

# 30 HPG PRESSURE PILOT

## Repair Manual



**KIMRAY**  
INC.®

Introduction ..... 1

Elastomer Materials ..... 2

Repair Kit Contents ..... 3

Disassembly ..... 4

Inspection & Cleaning ..... 9

Assembly ..... 13

Testing ..... 19

Appendix A (Updated Diaphragm) ..... 21

Appendix B (Direct Acting) ..... 23

NOTE: We reserve the right to modify or change, without prior notice, any statement or information contained herein. If exact dimensions or specifications are required by the customer certified prints will be furnished for a minimum charge upon request to KIMRAY, Inc.  
® Copyright 2006, KIMRAY, Inc.



#### SCOPE

This repair manual contains information concerning the 30 HPG Pressure Pilot. Included are detailed instructions regarding disassembly, repair, assembly and testing.

#### DESCRIPTION

The **30 HPG-D** is used to modulate an output pneumatic signal when the monitored pressure changes in relation to the desired setpoint. The control pilot may be remotely installed to actuate a motor valve.

#### MAINTENANCE

Maintenance should be performed on a regular basis. Initial interval of 12 months is recommended. The maintenance interval may increase or decrease depending on changing application environments.

#### WARNING

Before performing any service to regulator verify all system pressures are bled-off or pilot is properly isolated and de-pressurized.

#### GENERAL SPECIFICATIONS

Working Pressures	125-300 Hydrostatic Test: ANSI B16.37
Body materials	Ductile Iron ASTM A395 Class 65-45-12
Bonnet Materials	Ductile Iron ASTM A395 Class 65-45-12
Connection Types	1/4" NPT
Elastomers	Buna-N (Nitrile)

To get the long service you have come to expect from Kimray products, always use **GENUINE KIMRAY PARTS** when doing repairs. Remember, parts made to less than Kimray specifications don't save you money!!!



## ELASTOMER MATERIALS



### AFLAS<sup>®</sup> is a trade mark of Asahi Glass Co

#### TEMPERATURE:

-25° to +500° F  
-30° to +260° C

#### APPLICATION:

Crude Oil & Gas Production (High heat), Steam Flood Production Chemicals (corrosion inhibitors) Amine Sweetener Systems, Gasoline, Diesel, Fuel Oil Systems

#### FLUID / GAS:

Crude Oil & Gas Production, H<sub>2</sub>S, Steam, Petroleum fluids, Sea Water

### HSN (Highly Saturated Nitrile)

#### TEMPERATURE:

-15° to +300° F  
-26° to +149° C

#### APPLICATION:

Crude Oil & Gas Production w/ H<sub>2</sub>S C02

#### FLUID / GAS:

Crude Oil & Gas H<sub>2</sub>S, C02, Sea Water

### NITRILE

#### TEMPERATURE:

Buna-N:  
-40° to +220° F  
-40° to +105° C  
Low-Temp:  
-85° to +120° F  
-65° to +49° C

#### APPLICATION:

Crude Oil & Gas Production Glycol Dehydrators, Gasoline, Jet Fuel & Diesel Fuel Pumping, Water Disposal, Methanol Injection Pumps, Water pump seals, hydraulic pump seals

#### FLUID / GAS:

Crude Oil & Gas, Good to Poor in Sour Production (See HSN), Water, Glycols, Hydraulic Oils, Resistance to crude oil in the presence of hydrogen sulfide and amines, Diesel fuel, fuel oils

#### DO NOT USE WITH:

Aromatic hydrocarbons, chlorinated hydrocarbons, phosphate esters (hydraulic fluids)

### GYLON

#### TEMPERATURE:

-350° to +500° F

#### APPLICATION:

High heat, high chemical resistance, highly resistance to gas permeation

### VITON<sup>®</sup> is a trade mark of Dupont

#### TEMPERATURE:

-10° to +350° F  
-23° to +177° C

#### APPLICATION:

Crude Oil & Gas Production, Glycol Dehydrators, Gasoline, Jet Fuel & Diesel Fuel Pumping, Water Disposal, Methanol Injection Pumps. (Also Vacuum Service) (Gas permeability is very low)

#### FLUID / GAS:

Crude Oil & Gas, Sour Gas (C02), Propane, Gasoline, Diesel, Fuel Oil Systems

#### DO NOT USE WITH:

Hot Water, Not preferred for wet H<sub>2</sub>S, Methyl Alcohol, Amines, Sodium hydroxide solutions

### ETHYLENE PROPYLENE

#### TEMPERATURE:

-65° to +300° F  
-54° to +148° C

#### APPLICATION:

Steam Flood

#### FLUID / GAS:

Steam, Water, Alcohol

#### DO NOT USE WITH:

Crude Oil & Gas, Diester Lubricants (Lube Oils)

### POLYURETHANE

#### TEMPERATURE:

-40° to +220° F  
-40° to +104° C

#### APPLICATION:

High abrasion resistance Seats, Diaphragms

#### FLUID / GAS:

Crude Oil gas and Water, Sour Gas (C02), propane, butane, fuel, mineral oil and grease

### POLYACRYLATE

#### TEMPERATURE:

±0° to +300° F  
-17° to +149° C

#### APPLICATION:

Production Heaters, Thermostats

#### FLUID / GAS:

Crude Oil & Gas at High Temperature

#### DO NOT USE WITH:

Alcohol, Glycols





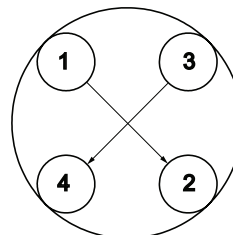
Repair Kit Contents



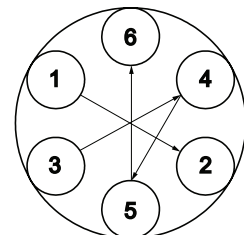
#### NOTE:

Always check fastener tightness prior to valve installation, testing, and use, as fasteners have the potential to loosen in transit. This is recommended to ensure your safety and proper valve function.

\*Kimray assembly torque method at right\*



Four Bolt



Six Bolt

### STEP 1 ADJUSTMENT SCREW

Unscrew adjustment screw counter-clockwise until spring is completely unloaded (Fig. 1.1) and remove (Fig. 1.2).

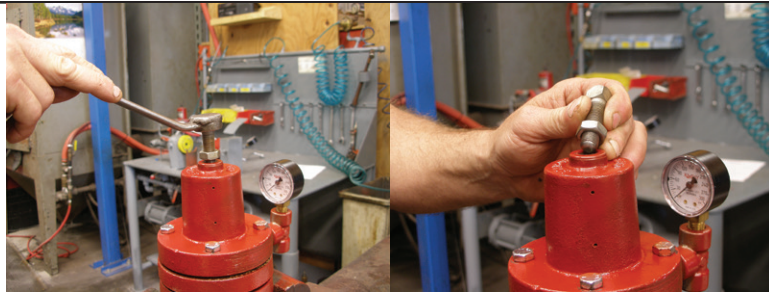


Figure 1.1

Figure 1.2

### STEP 2 PRESSURE GAUGE

With a back-up wrench on the tee, wrench loose the pressure gauge and remove (Fig. 2.1).

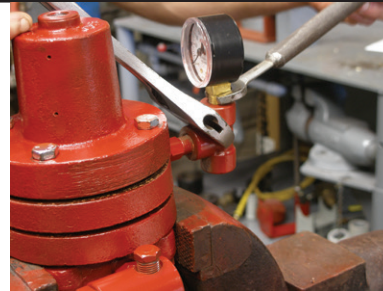


Figure 2.1

### STEP 3 HOUSING BOLTS

Using a back-up wrench loose the (4) main housing bolts (Fig. 3.1).

Remove the bolts and set aside as can be re-used in this rebuild (Fig. 3.2).



Figure 3.1

Figure 3.2

### STEP 4 BONNET

With bolts removed the bonnet will simply lift off upper body (Fig. 4.1).

Remove spring plate and set aside (Fig. 4.2).



Figure 4.1

Figure 4.2

Remove spring and set aside (Fig. 4.3.)

Remove second spring plate and set aside (Fig. 4.4).



Figure 4.3

Figure 4.4



#### STEP 5 BODY

Separate the housings from the base (Fig. 5.1).



Figure 5.1

Unscrew the upper seat from the lower housing (Fig. 5.2).



Figure 5.2

Remove seat and diaphragm and discard both. Replacements are included in the rebuild kit (Fig. 5.3).



Figure 5.3

Separate the two housings (Fig. 5.4).



Figure 5.4

Remove spacer ring and set aside (Fig. 5.5).



Figure 5.5

Wrench loose seat extension (Fig. 5.6).



Figure 5.6

Discard diaphragm and set seat extension aside (Fig. 5.7).



Figure 5.7

Secure the diaphragm plate and wrench loose from the diaphragm nut (Fig. 5.8).



Figure 5.8

Remove diaphragm nut and set aside (Fig. 5.9).



Figure 5.9

Remove diaphragm from plate and discard (Fig. 5.10).



Figure 5.10



### STEP 6 BASE

Remove the spring from top of the seat and discard (Fig. 6.1).



Figure 6.1

Using a socket wrench loose the seat (Fig. 6.2).

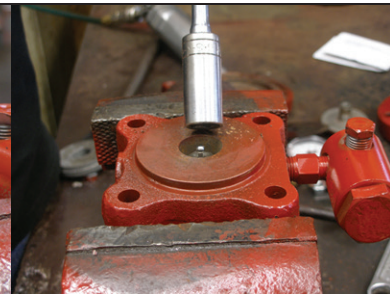


Figure 6.2

Remove seat assembly and discard (Fig. 6.3).



Figure 6.3

Remove booster spring from base and discard (Fig. 6.4).



Figure 6.4

Remove plug from filter body and set aside (Fig. 6.5).



Figure 6.5

Wrench loose filter cap (Fig. 6.6).



Figure 6.6

Remove filter cap from filter body (Fig. 6.7).



Figure 6.7

Remove o-ring from cap and discard (Fig. 6.8).



Figure 6.8

Insert a round-file, punch, screwdriver etc. into the plug hole to assist in removing filter screens (Fig. 6.9).



Figure 6.9

Pliers work well in completing the removal of the filter screens (Fig. 6.10).



Figure 6.10

Wrench loose the nipple/filter assembly (Fig. 6.11).

Remove and set aside (Fig. 6.12).

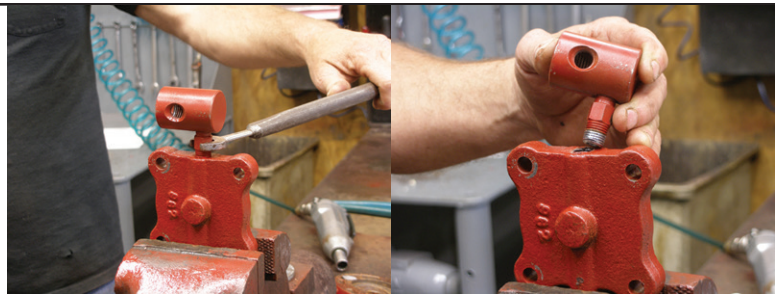


Figure 6.11

Figure 6.12

Probe the npt to verify obstructions are not present (Fig. 6.13).



Figure 6.13







After disassembly of the pilot, Kimray Inc. recommends metal surfaces be thoroughly cleaned and sandblasted. This not only helps in restoring your pilot to “like-new” condition, but it also allows for a proper inspection.

**Note:** It is very important all debris from sandblasting is completely removed, any contamination in the pilot area can cause the product to malfunction.

### STEP 1 CLEANING

Having a few different sizes of wire brushes is recommended for preparing the threads (Fig. 1.1).



Figure 1.1

### STEP 2 THREADS

It is important to thoroughly clean all thread surfaces.

Fig. 2.1- Filter Body

Fig. 2.2- Housing NPT's



Figure 2.1

Figure 2.2

Fig. 2.3- Base

Fig. 2.4- Bonnet

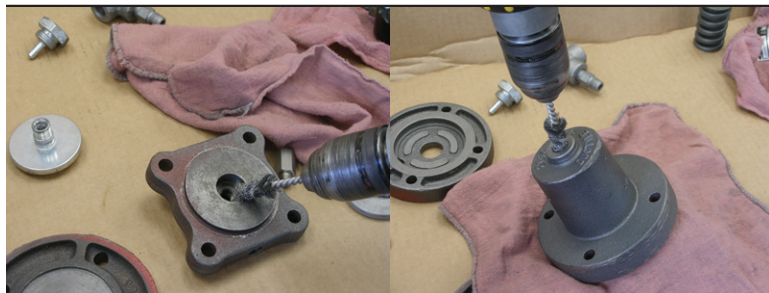


Figure 2.3

Figure 2.4

Fig. 2.5- Diaphragm Nut



Figure 2.5

### STEP 3 BODY

Using shop air clean out the sense port in the upper body and tee (Fig. 3.1).

Blow out the vent port in the lower body (Fig. 3.2).

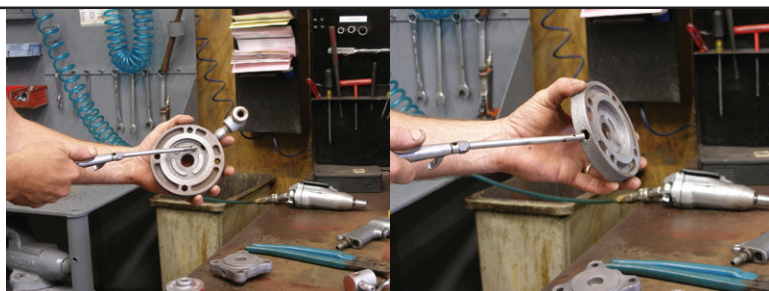


Figure 3.1

Figure 3.2

Blow out the bonnet (including the adjustment screw threads) (Fig. 3.3).

Blow out the upper seat threads in the lower body (Fig. 3.4).

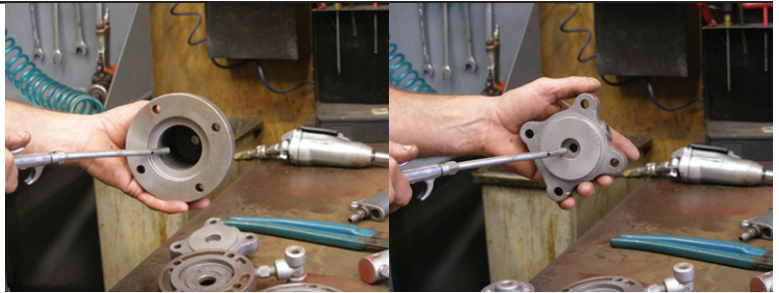


Figure 3.3

Figure 3.4

Blow out the filter body (attention should be paid to cap and nipple threads) (Fig. 3.5).

Blow clean the diaphragm nut (Fig. 3.6).



Figure 3.5

Figure 3.6





30 HPG PRESSURE PILOT REPAIR KIT			
ITEM	PART #	ITEM	PART #
Modulating diaphragm	106P	Diaphragm	110
Diaphragm	110	Pilot Plug	112
Upper Seat	565	Lower Seat	113
Spring	556	Spring	108
Gasket	118	O-Ring	155
Filter Screen	619		



### STEP 1 FILTER BODY

Install wire mesh screens into the body (Fig. 1.1).

Install o-ring onto filter cap (Fig. 1.2).

Install cap onto filter body and wrench tight (Fig. 1.3 & Fig. 1.4).

#### VERY IMPORTANT!

Verify the drill hole is in the lower position in the base for the correct "Supply" connection (Fig. 1.4).

Thread filter body onto housing and wrench tight (Fig. 1.5).

Install 1/4" npt plug into filter body and wrench tight (Fig. 1.6).



Figure 1.1

Figure 1.2



Figure 1.3

Figure 1.4

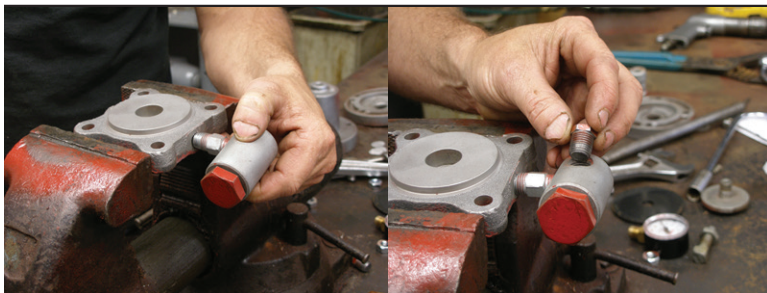


Figure 1.5

Figure 1.6

### STEP 2 BASE

Install #108 booster spring "wide" end first (Fig. 2.1)

Install the gasket onto the shoulder of the seat and install the pilot plug "small ball" first thru the seat (Fig. 2.2)

Using the pilot plug as a handle thread the seat into the base (Fig. 2.3).

Using a 9/16th socket torque the seat down. (Fig. 2.4).



Figure 2.1

Figure 2.2

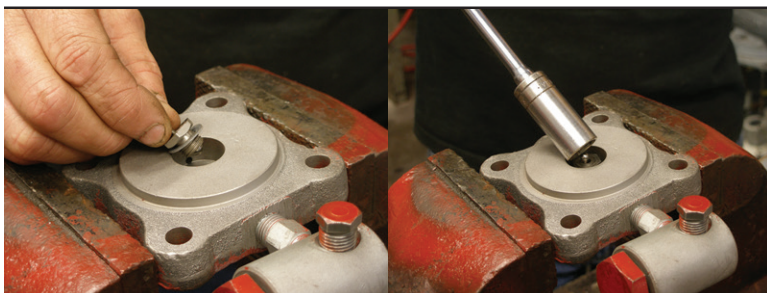


Figure 2.3

Figure 2.4



Install the #566 spring into the groove machined into the seat (Fig. 2.5).



Figure 2.5

### STEP 3 HOUSINGS

Install 106 diaphragm onto the diaphragm plate (Fig. 3.1). See Appendix

Thread the diaphragm nut onto the plate and over the diaphragm (Fig. 3.2).



Figure 3.1



Figure 3.2

Wrench tight the diaphragm nut (Fig. 3.3) and install onto the 1701 housing (Fig. 3.4).



Figure 3.3



Figure 3.4

Notice the tapped section of the plate facing the bottom of the housing (Fig. 3.5).

Install the seat extension through the center hole of the 110 Diaphragm (Fig. 3.6).



Figure 3.5



Figure 3.6

**Warning:** Plate or Pilot Seat edges may cut Diaphragm

Thread the seat extension into the diaphragm nut by hand to hand tight. (Fig. 3.7).

Using wrench or nut driver, tighten to 1/8 turn (15 in-lb) (Fig. 3.8).



Figure 3.7



Figure 3.8

Install spacer onto upper body, verifying diaphragm remains centered and flat (Fig. 3.9).

Install lower body onto spacer and upper body (Fig. 3.10).



Figure 3.9



Figure 3.10

Install the upper #113 seat through the #110 diaphragm (Fig. 3.11).

**Warning:** Plate or Pilot Seat edges may cut Diaphragm

Thread the seat extension into the diaphragm nut by hand to hand tight. (Fig. 3.12).



Figure 3.11



Figure 3.12

Using wrench or nut driver, tighten to 1/8 turn (15 in-lb) (Fig. 3.13).

Wrench tight the seat, but careful not to over-torque (Fig. 3.13).

Now is a good time to install the breather plug and wrench tight (Fig. 3.14).

**Warning do not use impact wrench on breather plug. Plug is stainless steel and could strip.**



Figure 3.13



Figure 3.14

Place the two connected housings onto the base (Fig. 3.15).

The spring must sit into the groove machined into the seat (Fig. 3.16).

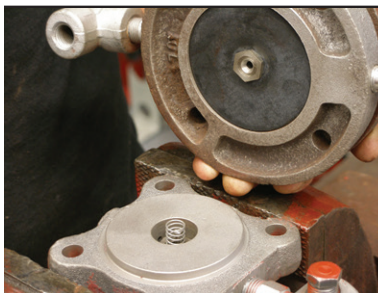


Figure 3.15

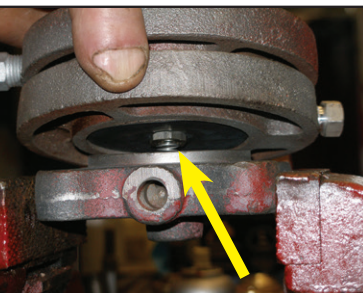


Figure 3.16

#### STEP 4 BONNET

Apply a generous amount of grease to the pivot point of the diaphragm plate (Fig. 4.1).

Install spring plate (Fig. 4.2).



Figure 4.1



Figure 4.2



Place the spring onto the spring plate (Fig. 4.3)



Figure 4.3

Apply a generous amount of grease to the upper diaphragm plate (Fig. 4.4).

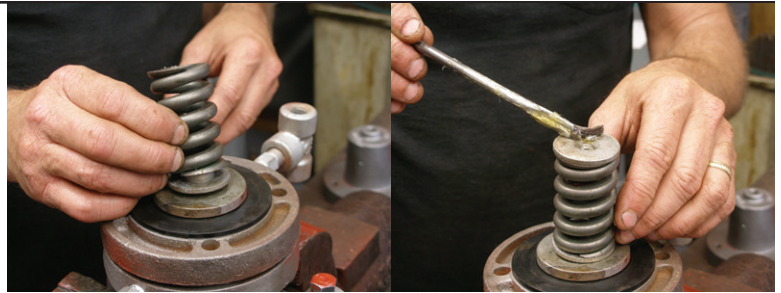


Figure 4.4

Install the bonnet, taking care that the spring assembly remains intact (Fig. 4.5).

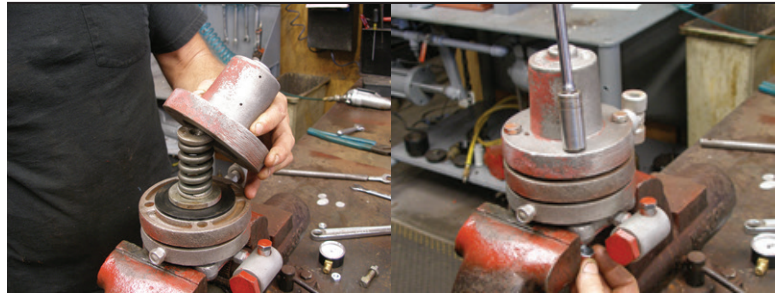


Figure 4.5

Replace the four bolts and nuts and tighten (Fig. 4.6).

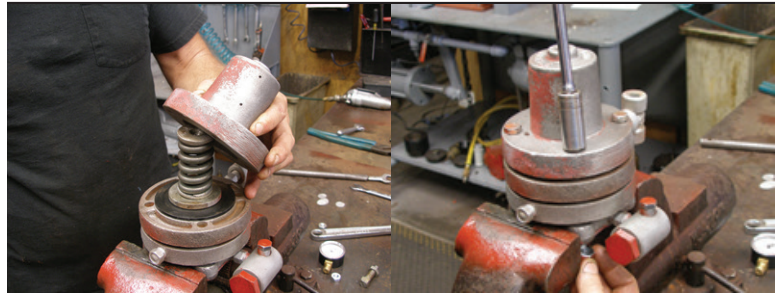


Figure 4.6

#### STEP 5 GAUGE

It is recommended to use lock-tight when replacing the pressure gauge (Fig. 5.1). It is important to use a back-up when tightening the pressure gauge in order to avoid breaking the npt nipple attaching it to the housing (Fig. 5.2).



Figure 5.1

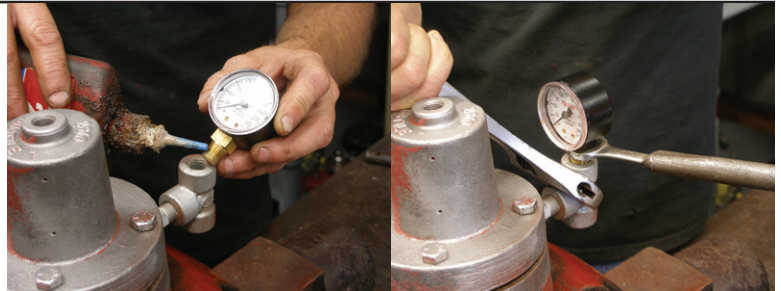


Figure 5.2

#### STEP 6 ADJUSTING SCREW

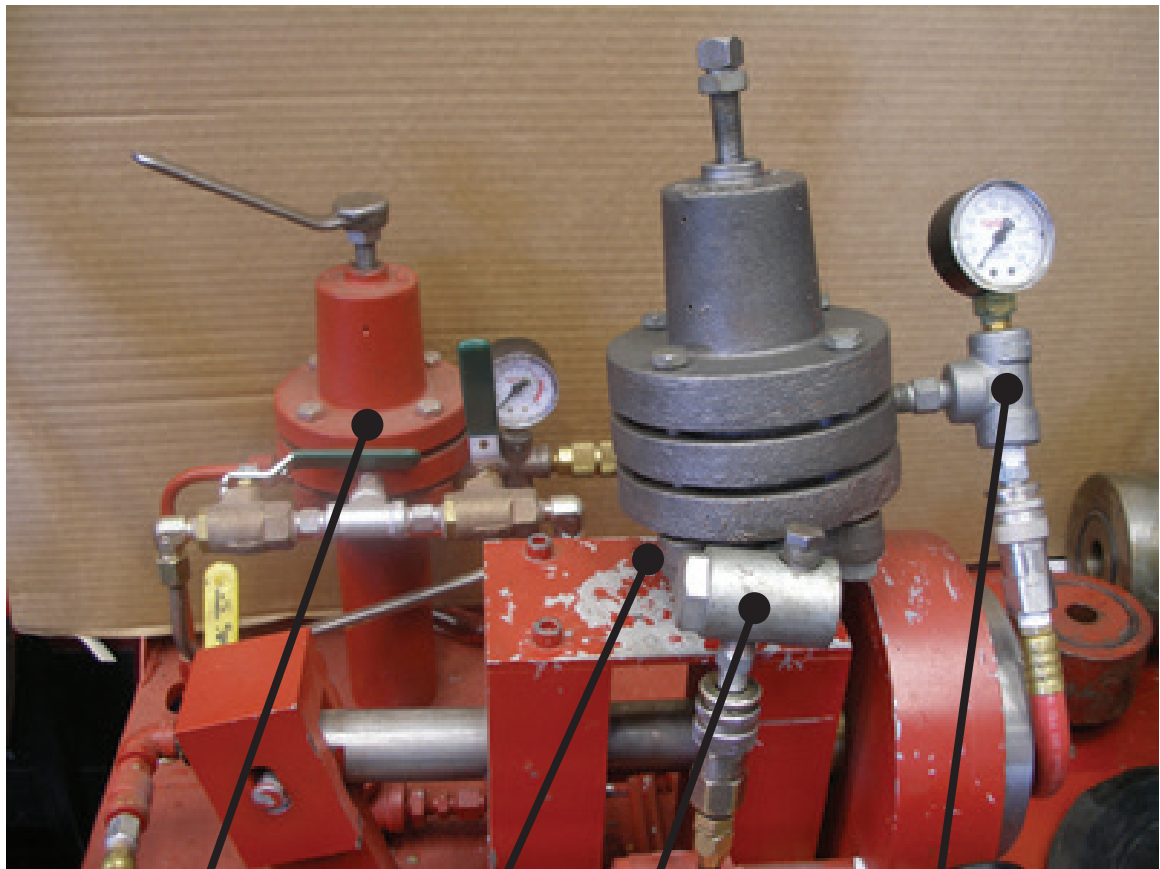
Install the adjusting screw (Fig. 6.1).



Figure 6.1







CONTROL REGULATOR


OUTPUT

SUPPLY

CONTROLLED PRESSURE

1. Connect 20-30 psig shop air to the **supply** inlet.
2. A secondary source of regulation will be needed in order to modulate different **controlled** pressures.
3. Test the pilot at 2-3 (increasing) setpoints.

Example: Set the control regulator at 20 psi, then

Then  until output returns.

  
CW

Repeat this process at 25 psi and 30 psi.

**Note:** Weep hole in the bonnet should **NOT** constantly vent during test.



An updated diaphragm and spacer ring will be included in all kits and new 30 HPG Pilots built after February, 2009. (Fig. 1.1)

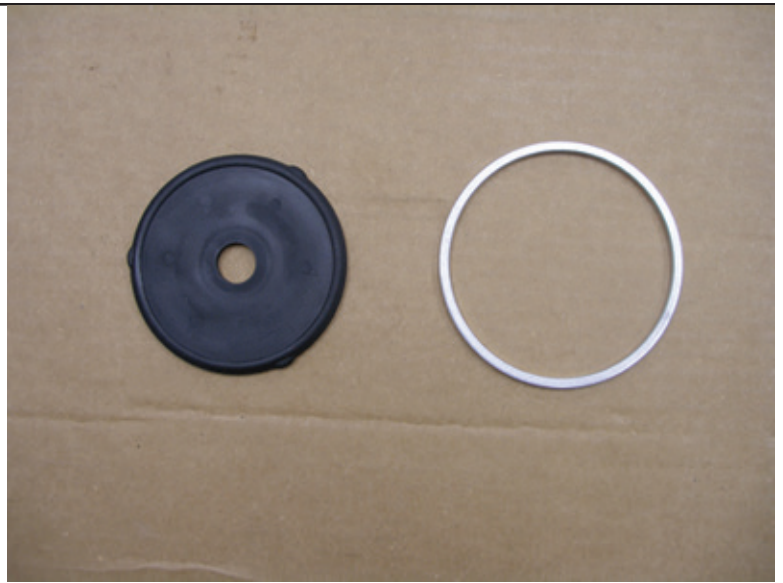


Figure A.1



Figure A.2



Figure A.3





#### STEP 1 DISASSEMBLY

The adjusting screw for the 30 HPG DA will have an additional washer with it to prevent leakage through the bonnet (Fig. 1.1). Wrench loose the balancing tube fittings (Fig. 1.2).



Figure 1.1

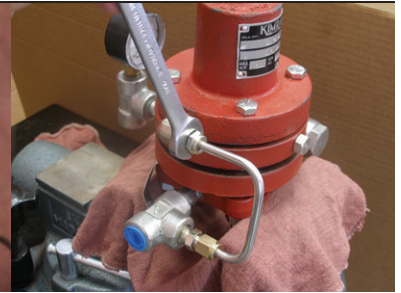


Figure 1.2

Remove the tubing and set aside (Fig. 1.3)



Figure 1.3

Follow standard disassembly procedures to this point, then remove the spacer (Fig. 1.4).



Figure 1.4

Remove the pivot screw and diaphragm (Fig. 1.5).



Figure 1.5

Secure the plate (Fig. 1.6).



Figure 1.6

With the plate secured, pilot seat can be wrenched loose and discarded (Fig. 1.7).



Figure 1.7

Notice the pilot plug and seats are inverted from the standard 30 HPG (Fig. 1.8).



Figure 1.8

Remove diaphragm and discard (Fig. 1.9).



Figure 1.9

Separate the body from the diaphragm plate and set aside (Fig. 1.10).



Figure 1.10

### APPENDIX B

### DIRECT ACTING DISASSEMBLY

Wrench loose the diaphragm nut (Fig. 1.11).

Remove the diaphragm nut from the diaphragm plate and set aside (Fig. 1.12).



Figure 1.11

Figure 1.12

Remove diaphragm and discard (Fig. 1.13).

Remove the upper spring and discard (Fig. 1.14).



Figure 1.13

Figure 1.14

Remove the lower spring and discard (Fig. 1.15)

Wrench loose seat (Fig. 1.16).

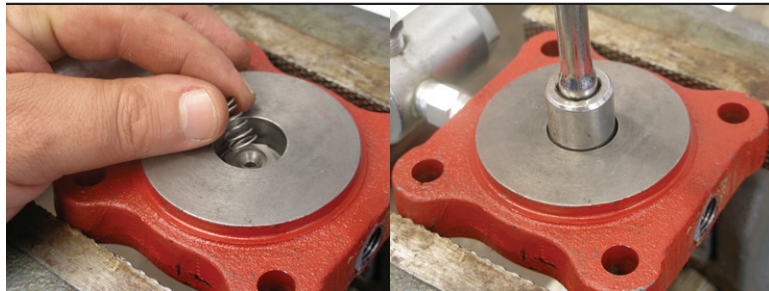


Figure 1.15

Figure 1.16

Remove and discard lower seat and gasket (Fig. 1.17).



Figure 1.17



#### STEP 2 ASSEMBLY

This is the top-view of the plate (Fig. 2.1).

Secure the plate (bottom up) and install new spring (tapered end up) (Fig. 2.2).

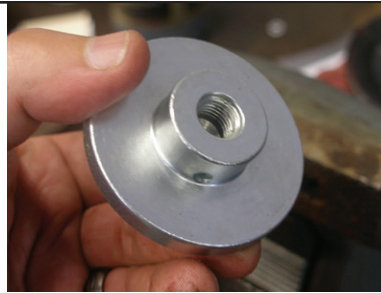


Figure 2.1



Figure 2.2

Install the diaphragm onto the plate (Fig. 2.3).



Figure 2.3

Thread the nut onto the plate and tighten (Fig. 2.4).



Figure 2.4

Install the upper body onto the diaphragm assembly (Fig. 2.5).



Figure 2.5

Install the new diaphragm onto the seat and install the pilot plug through the seat **small ball** first (Fig. 2.6).



Figure 2.6

Thread the pilot plug onto the plate (careful not to overtighten and roll diaphragm) (Fig. 2.7).



Figure 2.7

Install spring into the seat groove (Fig. 2.8).



Figure 2.8

Install the lower body onto the base, careful to verify that the spring is seated in both seat grooves (Fig. 2.9).

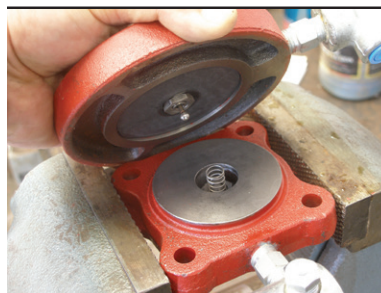


Figure 2.9

Install the diaphragm onto the pivot screw (Fig. 2.10).



Figure 2.10

### APPENDIX B

### DIRECT ACTING ASSEMBLY

Thread the pivot screw into the base (Fig. 2.11).

Replace the spacer (Fig. 2.12).

Follow standard procedure to complete assembly, with the exception of the balancing tubing, as described in the main body of this manual.

For tubing reinstallation the base output npt and the bonnet npt need to be vertically aligned (Fig. 2.13).

Reinstall fittings and balancing tube (Fig. 2.14)

**Note: Verify the tube is installed at the output of the base.**



Figure 2.11

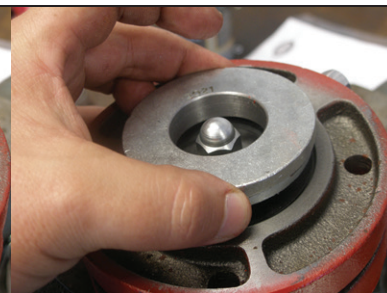


Figure 2.12



Figure 2.13



Figure 2.14





