

- 1978 Rear Bath CORTEZ -

Purpose: To modify water lines to simplify the winterizing operation. 2 gallons of anti-freeze solution required.

Cost: Approximate \$50.00

Time: One weekend job for a handy man.

Modification required: Provide a by-pass for the hot water heater.

Provide means to isolate the fresh water supply.

Provide means to circulate anti-freeze through the water system by use of the water pump.

Provide means to easily remove anti-freeze and flush out system.

Bill of Material for plumbing.

- 1- tube flaring tool
- 1- sharp knife to cut tubing

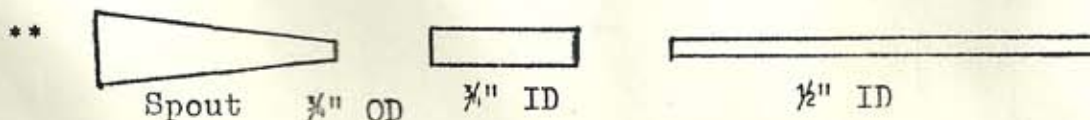
Qest Quicktite Celcon fittings: (from your RV service center)

- 2- $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$ Tees
- 2- $\frac{1}{2}$ " Ells
- 10- $\frac{1}{2}$ " inserts for flare connection
- 10- $\frac{1}{2}$ " nuts
- 4 ft. polybutylene $\frac{1}{2}$ " tubing

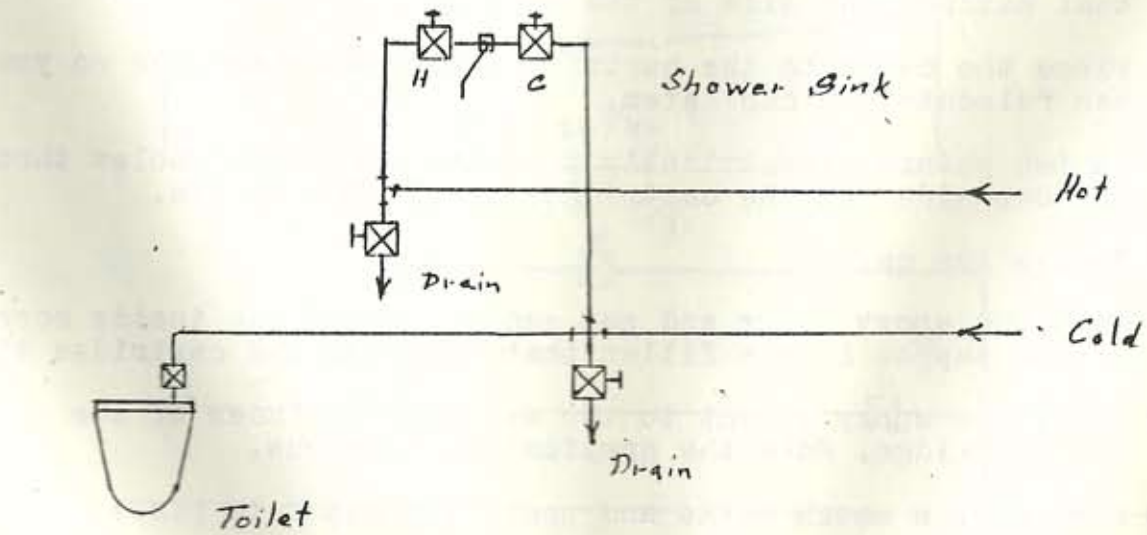
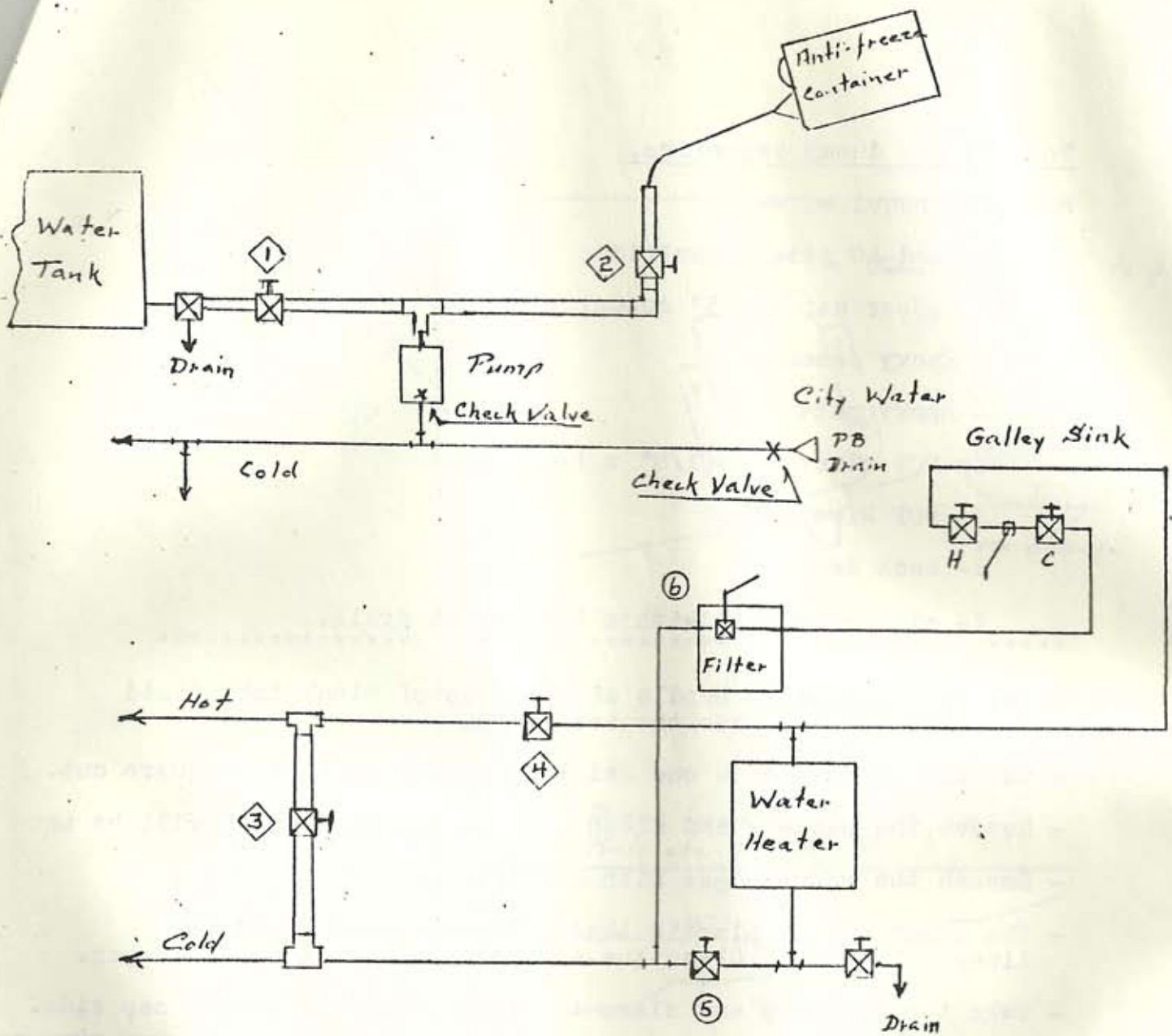
Brass fittings: (from your plumbing supplier)

- 4- $\frac{1}{2}$ " IPS gate valves
- 4- $\frac{1}{2}$ " flare adaptors
- 4- $\frac{1}{2}$ " flare nuts
- 1- $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$ IPS Tee
- 1- $\frac{1}{2}$ " IPS Ell
- 3- $\frac{1}{2}$ " IPS close nipples
- 1- $\frac{1}{2}$ " IPS x 6" nipple (use at valve #2)
- 1- $\frac{1}{2}$ " IPS x $\frac{1}{2}$ " barb adaptor (anti-freeze tube attachment)
- 4- $\frac{5}{8}$ " OD copper tubing clips (to secure valves to wall or floor)
- ** 1- 5 gallon plastic gas container with a $\frac{3}{4}$ " OD pouring spout.
- ** 1- piece suitable length of $\frac{3}{4}$ " ID x 1" OD plastic tubing.
- ** 1- piece suitable length of $\frac{1}{2}$ " ID x $\frac{3}{4}$ " OD plastic tubing.
- 1- roll $\frac{1}{2}$ " TEFLON Threadseal tape (for use with the brass IPS fittings)

Note: IPS = Iron pipe size



Note: Heat $\frac{1}{2}$ " tubing in hot water to slip over $\frac{1}{2}$ "



- ① = New Valves
 - ⑤ = Existing Valves
 - = New
- ARP/10-79

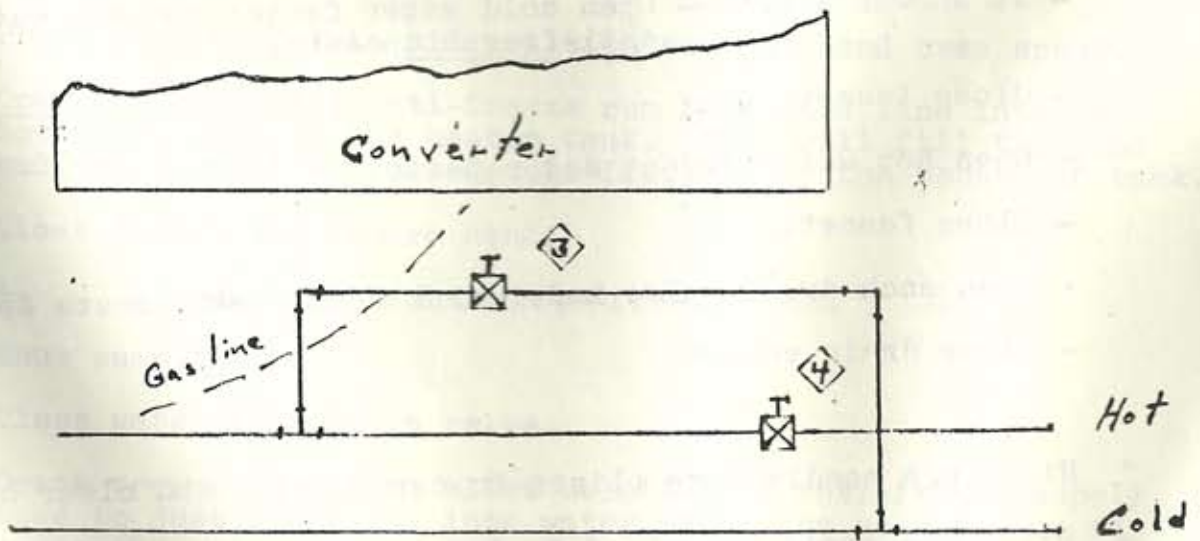
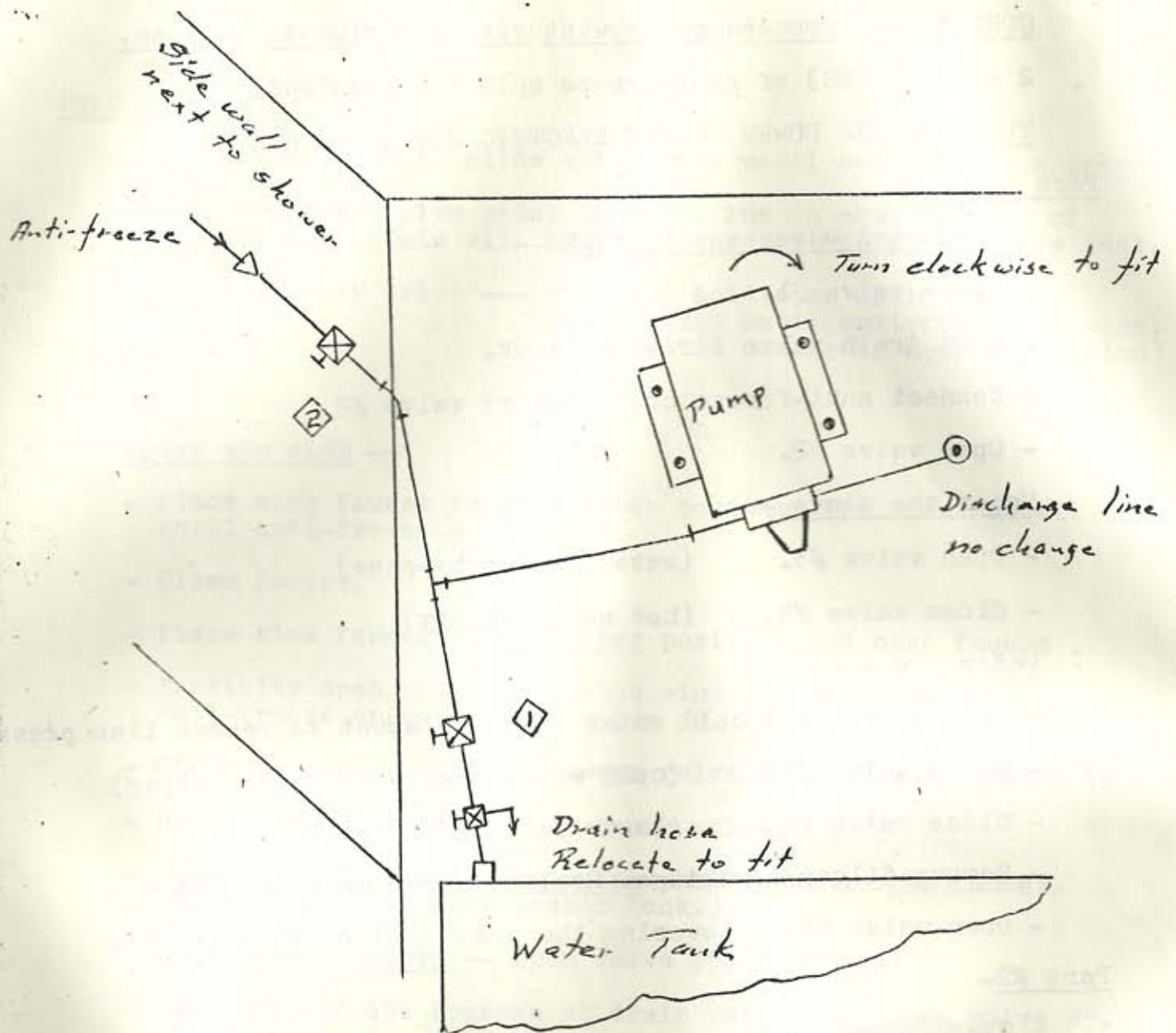
To make the dummy cartridge.

Material required ---

- 1- used AC filter cartridge
- 1- copper cap for 3" copper pipe
 - Epoxy cement
 - Epoxy putty
- 2- POP rivets (1/8" x 1/4" grip)
- 1- POP Rivetool
- 1- hack saw
- 1- electric drill with a 1/8" twist drill.

Note: Be prepared to handle about 1 cup of black inky fluid when you cut into the cartridge.

- Cut the cartridge in one half. Important to make a square cut.
- Remove the packets and clean out the top half which will be used.
- Smooth the rough edges with a file.
- The cartridge is plastic lined. Remove about 1/2" of the liner at the cut. Clean the exposed surface with sand paper.
- Take the pipe cap and clean the inside surface of the cap side.
- Clean the outside of the cartridge at the cut for an area that matches the side of the pipe cap.
- Place the cap onto the cartridge. Make a match mark so you can relocate the cap later.
- At two points diametrically opposite drill 1/8" holes through the cap side and the cartridge for the POP rivets.
- Remove the cap.
- Take the epoxy putty and put enough around the inside corner of the cap to form a fillet that will bed the cartridge tight.
- Apply the epoxy cement to the matching surfaces of the cap and cartridge. Make the application generous.
- Line up the match marks and press the cap into place.
- Rivet the cap to the cartridge.
- Let the epoxy cure for 24 hours before using the cartridge.



- Under Stove -

CORTEZ --- Procedure to winterize the plumbing system.

- + 2 gallons (US) of anti-freeze solution required.

TURN OFF THE POWER TO THE ELECTRIC HOT WATER HEATER.

Part #1-

At pump and water supply tank --

- Close valve #1.
- Open drain valve for water tank.
- Connect anti-freeze container at valve #2.
- Open valve #2.

Under the stove --

- Open valve #3. (water heater by-pass)
- Close valve #4. (hot water supply)

Under the sink --

- Open up hot and cold water line at faucet to remove line pressure
- * - Close valve #5. (cold water supply to water heater)
- Close valve #6. (lever on water filter)
- Remove filter cartridge. Replace with dummy cartridge.
- Open valve #6 by lowering the arm. - Close sink faucet.

Part #2-

- Start pump.
 - At shower sink --- Open cold water faucet and urn water until anti-freeze appears.
 - Close faucet.
 - Open hot water faucet and repeat.
 - Close faucet.
 - Open each drain valve under sink until anti-freeze appears.
 - Close drain valves.
- * Hint: use needle nose pliers to turn handle and clear heater hose.
- + Hint: add small amount of food coloring to strengthen color of anti-freeze. This makes it easier to identify the full strength anti-freeze when it follows clear water.

(1 teaspoon)

Part #2 (con't)

- Flush toilet. Hold slide valve open until anti-freeze appears.
- Step on water valve pedal only and run in about 1 pint of anti-freeze. (This will help to preserve the slide valve seal.)
- At city water inlet --- push and hold open drain valve push button until anti-freeze appears. (located in center of hose connection)

Part #3-

Under the sink --

- Place sink faucet in cold water position and open faucet. Run until anti-freeze appears.
- Close faucet.
- Place sink faucet in hot water position and open faucet .
- Partially open valve #4. Watch sink faucet spout and when anti-freeze appears close valve #4.
- Close faucet. (line between valve #4 and water heater is full)
- Drain hot water tank. Open drain valve.
- Place sink faucet in hot water position and open faucet. (To vent air to water heater tank.)
- When tank is empty -- open valve #5. (1/2 turn)
- When anti-freeze appears at drain valve --- close valve #5.
- Close sink faucet.
- Place sink faucet in mid position and put hand over spout.
- Open faucet to let anti-freeze run from cold line into the hot water line to the heater tank. (This will fill the line and run a small amount of anti-freeze into the bottom of tank.)
- Close faucet and remove hand.

Part #4- -- Remove hose from anti-freeze tank.

- Shut pump off.
- Close water tank drain valve.
- Crack open valve #1 to allow solution in anti-freeze supply hose to just drain out into water tank. (no more or you may drain the pump intake of anti-freeze.)

Part #4 (con't)

- Close valve #1.
- Close valve #2.
- Remove anti-freeze container.
- Pour 1 pint of anti-freeze into ---
 - Sink drain trap.
 - Shower drain trap.
 - Shower sink trap.

- Operation complete.

- Status of valves:

#1--- Closed

#2--- Closed

#3--- Open

#4--- Closed

#5--- Closed

To winterize the 40 gallon and 20 gallon holding tanks

Material: 77-80% Calcium Chloride Flake

For each 5 gallon volume of the tank mix----

50% stock solution by weight -----

Gives a volume of 2 gallons US.

Mix 12 pounds of Calcium Chloride --

in 1 gallon + 2 quarts of water.

Note: The chemical reaction gives off heat but not enough to damage a plastic pail.

The above solution will treat 3 gallons of plain water and will protect it to 0° F. This will be a 25% solution.

You can usually plan that the solution will protect the black water tank down to -5° F. This will depend on the amount of sewage that is in the tank.

Note:

The use of calcium chloride flake will cost about 40% of similar protection with Prestone.

Be certain to flush the toilet and/or the sink with about 1 pint of water after pouring the calcium chloride into the tanks.

The 25% solution weighs 17% more than a similar volume of plain water. This should be kept in mind in the event you exceed the 3/4 capacity of the tank as the tank supports will have to carry more than the normal weight. (1 gal. water = 8.34#)

Procedure to remove anti-freeze and flush plumbing system.

- 1- Fill fresh water tank. (not higher than elevation of valve #2 inlet.)
- 2- Check to see that ---
 - Valve #3 is open.
 - Valve #4 is closed.
 - Valve #5 is closed.
 - Valve #6 is open at water filter.
 - Valve #1 and #2 are open at pump.
- 3- Turn on pump.
 - Open cold faucet at shower sink. (let pump run for about 15 seconds to clear pump and inlet line.)
 - Close valve #2.
- 4- Open shower cold and hot faucets. Run until water is clear.
 - Close faucet.
 - Open and close each drain valve until clear water appears.
 - At city water inlet -- push and hold open drain valve push button until clear water appears. Release button.
 - Open sink cold water faucet until water runs clear.
 - Close faucet.
 - Close valve #3. (heater by-pass)
 - Open sink hot water faucet to vent water heater.
 - Open valve #5 and fill water heater.
 - When water runs out of faucet and heater is full -- close sink hot faucet.
 - Open and close heater drain valve to clear line.
 - Close valve #5.
 - Open valve #4.
 - Crack valve #3
 - Open sink hot faucet for about 15 seconds. (To clear line between valve #4 and water heater.)

5- (con't)

- Close valve #3.
- Open valve #5.
- Flush toilet until clear water appears.
- Remove dummy cartridge. Install normal cartridge.
- Top off fresh water tank.

- System is now ready for normal service.

Status of valves:

- #1 --- Open
- #2 --- Closed
- #3 --- Closed
- #4 --- Open
- #5 --- Open