

Maintenance Manual

HYDRANT SHUTOFF VALVE

F352/F353 Series

MMF352/F353
Revision 2.0
25 October 2013



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Meggitt Fuelling Products
Maintenance Manual (MMF352/F353)
Hydrant Shutoff Valve – F352/F353 Series

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS!

This manual contains important instructions that shall be followed during installation and maintenance of the Hydrant Shutoff Valve. The following are general safety precautions that are not related to specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during maintenance.

The Valve is a mechanical device and can be dangerous if not correctly operated or maintained.

Safety Alert Symbols

Safety alert symbols are used in this manual to identify potential or immediate personal injury hazards. The safety alert symbol words are explained below:



- indicates an imminently hazardous situation which, if not avoided, will result in injury or serious injury.



- indicates a potentially hazardous situation which, if not avoided, could result in injury or serious injury.



- indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



- used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

WEAR PROTECTIVE CLOTHING

- Wear protective clothing (gloves, apron, etc.) approved for the materials and tools being used.

USE APPROVED SAFETY EQUIPMENT

- Use only approved equipment and make sure firefighting equipment is readily available.

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GIVE CLEANERS SPECIAL CARE

- When cleaners are being used read and follow the material safety data sheet (MSDS) instructions for correct handling.

Equipment Safety Information

The following safety information briefly discusses hazards peculiar to the equipment, which are likely to be encountered during maintenance activity.

GENERAL OPERATING LOCATION PRECAUTIONS

- Use only authorized replacement parts or hardware.
- Obey Lock-Out/Tag-Out procedures when working on the Valve.

OPERATION AND MAINTENANCE OF FUEL SYSTEMS

- Protect all fuel lines from damage or puncture. Do not operate the Valve if a fuel leak is detected.
- Do not use flammable solvents for cleaning parts.
- Check for tools, rags, or loose parts left in the area before resuming operation.
- Do not attempt to remove the Valve from the system without first isolating it from the line pressure and venting all of the trapped internal pressure.

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INTRODUCTION

1. General

The information and procedures contained in this manual have been prepared to assist qualified repair personnel in off-aircraft maintenance of the Hydrant Shutoff Valve (valve). The instructions provide information necessary to accomplish maintenance functions. The valve is manufactured by Meggitt (North Hollywood), Inc., 12838 Saticoy Street, North Hollywood, California 91605.

2. Scope

The instructions contained in this manual do not claim to cover all details or variations in equipment. They do not provide for every problem that could occur during installation, operation, or maintenance. If further information is required, contact Meggitt (North Hollywood), Inc., Product Support Department.

3. Standard Shop Practices

Use approved procedures and safety precautions to prevent damage to the equipment and injury to personnel.

4. Weights and Measurements

Weights and measurements in this manual are expressed in both English (U.S. customary) and Metric (SI) units.

5. Revision Service

This manual will be revised, as necessary, to reflect current information.

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DESCRIPTION AND OPERATION

1. Description

The Hydrant Shutoff Valve (see [Figure 1](#)) provides the means of controlling ON/OFF flow control in aircraft refueling operations. The valve inlet is connected to the riser flange of the underground fuel piping. The outlet adapter mates with a hydrant coupler or coupler/regulator attached to a hose supplying or receiving fuel. The installed hydrant valve forms a pressure tight ON/OFF connection between the refueling system and fuel supply source. The major functional components of the valve are the outlet adapter, pressure relief valve, poppet, servo assembly, maintenance valve stem, piston, inner chamber, and valve body.

2. Installing the Hydrant Coupler on the Hydrant Shutoff Valve

A suitable hydrant coupler is connected to the outlet adapter, opening the hydrant coupler will first open the relief valve plunger in the poppet and then will push the main poppet open. The relief valve relieves pressure in the valve body to allow easy opening of the main poppet.

3. Operation

- A. With the servo not actuated, inlet pressure is applied to the inside of the piston chamber, holding it in its closed position.
- B. When the servo is actuated, pressure inside the piston chamber is relieved downstream and upstream Pressure opens the piston. When the servo is de-activated, the downstream bleed is shut off, allowing upstream pressure to build behind the piston, forcing it closed.

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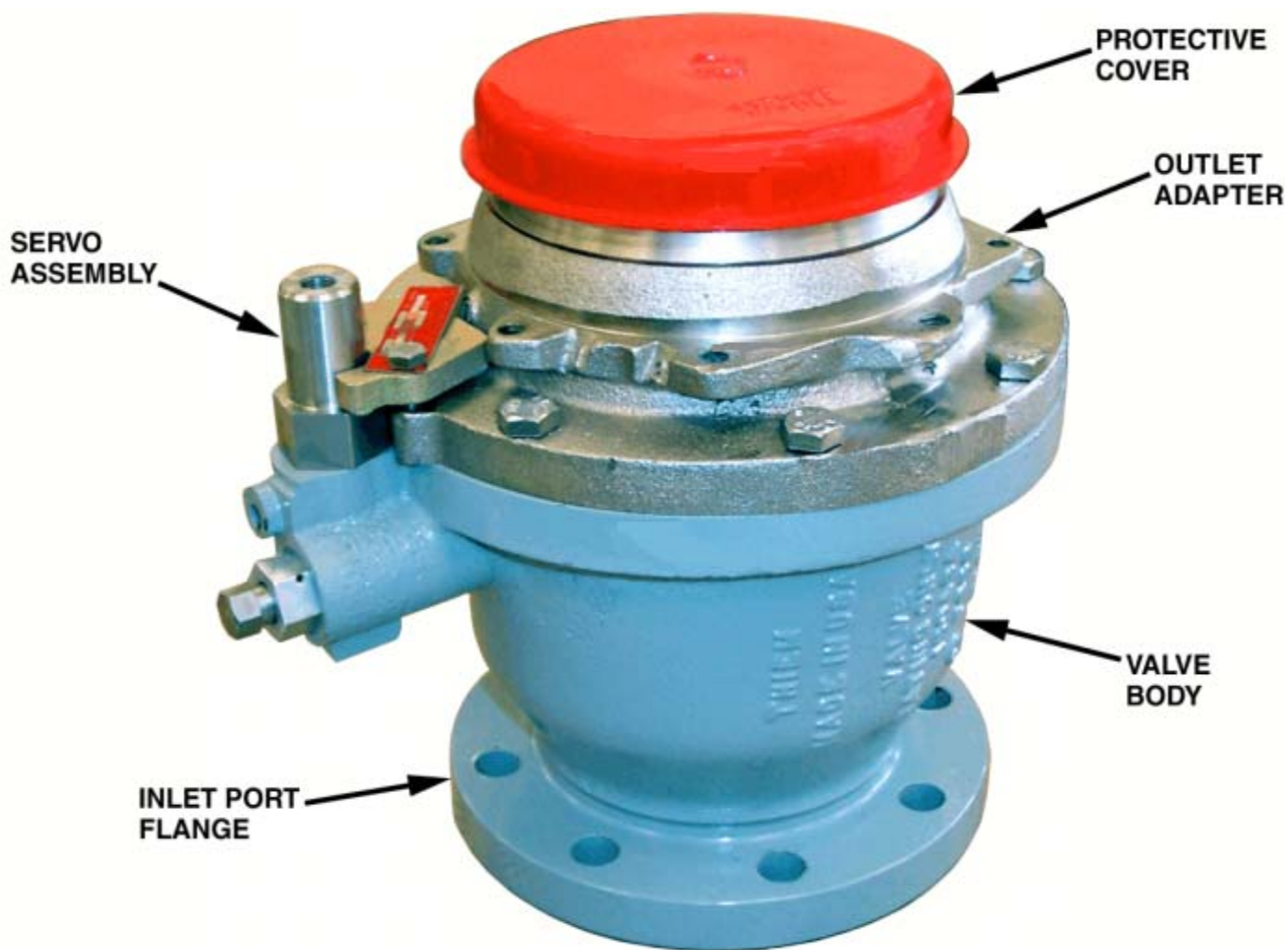


Figure 1. Hydrant Shutoff Valve (Series F353 Shown)

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4. Leading Particulars

For the leading particulars refer to [Table 1](#).

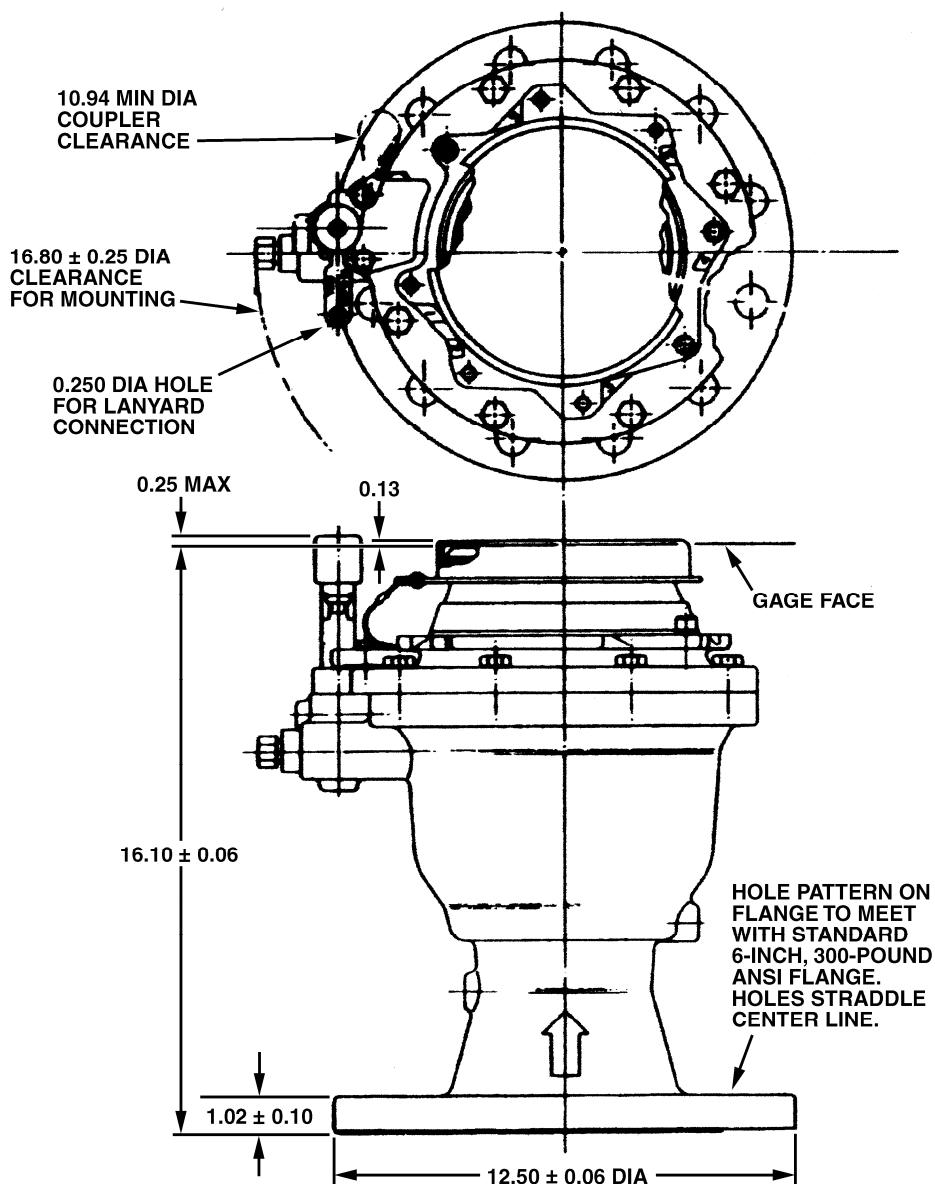
Table 1. Leading Particulars

Service Fluid	Automotive and Aviation Fuels
Operating Pressure	
Maximum Working.....	200 psig (14 bar)
Proof.....	415 psig (9 bar)
Pressure Drop (connected to F240 or F250 Hydrant Coupler) (approximate)	14.5 psi at 1200 US gpm (1 bar at 4542 lpm)
Operating Times	
Opening.....	5 to 10 seconds
Closing	2 to 5 seconds
Fluid Temperature.....	–40 to 160°F (–40 to 71°C)
Ambient Temperature	–40 to 160°F (–40 to 71°C)
Envelope Dimensions	See Figure 2
Weights (approximate)	
F352	88 pounds (40 kg)
F353	60 pounds (27 kg)

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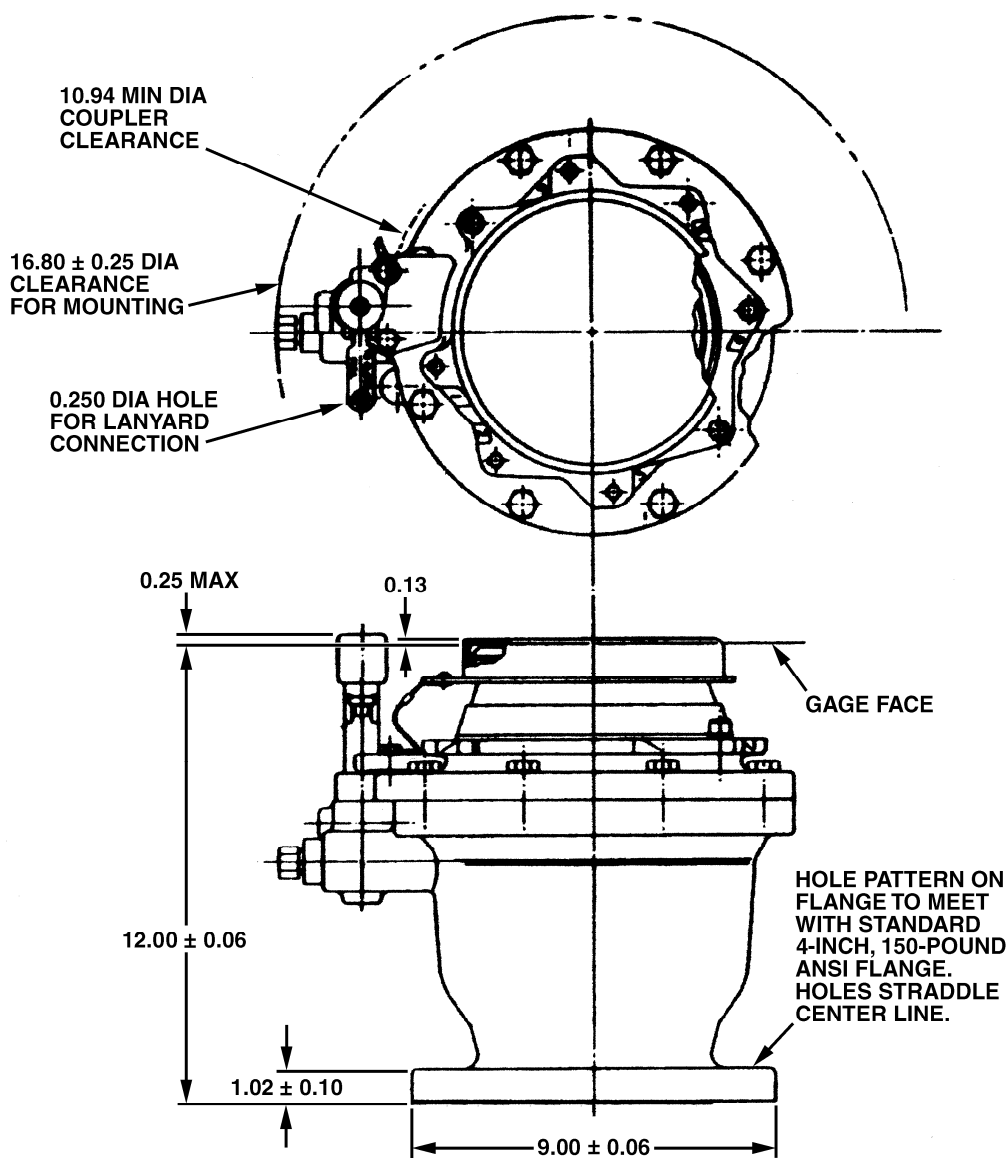
NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

Figure 2. Hydrant Shutoff Valve Envelope Dimensions (Sheet 1 of 2)

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NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

Figure 2. Hydrant Shutoff Valve Envelope Dimensions (Sheet 2)

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5. Model Variations

The valves conform to API/IP Standard 1584, Third Edition, dated April 2001. [Figure 1](#) shows the basic F352 and F353 versions. The F352 inlet mates with a 6-inch, 300-pound, ANSI R/F flange. The F353 inlet mates with a 4-inch, 150-pound, ANSI R/F flange. Both of the valve versions comply with API/IP Standard 1584. Refer to [Table 2](#) for the available valve variations. Refer to the ILLUSTRATED PARTS LIST section for additional details.

Table 2. Model Variations

MOD LETTER		DESCRIPTION
F352	F353	
Baseline	–	Standard hydrant shutoff valve per IP specification – lanyard operated shut-off, 6-inch ANSI inlet, 4-inch API outlet, 5 mm mesh inlet strainer, ductile iron body
–	Baseline	Standard hydrant shutoff valve – lanyard operated shutoff, 4-inch ASA inlet, 4-inch API outlet, ductile iron body
	A	Adds 20 mesh strainer at split-line of outlet adapter
	C	Adds product selection screws in Position 4 (moveable)
	D	Substitutes air operated servo with plug inlet similar to F554 (per API Bulletin 1584) (used with F587)
	E	Adds mechanical servo
	F	Substitutes air operated servo (50 psi [3.4 bar] minimum, 1/4-28 NPT connector)
–	G	Adds 10 mesh strainer
–	H	Change valve body to 4-inch 150# FF version
–	K	Changes valve body to 6-inch ANSI 300# RF version
–	L	Changes valve body to 6-inch ANSI 150# RF version
	M	Adds epoxy coating to body
	N	Substitutes epoxy coated outlet adapter
	P	(Mods E and F) Adds lanyard operated override
	Q	Changes adapter without product selection

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FAULT ISOLATION

1. General

This section contains fault isolation procedures for the Valve. Operate the valve in accordance with the Operation section, if the valve fails to operate correctly refer to [Table 3](#) and select the appropriate action. [Table 3](#) identifies the Fault, Probable Cause and Corrective Action.

Table 3. Fault Isolation

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
No fuel flow	Hydrant coupler closed	Open the hydrant coupler.
	Downstream system shut off	Open the downstream system.
	Maintenance valve stem (20) closed	Open the maintenance valve stem (IPL Figure 1, 20).
	Servo assembly (7) not actuated	Actuate the servo by pulling the lanyard.
	Servo assembly (13) not actuated	Actuate the servo by applying 70 psi (4.8 bar) air pressure.
	Piston (6) jammed by contamination	Attempt to cycle the valve 3 or 4 times to clear any loose contamination. If not successful, overhaul valve.
	Tube (48) is misaligned or damaged	Check tube alignment. If damaged, replace.
Valve will not close	Servo assembly (13) not deactivated, air pressure trapped in servo	Relieve air pressure from the servo.
	Servo valve ball (33) will not seat	Replace the servo ball (refer to MAINTENANCE step 9).
	Piston (6) jammed by contamination	Attempt to cycle the valve 3 or 4 times to clear any loose contamination. If not successful, overhaul the valve.

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Table 3. Fault Isolation – (cont.)

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
Valve will not close (continued)	Piston seal (14) excessively worn or damaged	Overhaul the valve.
	Tube (18) damaged	Overhaul the valve.
Hot valve – Valve not fully closed when not actuated	Piston (6) jammed by contamination	Attempt to cycle the valve 3 or 4 times to clear any loose contamination. If not successful, overhaul the valve.
	Piston (6) not seating fully due to contamination on seat	Attempt to cycle the valve 3 or 4 times to clear any loose contamination. If not successful, overhaul the valve.
	Servo valve ball (33) will not seat	Replace the servo ball (refer to MAINTENANCE step 9).
	Tube (18) damaged	Replace the tube (refer to MAINTENANCE step 12).
Leakage past relief valve poppet plunger (5)	Relief valve poppet plunger (5) or gasket (45) excessively worn or damaged	Remove and clean the parts. Replace if worn or damaged (refer to MAINTENANCE step 7).
Leakage around poppet (4)	Contamination on seat or seat excessively worn or damaged	Remove and clean the parts. Replace if worn or damaged (refer to MAINTENANCE step 7).
Valve opens or closes too slowly	Metering pin (17) incorrectly adjusted for the system flow and pressure	Make sure the slow operating time is not due to other system functions. Then, adjust the metering pin (refer to MAINTENANCE step 13).
	Contamination in the orifice of piston (6), or on the metering pin (17).	Attempt to cycle the valve 3 or 4 times to clear contamination. If not successful, overhaul the valve.

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Table 3. Fault Isolation – (cont.)

FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
Valve opens or closes too fast	Metering pin (17) incorrectly adjusted for the system flow and pressure	Make sure slow operating time is not due to other system functions. Then, adjust the metering pin (refer to MAINTENANCE step 13).
Hydrant coupler is difficult to open	Piston (6) jammed by contamination	Attempt to cycle the valve 3 or 4 times to clear any loose contamination. If not successful, overhaul the valve.
	Piston (6) not seating fully due to contamination on seat	Attempt to cycle the valve 3 or 4 times to clear any loose contamination. If not successful, overhaul the valve.
	Servo valve ball (33) will not seat	Replace the servo ball (refer to MAINTENANCE step 9).
	Tube (18) damaged	Replace the tube (refer to MAINTENANCE step 12).
	Poppet relief valve plunger (5) not actuated due to contamination	Remove and clean the plunger. Replace if damaged or excessively worn. (Refer to MAINTENANCE step 7.)
	Poppet relief valve plunger (5) not actuated due to hydrant coupler poppet shape.	Use the correct hydrant coupler (with the required poppet type).
Hydrant coupler is difficult to close	Pressure trapped downstream of hydrant coupler	Check the downstream pressure and correct as necessary. Check functioning of the hydrant coupler relief valve (if equipped).

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MAINTENANCE



ONLY THE ADAPTER, THE SERVO, THE STRAINER, AND THE BALL MAY BE SERVICED WITH THE VALVE INSTALLED AND UNDER PRESSURE.

BEFORE SERVICING THE VALVE, THE MAINTENANCE VALVE STEM (20) MUST BE CLOSED AND PRESSURE IN THE ADAPTER (2) MUST BE COMPLETELY RELIEVED; SEE STEP 6. FOR MAXIMUM SAFETY, DEPRESSURIZE THE UPSTREAM SYSTEM.

1. Overhaul Parts Kits

Refer to the ILLUSTRATED PARTS LIST section for the Overhaul Parts Kit information.

2. Recommended Maintenance Materials

Refer to [Table 4](#) for recommended assembly materials. Suitable equivalent materials may be substituted for the items listed.

Table 4 Recommended Assembly Materials

DESCRIPTION	SPECIFICATION	SOURCE
Lubricant	Molycote 33	Commercially available (Dow Corning) (for air servo packing only)
Petroleum Jelly	–	Commercially available
Thread Locking Compound	Loctite 262	Commercially available (Loctite Corporation) (for mechanical servo screw only)

3. Lubrication

Before installation, apply a light coat of petroleum jelly to all packings (except packing (IPL [Figure 1](#), 13B)).

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4. Removing the Hydrant Shutoff Valve from the System (See [IPL Figure 1](#))

- A. Make sure all pressure is removed from the system, shut down all pumps and close the riser valve.
- B. Actuate the manual (mechanical) servo or apply air pressure to the air-operated servo, to set the valve to its OPEN position.
- C. Do not close the maintenance valve stem (20).
- D. Release the pressure in the outlet adapter (2); by pressing the relief valve plunger (5) in the poppet (4) until flow stops. Place a cloth or towel on top of the adapter to contain any fuel spray.



IF FUEL FLOW DOES NOT STOP AFTER 5 OR 6 SECONDS, STOP. THE VALVE INLET HAS NOT BEEN DEPRESSURIZED. THE RISER OR OTHER VALVES MAY NOT BE SEALING. TURN OFF THE LINE PUMPS.

- E. Remove the mounting flange bolts.
 - F. Remove the air pressure from the air servo or actuate the mechanical servo to its CLOSED position. Lift the valve out. Remove the gasket(s) and the stone guard (if installed) from the riser flange.
- #### 5. Installing the Hydrant Shutoff Valve (See [IPL Figure 1](#))



WHEN INSTALLING ON A NEW SYSTEM; BEFORE VALVE INSTALLATION, MAKE SURE TO FLUSH THE SYSTEM CLEAN AS EXCESS CONTAMINATION MAY DAMAGE THE SEALING SURFACES.

- A. Clean the riser flange face.
- B. Install new gasket(s) on the riser flange.
- C. Install the valve on the riser flange. Make sure the gasket(s) and the stone guard (if installed) are correctly positioned.
- D. Install the flange bolts, nuts and washers (if required).
- E. Torque the flange nuts evenly to the user's specification. The recommended minimum torque for 4-inch flanges is 80 lb-ft (108 Nm). The recommended minimum torque for 6-inch flanges is 150 lb-ft (203 Nm).

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- F. Close the maintenance valve stem (20) (maximum torque is 50 lb-in. (5.7 Nm).
- G. Apply pressure to the valve by turning on the pumps and opening the riser shutoff valve.
- H. Make sure there is no flange leakage.
- I. Fully open maintenance valve stem (20).
- J. Connect a hydrant coupler to the valve and operate the hydrant on-and-off 6 or 7 times, to expel any air from the piston chamber.
- K. Set the servo CLOSED. Remove the hydrant coupler.
- L. Check for any leakage. Press plunger (5). The flow shall stop after 5 or 6 seconds.
- M. Install the protective cover on the outlet.



THE VALVE MUST BE INSTALLED TO COMPLETE MAINTENANCE STEPS 6 THROUGH 11.

6. Removing and Replacing the Servo Assembly (See [IPL Figure 1](#))

- A. For a mechanical servo (7), set it to the CLOSED position. For an air servo, make sure air pressure is relieved.
- B. Close maintenance valve stem (20) maximum torque is 50 lb-in. (5.7 Nm).
- C. Relieve pressure in outlet adapter (2) by pressing relief valve plunger (5) in poppet (4) until the flow stops. Place a cloth or towel on top of the adapter to contain any fuel spray.



IF FUEL FLOW DOES NOT STOP AFTER 5 OR 6 SECONDS, STOP. THE VALVE INLET HAS NOT BEEN DEPRESSURIZED. THE VALVE MUST BE REMOVED FROM THE SYSTEM FOR OVERHAUL.


- D. Press one side of poppet (4) and insert a plastic rod or a large section packing to keep poppet open.
- E. Remove two screws (41).
- F. Remove clamp (40) and servo assembly (7 or 13).

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- G. Clean the servo seating area and the base of the servo. The base of the servo may be lightly lubricated with petroleum jelly.
 - H. Install servo assembly (7 or 13) on the projecting boss of valve body (1). Install clamp (40) over servo body, aligning the holes in clamp (40) and adapter flange (2).
 - I. Install two screws (41), securing the protective cover lanyard with one of the screws. Torque the screws to 75 lb-in. (8 Nm). Fully open maintenance valve stem (20).
- 7. Removing and Replacing the Outlet Adapter, the Poppet, and the Strainer (See IPL Figure 1)**
- A. Remove servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).
 - B. Remove the eight screws (34).
 - C. The adapter (2) can now be removed. The adapter is internally guided and must be lifted straight upward. To break adapter seal, one of screws may be put back in its threaded hole and used as a jack screw. Remove the screw after use.
 - D. Remove the poppet (4) and spring (9). Remove packing (11).
 - E. If the strainer (37) is installed, it may be removed now. Remove the retaining ring (43) and the spacer (47). Then, lift out the strainer (37).
-  **WARNING**
- DO NOT REMOVE THE RETAINING RING (44) WITH THE VALVE INSTALLED IN A PIT.**
- F. Remove the tube (48) for cleaning.
 - G. Clean all parts (refer to the CLEANING section).
 - H. Check all parts for damage or defects (refer to the INSPECTION section), replace as necessary.
 - I. Install tube (48) in valve body (1) with its open end pointed straight upward.
 - J. If the strainer (37) is being installed, slide it over the top of the inner chamber (3) and tube (48) and install the spacer (47) on top of the strainer.
 - K. Install retaining ring (43) to secure strainer (37) (must always be installed).

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- L. Install spring (9) in the top of inner chamber (3) and balance poppet (4) on top of spring (9).
 - M. Make sure tube (48) is pointing straight upward.
 - N. Apply petroleum jelly to new packing (11) and install it over the boss on adapter (2) flange.
 - O. Rotate the outlet adapter (2) to align notch in flange with the servo boss on the body (1). Slide the outlet adapter straight downward over the top of inner chamber (3), and do not rotate it until the packing (11) is seated in the valve body (1).
 - P. Make sure packing (11) is in the correct position and has not fallen off of the boss or trapped.
 - Q. Press the poppet (4) and look inside the outlet adapter (2) to make sure the tube (48) is pointed upward.
 - R. Install the eight screws (34) and tighten them down evenly. Torque the screws to 150 lb-in. (17 Nm).
 - S. Install servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).
- 8. Overhauling the Pressure Relief Valve (See IPL Figure 1)**
- A. Remove poppet (4); refer to Removing and Replacing the Outlet Adapter, the Poppet, and the Strainer (step 7).
 - B. Remove shaft (15). Hold the poppet (4) in a padded vise. Be careful not to damage the poppet (4) sealing surface.
 - C. Remove spring (10), plunger (5) and gasket (45).
 - D. Clean all parts, giving particular attention to the threads of poppet (4) and shaft (15) (refer to the CLEANING section).
 - E. Check all parts for damage or defects (refer to the INSPECTION section), replace as necessary.
 - F. Install a new gasket (45) in the poppet (4), make sure it is flat when seated.
 - G. Install plunger (5) and spring (10).

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- H. Apply 2 drops of thread locking compound (Loctite 262) to the threads of shaft and install in poppet (4). Torque shaft (15) to 50 lb-in. (5.7 Nm).
- I. Install poppet (4); refer to Removing and Replacing the Outlet Adapter, the Poppet, and the Strainer (step 7).

9. Overhauling the Servo Valve (See [IPL Figure 1](#))

- A. Remove servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).
- B. Remove retaining ring (30).
- C. Using two flat blade screwdrivers as levers (see [Figure 3](#)), lift out seat (19).
- D. Remove plunger (31) and packing (28) from inside of seat (19). Remove packing (28) from plunger (31).
- E. Remove packings (22 and 24) from seat (19).
- F. Lift ball (33) and spring (39) out of valve body (1).
- G. Do not remove plugs (23 and 32) (if installed).
- H. Clean all parts (refer to the CLEANING section).

Note: All packings must be replaced.

- I. Check all parts for damage or defects (refer to the INSPECTION section), replace as necessary.
- J. Install spring (39) and ball (33) in valve body (1).
- K. Lubricate two new packings (22 and 24) with petroleum jelly and install on seat (19).
- L. Install seat (19) in valve body (1) and secure with retaining ring (30).

Note: If valve body (1) is full of fuel, it is necessary to prevent the ball from sealing on the seat. A 3/16-inch (5 mm) diameter rod can be inserted through the hole in the top of the seat.

- M. Lubricate a new packing (28) with petroleum jelly and install on plunger (31).

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- N. Install plunger (31), long end first, in seat (19) as shown in [Figure 4](#).
- O. Install servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).

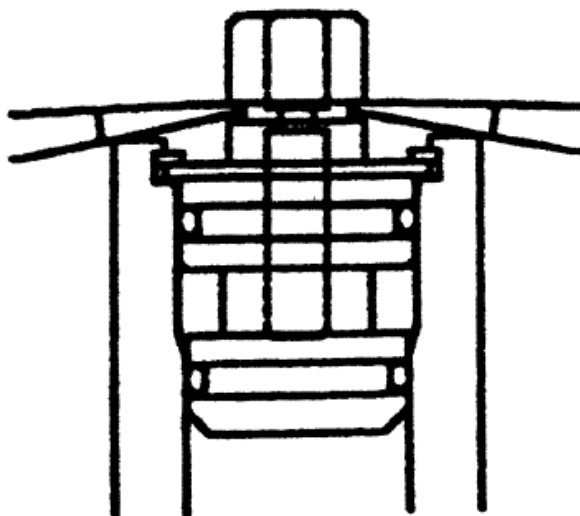


Figure 3. Removing the Servo Valve Seat

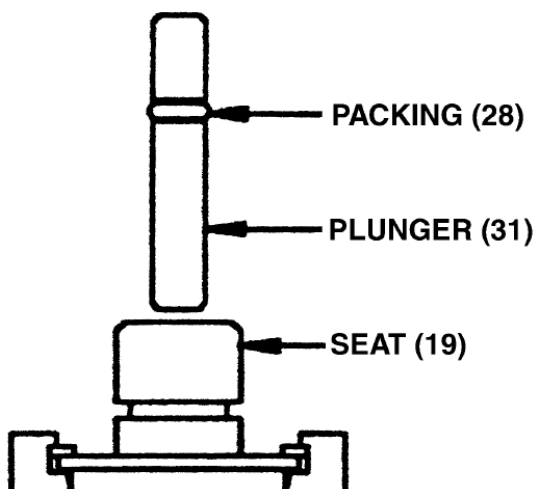


Figure 4. Installing the Servo Valve Plunger

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10. Overhauling the Mechanical Servo Assembly (See [Figure 5](#) and [IPL Figure 1](#))

- A. Remove servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).
- B. Drive out upper pin (7G), lift lever (7F) and remove assemble pedal shaft (7A, 7B, 7C and 7E). Remove spring (7D).
- C. Hold shaft (7E) and remove screw (7A) and washer (7B). Separate pedal (7C) and shaft (7E).
- D. Drive out lower pin (7G) and remove the lever (7F).
- E. Drive out middle pin (7G) and remove spring (7J).
- F. Clean all of the parts (refer to the CLEANING section).
- G. Check all part for damage or defects (refer to the INSPECTION section).
- H. Install spring (7J) and middle pin (7G). Install the lever (7F) and upper pin (7G).
- I. Hold shaft (7E) and put pedal (7C) in position. Apply one drop of thread locking compound (Loctite 262) on screw (7A) and install it and washer (7B) in shaft (7E) and tighten securely.
- J. Install spring (7D) and shaft (7E) in body (7H). Press inward on shaft (7E) until lever (7F) latches. Install lower pin (7G).
- K. Make sure pedal (7C) latches securely when pressed, and releases when the lever (7F) is lifted.
- L. Install servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).

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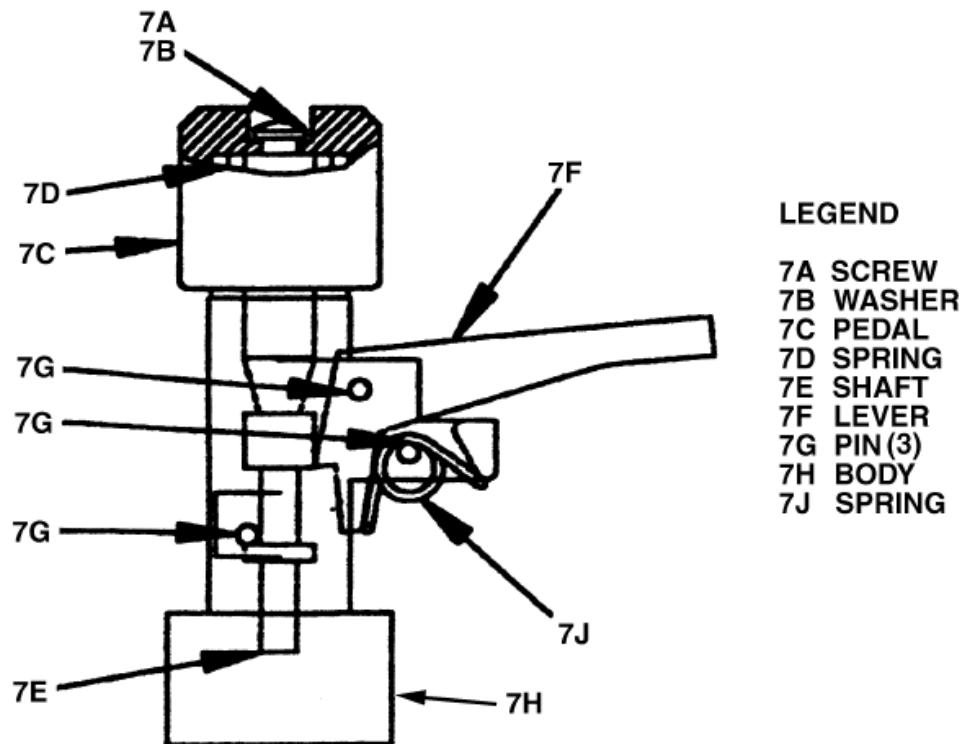


Figure 5. Mechanical Servo Assembly

11. (Mod D and F) Overhauling the Air Servo Assembly (See Figure 6 and IPL Figure 1)

- A. Remove servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).
- B. Push retainer (13E) into cylinder (13A) and remove ball (13F).
- C. Allow spring (13D) to push retainer (13E) out of cylinder (13A) and remove all of the components from cylinder (13A).
- D. Remove packing (13B) from piston (13C).
- E. Clean all parts (refer to the CLEANING section).
- F. Check all parts for damage or defects (refer to the INSPECTION section), replace as necessary.

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- G. Lubricate a new packing (13B) with lubricant (Molycote 33) and install in packing groove of piston (13C).
- H. Install piston (13C) in cylinder (13A).
- I. Install spring (13D) and retainer (13E) in cylinder (13A).
- J. Push retainer (13E) into cylinder (13A) and insert ball (13F) in ball groove the release retainer (13E) to trap ball (13F).
- K. Remove servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).

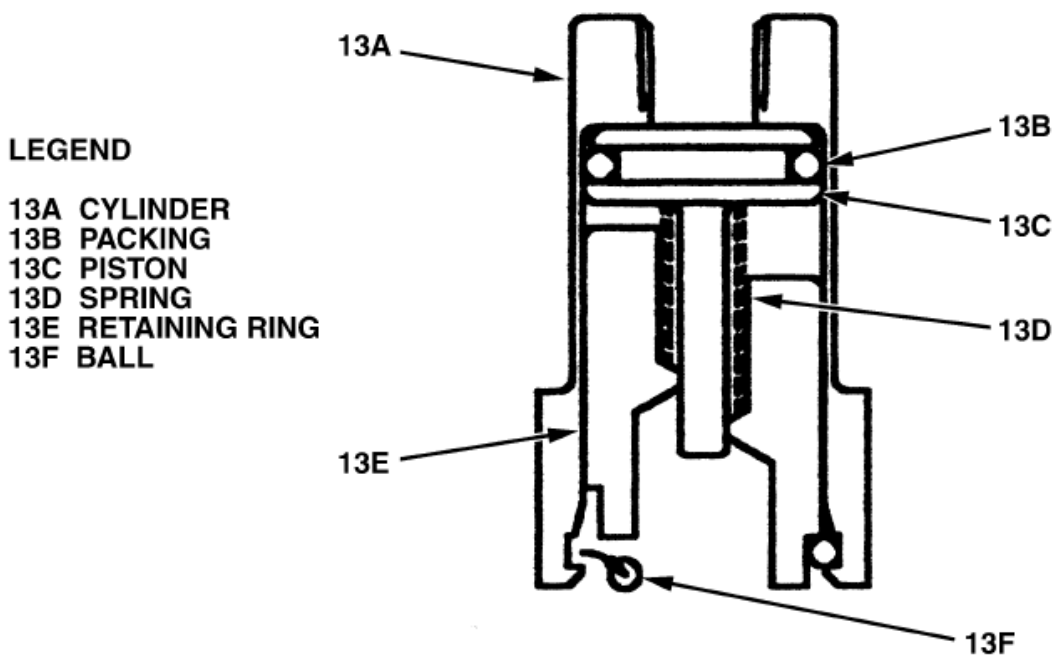


Figure 6. Air Servo Assembly

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WARNING

THE VALVE SHALL BE REMOVED FROM THE SYSTEM TO ACCOMPLISH THIS REPAIR TASK.

12. Overhauling the Maintenance Valve

- A. With the valve on a bench, fully open the maintenance valve stem (20).
- B. Using a deep 1-inch (25.4 mm) hex socket, remove maintenance valve stem (20) from valve body (1).
- C. Drive out pin (42). Remove maintenance valve stem (20) from tube (18). Ball (38) will be free for removal.
- D. Remove packings (24, 25, 26 and 27).
- E. Clean all of the parts (refer to the CLEANING section).
- F. Check all parts for damage or defects (refer to the INSPECTION section), replace as necessary.
- G. Lubricate new packings (24, 25, 26 and 27) with petroleum jelly.

CAUTION

MAKE SURE PACKINGS ARE SEATED CORRECTLY (NOT TWISTED).

- H. Lubricate the packings' contact surface with petroleum jelly and the internal threads of the tube (18).
- I. Put ball (38) inside of tube (18). Screw maintenance valve stem (20) inward by hand until it touches ball (38).

CAUTION

MAKE SURE THE INNER CHAMBER (3) IS ALIGNED CORRECTLY, AS DAMAGE TO THE TUBE (18) MAY OCCUR.

- J. Drive the pin (42) into its bore. Remove maintenance valve stem (20) by hand until it touches pin (42). Before installing the maintenance valve stem (20) in valve body (1), look into the side port and make sure the port in the inner chamber (3) is lined up with the side port. Rotate the inner chamber (3) in the valve body as necessary to achieve accurate alignment. The alignment pin (P/N 908011-101) may be used to check the alignment.

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- K. Use petroleum jelly to lubricate the parts and the threads of; valve body (1), inner chamber (3) and maintenance valve stem (20).
- L. Install the maintenance valve stem (20) in the valve body (1) and torque maintenance valve stem (20) to 50 lb-in. (5.7 Nm).

WARNING

THE VALVE SHALL BE REMOVED FROM THE SYSTEM TO ACCOMPLISH THIS REPAIR TASK.

13. Overhauling the Piston and Inner Chamber

- A. With valve on a bench, fully open maintenance valve stem (20).
- B. Remove servo assembly (7 or 13); refer to Removing and Replacing the Servo Assembly (step 6).
- C. Remove outlet adapter (2), poppet (4) and strainer (37); refer to Removing and Replacing the Outlet Adapter, the Poppet, and the Strainer (step 7).
- D. Using a deep 1-inch (25.4 mm) hex socket, remove maintenance valve stem (20) from valve body (1).
- E. See [Figure 7](#) and measure and write down Dimension M, the position of metering pin (17) in inner chamber (3). This measurement is required to make sure the adjustment of the valve is retained.
- F. Turn the valve body (1) on its side. Remove retaining ring (44) and lift inner chamber (3) out of valve body (1).

CAUTION

THE PISTON (6) MAY OR MAY NOT REMAIN IN THE INNER CHAMBER (3). DO NOT ALLOW THE PISTON TO DROP OR FALL AND BE DAMAGED.

- G. Remove piston (6) from inner chamber (3). If piston (6) does not come out with ease when pulled by hand; remove nut (35), washer (36), seal (46) and metering pin (17). Using a plastic or wooden rod, drive the piston (6) out. Do not remove metering pin (17), unless required to remove piston (6), or if metering pin (17) is damaged.

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CAUTION

DO NOT PRY OR USE TOOLS THAT WILL DAMAGE THE POLISHED SURFACES.

- H. Using a soft metal blade remove the seal (14) and packing (12) from the inner chamber (3).
- I. Clean all parts thoroughly (refer to the CLEANING section).
- J. Check all part for damage or defects (refer to the INSPECTION section), replace as necessary.

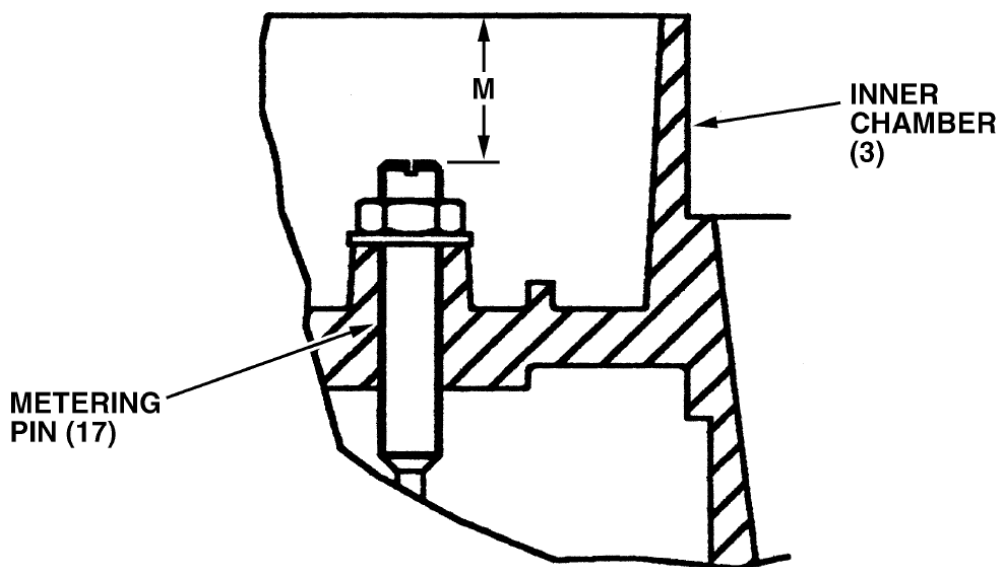


Figure 7. Measuring the Metering Pin Position

- K. Install metering pin (17), washer (36), seal (46) and nut (35) in inner chamber (3). Adjust the position of the metering pin (17) to Dimension M measured in paragraph E (or 1.20 inches [30.5mm]) if no measurement is available. Lock metering pin (17) in position with nut (35) and torque nut (35) to 100 lb-in. (11.3 Nm).
- L. Lubricate (petroleum jelly) and install packing (12) in the seal groove of inner chamber (3).

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CAUTION

MAKE SURE THE PACKINGS ARE SEATED CORRECTLY (NOT TWISTED).

- M. Lubricate seal (14) with petroleum jelly. Gently roll the seal (14) between your fingers so that it forms a slight U shape. See [Figure 8](#) and insert seal (14) into the seal groove inside of inner chamber (3), covering packing (12).

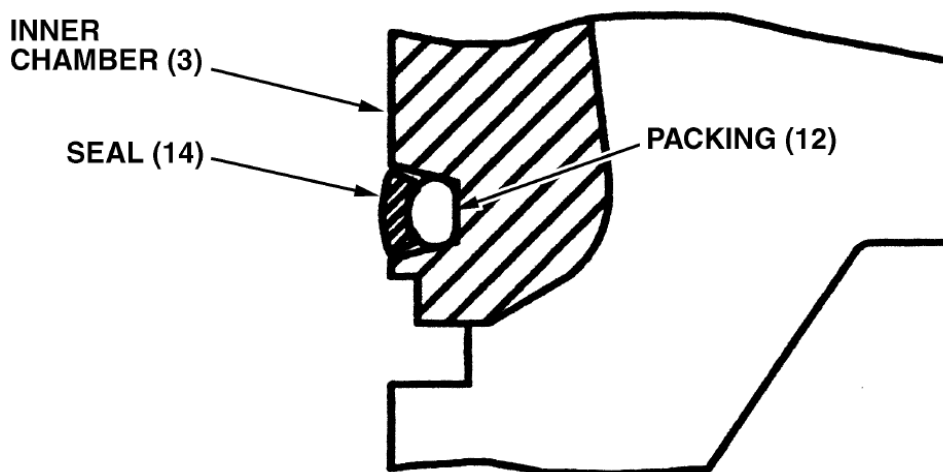


Figure 8. Forming the Piston Seal

CAUTION

DO NOT ALLOW SEAL (14) TO CREASE SINCE THIS WILL DAMAGE THE SEAL.

- N. Lubricate the outside diameter of piston (6) with petroleum jelly. Install spring (8) and piston (6) in inner chamber (3). Apply steady hand pressure and rotate the piston (6), do not hammer. If the piston (6) does not enter the seal easily, remove the piston (6) and make sure seal (14) and packing (12) are correctly seated and have not been damaged.
- O. Press piston (6) against spring (8) in inner chamber (3). When released, the piston (6) shall return.
- P. Turn valve body (1) on its side. Insert inner chamber (3) and piston (6) into valve body (1). Keep the piston (6) in the inner chamber (3) by putting one hand through the seat from the flange end.

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- Q. Push the inner chamber (3) fully downward and install retaining ring (44). Allow inner chamber (3) to return, stopping against retaining ring (44).

CAUTION

MAKE SURE THE INNER CHAMBER (3) IS ALIGNED CORRECTLY, AS DAMAGE TO THE TUBE (18) MAY OCCUR.

- R. Before installing the maintenance valve stem (20) in valve body (1), look into the side port and make sure the port in the inner chamber (3) is lined up with the side port. Rotate the inner chamber (3) in the valve body (1) as necessary to achieve accurate alignment. The alignment pin (P/N 908011-101) may be used to check the alignment.
- S. Using petroleum jelly, lubricate the parts and the threads in the valve body (1), inner chamber (3) and maintenance valve stem (20).
- T. Install the maintenance valve stem (20) in the valve body (1). Torque the maintenance valve to 50 lb-in. (5.7 Nm).
- U. Install outlet adapter (2), poppet (4) and strainer (37); refer to Removing and Replacing the Outlet Adapter, the Poppet, and the Strainer (step 7).

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CLEANING

1. Cleaning Materials

Refer to [Table 5](#) for recommended cleaning materials. Suitable equivalent cleaning materials may be substituted for the items listed

Table 5. Recommended Cleaning Materials

DESCRIPTION	SPECIFICATION	SOURCE
Alcohol, Isopropyl	ASTM D770	Commercially available
Bags, Plastic	-	Commercially available
Brush, Bristle, Stiff, Non-metallic	-	Commercially available
Pick, Teflon®	-	Commercially available
Solvent, Dry Cleaning	P-D-680, Type 2	Commercially available
Tissues, Lint-free	-	Commercially available

2. Cleaning Procedures



DRY CLEANING SOLVENT AND ISOPROPYL ALCOHOL ARE HARZARDOUS MATERIALS. BEFORE USE, READ AND FOLLOW THE MATERIAL SAFETY DATA SHEET (MSDS) INSTRUCTIONS FOR CORRECT HANDLING. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN PERSONAL INJURY, LONG TERM HEALTH HAZARDS OR DEATH.

- A. Clean all metal parts by washing thoroughly in dry cleaning solvent. Remove stubborn deposits by scrubbing with a nonmetallic stiff bristle brush. Brush all threaded areas. Use a Teflon® pick to remove blockage from the ports, the seal or packing grooves and the flow passages.
- B. Clean all of the non-metallic parts by wiping them with clean lint-free tissues slightly moistened with isopropyl alcohol.

Note: All parts must be free of corrosion, dirt, grease, oil or any other foreign matter.

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WEAR EYE PROTECTION WHEN USING COMPRESSED AIR. DO NOT DIRECT AIRSTREAM AT PERSONNEL OR LIGHT METAL PARTS.

- C. Dry the parts with clean lint-free tissues or clean, dry, compressed air.
- D. Package all of the clean parts in plastic bags.

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CHECK/INSPECTION

1. General

Under strong light and magnification, look at all parts in accordance with the general criteria specified in [Table 6](#).

Repair minor damage in accordance with local directives. If damage is major or beyond simple repair, replace the part.

2. Component Checks (Refer to [Table 6](#))

Table 6. Component Checks

DESCRIPTION (IPL Figure 1 Item Number)	INSPECTION CRITERIA
General	Look at all parts, as applicable for; nicks, cracks, cuts, burrs, corrosion, breaks, scoring, chafing, scarring, deformation, dents, thread damage, or any other obvious defects. Make sure the ports, passages, recesses and sealing grooves are clean and unobstructed.
	Make sure all sealing and seating surfaces are free of damage or corrosion.
Installed Hydrant Shutoff Valve	Check periodically for “hot valve” condition (excessive internal leakage). Test the valve in accordance with local company policy.
Valve Body (1 or 1A)	Main Piston Seat – Check for corrosion and contamination. Can be cleaned and polished with 600-grit emery cloth. Replace if there is heavy corrosion or mechanical damage.
	Servo Port in Top Flange – Check for corrosion and contamination. Can be cleaned and polished with 600-grit emery cloth. Replace if there is heavy corrosion or mechanical damage.
Outlet Adapter (2)	Sealing Surfaces – Check for corrosion and contamination. Can be cleaned and polished with 600-grit emery cloth. Replace if there is heavy corrosion or mechanical damage.
	Coupler Locking Flange – Replace if there is visible heavy corrosion or mechanical damage.

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Table 6. Component Checks – (cont.)

DESCRIPTION (IPL Figure 1 Item Number)	INSPECTION CRITERIA
Inner Chamber (3)	Piston Bore – Check for minor scoring. Can be cleaned and polished with 600-grit emery cloth. Replace if there is heavy scoring.
	Seal Groove in Piston Bore – Replace if there is any damage.
	Side Port – Replace if there is any scoring or damage.
Poppet (4)	Molded Seal – Replace if there are cuts or other damage.
Piston (6)	Outside Diameter – Check for light scoring. Can be cleaned and polished with 600-grit emery cloth. Replace if the surface coating is worn through to bare metal.
Pedal (7C)	Replace if damaged or visible worn.
Spring (7D)	Replace if latching is weak.
Shaft (7E)	Replace if bent. Minor corrosion can be cleaned and polished with 600-grit emery cloth.
Lever (7F)	Latch Area – Replace if visibly worn.
Plunger (5)	Actuating End and Seat Area – Replace if there is visible wear or damage.
Packing (11)	Replace if there are cuts, deformation or other damage.
Packings (12, 22, 24, 25, 26 and 27)	Replace if there are cuts, swelling, visible wear, deformation or other damage.
Cylinder (13A)	Check for light scoring or corrosion. Can be cleaned and polished with 600-grit emery cloth. Replace if there is heavy scoring or other damage.
Packing (13B)	Replace if there are cuts, swelling, visible wear, deformation or other damage.
Piston (13C)	Replace if bent.
Seal (14)	Replace if there is embedded contamination or mechanical damage.
Metering Pin (17)	Make sure all contamination has been removed by cleaning. Replace if there is visible wear on the head end. Check for straightness; replace if bent.

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Table 6. Component Checks – (cont.)

DESCRIPTION (IPL Figure 1 Item Number)	INSPECTION CRITERIA
Tube (18)	Small Diameter Tube End – Replace if bent, cracked, or if there is other damage.
	Packing Grooves – Replace if there is any damage.
	Internal Ball seat and Seal Bore – Check for scoring and contamination. Can be cleaned and polished with 600-grit emery cloth.
Seat (19)	Packing Grooves – Replace if damaged.
	Internal Ball Seat – Check for scoring and contamination. Can be cleaned and polished with 600-grit emery cloth.
	Plunger Bore – Replace if scored or contaminated.
Packing (28)	Always replace if exposed during maintenance.
Plunger (31)	Seal Groove – Check for minor scoring. Can be cleaned and polished with 600-grit emery cloth. Replace if there is any damage or major scoring.
Balls (33 and 38)	Replace if there is any corrosion, scratching or pitting.
Spring (39)	Replace if there is corrosion or deformation.
Gasket (45)	Always replace if removed and the valve has been in service for 3 months or longer.
Thread Seal (46)	Seal Molding – Replace if damaged.
Tube (48)	Must slip easily into its valve body port. Replace if there is any crushing or other damage.

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TESTING AND ADJUSTMENT

1. General

- A. Complete all of the tests using Stoddard solvent, jet fuel or equivalent (referred to as solvent herein).
- B. All of the test equipment and fixtures are to be supplied by user.

2. Valve Test – Static

A. Test Setup

1. Install the valve in a test setup equivalent to [Figure 9](#).
2. Solvent pressure: 0 to 200 psi (13.8 bar). Flow: 0 to 15 gpm (57 lpm).
3. Air pressure (if required to operate air-servo): 0 to 100 psi (6.9 bar).

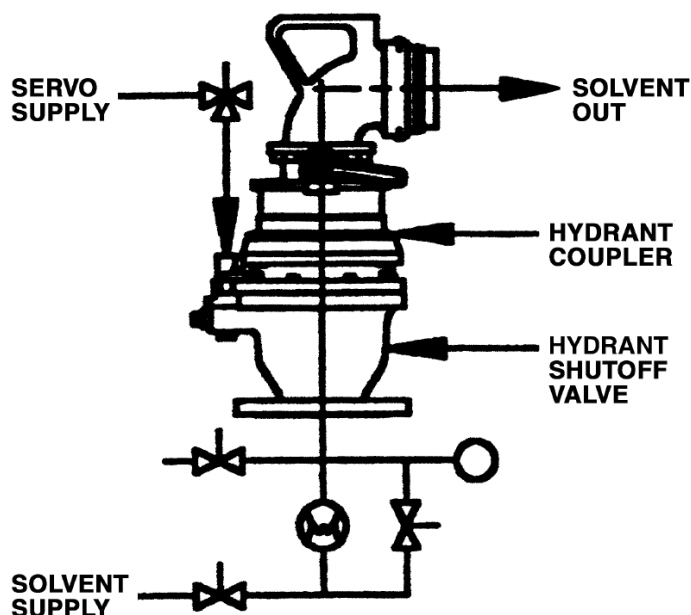


Figure 9. Leakage Test Setup

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B. Internal Leakage

1. Make sure the maintenance valve stem (20) is open.
2. Actuate the servo (7 or 13) open (use air pressure for the air servo).
3. Open the hydrant coupler.
4. Apply 200 psi (13.8 bar) solvent pressure at a flow rate of 15 gpm (57 lpm) maximum.
5. The valve must open (allow solvent to flow until bubbles do not appear in the flow).
6. De-actuate the mechanical servo (7) or vent the air pressure from the air servo (13).
7. The hydrant valve must close within 30 seconds.
8. The internal leakage must not exceed 30 cc/minute.
9. Remove the solvent pressure.

C. External Leakage

1. Close the hydrant coupler and remove it from the hydrant.
2. Make sure the maintenance valve stem (20) is open.
3. Actuate the servo (7 or 13) open (use air pressure for the air servo).
4. Apply 200 psi (13.8 bar) solvent pressure.
5. There must not be any external leakage.
6. Remove the solvent pressure.
7. De-actuate the mechanical servo (7) or vent the air pressure from the air servo (13).
8. Remove the valve from test setup.

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3. Valve Test – Flow

A. Test Setup

1. Install the valve in a test setup equivalent to [Figure 10](#).
2. Solvent pressure: 0 to 120 psi (8.3 bar). Flow: 0 to 1200 gpm (4542 lpm).
3. Air pressure (if required to operate air-servo): 0 to 100 psi (6.9 bar).

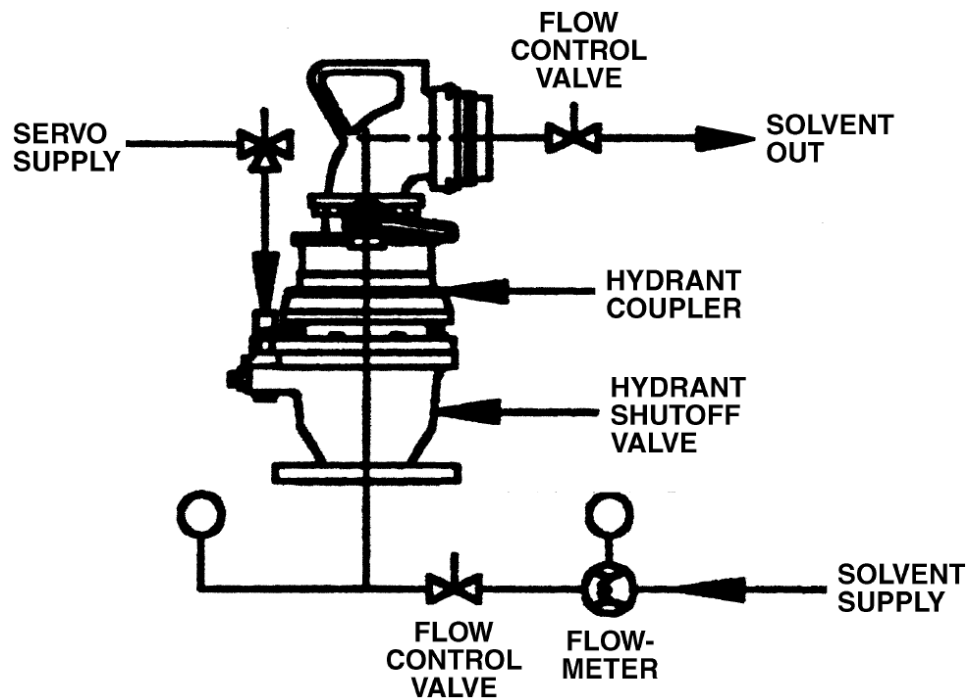


Figure 10. Flow Test Setup

B. Flow Test Procedure

1. Make sure maintenance valve stem (20) is open.
2. De-actuate the mechanical servo (7) or vent the air pressure from the air servo (13).

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3. Open the hydrant coupler.
4. Apply 120 psi (8.3 bar) solvent pressure at zero flow.
5. Actuate and de-actuate the servo (7 or 13) open and close at least 4 times.
6. Allow the hydrant valve to open and close to remove the air trapped in the inner chamber (3). Use air pressure to actuate the air servo (13).
7. Make sure valve fully opens and fully closes.
8. Actuate the hydrant valve open and set the flow to 1200 gpm (4 542 lpm).
9. Close the maintenance valve stem (20). Hydrant valve must close.
10. Open the maintenance valve stem (20) and leave it open. The hydrant valve must open.
11. De-actuate the servo (7 or 13). The valve must close in 2 to 5 seconds.
12. Actuate the servo (7 or 13). The valve must open in 5 to 10 seconds.
13. Repeat steps 11 and 12 at least 3 times. The opening and closing times must be consistent. If the opening and closing times require adjustment; refer to [Adjusting the Valve](#) Step 5.
14. Repeat steps 11 and 12 after each adjustment.
15. De-actuate the servo (7 or 13). Remove the solvent pressure.
16. Remove the valve from the test setup.
17. Drain the valve; refer to Draining the Valve Step 4.

4. Draining the Valve (See [IPL Figure 1](#))

CAUTION

AFTER TESTING, THE VALVE BODY AND THE INNER CHAMBER WILL BE FULL OF SOLVENT OR TEST FLUID. THIS FLUID MUST BE REMOVED BEFORE THE VALVE IS TRANSPORTED OR STORED.

- A. Turn valve on its side.

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- B. Using a deep 1-inch (25.4 mm) hex socket, remove the maintenance valve stem (20) from the valve body (1).
- C. Turn the valve so that the maintenance valve stem (20) port points straight downward.
- D. By hand, push the piston (6) fully open and then allow it to close. Repeat this step 5 or 6 times, or until no more solvent comes out of the valve.
- E. Stand the valve on its inlet flange.

CAUTION

IF THE INNER CHAMBER IS NOT CORRECTLY ALIGNED, TUBE (18) COULD BE BENT OR BROKEN.

- F. Before installing the maintenance valve stem (20) in the valve body (1), look into the side port and make sure the port in the inner chamber (3) is lined up with the side port. Rotate the inner chamber (3) in the valve body as necessary to achieve accurate alignment. The alignment pin (P/N 908011-101) may be used to check the alignment.
- G. Using petroleum jelly, lubricate the parts and the threads in the valve body (1), the inner chamber (3) and the maintenance valve stem (20).
- H. Install the maintenance valve stem (20) in the valve body (1) and torque stem (20) to 50 lb-in. (5.7 Nm).

5. Adjusting the Valve

- A. Remove the servo (7 or 13); refer to MAINTENANCE section (Step 6).
- B. Remove adapter and poppet; refer to MAINTENANCE section (Step 7).
- C. With a screwdriver in the slot of the metering pin (17) to prevent rotation, unlock the nut (35).
- D. Adjust the metering pin (17) position. Turning the metering pin (17) inward will reduce the opening and closing times. Turning the metering pin (17) outward will increase opening and dosing times.
- E. With a screwdriver in the slot of the metering pin (17) to prevent rotation, lock the nut (35) securely. Torque the nut to 100 lb-in. (11.3 Nm).
- F. Install the adapter and the poppet; refer to MAINTENANCE section (Step 7).

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- G. Install the servo (7 or 13); refer to MAINTENANCE section (Step 6).
- H. Test the valve; refer to Steps 1, 2 and 3.

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ILLUSTRATED PARTS LIST

1. General

This section lists, describes, and illustrates all detail parts required for maintenance support of the Hydrant Shutoff Valve.

2. Scope of Information

The parts list is arranged in the general order of disassembly. The listing is indented to show the relationship between each part and its next higher assembly. Item numbers used in the parts list are keyed to the corresponding numbers of the accompanying illustration.

A. MODIFICATION CODE

The modification code indicates the parts usage with respect to the end item. When the MOD column is blank, the part usage is applicable to all versions unless otherwise specified in the DESCRIPTION column.

B. How to Identify a Part

When the part number is known: Refer to the parts list for the item number, description, modification codes, and quantity. Refer to the illustration to make sure of the physical appearance and location of the part.

When the part number is not known: Examine the illustrations to identify the part by physical appearance and location. Refer to the accompanying parts list to get the part number, nomenclature, modification codes, quantity, etc.

C. Abbreviations

ASSY	Assembly
FIG.	Figure
HECV	Hose End Control Valve
IPL	Illustrated Parts List
MOD	Modification

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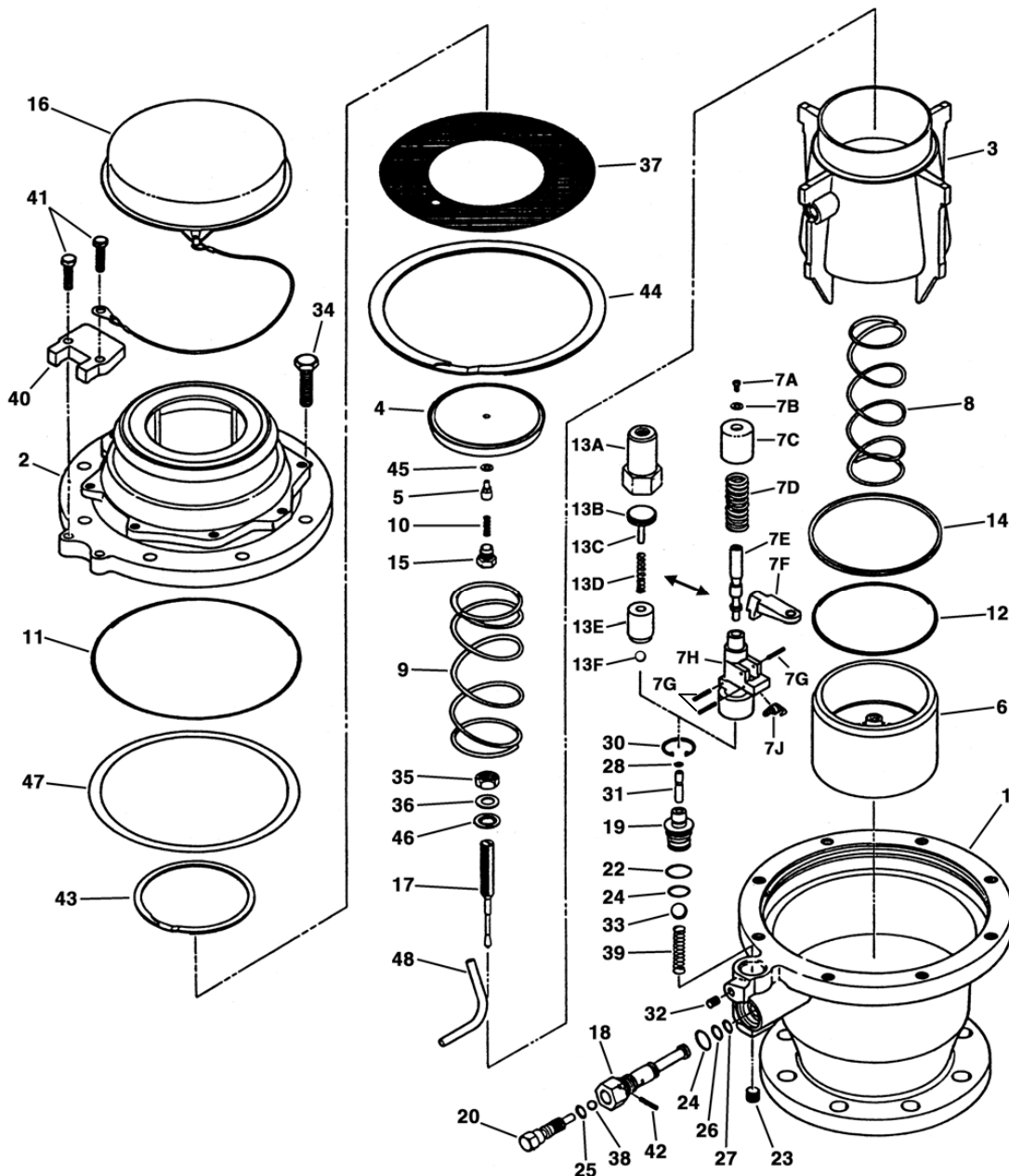
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IPL Figure 1. Hydrant Shutoff Valve

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FIG. ITEM	PART NUMBER	DESCRIPTION	MOD CODES	UNITS PER ASSY
VALVES, BASELINE HYDRANT SHUTOFF, PART NO F352 AND F353				
1 - 1	2763458-101	. BODY, VALVE (Used on F352 only).....	BSC,A-F,N,P	1
	2773458-111	. BODY, VALVE (Used on F352 only).....	M,Q	1
- 1A	2773333-104	. BODY, VALVE (Used on F353 only).....	BSC,A-G,P,Q	1
	2773333-102	. BODY, VALVE (Used on F353 only).....	K	1
	2773333-103	. BODY, VALVE (Used on F353 only).....	L	1
	2773333-105	. BODY, VALVE (Used on F353 only).....	H	1
	2773333-114	. BODY, VALVE (Used on F353 only with BSC).....	M	1
	2773333-112	. BODY, VALVE (Used on F353 only with suffix K).....	M	1
	2773333-113	. BODY, VALVE (Used on F353 only with suffix L).....	M	1
	2773333-115	. BODY, VALVE (Used on F353 only with suffix H).....	M	1
2	2763460-101	. ADAPTER, OUTLET.....		1
	2763460-102	. ADAPTER, OUTLET(Without Product Selection).....	Q	1
3	2763462-101	. CHAMBER, INNER.....		1
	2763462-102	. CHAMBER, INNER (Used on F353 only).....	G	1
4	2681242-2	. POPPET.....		1
5	2681261-1	. PLUNGER.....		1
6	2763465-101	. PISTON.....		1
- 7	2763466-101	. SERVO ASSEMBLY (LANYARD OPERATED).....	BSC,A,C,G-Q	1
	2763466-102	. SERVO ASSEMBLY (LANYARD OPERATED).....	E	1
7A	CMS51957-43	. . SCREW, MACHINE (ALT CMS35233-43).....	BSC,A,C,E,G-Q	1
	CMS35233-43	. . SCREW, MACHINE (ALT TO CMS51957-43).....	BSC,A,C,E,G-Q	RF
7B	CAN935-12	. . WASHER, LOCK.....	BSC,A,C,E,G-Q	1
7C	2642979-2	. . PEDAL.....	BSC,A,C,E,G-Q	1
7D	F59C1275	. . SPRING, COMPRESSION.....	BSC,A,C,E,G-Q	1
7E	2763509-101	. . SHAFT.....	BSC,A,C,G-Q	1
	2763509-102	. . SHAFT.....	E	1
7F	F59C1273	. . LEVER.....	BSC,A,C,E,G-Q	1

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FIG. ITEM	PART NUMBER	DESCRIPTION	MOD CODES	UNITS PER ASSY
1 7G	CMS39086-143	. . PIN, SPRING.....	BSC,A,C,E,G-Q	3
	7H 2763508-101	. . BODY, SERVO.....	BSC,A,C,G-Q	1
	2861008-101	. . BODY, SERVO.....	E	1
7J	2763511-101	. . SPRING, TORSION.....	BSC,A,C,E,G-Q	1
8	2661925	. SPRING, COMPRESSION (PISTON).....		1
9	2681220	. SPRING, COMPRESSION (POPPET).....		1
10	2-1349-46	. SPRING, COMPRESSION (PLUNGER).....		1
11	2661058BD268	. PACKING, PREFORMED.....		1
12	2661058BD248	. PACKING, PREFORMED.....		1
- 13	2860002-101	. SERVO ASSEMBLY.....	F	1
	2860002-102	. SERVO ASSEMBLY.....	D	1
	2774525-101	. SERVO ASSEMBLY.....	B	1
13A	2861005-101	. . CYLINDER.....	F	1
	2861005-102	. . CYLINDER.....	D	1
	2774523-101	. . CYLINDER.....	B	1
13B	2661058BD210	. . PACKING, PREFORMED.....	D,F	1
	2661058BD208	. . PACKING, PREFORMED.....	B	1
13C	2891022-101	. . PISTON.....	D,F	1
	2774011-101	. . PISTON.....	B	1
13D	LC032D13MW	. . SPRING, COMPRESSION.....	D,F	1
	C0300-0401380NW	. . SPRING, COMPRESSION (ALT LC-040D-14MW).....	B	1
	LC-040D-14MW	. . SPRING, COMPRESSION..... (ALT TO C0300-0401380NW)	B	RF
13E	2861003-101	. . RETAINER.....	D,F	1
	2774012-101	. . RETAINER.....	B	1
13F	2706786-3	. . BALL.....	D,F	1
	MS19060-3	. . BALL.....	B	1
14	2773322-102	. SEAL.....		1
15	2763612-101	. SHAFT.....		1

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FIG. ITEM	PART NUMBER	DESCRIPTION							MOD CODES	UNITS PER ASSY
		1	2	3	4	5	6	7		
1 16	2681255	. COVER ASSY, DUST								1
17	2763467-101	. PIN, METERING								1
18	2763468-101	. TUBE							BSC,A-N,Q	1
19	2763469-101	. SEAT								1
20	2763470-101	. STEM.....							BSC,A-N,Q	1
- 21	2763546-101	. WASHER.....							C	3
22	2661058BD117	. PACKING, PREFORMED								1
23	CAN932-3S	. PLUG (Used on F353 only)								1
24	2661058BD116	. PACKING, PREFORMED							BSC,A-N,Q	2
25	2661058BD012	. PACKING, PREFORMED							BSC,A-N,Q	1
26	2661058BD111	. PACKING, PREFORMED							BSC,A-N,Q	1
27	2661058BD013	. PACKING, PREFORMED							BSC,A-N,Q	1
28	2661058BD006	. PACKING, PREFORMED								1
29	2706525C10020	. SCREW, MACHINE							C	3
30	N5000-112	. RING, RETAINING								1
31	2763471-101	. PLUNGER								1
32	PLGA3431020	. PLUG, PIN.....								1
33	2706786-4826	. BALL.....								1
34	2706500HH12045	. SCREW, SOCKET HEAD CAP								8
35	CMS35691-37	. NUT, HEX.....								1
36	CAN960-816	. WASHER, FLAT								1
37	2763473-101	. STRAINER (20 MESH)							A	1
	2763473-102	. STRAINER (10 MESH) (Used on F353 only).....							G	1
38	2706786-10	. BALL.....							BSC,A-N,Q	1
39	2706155-106	. SPRING, COMPRESSION.....								1
40	2763475-101	. CLAMP								1
41	2706500HH08030	. SCREW, SOCKET HEAD CAP.....								2
42	CMS171532	. PIN, SPRING.....							BSC,A-N,Q	1
43	RS450	. RING, RETAINING								1

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FIG. ITEM	PART NUMBER	DESCRIPTION	MOD CODES	UNITS PER ASSY
1 44	RR850	. RING, RETAINING	A,G	1
45	2681965	. GASKET		1
46	750-0015-1/2	. SEAL, THREAD		1
47	2763552-101	. SPACER		1
48	2774084-101	. TUBE		1
- 49	2691179-3	. PLATE, IDENTIFICATION	D	1
- 50	2763472-101	. GUARD, STONE (USED ON F352 ONLY)		1
- 51	UR675	. RETAINER (USED ON F352 ONLY)		1
- 52	2642566	. COVER (USED ON F352 ONLY)	P	1
- 53	950003-103	. OVERRIDE ASSY		1

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OVERHAUL PARTS KITS AVAILABLE		
KIT PART NUMBER	DESCRIPTION	ITEMS IN KIT (IPL Figure 1)
KITF352-101	Without Air Servo	11, 12, 14, 22, 24, 25, 26, 27, 28, 30, 33, 39 and 45
KITF352-103	With Air Servo	11, 12, 13B, 13D, 13F, 14, 22, 24, 25, 26, 27, 28, 30, 33, 39 and 45

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