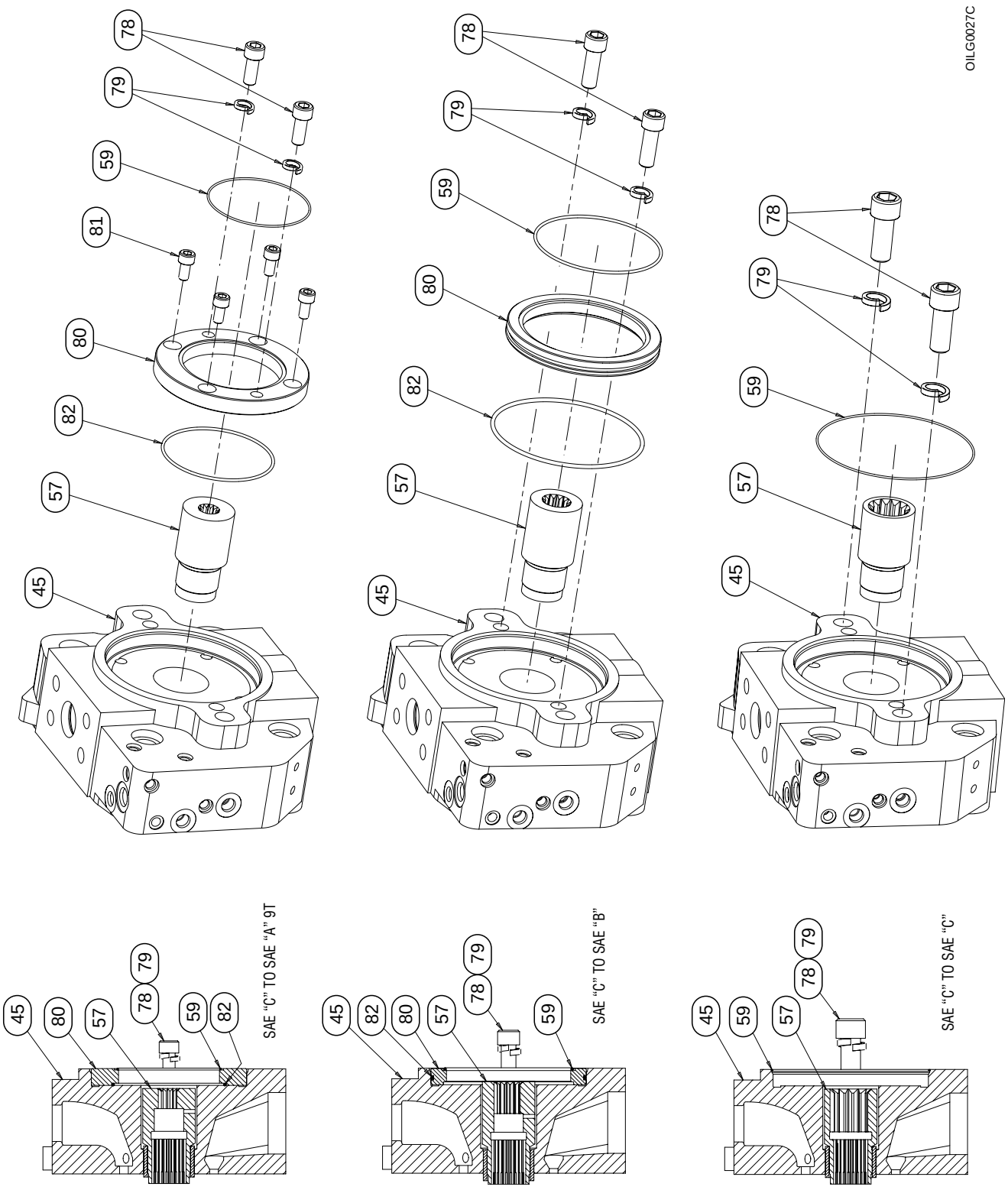
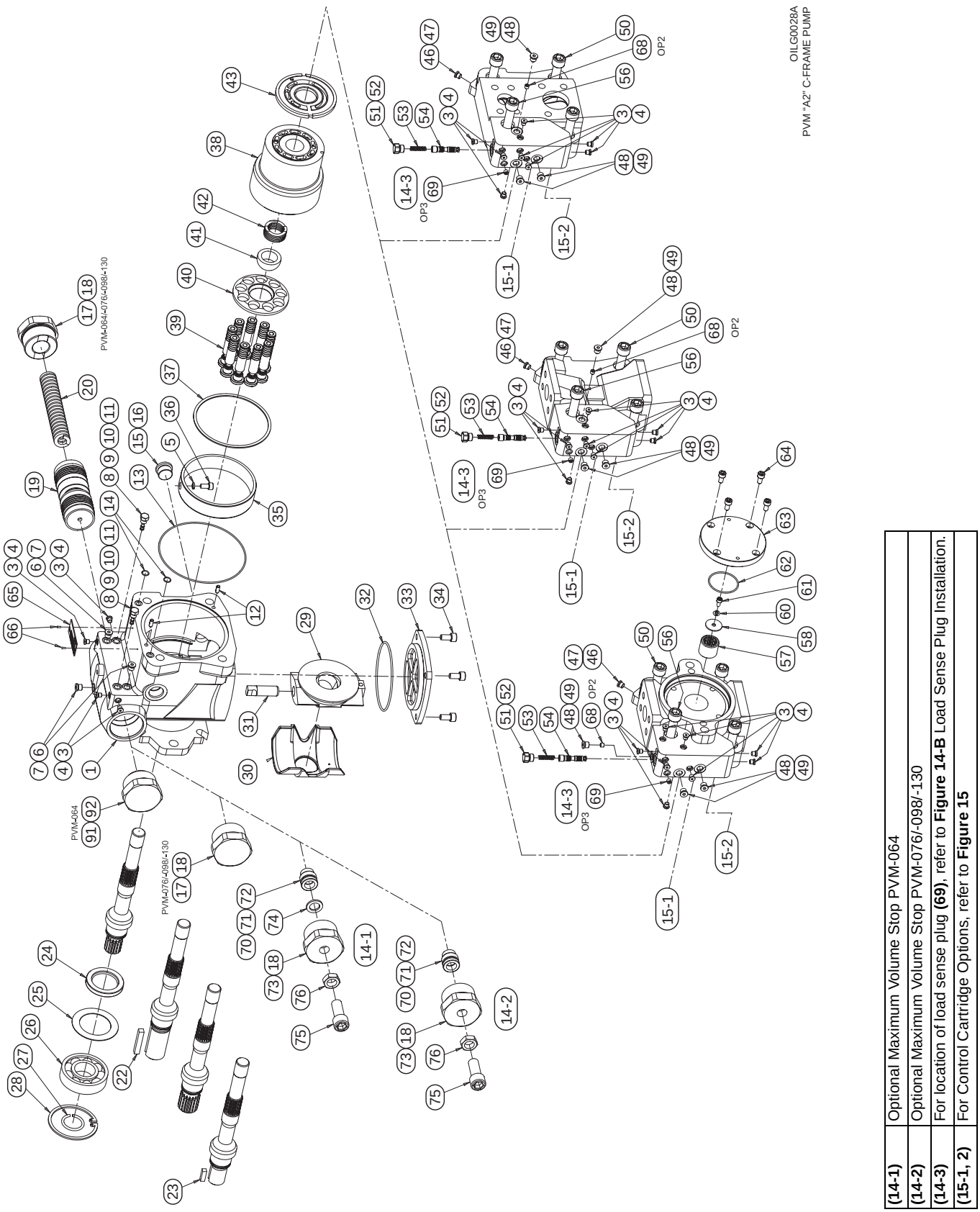
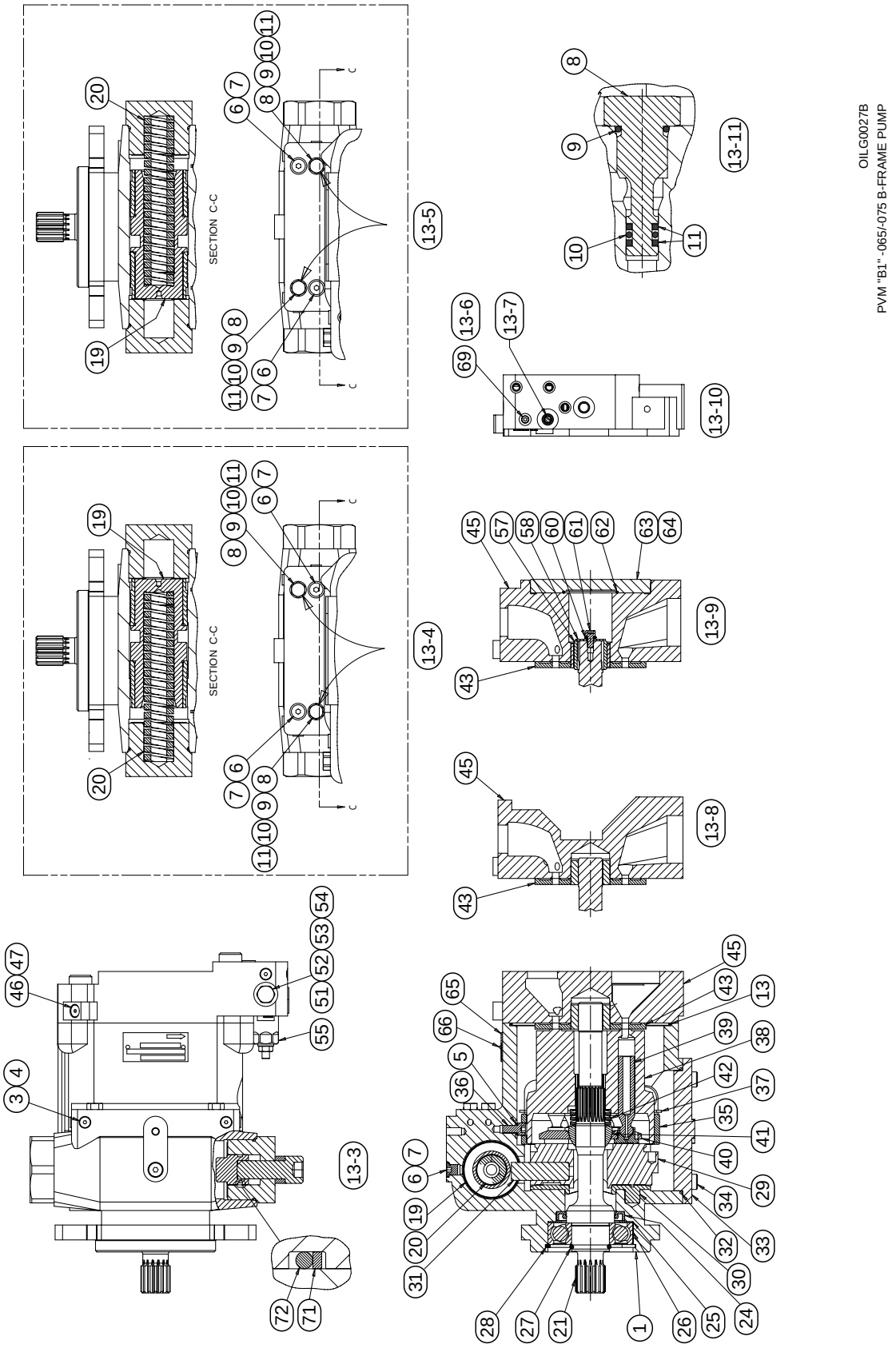


Figure 13-C. Exploded Parts Drawing for PVM-065/-075 B-Frame (519272-202 sheet 3)
Thru-Shaft Options



(14-1)	Optional Maximum Volume Stop PVM-064
(14-2)	Optional Maximum Volume Stop PVM-076/-098/-130
(14-3)	For location of load sense plug **(69)**, refer to **Figure 14-B** Load Sense Plug Installation.
(15-1, 2)	For Control Cartridge Options, refer to **Figure 15**

Figure 14-A. Exploded Parts Drawing for PVM-064/-076/-098/-130 C-Frame (519272-302 sheet 1)
For Control Cartridge Options, refer to **Figure 15** and for Thru-shaft Options, refer to **Figure 14-C**.



(14-3)	Shown with optional maximum volume stop.
(14-4)	Left hand rotation, configuration shown loading.
(14-5)	Right hand rotation, configuration shown loading.
(14-6)	Load Sense Plug installed here if not used (pressure compensator and adjusting load sensing options).

(14-7)	Load Sensing Port. Install **(69)** here for standard load sensing option.
(14-8)	Valve Plate, non thru-shaft.
(14-9)	Side Port Valve Plate, thru-shaft with cover plate.
(14-10)	Load Sense Plug Installation.
(14-11)	Flow Reversing Plug.

Figure 14-B. Exploded Parts Drawing for PVM-064/-076/-098/-130 C-Frame (519272-302 sheet 2)

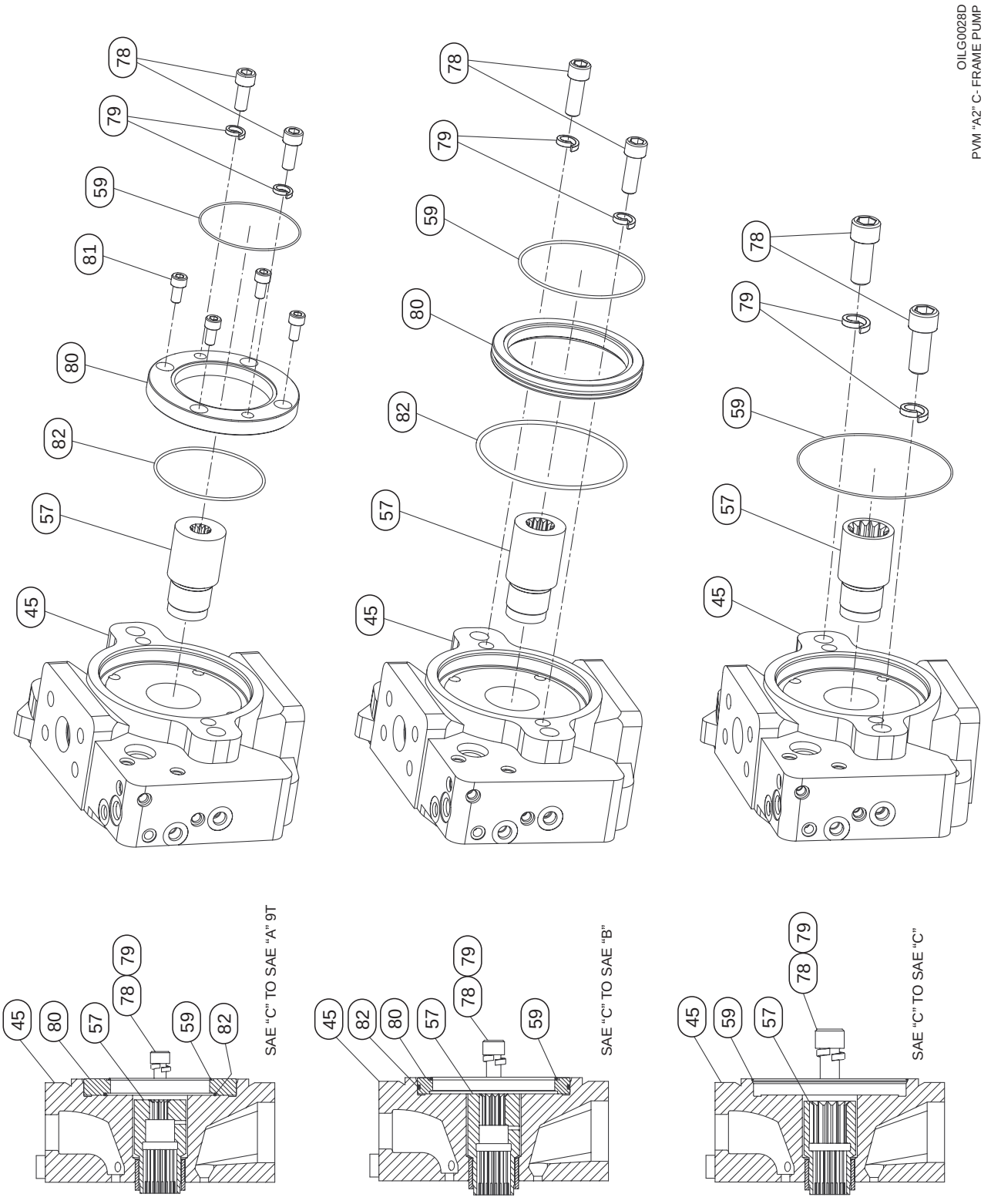
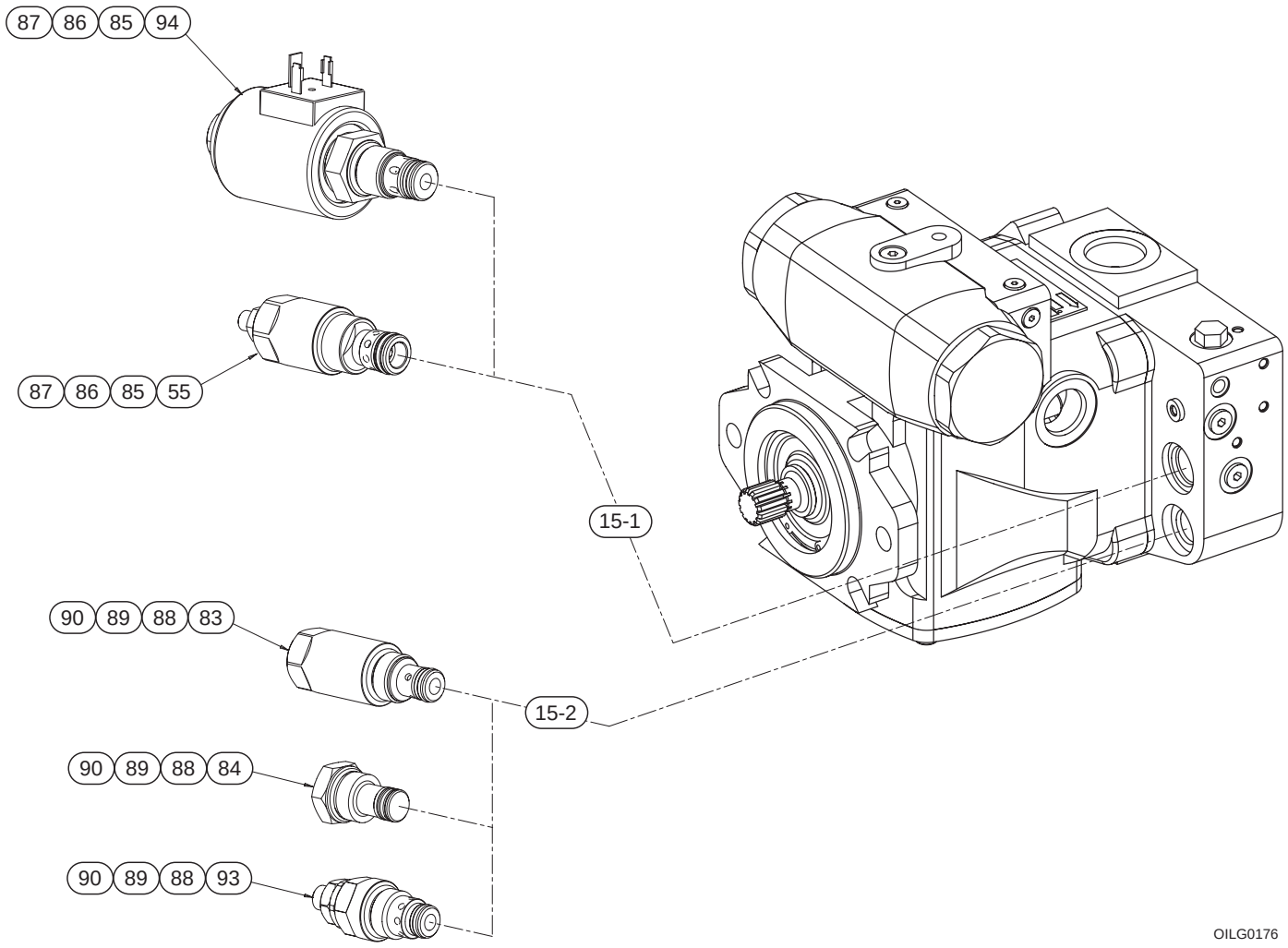


Figure 14-C. Exploded Parts Drawing for PVM-064/-076/-098/-130 C-Frame (519272-302 sheet 3) Thru-Shaft Options



Item	Description
55	PC Control Cartridge
94	Electronic Proportional Pressure Compensator Control
83	Optional Adjustable Load Sense Cartridge
84	Cavity Plug. Used for Standard Load Sense Control or Pressure Compensator Control (not used for PVM -011/-014/-022)
93	Pressure Override Cartridge. Used with Electronic Proportional Pressure Compensator Control

Figure 15. Control Cartridge Options

AFTER SALES SERVICES

At Oilgear we build products to last. It is the nature of this type of machinery to require proper maintenance regardless of the care we put into manufacturing. Oilgear has several service programs in place to help you.

STAY-ON-STREAM SERVICE

By signing up for Oilgear's Stay-On-Steam program, you can prepare for problems before they happen. Certain field tests such as fluid testing, slip testing and electronic profile recording comparisons can be performed by our field service people or your own factory trained personnel. These tests can indicate problems before they become “down-time” difficulties.

SERVICE SCHOOLS

Oilgear conducts training to train your maintenance personnel. “General” hydraulic or electronic training is conducted at our Milwaukee, Wisconsin plant on a regular basis. “Custom” training, specifically addressing your particular hydraulic and electro-hydraulic equipment can be conducted at your facilities.

SPARE PARTS AVAILABILITY

Prepare for your future needs by stocking Oilgear original factory parts. Having the correct parts and necessary skills “in-plant” enables you to minimize “down-time.” Oilgear has developed parts kits to cover likely future needs. Oilgear Field Service Technicians are also ready to assist you and your maintenance people in troubleshooting and repairing equipment.

THE OILGEAR COMPANY
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Milwaukee, Wisconsin 53219

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