



# **VALVE OPERATING UNIT**

SAN FRANCISCO FIRE DEPARTMENT

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**Valve Operating Unit**  
Revised January 2008

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## **FOREWORD**

The goal of this manual is to establish standard operating practices as authorized by the Chief of Department and implemented by the Division of Training.

The purpose of this manual is to provide all members with the essential information necessary to fulfill the duties of their positions, and to provide a standard text whereby company officers can:

- Enforce standard drill procedures authorized as a basis of operation for all companies.
- Align company drills to standards as adopted by the Division of Training.
- Maintain a high degree of proficiency, both personally and among their subordinates.

All manuals shall be kept up to date so that all officers may use the material contained in the various manuals to meet the requirements of their responsibility.

Conditions will develop in fire fighting situations where standard methods of operation will not be applicable. Therefore, nothing contained in these manuals shall be interpreted as an obstacle to the experience, initiative, and ingenuity of officers in overcoming the complexities that exist under actual fire ground conditions.

To maintain the intent of standard procedures and practices, no correction, modification, expansion, or other revision of this manual shall be made unless authorized by the Chief Of Department. Suggestions for correction, modification or expansion of this manual shall be submitted to the Division of Training. Suggestions will be given due consideration, and if adopted, notice of their adoption and copies of the changes made will be made available to all members by the Division of Training.

Joanne Hayes-White  
Chief of Department



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# **CHAPTER 1 AUXILIARY WATER SUPPLY SYSTEM (AWSS)**

The AWSS is a grid system of cast-iron and ductile iron mains used solely to furnish water supply to High Pressure hydrants throughout two thirds of the city. The system is constantly being expanded and use of the system is confined solely to the Fire Department for fire suppression.

Water is supplied to the System by gravity from a reservoir through two storage tanks. The System is divided into three zones:

- 1. Upper Zone**
- 2. Lower Zone**
- 3. West of Twin Peaks Zone**

The Upper Zone is normally supplied by Ashbury Tank; the Lower Zone is supplied by Jones Street Tank and the West of Twin Peaks Zone is supplied by Twin Peaks Reservoir.

Storage at Twin Peaks Reservoir is also available to replenish either tank or to increase pressure in the System. Additional supply to the system can be provided by the two pumping stations or from the fireboat pumping into the system through manifolds.

The System consists of a grid of mains varying from 10 inches to 20 inches in diameter in 2-inch increments. Gate valves of special design with heavy cast-iron bodies and bronze stems are installed on all mains. Gate valves 12 inches and larger are equipped with a by-pass valve to equalize pressure on each side of the gate valve during closing or opening operations. These gate valves and by-pass valves are so installed that in case of breakage or repair of the main, it would only be necessary to shut off supply between gate valves of the section involved without affecting service to the remainder of the System.

A complete description of the AWSS and its operation can be found in the Manual of Water Supplies.

Detailed maps of the AWSS are carried in all AWSS Valve Units, all chief's buggies assigned to the fire fighting divisions and battalions, and all fire fighting company apparatus. The maps are essential in the event of an emergency necessitating the operation of any AWSS gate valve because the maps designate the size of all mains and the location of all gate valves in the System and whether the valves are open or closed.



## **CHAPTER 2 AWSS GATE VALVES**

Normally the gate valves on all mains 12 inches or more in diameter are 2 inches smaller than the main on which they are installed. Gate valves on 10-inch mains are 10 inches. Gate valves on hydrant branches are 8 inches. The size of the gate valves is of particular importance since the number of turns necessary to close or open a valve is determined by the size of the valve, not by the size of the main.

### **DIVISION GATE VALVES**

It has already been stated that the area protected by the Auxiliary Water Supply System is divided into an Upper zone, Lower zone and a West of Twin Peaks zone. The Upper zone is generally at or above the 150-foot elevation contour. The Lower zone is below the 150-foot level. The West of Twin Peaks zone does not follow elevation contours. Each of these zones is normally supplied with water through an independent distributing system. However, these three distributing systems may be connected into one, upon an emergency, by opening of normally closed division gate valves which maintain the three zones separate from each other. These division gates are located along the common boundaries of the three zones where the pipelines interconnect. Should it be necessary to reinforce the lower zone with Ashbury Tank or Twin Peaks Reservoir supply, other than through the Jones Street Tank manifolds, water may be obtained directly from the upper zone by opening these division gates. This however, is strictly an emergency procedure and shall only be done by AWSS personnel.

### **INFIRM AREA GATE VALVES**

Within the Lower Zone of the AWSS there are 10 infirm areas (filled ground). These areas are detailed on the AWSS maps and are susceptible to multiple breaks. A description of the special arrangement of the mains and gate valves which prevent major disruptions follows.

Each infirm area is normally supplied through one open gate valve. The mains within the boundary streets of infirm areas extend to and are connected with the mains laid in firm ground. Insufficient water supply to these areas can be overcome by opening closed gate valves on mains supplying the areas.

It is possible to isolate any section of an infirm area by first closing the one open control gate valve supplying the affected area (usually by remote operation from Jones St. Tank), isolating the break by closing the gate valves surrounding it, then re-opening the normally open valve supplying the area. It is possible that normally closed gate valves supplying the area may have to be opened to supply areas isolated by the closing of gates.

## Open Control Gate Valves Supplying Infirm Areas

Area Number	Size	Location
1	16"	SE Sacramento & Kearny
2 (motorized)	14"	SE Brannan & 2nd St.
3 (motorized)	16"	SE 6th & Market St.
4 (motorized)	12"	SE 5th & Brannan St.
5 (motorized)	12"	SW 7th & Brannan St.
6	14"	SE 17th & Dolores St.
7	12"	SW San Bruno & Army
8 (motorized)	12"	NE Larkin & Market
9 (motorized)	10"	NW Fillmore & Cervantes
10 (motorized)	16"	NW Leavenworth & Bay

The location of the infirm area open control gate valves, as well as the location of the closed gates are detailed on the AWSS maps. Except for extreme emergencies, these particular gate valves should be operated only by Water Supply Unit personnel.

## OPERATION OF GATE VALVES AND BY-PASS VALVES

**NOTE: No gate valve closing or opening will be performed without prior consultation of the AWSS maps.**

The operation of gate and by-pass valves for the purpose of inspection, maintenance and repair is the sole responsibility of the Water Supply Unit personnel.

Should a break occur in a high pressure main, it must be controlled as quickly as possible to prevent major water damage. When on duty, Water Supply Unit personnel should be contacted to perform this task. However, if they are off-duty or unavailable, the task of dealing with any AWSS emergency becomes the responsibility of on duty fire fighting personnel. For this reason, both Engine and Truck Companies carry gate valve wrenches for manual operation of gate and by-pass valves. A Valve Operating Unit truck is available to the firefighting service and is stored at Station 15. (Mon-Fri 3:30pm-7:00am, Sat & Sun 24hrs.) In addition, other valve-operating unit trucks are stored overnight at the AWSS Yard behind Station 9. The Emergency Communications Department will have an up-to-date list of these stations.

Except in extreme emergency, operation of any gate valve by fire fighting personnel will be done only under the supervision of either a Chief Officer or Water Supply Unit personnel.

Usually the extent of pipeline required to isolate a break will not exceed one block which involves the shutdown of two valves. There are exceptions and these exceptions will be shown on the AWSS maps.

Gate valves may be operated either manually or with a valve-operating unit. Due to the large number of turns required to close or open the 10-inch to 18-inch valves, the valve-operating unit should be used whenever possible. All by-pass valves must be OPERATED BY HAND ONLY. All gate and by-pass valves close by turning the operating nut in a clockwise direction and open in a counter-clockwise direction. The 8" hydrant branch gate can be operated by hand or valve unit.

## GATE VALVE IDENTIFICATION

Gate Valves may be quickly identified by their cover design. Covers over valves 10-inches or larger are provided with handles for ease of removal. Covers over hydrant-branch gate valves, over air relief valves, and over by-pass valves have a center bolt which can be used to lift the cover.

Removable dust pans are normally located immediately below the street valve cover. Gate valve stem operating nuts are located in a vertical position over the center of the valve body except when the valve is installed in a horizontal position. By-pass valves are normally installed in the same chamber as is the gate valve but sometimes must be accessed through their own street cover. The number of turns required to close or open a valve is determined by the size of the valve. Look for exceptions where a gate valve is left partially open thus requiring fewer than the standard number of turns to close.

**Note: Always Refer to AWSS Maps Before Operating Any Valves.**

<b>Turns required to close or open gate or by pass valves.</b>	
8 inch Hydrant Branch Gate Valve	35
10 inch Gate Valve	45*
12 inch Gate Valve	70
14 inch Gate Valve	113
16 inch Gate Valve	170
18 inch Gate Valve	267
3 inch By-Pass Valve	14
4 inch By-Pass Valve	18

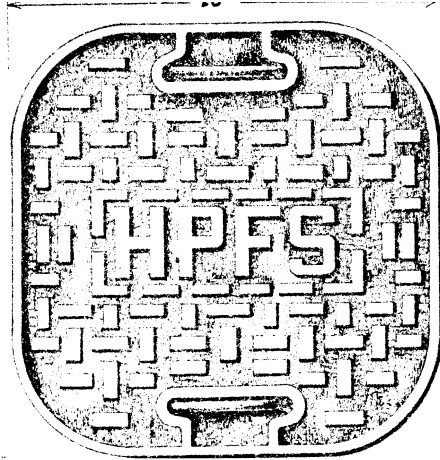
\*Gate Valve at 8th & Townsend Streets is maintained 10-turns open.

NOTE: The by-pass valves installed with the gate valves on the pipeline on Market Street between Castro Street and the Embarcadero are normally kept closed because of poor accessibility. Should it be necessary to close or open any of the gate valves on this pipeline, operate the gate valve without the use of the by-pass. If pressure against the valve faces is so great as to prevent operation of the valve, operate the by-pass in conjunction with the gate valve.

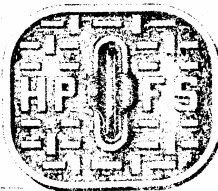
## EMERGENCY SHUT-DOWN

No gate valves or by-pass valves should be closed or opened by firefighters except when operating under emergency conditions involving a break in the AWSS mains or when operating the valves for company drills. Operating gate valves or by-pass valves at company drills can only be done with the permission of the Division Chief in whose Division the valve is located and under the supervision of Water Supply Unit personnel.

<b>Gate Valve</b>	<b>Operations</b>	<b>Installation</b>	<b>Location</b>	<b>Open</b>	<b>By-pass Valve</b>
<b>8" Hydrant Branch Gate Valve</b>	Valve Operating Unit or manually.	Installed on 8" hydrant pipe between main and hydrant	In cast-iron valve box, round cover, lettered Hydrant – HPFS.	35 turns	None
<b>10" Gate Valve</b>	Valve Operating Unit or manually.	Installed on 10" and 12" mains	In cast-iron box, 12"x14" cover, lettered HPFS.	45 turns	None
<b>12" Gate Valve</b>	Valve Operating Unit or manually.	Installed on 14" mains	In concrete vault, 28" cover, lettered HPFS.	70 turns	3" by-pass valve a. 14 turns to close or open b. operate manually.
<b>14" Gate Valve</b>	Valve Operating Unit or manually.	Installed on 16" mains	In concrete vault, 28" cover, lettered HPFS.	113 turns	3" by-pass valve a. 14 turns to close or open b. Operate manually
<b>16" Gate Valve</b>	Valve Operating Unit or manually.	Installed on 18" mains	In concrete vault, 28" cover, lettered HPFS.	170 turns	4" by-pass valve a. 18 turns to close or open b. Operate manually When gate valve is installed horizontally, the by-pass valve operating nut normally is accessible through a separate opening approximately 3 feet from the vault cover, identified by a round cover lettered By-pass HPFS.
<b>18 "Gate Valve</b>	Valve Operating Unit or manually.	Installed on 20" mains	In concrete vault, 28" square cover, lettered HPFS	267 turns	Equipped with 4" by-pass valve a. 18 turns to close or open b. Operate manually. When gate valve is installed horizontally, the by-pass valve operating nut normally is accessible through a separate opening approximately 3-feet from the vault cover, identified by a round cover lettered By-pass HPFS.



12" to 18" gate valve cover  
28" x 28"



10" GATE

10" gate valve cover  
12" x 14"



HYDRANT GATE

Hydrant Gate  
8" diameter



By-pass gate  
8" diameter



AIR RELIEF

Air relief cover  
8" diameter

### **BREAKS AND LEAKS IN THE AWSS MAINS**

When a break occurs, it will normally be evident by flooding of property adjacent to the break, flooding of the street, and possible collapse of the street surface. Immediately contact the Water Supply Unit Supervisor to verify if there is water loss in the AWSS or extreme pressure fluctuations.

Whenever a break occurs in the AWSS mains, the San Francisco Water Department and PG&E should be notified immediately because a break may endanger adjacent Water Department

pipelines as well as other underground installations. Conversely, any break in Water Department pipelines may affect AWSS mains. The Communications Center shall be immediately notified to contact the Water Supply Unit Supervisor for response.

Where water is flooding the street due to a break in underground pipelines, verify that the Water Department has been notified, then determine by reference to the maps that AWSS mains exist at the location of the break because the break may be in a Water Department main. If AWSS mains are in the area of the break, ask the Water Supply Unit Supervisor to confirm an abnormal loss of water in the system.



## CHAPTER 3 VALVE OPERATING UNIT

The valve Operating Unit is a hydraulic valve operator mounted on a truck. The valve operator is mounted on sliding shafts in a compartment on the left or driver's side of the truck, adjacent to the driver's cab. The hydraulic system of the valve operator is powered by a Power Take-Off (PTO).

### VALVE OPERATING UNIT EQUIPMENT

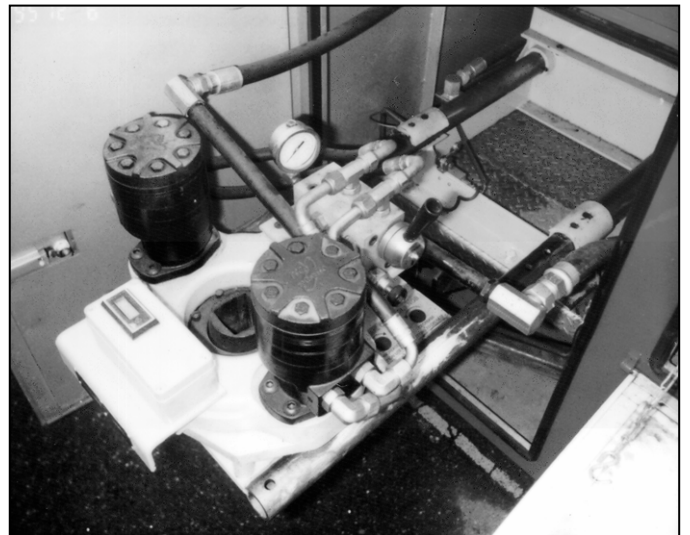
The normal complement of equipment carried on the truck with each Valve Operating Unit includes the following:

1. Hydraulic valve operator
2. Two universal wrenches, one short and one long
3. Double-socket universal wrench extensions
4. One double square arbor (solid) used to extend the double socket wrenches
5. A High Pressure (AWSS) hand wrench, extension and T-handle
6. A Low Pressure hand wrench and T-handle
7. A removable square-drive shaft
8. Cistern hooks, crowbar, sledge hammer, chocks and traffic warning devices
9. An AWSS map kept in a cardboard cylinder and stored in the tool box
10. A data plate mounted on the valve operator head, detailing the number of turns required to close or open the different size valves

These tools and equipment are stored in the tool boxes adjacent to the Hydraulic Valve Operator.

### HYDRAULIC VALVE OPERATOR

The main features of the hydraulic valve operator are the simplicity of operation and the maximum protection against damage to a gate valve and its operating parts.



The valve operator is installed in a compartment on the left hand side of the truck just back of the driver's seat. It is mounted on two horizontal sliding shafts and operable only from the left or driver's side of the truck.

A hand throttle is provided for control of the valve operator speed. Turning the knob counter-clockwise increases the speed while clockwise decreases the speed. This hand throttle is located on the dash in the valve operator compartment.

Before putting the valve operator into use, the following precautions must be strictly observed:

**The valve operator Direction Lever must be placed in the neutral/stop(s) position before operation of the power take-off (PTO) control. The foot accelerator must NEVER be used at any time during the use of the valve operator.**

## DISCONNECT COUPLING

On older units, a disconnect coupling will automatically disconnect any power overload in the event the relief valve fails. It is housed in a metal box at the right rear of the valve operator head and is covered by a hinged metal plate. The plate must be kept closed at all times during operation of the valve operator for safety.

The disconnect coupling consists of driving and driven shafts connected by a flanged coupling into which are inserted three brass shear pins of known shearing strength. If the relief valve should fail to function at the build-up of 1000 psi, the shear pins will shear off and disconnect the flanged coupling which stops power flow to the valve operator. When this happens the direction lever must be instantly returned to the "S" position, followed immediately by placing the power take-off (PTO) out of gear. The broken shear pins must then be replaced. Repeated shearing of pins may necessitate moving to another valve.

To reset the disconnect coupling:

1. Make certain that the power take-off (PTO) is out of gear and that the direction lever is set at the "S" position.
2. Secure three shear pins from metal box at left of valve operator head.
3. Open disconnect box coupling cover.
4. Turn shaft alignment knob until shaft alignment markers (colored red) are aligned. To relieve pressure, the direction lever may be turned to either the "U" or "D" position.
5. Remove all portions of sheared pins and insert new shear pins.
6. Close cover and set direction lever to "S" position.

New valve operating units have a different means of disconnecting to protect against power overload. Company Officers of the stations that house these units must learn resetting procedures from the hydrant gateperson assigned to the unit.

## LOADOMETER

The Loadometer is a pressure gauge which indicates the hydraulic pressure, in pounds per square inch (psi), of the oil flowing from the pump to the valve operator motor. Green, yellow and red areas are marked on the face of the gauge denoting the following loads: SAFE: 0 to 500 psi, CAUTION: 500 to 1,000 psi, DANGEROUS: over 1,000 psi.

Operating experience with this type valve operator has shown that the average normal pressure range in the operation of AWSS gate valves should be between 300 to 500 psi. The Loadometer must be monitored during any operation of the valve operator because this gauge will immediately indicate any excessive resistance to valve operation by an increase in pressure.

If the Loadometer indicates a pressure in the caution range, the pressure may be lowered by slowing down the rotation speed of the valve operator. This is done by moving the direction lever toward the neutral/stop(s) position which reduces the rotational speed. It may be necessary to reverse direction of the rotation of the gate valve stem to relieve a jammed condition; however, in this instance it is essential that the truck motor speed be reduced to idle using the hand throttle before changing position of the direction lever. If these actions do not relieve the excess pressure condition and particularly if the Loadometer indicates a pressure exceeding 750 psi, it may be necessary to move to the next nearest valve.

## DIRECTION LEVER

The direction lever is the control which determines whether the valve is being closed, opened or in a neutral/stop position. The direction lever along with the hand throttle can be used to vary the RPM speed of the valve operator.

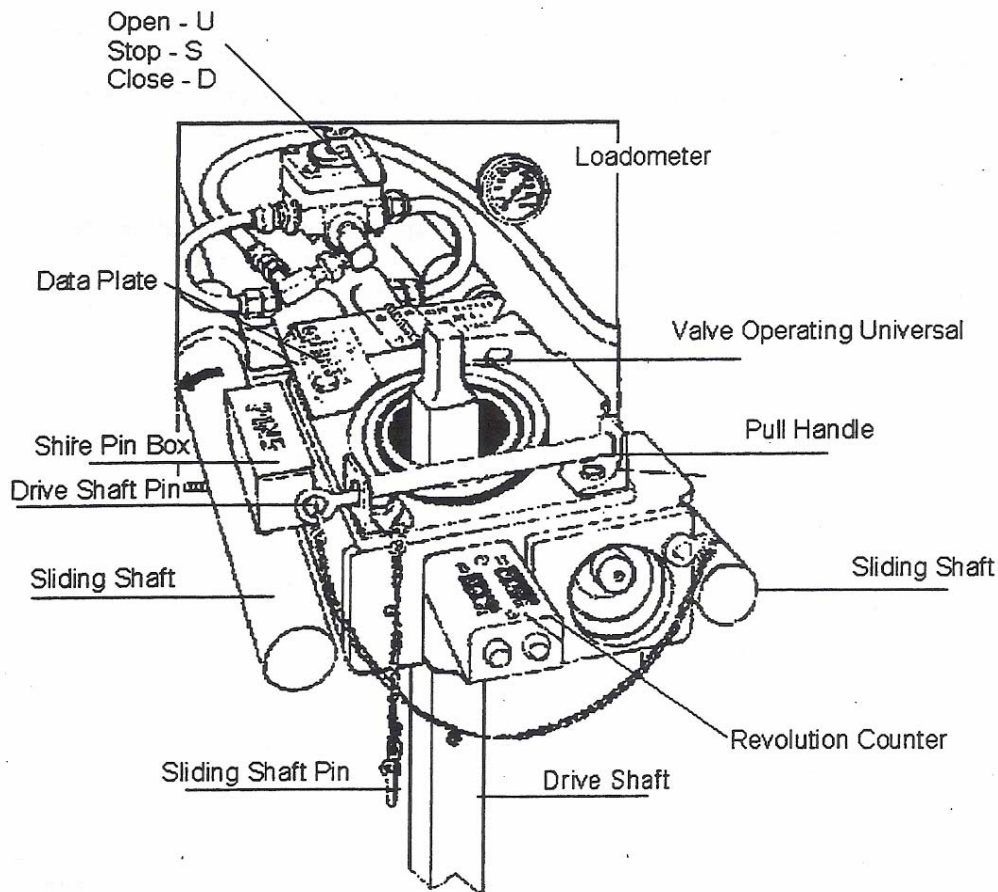
There are three positions at which the direction lever may be set. "S" is the neutral/stop position of the valve operator. "D" is the position to close down a gate valve. "U" is the position to open up a gate valve.

It is important to remember that the hand throttle must be set at idle motor speed when starting the valve operator and whenever changing the direction lever from "D" to "U" or vice-versa. The direction lever may be used at the lowest speed setting to test the direction of the gate valve and also to be sure it is not jammed. Normal operating speed should not exceed 20 RPM or 300 to 500 psi. Remember that the AWSS gate valves were made for hand operation and will not withstand excessive speed.

## REVOLUTION COUNTER

The valve operator is provided with two revolution counters. The counter on the left (nearest the driver's cab) counts the number of turns when a gate valve is being closed. The counter on the right (nearest the rear of the truck) counts the number of turns when a gate valve is being opened. **Both counters must be set at 0000 before starting any gate valve operation.** When it is necessary to move the gate valve stem up and down a few turns, to ease the operation, the counters need not be adjusted as each counter will automatically add or subtract the exact number of valve stem turns made.

New valve units are provided with only one revolution counter. The counter knob must be pushed in or pulled out depending on the direction of travel.



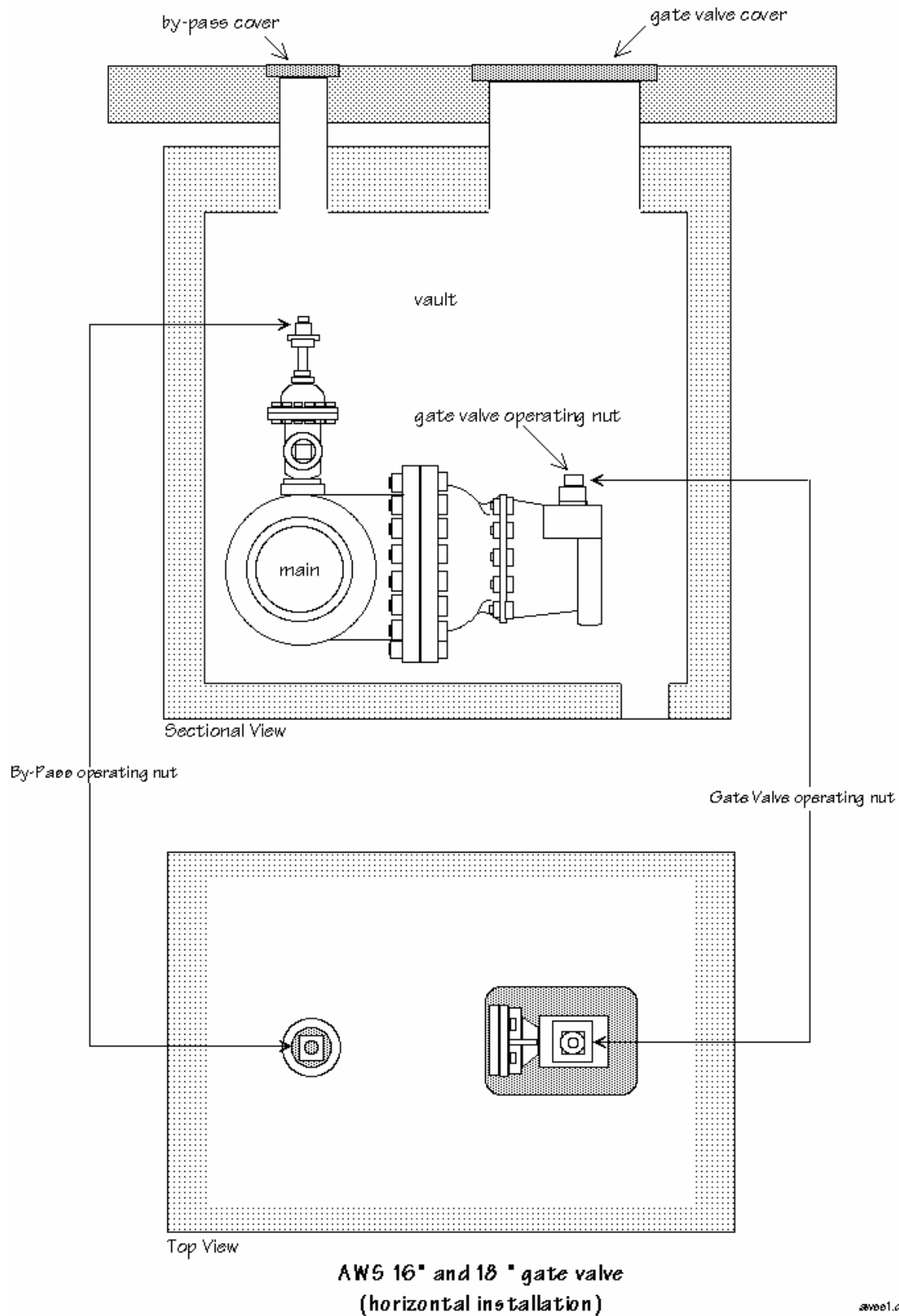
Hydraulic Valve Operator (older valve units)

## PRECAUTIONS FOR GATE VALVE OPERATORS

The purpose of this section is to outline general procedures for the emergency use of the Valve Operating Unit by the fire fighting force. Emergency operation of gate valves and by-pass valves by fire fighting personnel shall be done only under the supervision of a chief officer, unless it is an extreme emergency. Valve operation Reports shall be forwarded promptly to the AWSS office immediately following the operation of any gate valve or by-pass valve.

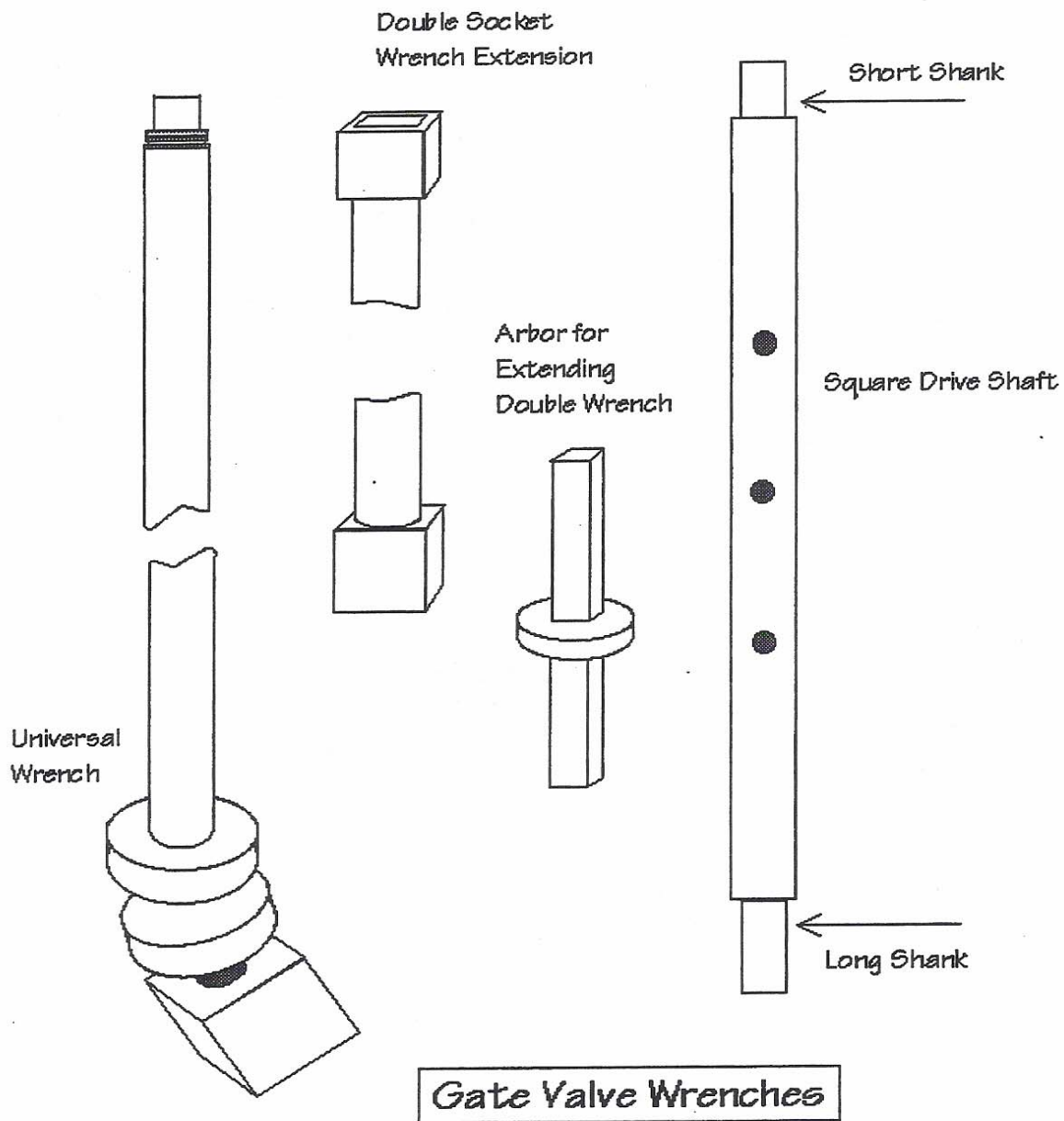
1. ALWAYS CONSULT AWSS MAPS PRIOR TO OPERATION OF ANY GATE
2. Equalized pressure should always be maintained on both sides of any gate valve equipped with a by-pass by:
  - a. Closing the by-pass last when closing the gate valve.
  - b. Opening the by-pass first when opening the gate valve.
  - c. Operation of by-pass valves will require the use of the high pressure hand wrench stored on every Valve Operating Unit truck.
3. If a break occurs in the mains located at an intersection where mains join, the gate valves on each adjoining main must be closed.  
Exception: 5 gate valves at Third and Market Streets and 5 gate valves at Sixth and Market Streets

4. Infirm areas are normally supplied from one source controlled by an open gate valve. If there is a break in the infirm area, shutting down the open gate valve may cut off supply to the entire area. In such a case it may be necessary to open one or more of the normally closed gate valves to supply the area and restore service.
5. If the resistance to operating a gate valve is extensive enough to cause stalling of the hydraulic valve operator, it may even be necessary to abandon that gate valve and move to the next nearest gate valve.
6. If it's impossible to operate the hydrant branch gate valve of a broken high pressure hydrant due to excessive water flow or other obstruction, shut-down can be made by closing the nearest AWSS gate valves. After shut-down, the hydrant branch gate valve should be closed as soon as possible and the AWSS main gate valves opened.
7. ALWAYS notify the Water Supply Unit Supervisor of any operation of AWSS gate valves. In the event of a shut-down, inform the Water Supply Unit Supervisor of the number and location of the hydrant placed out-of service.
8. Replace covers of 12 inch to 18 inch gate valves so that the cover handles are parallel with the flow of traffic.
9. Operate all AWSS valves slowly and with caution. When closing, the last few turns must be made SLOWLY to avoid a pressure surge in the main. A pressure surge causes damage to the valve and main.



## **CLOSING AN AWSS GATE VALVE**

1. Selection of Gate Valve
  - A. After surveying area, refer to AWSS maps to determine which valve(s) to shut down
  - B. Valves to be closed should be white (open position) on map
2. Initial Positioning of Truck
  - A. Driver's side of truck toward gate valve cover, front wheel 2-4 feet back and close to side of cover
  - B. Turn on headlights and red lights
  - C. Remove necessary tools and equipment - chock blocks, square drive shaft, crowbar, cistern hooks, universal wrench, double-socket wrench extensions and sledge hammer
3. Removal of Gate Valve Cover and Dust Pan
  - A. Break seal of accumulated dirt from edge of cover by striking cover with sledge hammer
  - B. Free both cover handles using crowbar and cistern hooks
  - C. Two members use cistern hooks to lift and slide cover out of work area
  - D. Two members use cistern hooks to lift dust pan and place on valve cover
  - E. Guard opening until truck is in final position
4. Positioning Universal Wrench on Gate Valve Operating Nut
  - A. Locate operating nut and determine necessary length of universal wrench
  - B. Set appropriate wrench on operating nut
  - C. Use double socket wrench extensions to extend above grade and hold in vertical position
5. Preparation of Valve Operator
  - A. Obtain key from driver's cab and open valve operator compartment door
  - B. Remove shaft pin from valve operator
  - C. Pull valve operator out of compartment to marked position
  - D. Place square drive shaft in universal socket of valve operator and lock shaft half way between street and valve operator with drive shaft pin
6. Final Positioning of Truck
  - A. Drive truck forward until drive shaft of valve operator is in line with universal wrench extensions
  - B. Place truck transmission in neutral and set emergency brake
  - C. Place chock blocks
7. Place Valve Operator in operating Condition
  - A. Remove drive shaft pin and align square drive shaft with wrench extension by adjustment of valve operator
  - B. Set both revolution counters to zero using the control knob at each end of counter. Counter at left side counts turns when closing a valve and counter at right side counts turns when opening a valve



8. Determine Number of turns required to Operate Gate Valve.
  - A. Ascertain size of main from AWSS maps.
  - B. Ascertain size of gate valve (normally 2-inches smaller than main). Exceptions are: 10-inch mains always have 10-inch gate valves and in the southeast section of the city some 12-inch mains have 12-inch gate valves.
  - C. Ascertain number of turns required from data plate on top of valve operator.
9. Closing a Gate Valve
  - A. Set direction lever to "D" to close down, "S" to stop (neutral position) and "U" to open up.



- B. Increase truck motor speed by turning hand throttle slowly counter-clockwise at not more than 5-RPM.
  - C. As a safety precaution do not place hand on valve operator pull handle during operation.
  - D. Increase RPM cautiously and do not exceed 20 RPM at any time.
  - E. Maintain constant watch of counter and Loadometer. If counter malfunctions, a visual count must be maintained. Loadometer should indicate 300-500 psi normally. If Loadometer exceeds 500 psi, immediately turn direction lever to the "S" position to minimize pressure. If pressure continues to build, return direction lever to "S" position and follow procedures under (Loadometer) on pages 3.2 and 3.3. Should pressure exceed 1000 psi, the Relief Valve or Disconnect Coupling will function.
  - F. At 15 turns from closed valve position, reduce speed to 5 RPM.
  - G. At 10 turns from closed valve position, turn direction lever to "S" position.
  - H. Disengage square drive shaft from universal wrench extension using drive shaft pin to hold shaft in position.
  - I. Remove universal wrench and extension(s) from gate valve operating nut.
  - J. Disengage power take-off control.
  - K. Remove chock blocks and back up truck until gate valve opening is cleared.
  - L. Complete gate valve closing manually using wrench and T-handle. Back off one turn from "Stop" position.
  - M. Close by-pass valve manually.
10. On Completion of Operation, Secure Truck and all Equipment. Replace Dust Pan and Valve Cover.

## OPENING AN AWSS GATE VALVE

Operating Directions for opening an AWSS Gate Valve are essentially the same as indicated for closing, with the following exceptions:

- 1. Selecting valves on maps.
  - A. Valves to be opened should be black or blue on maps.
  - B. If a normally open (white) valve is temporarily closed (according to teletype), DO NOT OPEN without explicit authority from Water Supply Unit Supervisor or a knowledgeable member of the Water Supply Unit.
- 2. By-pass valve must be opened first before operating the main gate valve.
  - A. Operate all AWSS valves slowly and with caution. When closing, the last few turns must be turned SLOWLY to avoid a pressure surge in the main. A pressure surge will cause damage to valve and main.
  - B. Open counter clockwise.
- 3. When operating gate valve, stop valve-operator 10 turns from the open position.
  - A. Complete gate valve opening.
  - B. Operate all AWSS valves slowly and with caution.
  - C. Open counterclockwise
- 4. Position of Direction Lever
  - A. Set in "U" position to open



## CHAPTER 4 MOTORIZED HIGH PRESSURE MAIN GATE VALVES

Auxiliary Water Supply System water mains are equipped with many gate valves. When open, a gate valve allows water to flow through it and continue within the main. If a gate valve is closed, water is stopped at that valve. Therefore, by closing a gate valve located before a break in a main, we can isolate the break with no further damage or loss of water. If the main is part of a grid where water can reach the break from more than one direction, gate valves on both sides of the break must be closed.

Mains laid in solid ground are far less susceptible to earthquake damage than those that extend into the infirm areas of the city. **All High Pressure Mains** entering infirm areas are equipped with gate valves before they enter the infirm area. Each infirm area has a minimum of two high pressure mains entering it at different locations, and these are gridded within the infirm area. One of these mains has a gate valve in the open position and the others are in the closed position.

Infirm areas are indicated on the Auxiliary Water Supply maps as shaded areas. Should the regular Auxiliary Water Supply to an infirm area be insufficient, the water can be quickly increased by opening the closed control gate valve on the main supplying the same area. Chief Officers should familiarize themselves with infirm areas which may develop a water problem during a large fire. The Auxiliary Water Supply Maps can be used for this purpose.

As of 2007, twenty-four high pressure main gate valves have been motorized. More are in the process of being motorized, with the total projected to be eighty-one. All motorized valves now in operation, with one exception, 17th and Collingwood, are located on the boundaries of the infirm areas.

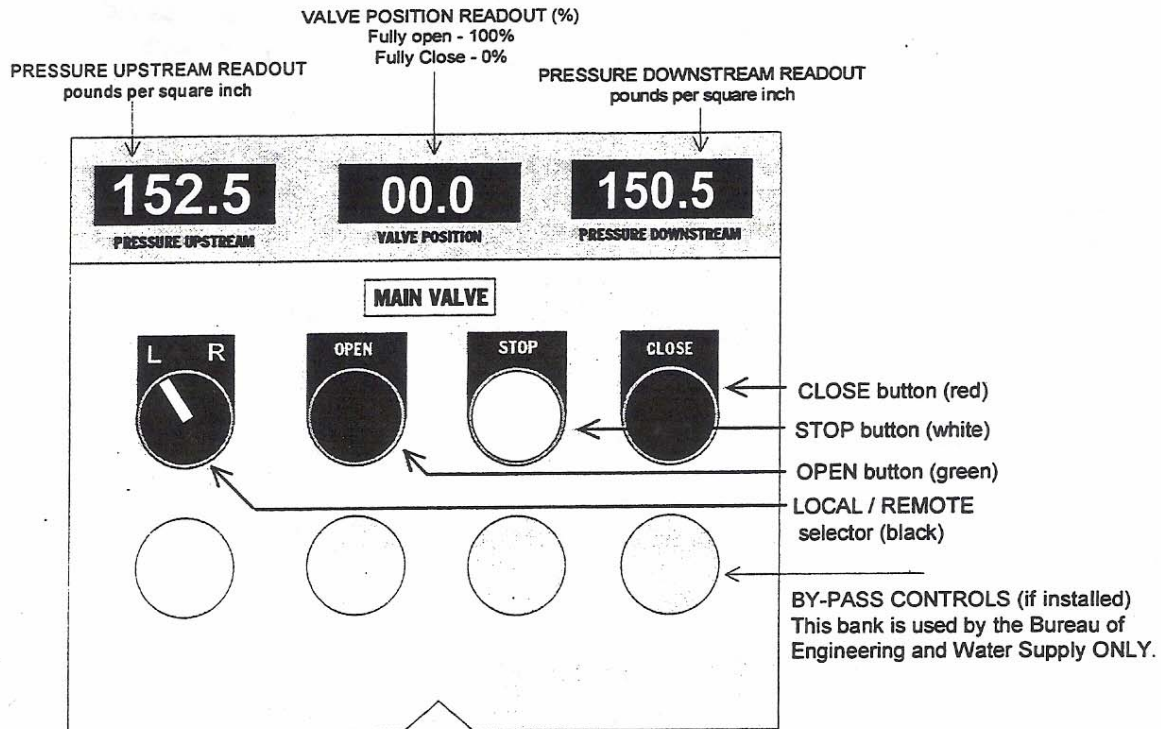
All of these valves have three means of operation. The valve motor can be controlled remotely by off-site computer activation, locally by pushing buttons, or the motor can be disengaged and the valve operated manually or with the help of a valve operating unit.

### REMOTE OPERATION OF THE VALVE

Each motorized valve will normally be controlled remotely by computer from Jones St. Tank. This computer operation of the valve may also be accomplished from the Communications Center, Fire Department Headquarters, the High Pressure System pipe yard ( behind station 9), Station 35, and Fireboat.

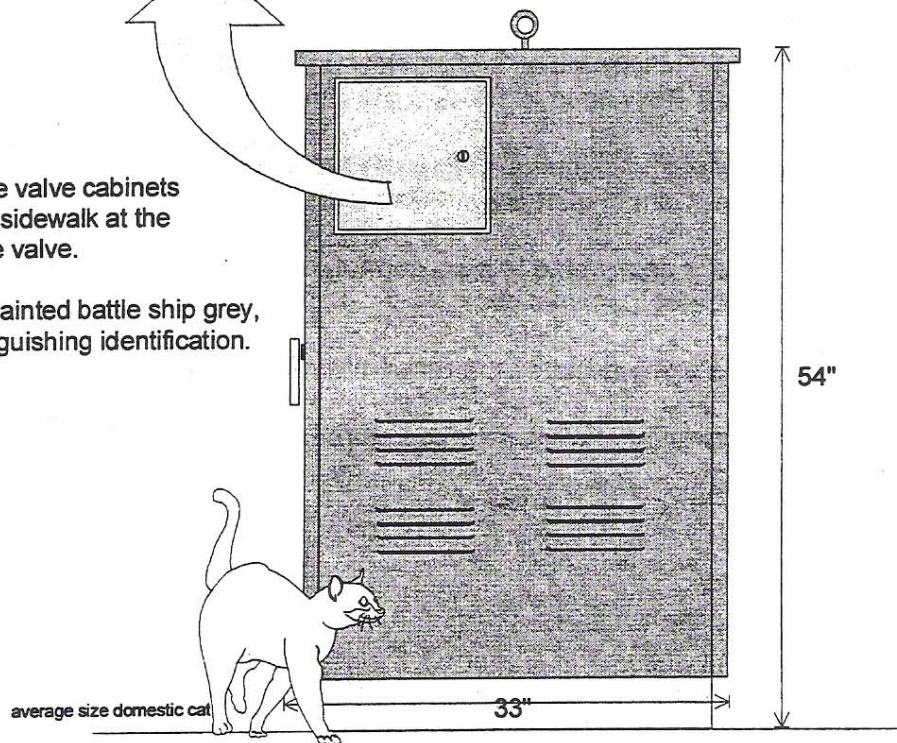
Jones St. Tank has equipment which is continually monitoring the water pressures within the High Pressure System and the operation of the monitoring system itself. When valve operation is required, the system also monitors the proper functioning of the equipment involved. Whenever possible, backup systems have been provided to guarantee the proper functioning of all equipment.

## Motorized High Pressure Gate Valve Cabinet & Controls



The motorized gate valve cabinets are located on the sidewalk at the location of the gate valve.

The cabinets are painted battle ship grey, and have no distinguishing identification.



## ON SITE VALVE OPERATION

Each motorized gate valve can be controlled from the control box located on the sidewalk near the valve. A special key will be required to enter this box. Two of these keys have been issued

to each Division and Battalion. One key should be kept with the auxiliary water supply maps and the other should be tagged and kept in reserve.

Entering a control box will cause a tamper alarm to sound at Central Fire Alarm. Therefore, **notify the Communications Center if you're going to open any of the doors on the box.** If no notification is received, a Chief or Company will be dispatched CODE 3 to investigate the alarm.

The valve control panel is located inside the 12 inch by 12 inch door on the front of the control box. The control panel has:

- 3 digital readouts
- 3 main valve control buttons
- Local / Remote switch for on site operation
- Some control panels have by-pass valve control buttons (Water Supply Unit or Water Supply Supervisor use **ONLY**)

Three digital readouts are located above the control buttons:

1. The readout on the **left** indicates the upstream pressure.
2. The **center** readout indicates the open or closed position of the valve by percentage opened. Fully open is 100%. Fully closed is 0%.
  - If the valve is operating, this center readout will change as the position of the valve changes, and both the Green and Red indicator lights will be lit.
  - Whether the valve is designated to be a normally open or closed will be written on the inside of the panel door.
3. The readout on the **right** indicates the downstream pressure.

Under normal circumstances (no broken mains), upstream and downstream pressures should be near identical.

The panel contains three main valve control buttons which illuminate when activated:

1. The **green button** opens the valve.  
The button stays lit when the valve is fully opened.
2. The **red button** closes the valve.  
The button stays lit when the valve is fully closed.
3. The **white button** stops the valve in intermittent positions, and will stay lit if the valve is not fully opened or closed.

Note: When the seismic switch causes a valve to close, the white button will not stop the operation of the valve while closing.

When the Red Button (close) is engaged, both the Red and Green Buttons will light. When the gate is fully closed, the Green Button will turn off and the Red Button will remain lit. The same principle applies to the Green Button.

There is also an L/R Switch (local / remote) located on the left side of the panel. If the switch is on R (remote), operation of the valve can only be accomplished remotely from one of the computer operated terminals named earlier. This switch must be transferred to L (local) before on-site operation of the valve is possible. **By transferring this switch to L (local), workers can safely work on the system without fear of its accidental operation.**

## BY-PASS CONTROLS

Some valve control boxes are equipped with by-pass valve controls located on the lower bank of the control panel. These controls are to be operated by Water Supply Unit personnel only. Firefighting personnel have no reason to operate these controls.

### SEISMIC SWITCH

Within all control boxes of normally open control gate valves is a seismic switch. This switch closes the gate if there's a magnitude 6.8 or greater earthquake or event. An event could be a bus or auto striking the box with the force of a 6.8 earthquake. If an event, other than an earthquake, caused the valve to close, Chief Officers are authorized to reset the seismic switch and open the valve.

The seismic switch is located within one of the side panel doors of the control box. The reset screw for the switch is located immediately below the red dome light. This switch resembles a miniature fire truck beacon and sits on top of a 4" high by 6" wide box. The seismic switch will be reset by turning the set screw 1/4 turn clockwise. Once the switch has been reset, the valve can be reopened.

If an earthquake caused the valve to close, and it has been determined that there's no break in the system below the gate closed by the seismic switch, open the normally closed gate on the main that serves the same infirm area. The Water Supply Unit will then be dispatched to reset seismic switches and open valves closed by the earthquake.

## MOTORIZED VALVES IN OPERATION (2007)

Below is a list of all the motorized valves now in operation. These valves should be highlighted on the cover page of the Auxiliary High Pressure Maps. You will be updated as new motorized valves are put into operation.

Seismic Equipped	Not Seismic Equipped
<ol style="list-style-type: none"><li>1. Southeast 5th St. and Brannan</li><li>2. Southwest 7th St. and Brannan</li><li>3. Northeast Larkin and Market</li><li>4. Southwest Powell and Chestnut</li><li>5. Northwest Fillmore and Cervantes</li><li>6. Southeast Brannan and 2nd Street</li><li>7. Southeast 6th and Market</li><li>8. Twin Peaks East</li><li>9. Twin Peaks West</li></ol>	<ol style="list-style-type: none"><li>10. Southeast Larkin and Eddy</li><li>11. Northwest Second St. and Mission</li><li>12. Northeast Harrison and 20th St.</li><li>13. Northeast Kearny and Francisco</li><li>14. Northeast Fifth St. and Brannan</li><li>15. Northwest Evans and Napoleon</li><li>16. Southeast Beach and Baker</li><li>17. Northwest Leavenworth and Bay</li><li>18. Southeast Market and New Montgomery</li><li>19. Northeast Market and Drumm</li><li>20. South 17th St. opposite Collingwood</li><li>21. Southeast 4th St. and Channel</li><li>22. Northeast 4th St. and Channel</li><li>23. E/S Ocean Avenue of Hwy. 280</li><li>24. W/S Ocean Avenue of Hwy. 280</li></ol>