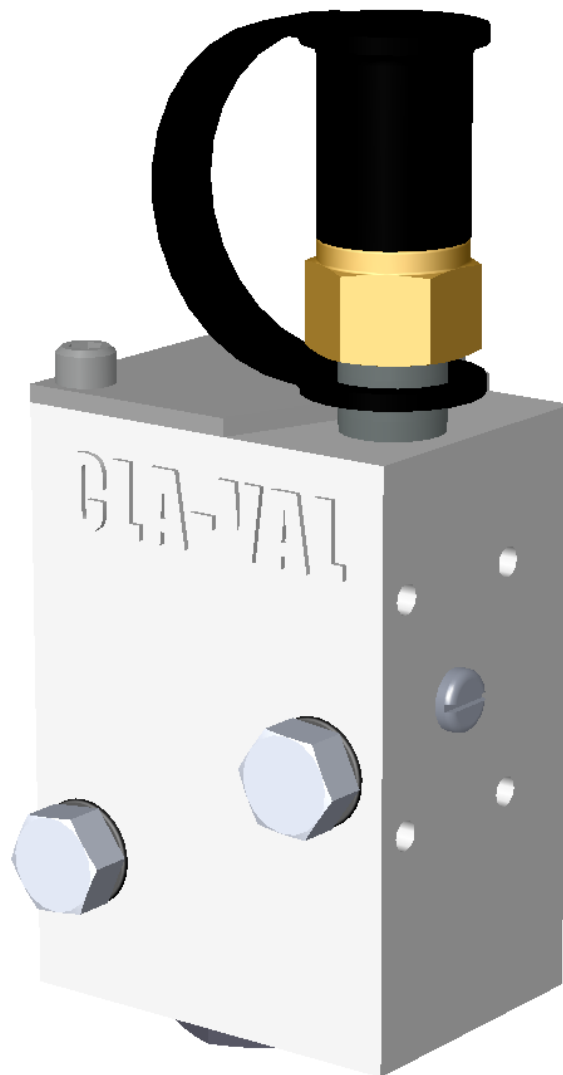


# MAINTENANCE MANUAL

CLA-VAL 352GF HYDRANT PIT VALVE AIR PILOT



## Revision History

Date of Change	Version
17-12-2014	1.0

## TABLE OF CONTENTS

	Page
1.0 Introduction	4
2.0 Operation	5
2.1 Exploded View	5
2.2 Parts List	6
2.3 Removal of Pilot from Pit Valve	6
2.4 Installation on to Pit Valve	6
3.0 Maintenance	7
3.1 Important Safety Features	7
3.2 Visual Inspection	7
3.3 Replacing Seals	7
4.0 Repair	8
4.1 Remove and Replace Plug, Quick Disconnect, and Dust Cap	8
4.2 Remove and Replace Air Piston O-ring, Seal Washer, and Seat O-ring	8
4.3 Remove and Replace Stem O-ring	9
5.0 Post-Repair Testing	10
5.1 Installation on to Pit Valve	10
5.2 Pressure Testing	10
6.0 Troubleshooting	10
6.1 The “Hot Hydrant”	10
6.2 Fuel in the Deadman Air System	11

## 1.0 INTRODUCTION

This Maintenance Manual covers the OPERATION, MAINTENANCE and REPAIR of a Cla-Val Air Pilot Assembly (Part No. DUK6000131) (and similar models) as used on 4 inch and 6 inch Model 352GF Hydrant Pit Valves, referred from here on as just **Pilot**. Only the Air Pilot Assembly is covered by this document. Other Pit Valve items, such as the Manual Pilots, Excess Flow Controls, and the Basic Pit Valve Subassembly (to which this Pilot would be attached) are covered in other specific documents. This document assumes that the Pilot has already been removed from the side of the Pit Valve and is ready for servicing.

The OPERATION section contains information for the installation and use of the Pilot.

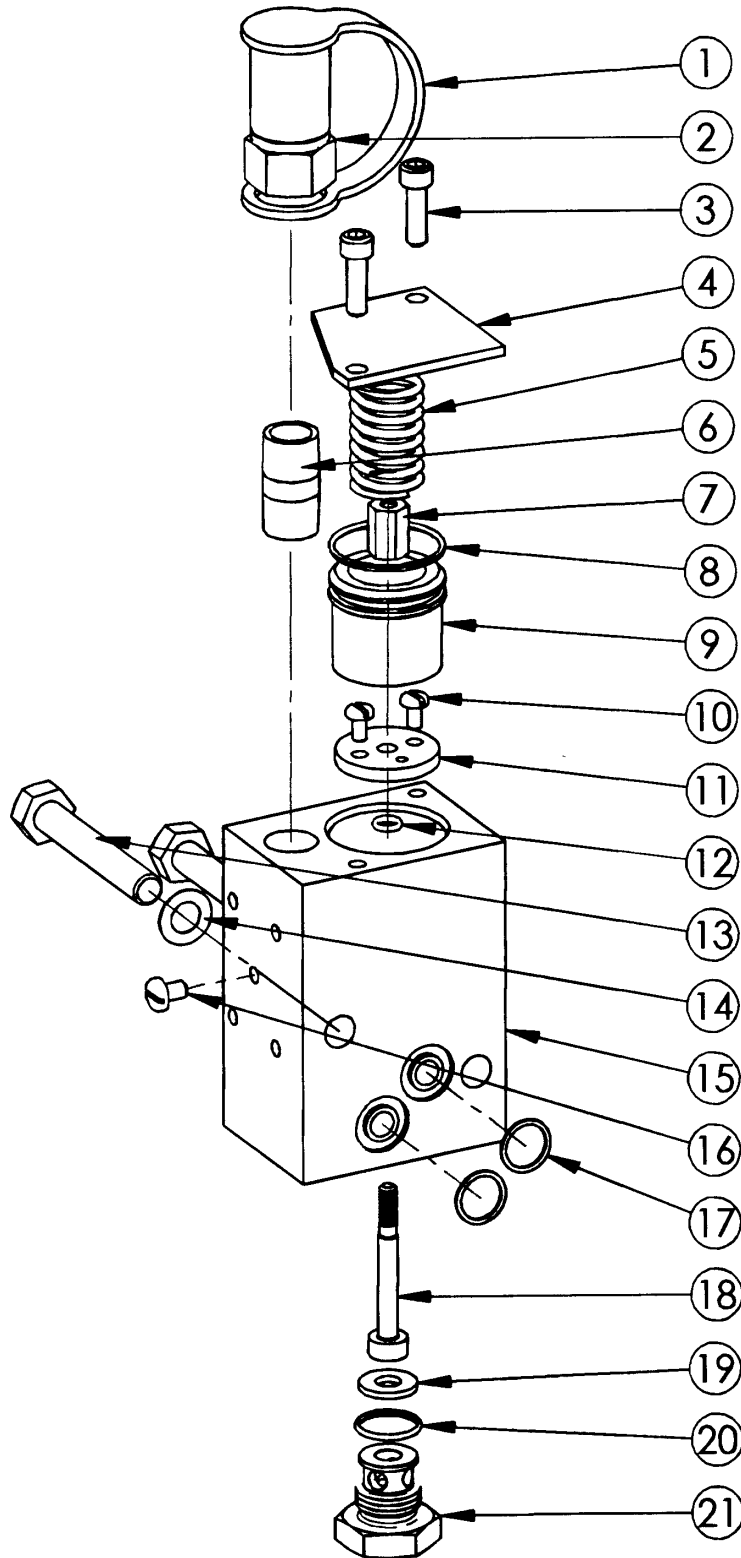
The MAINTENANCE section contains information for the regular inspection and service.

The REPAIR section contains information on how to disassemble and re-assemble the Pilot.

The TROUBLESHOOTING section contains helpful hints for diagnosing problems.

## 2.0 OPERATION

### 2.1 Exploded View:



## 2.2 Parts List:

Item	Qty.	Part No.	Description	Material
1	1	DUK6000138	Dust Cap	Polyurethane
2	1	DUK6000360	Plug, Quick Disconnect	Brass
3	2	DUK6000361	Cap Screw, Socket Head	Stainless Steel
4	1	DUK6000362	Cover	Aluminium
5	1	DUK6000363	Spring	Stainless Steel
6	1	DUK6000364	Pipe Nipple	Stainless Steel
7	1	DUK6000365	Stand-Off	Aluminium
8	1	DUK6000366	O-Ring	Nitrile
9	1	DUK6000367	Piston	Aluminium
10	2	DUK6000368	Screw, Pan Head	Stainless Steel
11	1	DUK6000369	Retainer, O-Ring	Aluminium
12	1	DUK6000370	O-Ring	Nitrile
13	2	DUK6000371	Bolt, Hex Head	Stainless Steel
14	2	DUK6000372	Washer	Stainless Steel
15	1	DUK6000373	Body	Aluminium
16	1	DUK6000374	Seal Screw	Stainless Steel
17	2	DUK6000375	O-Ring	Nitrile
18	1	DUK6000376	Stem	Stainless Steel
19	1	DUK6000377	Washer, Seal	Nitrile
20	1	DUK6000378	O-Ring	Nitrile
21	1	DUK6000379	Seat	Aluminium

## 2.3 Removal of Pilot from Pit Valve:

- **WARNING:** It is highly recommended that the Pit Valve be removed from service before removing the Pilot from the Pit Valve. However, a Servicing Valve is included on the side of the Pit Valve for the purpose of removing the Pilot even when the Pit Valve is attached to an active, pressurized delivery system.
- If removing the Pilot from a Pit Valve attached to an active, pressurized delivery system, first turn the T bar handle of the Servicing Valve on the side of the Pit Valve clockwise until it stops. This will isolate the Pilot from pressure and also force the Pit Valve to remain closed.
- The Pilot is affixed to the side of the Pit Valve with two Bolts (13) and Washers (14). Loosen these two Bolts (13). There is no need to completely remove them. **WARNING:** If removing the Pilot from a Pit Valve attached to an active, pressurized delivery system, loosen the two Bolts (13) to a very small extent and watch for leakage of fuel from between the Pilot and the Pit Valve Body. With the Servicing Valve closed, there should not be any sustained flow emitting from between the Pilot and the Pit Valve Body. If leaking fuel does not stop, this may mean that the Servicing Valve is damaged and not able to hold the Pit Valve closed. In this case, re-tighten the two Bolts (13) and remove the Pit Valve from service before repairing the Pilot.
- Pull the Pilot away from the machined pad on the side of the Pit Valve.
- Take care to retrieve the two O-Rings (17) from between the Pilot and the Pit Valve.

## 2.4 Installation on to Pit Valve:

- The Pilot is bolted to the side of the Pit Valve Subassembly on a raised, machined pad provided for it. Clean off the surface of this pad before installation.
- To simplify the attachment of the Pilot to the pad, and to prevent the two O-Rings (17) from being damaged or crushed, lightly coat the O-Rings (17) and the corresponding O-ring grooves on the Body (15) with commercially available O-ring lubricant (suitable for use with fuel).

- Place the two O-Rings (17) into the two grooves. The lubricant will help them stick in place.
- Use the two Bolts (13) and Washers (14) to bolt the Pilot to the pad.
- Torque the two Bolts (13) to 135 in-lbs.
- If the Servicing Valve on the side of the Pit Valve had been closed for removal of the Pilot from a Pit Valve attached to an active, pressurized delivery system, then re-open the Servicing Valve by turning the T bar handle counter-clockwise just until it stops. At that point, rotate the T bar handle back in a clockwise direction one-half turn.

### 3.0 MAINTENANCE

#### 3.1 Important Safety Features:

- The male quick disconnect fitting, described herein as Plug, Quick Disconnect (2), is supplied with each Pilot and must not be changed. This Plug (2) has a special feature not found on common quick disconnect fittings. This feature prevents compressed air from being trapped within the Pilot. Trapped air might allow the Pit Valve to flow even when even after the deadman air connection is removed from this Plug (2). If this Plug (2) must be replaced, use only an approved Cla-Val replacement part.

#### 3.2 Visual Inspection:

- When installed on the side of the Pit Valve, inspect the fasteners that retain the Pilot onto the Pit Valve. The Bolts (13) must be tight to prevent a fuel leakage.
- The Socket Head Cap Screws (3) that hold down the Cover (4) must be tight to retain the cover and to oppose the force of the Spring (5) located under the Cover (4).
- The Seal Screw (16) must be tightly screwed into the corresponding hole in the side of the Body (15). If this Seal Screw (16) is loose, or if the integral seal is damaged, an air leak will result that may cause the Pit Valve to not open fully. There is no need to remove this Seal Screw (16) for maintenance reasons, so a replacement should never be needed. A leak past this Seal Screw (16) can easily be detected by wetting it with soapy water or liquid window cleaner when deadman air pressure is applied to the Pilot.

#### 3.3 Replacing Seals:

- The rubber seals within the Pilot should be replaced every 12 months, although service life of these components can be much longer depending on the application. The following is a list of all seals within the Air Pilot.

Item	Qty.	Part No.	Description
8	1	DUK6000366	O-Ring
12	1	DUK6000370	O-Ring
17	2	DUK6000375	O-Ring
19	1	DUK6000377	Washer, Seal
20	1	DUK6000378	O-Ring

The following replacement seal kit is available for maintaining the valve as noted:-

Part No.	Description
DUK6000139	This kit is for use in repairing/overhauling any 352GF Hydrant Valve Air Pilot and contains items 8, 12, 17, 19, and 20.

- Follow the instructions in section 4.0 REPAIR below to remove and replace these seals. Other than these resilient seals, and the visual inspections described above, the mechanical parts of the Pilot need no routine maintenance.

## 4.0 REPAIR

### 4.1 Remove and Replace Plug, Quick Disconnect, and Dust Cap:

Required Tools:

- 3/4 inch Wrench
- Teflon Tape or other suitable pipe thread sealant

Removal:

- Remove the Dust Cap (1) from the Plug (2).
- Remove the Plug (2) from the Pipe Nipple (6) using the ¾ inch wrench.
- If the Pipe Nipple (6) came out of the Body (15) with the Plug (2), remove the Pipe Nipple (6) from the Plug (2).
- The lanyard of the Dust Cap (1) will, therefore, be free from the Pipe Nipple (6).

Re-assembly:

- Apply Teflon Tape or other suitable pipe thread sealant to both ends of the Pipe Nipple (6).
- Start the Pipe Nipple into the Body (15).
- Place the hole-portion of the Dust Cap (1) lanyard over the Pipe Nipple (6). Start the Plug (2) onto the Pipe Nipple (6).
- Tighten the Plug (2) with the ¾ inch wrench. With the pipe sealant applied, take care to not over-tighten these tapered pipe threads. It is possible to crack the threaded hole in the Body (15) if the pipe threads are over-tightened.
- Push the Dust Cap (1) onto the Plug (2).

### 4.2 Remove and Replace the Air Piston O-ring & Seal Washer & Seat O-ring:

Required Tools:

- 5/32 inch Hex Key or Allen Wrench
- 3/16 inch Hex Key or Allen Wrench
- 11/32 inch Socket Wrench or other suitable style wrench
- 7/8 inch Wrench
- An O-ring Pick or similar tool
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench for 19 in-lbs adapted for 5/32 Hex Key or Allen Wrench
- Torque wrench for 10 in-lbs adapted for 3/16 Hex Key or Allen Wrench for an 11/32 inch Socket
- Torque wrench for 60 ft.-lbs adapted for a 7/8 hex

Removal:

- **CAUTION:** THIS PROCEDURE REQUIRES THAT YOU REMOVE THE SPRING LOADED COMPONENTS. THOUGH THE SPRING LOAD ON THESE ITEMS IS NOT LARGE, PROPER CONTAINMENT OF SPRING LOADED INTERNAL COMPONENTS MUST BE CONSIDERED FOR YOUR SAFETY. THESE INSTRUCTIONS CAN BE PERFORMED BY ONE MECHANIC.
- Slowly remove the two Socket Head Cap Screws (3). Remove both evenly so as to control the force of the Spring (5) located under the Cover (4). The Cover (4) will rise due to the force of the Spring (5) as the Screws (3) are turned out. The two Screws (3) are extra long so that the force of the Spring (5) will be depleted when the Screws (3) finally come free of the Body (15).
- Remove the Spring (5) from within the Piston (9).
- Remove the Seat (21) from the bottom of the Body (15).
- Remove the O-ring (20) from the Seat (21) for replacement.
- Remove the Seal Washer (19) from within the bottom of the Body (15).



- Insert the 3/16 Hex Key or Allen Wrench into the exposed end of the Stem (18) exposed in the bottom of the Body (15). Place the 11/32 Socket Wrench or other suitable style wrench over the Stand-off (7). Unscrew the one from the other.
- Remove the Piston (9) from within the Body (15).
- Remove the O-ring (8) from the Piston (9).

#### Re-assembly:

- Lubricate the new O-ring (8) and place it in the groove on the Piston (9).
- Lubricate the new O-ring (20) and place it in the groove against the hex head of the Seat (21). Take care to not damage the O-ring (20) as it passes over the threads on the Seat (21).
- Push the Piston (9) down into the Body (15). Push the threaded end of the Stem (18) through the hole in the bottom of the Piston (9).
- Start the Stand-off (7) onto the Stem (18) within the Piston (9).
- Tighten the Stem (18) and the Stand-off (7) together. Torque them to 10 in-lbs.
- Place Seal Washer (19) into the threaded recess in the bottom of the Body (15).
- Install the Seat (21) into the threaded hole in the bottom of the Body (15). Torque to 60 ft-lbs.
- Insert the Spring (5) into the recess within the Piston (9).
- Place the Cover (4) onto the top of the Spring (5). Compress the Cover (4) and the Spring (5) while installing the two Socket Head Cap Screws (3) into the two threaded holes in the top of the Body (15)
- Evenly turn the two Screws (3) thereby compressing the Spring (5) until the Cover (4) becomes flush with the top of the Body (15). Torque to 19 in-lbs.

### 4.3 Remove and Replace Stem O-ring:

#### Required Tools:

- Flat Blade Screwdriver
- 5/32 inch Hex Key or Allen Wrench
- 3/16 inch Hex Key or Allen Wrench
- 11/32 inch Socket Wrench or other suitable style wrench
- 7/8 inch Wrench
- An O-ring Pick or similar tool
- An O-Ring lubricant that is specifically formulated for use with rubber O-Rings
- Torque wrench for 19 in-lbs adapted for 5/32 Hex Key or Allen Wrench
- Torque wrench for 10 in-lbs adapted for 3/16 Hex Key or Allen Wrench for an 11/32 inch Socket
- Torque wrench for 60 ft.-lbs adapted for a 7/8 hex

#### Removal:

- Follow the instructions in section 4.2 above to remove the Piston (9) and Seat (21).
- Remove the Stem (18) from the bottom of the Body (15).
- Remove the two Pan Head Screws (10) from within the cavity of the Body (15) from where the Piston (9) was removed.
- Remove the O-ring Retainer (11). (Note: The #6-32 threaded hole in this part is provided to aid in removing this part from the cavity of the Body (15).)
- Remove the O-ring (12) from the Body (15). Take great care to not scratch or otherwise damage the O-ring groove.

#### Re-assembly:

- Lubricate the new O-ring (12) and place it in the groove in the Body (15).
- Place the Retainer (11) down onto the O-ring (12).
- Install the two Screws (10). Torque to 5 in-lbs.
- Insert the Stem (18) into the bottom of the Body (15) and up through the O-ring (12).

- Follow the instructions in section 4.2 above to re-assemble the Seat (21), Piston (9), Spring (5) and Cover (4).

## 5.0 POST-REPAIR TESTING:

### 5.1 Installation on to Pit Valve:

- Testing of the Pilot must be done when attached to a Pit Valve.
- To simplify the attachment of the Pilot to the pad, and to prevent the two O-rings (17) from being damaged or crushed, lightly coat the O-rings (17) and the corresponding O-ring grooves on the Body (15) with commercially available O-ring lubricant (suitable for use with fuel).
- Place the two O-rings (17) into the two grooves. The lubricant will help them stick in place.
- Use the two Bolts (13) and Washers (14) to bolt the Pilot to the pad.
- Torque the two Bolts (13) to 135 in-lbs.
- If the Servicing Valve on the side of the Pit Valve had been closed for removal of the Pilot from a Pit Valve attached to an active, pressurized delivery system, then re-open the Servicing Valve by turning the T bar handle counter-clockwise just until it stops. At that point, rotate the T bar handle back in a clockwise direction one-half turn. **CAUTION: If any leakage is detected, quickly re-close the Servicing Valve.**

### 5.2 Pressure Testing:

- All pressure tests should be performed using jet fuel or a suitable substitute such as Mil-C-7024 Type II calibration fluid. DO NOT TEST WITH WATER. Wear appropriate safety gear.
- Bolt the Pit Valve to a test flange for testing. Be prepared to catch or contain any fluid that might leak from the Pit Valve during testing.
- Push open the Pit Valve Upper Poppet. Open the Pilot by applying at least 30 psig of air pressure to the hose fitting on the Air Pilot. Slowly fill the Pit Valve with test fluid. Allow the Pit Valve Upper Poppet to close when test fluid has filled the Pit Valve. Close the Pilot by relieving the compressed air.
- Pressurize the inlet of the Pit Valve to 4 to 6 psig. Hold this pressure for one minute. After one minute, place a rag over the Pressure Equalizing Valve Stem in the centre of the Pit Valve Upper Poppet and carefully depress the Stem. There may be a small amount of pressure exhausted. Release the Stem, wait one minute, and depress the Stem again. There should be no pressure released and there should be no flow from the Stem when depressed open. If pressure or flow is detected, the Pilot or the Pit Valve must be repaired before continuing. Inspect the Pilot for external leakage.
- If the previous test is passed with no leakage, pressurize the Pit Valve to 120 psig. Hold this pressure for one minute. After one minute, place a rag over the Pressure Equalizing Valve Stem and carefully depress the Stem. There should be no pressure released and there should be no flow from the Stem when depressed open. If pressure or flow is detected, the Pilot or the Pit Valve must be repaired before continuing. Inspect the Pilot for external leakage.

## 6.0 TROUBLESHOOTING:

### 6.1 The “Hot Hydrant”:

- A “Hot Hydrant” refers to a “closed” Pit Valve that has a pressurized top. When there is pressure under the Pit Valve Upper Poppet when the Pit Valve Pilot is in the closed state, then there is a leak either past the Pit Valve Piston or through the Air Pilot. In either case, a “Hot Hydrant” will not allow the Poppet of the Coupler to push open the Poppet of the Pit Valve. The leak may be too bad to allow the pressure to equalize between the Pit Valve and the Coupler when trying to open the Coupler.
- To verify the “Hot Hydrant” condition, place a heavy rag over the Pressure Equalization Valve Stem and then depress the Stem. Try using the tip of a screw driver for this. If fuel squirts from the Stem AND continues to flow at an obvious rate, then there is a leak either through the lower portion of the Pit Valve or through the Pilot.

- To determine where the leak may be, close the Servicing Valve on the side of the Pit Valve. This will block the path of fuel that might be leaking through the Pilot. If the leak through the Pressure Equalizing Valve stops, then the cause of the “Hot Hydrant” is the Pilot. Follow the instructions in Section 4.2 above to remove and replace the Seal Washer (19).
- If the leak through the Pressure Equalizing Valve does not stop when the Servicing Valve is closed, then the cause of the “Hot Hydrant” is one or both of the seals that contact the Pit Valve Piston. The leak could be past the Square Cut Ring or past the Cap Seal. Follow the instructions in the Maintenance Manual for the Basic Pit Valve Subassembly for repair of the Pit Valve.

## 6.2 Fuel in the Deadman Air System:

- The Pilot is an interface between the Deadman Air system and jet fuel. Whenever fuel is found in the compressed air system that is utilized to operate the Air Pilot, this is one place to look for a leak of fuel into the air system. (There are many other components in an air operated pressure control system on a refuelling vehicle that must also be checked.)
- The O-ring (12) that the Stem (18) passes through is the only seal interface between air and fuel within the Pilot. Follow the instructions in Section 4.3 above to remove and replace the O-ring (12).