



Pierce Pumper



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1-1. Who Should Use, Service and Maintain This Vehicle

This manual explains the operation of a Pierce® fire apparatus equipped with a water pump. The manual reviews basic principles of operation, highlights common safety concerns and procedures, and gives recommendations for using the pump.

This manual assumes that you are a pump operator and that:

- You have already been fully trained and certified to operate a pump.
- You have had formal education from a technical college or other fire fighter training institution.
- You understand, are proficient in, and meet all of the requirements set forth in NFPA 1002 *Standard on Fire Apparatus Driver/Operator Professional Qualifications* (latest edition).
- You already understand water pump operation.

All Pierce vehicles are delivered with a set of manuals for major components that your fire department selected.

If you need replacement manuals, or safety warning labels, contact Pierce customer service at 888-Y-PIERCE or 888-974-3723.

BEFORE operating the pumping system, you, the operator, must read, understand, and follow the instructions found in:

- Pump manufacturer's operator and maintenance manuals.
- Operator and maintenance manuals for pumping components, such as valves, pressure controllers, flow controls, manual overrides, foam systems, and primer pumps.
- IFSTA *Pumping Apparatus Driver/Operator Handbook* (latest edition).

1-2. What To Do If You Lack Knowledge

Pump control systems require you to understand the function of each valve, each switch, each gauge, each Emergency Stop, and each manual override.

Before your fire department allows you to operate this pump, you already must be educated, trained, and have passed a test for pump logic and operations.

You also must know the principles of operation, so you can change operation when circumstances change.

Each valve, switch, or gauge has an important function. If you are uncertain about the function or don't know something, inform your fire department's training officer.

You are always welcome to call Pierce Customer Service at 888-Y-PIERCE or 888-974-3723 with questions.

You are the only person who knows what you don't know. You must speak up about the things you don't know, so you can learn about them before someone is injured or killed because of your lack of knowledge.

You are responsible for learning how to operate the pumper under all conditions without having to read this manual at a fire or other emergency.

1-3. Cautions, Warnings and Dangers

1-3.1 Safety Warning Labels

Throughout this manual, you will find Caution, Warning and Danger signals. Walk around the apparatus. Find each Safety Warning Label. Read the label. Identify and pay attention to the hazard it describes. Practice all the time to avoid the hazard, so you develop a habit to avoid the hazard:

DANGER

DANGER signals an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

WARNING signals a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

CAUTION with the safety triangle signals a potentially hazardous situation that, if not avoided, might result in minor or moderate injury.

CAUTION

CAUTION used without the safety triangle symbol signals a potentially hazardous situation that, if not avoided, might result in property damage.

1-4. Responsibility

Study carefully this manual and the manuals for major components such as pump, engine, and other allied equipment. Make sure that all operators and other users also completely understand their contents.

The warnings, cautions, and procedures listed in these manuals must be part of the fire department's safety program.

As the operator of this vehicle and pumping equipment, you are responsible for:

- Understanding the function of each component of the pumping system.
- Understanding how to adjust each control to obtain the results you want.
- Maintaining control of the pumping system at all times.
- Remaining proficient in use, so at a fire you can operate and make successful changes in the operation quickly, without having to read the operator's instructions or safety warning labels.
- Practicing proper manual override and emergency shutdown procedures, so you can respond immediately in an emergency or during the failure of a component. Remember stress is high. Your failure to practice increases the odds you will forget or do it wrong in the heat of the moment.

1-5. Daily Checks

At start of shift, follow your department's apparatus check.

It is critically important that you turn each control—valve, gate, or switch, etc.—ON and OFF or OPEN and CLOSED. You want to make sure they work now. You don't want to find out at a fire.

ALWAYS check the controls you rarely use. That also reminds you of their location and their function.

If you find a control whose function you do not know, then right away find out what it does. Every control serves a purpose. You must know the purpose and how to use the control.

Pierce Customer Service is always available to help you and answer your questions. Call 888-974-3723.

1-6. Custom Products

Your department developed specifications for this fire apparatus. It purchased a Pierce apparatus that is built to meet those specifications. The information in this manual will be generic at times.

Due to the highly customized nature of each Pierce fire apparatus, the exact location of each component in the pumper system will vary.

This manual describes basic controls. Not every apparatus will have all controls. Some will have extra controls, as determined by each fire department's specification.

Pictures describe typical components or devices. Actual parts might vary from those pictured.

You must learn the location and function of all controls, switches, gauges, valves, inlets, and discharges.

Major inconsistencies between your vehicle and the information contained in this manual should be directed to your Pierce Dealer or Sales Representative.

1-7. Professional, Training, and Standards Organizations

To keep up-to-date on knowledge and new standards that affect all facets of fire fighting, make sure that you check these organizations' catalogues and websites each month:

National Fire Protection Association (for standards and requirements)

One Batterymarch Park

P.O. Box 9101

Quincy, MA 02269-9101

617-770-3000

www.nfpa.org

Make sure you read the latest editions.

Pierce Manufacturing Inc.

Customer Service

2600 American Drive

P.O. Box 2017

Appleton, WI, 54913

888-Y-PIERCE or 888-974-3723

www.piercemfg.com and www.pierceparts.com

International Fire Service Training Association (for textbooks and other training material)

Fire Protection Publications
Oklahoma State University
930 North Willis
Stillwater, OK 74079-8045
800-654-4055
www.ifsta.org

1-8. Safety Defect Reporting

If you believe your vehicle or any associated component might have a design defect that could result in failure or injury, please report this information immediately to Pierce Manufacturing.

Additionally, should any information in this manual prove to be seriously inconsistent with your Pierce fire apparatus also inform Pierce Customer Service.

Most service and support issues should be handled by the local Pierce dealer or sales representative. However, to report any design defects or request support directly from Pierce contact:

Customer Service
Pierce Manufacturing, Inc.
2600 American Drive, P.O. Box 2017
Appleton, WI, 54913
888-Y-PIERCE or 888-974-3723
www.piercemfg.com

1-9. Keeping Your Knowledge Refreshed and Up-to-Date

This manual will be revised from time to time. Check the Pierce website, www.piercemfg.com, to stay current.

A log exists at the end of this manual so you and other operators can track the dates you review this manual.

Also review the latest edition of the IFSTA (www.ifsta.org) manual *Pumping Apparatus Driver/Operator Handbook*.

Remember, if there's anything you don't understand, call Pierce Customer Service at 888-974-3723.



2-1. Create a Pump Chart

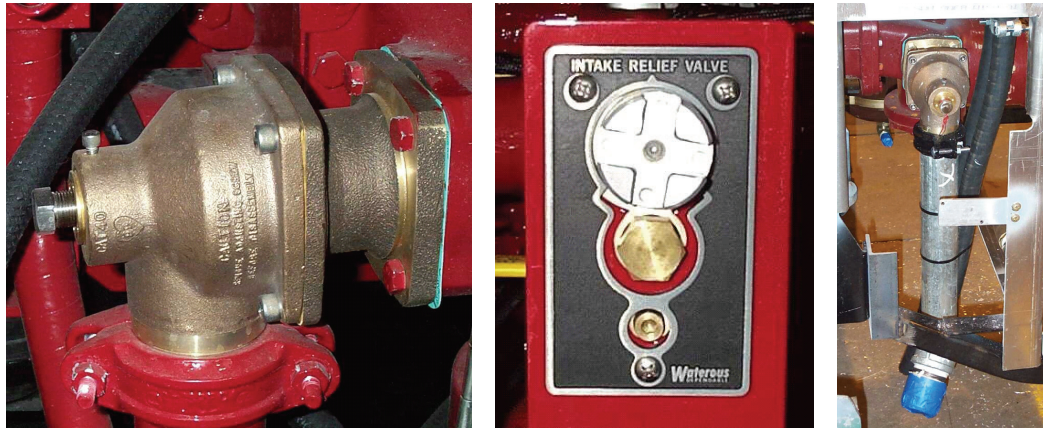
Use a Pump Chart to determine the pump discharge pressure that will provide desired nozzle pressure for various hose lay configurations and combinations.

The IFSTA *Pumping Apparatus Driver/Operator Handbook* tells how to develop a pump chart. Develop the chart for all situations.

Make sure this chart is always available during pump operation.

2-2. Check Adjustment of Intake Relief Valve

Figure 2-1: Typical Inlet Relief Valves. Relief outlet pipe with threaded end shown on right.



POM0016, 0017, 0018

All pumps have a relief valve on the intake side ([Figure 2-1](#)). It prevents a pressure spike in intake water from passing to hoses through the discharge side of the pump.

The intake relief valve is a pressure regulator. If intake pressure goes over the pressure setting, the valve opens and allows water to flow out the relief outlet.

Some departments choose to connect a hose to the relief valve outlet to direct the water discharge away from the apparatus. Pressure surges in this hose can occur without warning.

⚠ WARNING

Secure unattended hoses.

Water discharged from hose will cause hose to whip violently.

Whipping hose can injure or kill.

To adjust this valve for desired pressure, the intake pressure to the pump must be higher than the normal static pressure of the municipal water supply. The best method to adjust the valve is to use another pumper to supply water at the desired pressure.

1. Increase inlet pressure until the master inlet pressure gauge reads the relief pressure you want.
2. With a wrench, slowly open the adjusting screw on the valve until water starts to flow from the valve outlet.
3. Slowly close the adjusting screw until the water stops flowing.

Read the valve manufacturer's documentation for complete instructions.



3-1. Approaching the Apparatus

3-1.1 Stepping and Walking Surfaces

⚠ WARNING

ALWAYS be careful when climbing up or down to avoid a slip and fall, and potential injury to yourself and others.

Enter and exit cabs slowly, deliberately, and carefully.

NEVER jump to ground. You can injure yourself.

ALWAYS maintain three points of contact when climbing up or down.

Keep contact with one hand and two feet, or two hands and one foot.

Use steps, hand-holds, or sturdy features on the apparatus.

ONLY grasp or step on items appropriate for climbing on or firmly attached objects.

Keep steps and hand-holds in good repair, and free of grease, mud, dirt, fuel, ice, and snow.

Make sure all attaching bolts and hardware are tight, thus eliminating any movement of steps and hand-holds.

NEVER step or climb on any vehicle surface unless it is slip-resistant and hand-holds are provided.

Replace slip-resistant material when worn.

All surfaces intended for stepping or walking are designed or treated with slip-resistant material your department specified. **NEVER** step or walk on surfaces not designed for stepping or walking, such as:

- Chromed surfaces or objects
- Painted surfaces
- Hose rollers
- Compartment doors or hatches
- Valves
- Controls
- Inlet or Outlet Connections

3-1.2 Compartment Doors

⚠ WARNING

NEVER step on open compartment doors.
They do not support your weight.
Falls can cause serious injury or death.

Always close swing-up or swing-out compartment doors. People can walk into doors left open at lower levels. Personnel working on top of the apparatus can mistake an open horizontal door for a walking surface.

3-1.3 Hose Bed Covers

⚠ WARNING

CLOSE hose covers after use.
Hose bed covers can cause serious injury if blown shut by wind.
Keep personnel clear of open hose bed covers during windy conditions.

Some apparatus are equipped with aluminum hose bed covers. Always close after use. They protect hose from sun and weather. Hose bed covers are heavy. They might require two or more people to open or close safely.

3-1.4 Folding Steps or Platforms

⚠ WARNING

High voltage electricity can travel down a water stream.
NEVER spray through electric wires.
High voltage can cause death or serious injury.

Keep **OFF** the ground when operating an aerial device.
ALWAYS stand with both feet on the pump operator's platform of an aerial device.
High voltage can jump gaps between wires and apparatus.
Electrical power will pass through people who stand on the ground and touch the apparatus.
Electrical power lines can cause death or serious injury.

Before beginning pump operations, make sure that folding steps or platforms are **DOWN** and firmly engaged in their weight-bearing position.

When operating the pump on an aerial apparatus, always stand with both feet on the operator's platform and off the ground.

Your body will become an electrical path to ground if you stand with one foot on the platform and one on the ground, or with both feet on the ground and your hands on the apparatus. If the aerial device contacts or comes close to high voltage power lines, electricity can shoot through you. You can die.

3-2. Hose

3-2.1 Hose Storage

The hose is stored in:

- Body Compartments
- Bumper Compartments
- Cross-Lay Trays
- Speed-Lay Trays
- Hose Beds
- Reels
- Hose Chutes

Evaluate each way of storing hose. Determine the most efficient and safest way to pack hose for your fire department's use.

WARNING

Hose restraints (nets, doors, webbing, ropes, etc.) must be used to secure the hoses after repacking. Failure to comply may result in hoses deploying while the vehicle is in motion, causing injury to bystanders and/or damage to equipment.

If hose is to be laid from a moving apparatus, first test the packing method under controlled conditions to learn the MPH at which hose will lay out smoothly, without snags or snarls.

3-2.2 Hose Chutes

Some aerial apparatus have a hose “chute.” The chute guides the hose from the hose bed around the aerial turntable, then out the back of the vehicle.

NEVER pack hose in the hose chute, because that can cause snagging and snarling.

To avoid creating a jam of tangled hose in the hose chute:

- Lay couplings so they are pulled out straight, without flipping around.
- Lay hose so that it never crosses over itself when paying out.
- Maintain vehicle speed of 5 MPH or less. At 5 MPH, seven feet of hose is pulled out each second. If you travel more than 5 MPH, you are likely to cause a hose jam in the hose chute.

3-2.3 Hose Beds

WARNING

Pack hose carefully in any hose bed to minimize the risk of hose snags or snarls as it lays out. Hose that snags or snarls during layout from a moving vehicle can fly about, causing serious injury or death to bystanders.

Hose beds come in many shapes and sizes. Hose characteristics vary with the size, type, and age of the hose.

Experiment with different methods of packing a specific hose, bed, and chute combination to determine a packing method that will lay out without snagging or snarling. Make sure you learn the maximum MPH at which hose can be laid out.

3-2.4 Hose Deployment

⚠ WARNING

NEVER ride on rear steps or other areas outside the cab.

Limit speed to 5 MPH when laying hose.

ALWAYS use a spotter when backing up.

Keep the spotter and all other people clear of the vehicle's path.

All occupants **MUST** be seated and belted while vehicle is in motion.

Any operation where people are working around a moving vehicle is dangerous. All occupants must be seated and belted while the vehicle is in motion. NEVER ride on rear steps or other areas outside the cab.

⚠ WARNING

Flying hose is extremely hazardous.

Keep all people clear of hose being laid by a moving vehicle.

Flying hose can injure or kill.

Fire hose under pressure can burst without warning.

NEVER straddle or stand over a charged hose.

Always wear complete protective gear, even when testing.

Burst hose can injure or kill.

When laying hose, an anchorman must protect himself from the dangers of flying hose.

It is safest to use rope to tie the hose to the hydrant. In the absence of rope, anchor the hose by wrapping the end half way around the hydrant in a J-pattern only. Never wrap more than half way around the hydrant. Wedge the end fitting against the hydrant with a booted foot. Stand clear of the hose so that you will be away from the hose if it becomes taut and swings out from the hydrant. A snag in the hose bed can pull the hose loose. The metal fitting can swing around and break your leg.

Keep people clear of the hose being laid before driving the vehicle.

When laying hose, limit vehicle speed to 5 MPH to minimize risk to personnel, equipment, and bystanders.

Avoid kinks, crimps, and twists when laying fire hose.

3-2.5 Hose Connections

⚠ WARNING

Hose fittings can fail without warning.

Inspect hose fittings for cracks, chips or other damage and replace when worn or damaged.

Damaged or worn fittings can burst without warning.

Burst fittings can injure or kill.

Hose fittings are critical to safe delivery of water to a fire. Treat hose connections with care and inspect regularly.

3-3. Positioning the Apparatus

3-3.1 Fire Scene Positioning

⚠ WARNING

Operate apparatus away from burning embers that can be sucked into the air intake system.

Burning embers in the engine air filter can cause engine fire.

Engine fire can cause property damage, serious injury, or death.

Heat from a fire can damage electrical systems, rubber seals and gaskets, and plastic components. Always place apparatus upwind from the fire and at a safe distance away from flames.

Diesel engines consume as much as 1200 cubic feet of clean air every minute. Hot embers sucked into the air intake can cause the air cleaner element to ignite. Although Pierce Custom Chassis are equipped with ember barriers composed of mesh screens or perforated metal, they are not a foolproof guarantee of protection.

Always leave a way out. Always position the apparatus in a location that allows a quick retreat if conditions change.

Always park upwind of the fire. Never park the apparatus downwind of the fire.

Always avoid electrical lines. Never park under electrical lines.

3-3.2 Positioning on Roads

Position the apparatus so that it protects emergency personnel. Many departments choose to park the apparatus at an angle so that personnel can work behind the vehicle, out of the direct path of oncoming vehicles.

Keep emergency response lighting ON to alert traffic.

3-3.3 Lighting

As soon as possible, provide good lighting for people working on and around the apparatus. Use extendable lighting or lighting from another apparatus.

Make sure that the pump operator can clearly observe controls, gauges, and hose connections, and can watch the condition of hoses and attack personnel to the greatest extent possible.

3-3.4 Chock the Wheels

ALWAYS place wheel chocks on both front and rear of tire when vehicle is parked.

Chock wheels as soon as you exit the cab.

3-4. Pump Operation

3-4.1 Driveline Driven Pump

WARNING

NEVER operate pump with Pump Shift Control in ROAD position.

Vehicle can move. Vehicle can override parking brake.

Moving vehicle can injure or kill.

3-4.1a To Engage the Pump

1. Shift Transmission Into Neutral (N)
2. Pull Parking Brake to Apply to prevent vehicle from rolling

If the parking brake is OFF, safety interlocks prevent hand throttles or pressure governors from operating.

NOTE:

- If the parking brake is applied, but then released during pump operation, the hand throttle or pressure governor will be disconnected, and the engine speed will fall to IDLE. A loss of water pressure will result.
- Manual Override: The pump speed will then be controlled only by the driver's throttle pedal.

3. Chock the Wheels

Block both front and rear of tire using wheel chocks every time you part the vehicle.

4. Apply the Service Brake by depressing and holding the Brake Pedal.
5. Engage the Pump Shift Control

Figure 3-1: Pump Shift Control



POM0002

CAUTION

Make sure that the air pressure gauges indicate that the air pressure system is at 80 PSI or greater. The pump may not shift out of road position if the air pressure is below 80 PSI.

The pump shift control is located in the cab ([Figure 3-1](#)). Flip Pump Shift Control DOWN to engage pump. Wait up to 4 seconds for pump to engage.

6. Look at Indicator Light

Look at the PUMP ENGAGED indicator light. This indicator light turns ON when the pump shift control is moved from the ROAD position to the PUMP position. It confirms that air pressure has been sent to the pump shift actuator in the pump house and the actuator has moved. This means that the pump transmission has shifted.

CAUTION

If the pump engaged light does not illuminate after the pump shift lever is moved from ROAD to PUMP, an incomplete shift has occurred. In this event confirm:

- that the air pressure is above 80 PSI;
- the parking brake is applied;
- the wheels are chocked.

7. Shift the Transmission into Drive (D)

Shift Transmission into Drive (D). A driveline-driven pump has a "Pump in Drive" label. It says that the transmission must be shifted into DRIVE for pumping.

CAUTION

The pump may fail to shift if the gear teeth fail to mesh. In this case:

- Shift chassis transmission into Neutral (N)
- Shift chassis transmission into Reverse (R)
- Shift chassis transmission into Neutral (N)
- Shift chassis transmission into Drive (D)

Transmission should shift into pump. Repeat steps as necessary.

8. Look at Speedometer

If the speedometer indicates approximately 12 to 18 MPH and the vehicle is NOT moving, then the pump is successfully engaged. Look for the speedometer showing some value of road speed, in the range of 12 to 18 MPH.

CAUTION

Begin pumping water immediately after engaging pump.

Recirculate water if hoses are not ready to keep water cool.

Running pump dry for more than a few minutes will cause damage.

9. Look at Indicator Light

The “OK TO PUMP” light turns ON *only* when:

- Pump Shift Control has successfully engaged the pump, AND
- Transmission has been successfully shifted into DRIVE, AND
- Transmission torque converter is in the locked mode.

Make sure “OK TO PUMP” light is ON and speedometer shows some value of road speed—12–18 MPH. When BOTH conditions are met, you have successfully shifted from ROAD into PUMP gear. You are now ready to pump water.

3-4.1b Manual Pump Shift Override (*Optional*)

⚠ CAUTION

Pump Shift Control must be in the PUMP position when running pump.

CAUTION

ONLY operate manual pump shift when BOTH automatic transmission AND Pump Shift Control are in NEUTRAL.

Engine or transmission damage can occur.

The manual pump shift control is located on the pump panel. This handle also controls the shift lever on the pump. If the air shift fails to engage the pump, THEN use the manual pump shift instead of the air shift. This is a manual override and requires two people to operate.

Practice using the manual pump shift, so you and a partner can do it automatically if the air shift fails.

1. **Position One Person in the Driver's Seat and One Person at the Pump Panel**
2. **Shift the Transmission into Neutral (N)**
3. **Pull Parking Brake to Apply**
4. **Apply Service Brake by Depressing and Holding Brake Pedal.**
5. **Place Pump Shift Control in NEUTRAL**

Move the Pump Shift Control located in the cab into the middle or NEUTRAL position.

6. **Engage Manual Shift Handle (Figure 3-2)**

Figure 3-2: Manual Pump Shift Override



POM0011

Waterous Pump: Push the Manual Shift T-Handle in towards the pump panel with steady pressure using the palm of your hand.

Hale Pump: Pull the Manual Shift Handle with steady pressure.

7. **Place Pump Shift Control in PUMP**
Move the Pump Shift Control back into the PUMP position.
8. **Shift the Transmission into Drive (D)**

3-4.2 PTO-Driven Pump

3-4.2a To Engage the Pump—Stationary Operation

1. **Shift Transmission into Neutral (N)**

Before engaging a PTO-driven pump for stationary operation, shift the transmission into NEUTRAL (N). Vehicles with a PTO-driven pump display a “Pump in Neutral” label.

2. **Pull Parking Brake to Apply**

If you fail to apply the parking brake, safety interlocks prevent operation of hand throttle or pressure governor.

NOTE: If the parking brake is released during pump operation, the hand throttle or pressure governor is disconnected AND the engine speed falls to IDLE. Water pressure to the hose will drop. The pump speed will then be controlled only by the driver's throttle pedal. That is the manual override.

3. Chock the Wheels

Block both front and rear of tire using wheel chocks.

CAUTION

Begin pumping water immediately after engaging pump.
Recirculate water if hoses are not ready to keep water cool.
Running pump dry for more than a few minutes will cause damage.

4. Engage the Pump

Activate the PTO Pump Shift control located on the driver's panel in the cab.

5. Observe Pump Engaged and OK to Pump indicator lamps

The PUMP ENGAGED and OK TO PUMP indicator lights turn ON when:

- PTO is engaged AND
- Pump is spinning.

3-4.2b Engaging PTO-Driven Pump when Vehicle is Driving *(Optional)*

⚠ WARNING

Pump-and-roll operation is dangerous.
NEVER ride outside the cab when the vehicle is moving.
Keep personnel walking to the side of the vehicle and in sight of driver at all times.
Drive slowly.

1. Stop Vehicle

2. Shift Transmission into Neutral (N)

3. Pull Parking Brake to Apply

CAUTION

Begin pumping water immediately after engaging pump.
Recirculate water if hoses are not ready to keep water cool.
Running pump dry for more than a few minutes will cause damage.

4. Engage the Pump

Activate the PTO Pump Shift control located on the driver's panel in the cab.

5. Observe Indicator Light

The PUMP ENGAGED indicator lights only when PTO has been engaged and the pump is spinning.

6. Provide Water Supply to Pump

Open the Tank-to-Pump valve to provide water to the pump.

7. Shift Transmission into Drive (D)

For pump-and-roll operation the transmission must be in the Drive (D) position.

8. Release Parking Brake**9. Look at Indicator Light**

The OK TO PUMP light turns ON when:

- PTO Pump is engaged, AND
- Transmission has been successfully shifted into DRIVE, AND
- Parking Brake is released.

3-4.3 Supply Water to Pump**1. Open Tank-to-Pump Valve**

Figure 3-3: Typical Tank-to-Pump Valves



POM0007, 0006

The Tank-to-Pump valve ([Figure 3-3](#)) controls the flow between the water tank and pump inlet. With this valve OPEN, water from the tank floods the pump intake manifold and slowly primes the pump.

2. Open Primer Valve

If the pump is dry, engage primer to expel air in the pump to get prime.

⚠ WARNING

Keep pump water cool.

ALWAYS circulate fresh water through the pump.

Pump can heat trapped water to boiling in seconds.

Burst lines can spray personnel with scalding water.

Scalding water can injure or kill.

3. Open Tank Fill or Recirculating Valve

Figure 3-4: Tank Fill or Recirculating Valve



POM0008

The Tank Fill valve ([Figure 3-4](#)) opens the connection from the discharge side of the pump to the water tank. Open Tank Fill Valve to refill the water tank from a water source that is connected to an intake fitting.

With the Tank-to-Pump valve and the Tank Fill valve both OPEN, water recirculates from the tank, through the pump, and back to the tank. This cools the pump before you begin flowing water to a discharge line.

ALWAYS crack open the Tank Fill Valve when running the pump. If you fail to continuously circulate water through the pump chamber, the water trapped in the pump chamber heats to boiling in seconds. Boiling water and steam can injure people. It also damages pump seals and gaskets.

When recirculating water, the water in the tank will eventually become too hot to cool the pump. Exchange tank water with fresh water to keep pump cooled.

Keep track of water temperature:

- Touch the outlet pipe to see how warm it is. If it is hot to the touch, it is time to bring fresh, cool water into the water tank or turn OFF pump.
- Watch tank temperature gauge (if your fire department selected this option). When temperature reaches 175° F, then add fresh cool water or turn OFF pump.

4. Open Recirculating Valve (Optional)

Figure 3-5: Recirculating Valve



POM0019

A dedicated Recirculating Valve ([Figure 3-5](#)) opens a small water flow from the pump to the tank. The flow through this line cools the pump. The recirculating line does not let water flow from the tank to the pump, so it works only if the Tank to Pump valve is OPEN, or if the intake is supplied by a water source.

CAUTION

Engine Cooler adds engine heat to the pump water.
Tank water will heat up faster when engine cooler valve is open.

5. Open Engine Cooler Valve

Figure 3-6: Engine Cooler Valve



POM0009

OPEN the Engine Cooler Valve ([Figure 3-6](#)) to provide more engine cooling when air temperature is above 80 degrees F, or if engine overheats. Heavy pumping in hot temperatures requires extra engine cooling.

The Engine Cooler transfers heat to the pump discharge water through a heat exchanger.

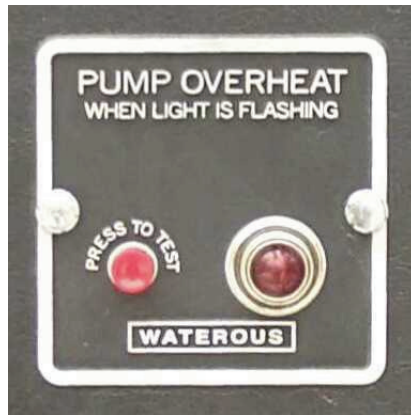
Turn the knob one-quarter turn counterclockwise to the left to OPEN the valve. To CLOSE the valve again, turn the knob one-quarter turn clockwise to the right.

OPERATION

Many departments leave this valve fully OPENED during summer and CLOSED during winter.
CLOSE the Engine Cooler Valve for road operation during cold weather for more cab heat.

6. Observe Pump-Overheat Indicator (*Optional*)

Figure 3-7: Pump-Overheat Indicator



POM0004

Watch the Pump-Overheat indicator (*Figure 3-7*) during pumping operations to make sure that the pump stays cool.

If the Overheat indicator light turns ON, add fresh water, recirculate, discharge water, or shut engine OFF to cool the pump.

3-5. Adjusting the Pump Pressure

⚠ WARNING

Hand Throttle Systems can malfunction.

If engine control is lost at pump panel, assign someone to use foot pedal in cab to continue pumping operation.

3-5.1 Determine Discharge Pressure

⚠ WARNING

Hoses and Nozzles can explode if over-pressurized.

NEVER exceed pressure rating of downstream devices.

Exploding devices can injure or kill.

Keep control of hose under pressure.

Hose under pressure wants to fly about.

Flying hose can injure or kill.

Pump pressure is determined by:

- Engine Speed
- Pump Size
- Discharge Restriction (size and length of discharge hose)
- Intake Restriction (size and length of intake hose)
- System Restriction (size and shape of valves, fittings, manifolds, etc.)

You must determine a pump pressure that will provide the desired nozzle pressure, based on the number and size of attack lines that are deployed.

Determine this pressure for all fire-fighting situations you might encounter, and record them on a Pump Chart. Keep the Pump Chart in a location accessible to the pump operator.

Refer to the IFSTA *Pumping Apparatus Driver/Operator Handbook* (latest edition) for procedures on creating a Pump Chart.

3-5.2 Engine Speed and Pump Pressure

The pump pressure is controlled by regulating the engine speed. If the apparatus is equipped with a pressure governor, the governor will regulate the engine speed automatically to maintain the desired pump pressure.

3-5.3 Controlling Engine Speed—Apparatus Not Equipped with a Pressure Governor

1. Observe Interlock Lamp

If the interlock light above the Hand Throttle Control on the pump panel is ON, it means you can change engine RPMs.

Two sets of conditions will turn ON the light:

- Parking Brake applied.
- Transmission in 4th gear lockup.
- Pump shift complete.

OR

- Parking Brake applied.
- Transmission is in NEUTRAL.

If either set of conditions fails, the Hand Throttle will be disabled. Engine speed control is then controlled ONLY by the foot throttle pedal in the cab. That is the manual override.

CAUTION

For non-emergency situations, return the engine speed to idle by turning the hand throttle knob. Continual use of the red button will wear out the threads on the screw and cause premature failure of the hand throttle.

2. Increase Engine Speed Using Hand Throttle

Figure 3-8: Hand Throttle



POM0014

- Turn counterclockwise to the left to INCREASE engine speed.
- Turn clockwise to the right to DECREASE engine speed.
- Adjust friction collar to set resistance to main constant engine speed.
- Press red button to return engine speed to IDLE.

⚠ WARNING

Emergency Stop button drops the engine to IDLE only.

Engine at IDLE creates water pressure.

- If an emergency requires that water stop flowing, close the discharge valves.
- If an emergency requires that the engine stop, turn OFF the ignition switch in the cab.

CAUTION

Press red shutdown button on the hand throttle after use to make sure it is set to lowest possible idle speed.

Hand throttle left at a higher speed will return to that speed when hand throttle control is resumed.

Practice hitting the Emergency Stop switch.

The Emergency Stop switch will drop the engine RPM to IDLE.

Practice this action until it is second nature, so you can bring engine to IDLE in an emergency.

3. Emergency Shut-Off

- Push IN the red button to return engine speed to IDLE.
- Practice hitting the Emergency Stop button until the movement becomes automatic. In an emergency you want to react automatically.
- If you fail to shift from Road to Pump, you can override the parking brake as you increase engine RPMs. If you feel the apparatus move, IMMEDIATELY push IN the emergency stop. It drops engine speed to IDLE. The wheel chocks and parking brake will then hold the vehicle in place.

4. Increase Engine Speed Using Optional Electronic Throttle

- Adjust Engine Speed using toggle switch.
- Press red button to return to IDLE. Red button is also an Emergency Stop. Practice using the Emergency Stop.

5. Observe Master Discharge Pressure Gauge

Figure 3-9: Master Discharge Pressure Gauge (Right)

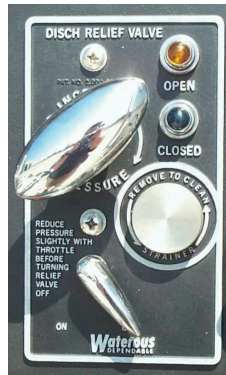


POM0013

Increase or decrease engine speed to maintain the pump pressure you want. Watch the Master Discharge Gauge and adjust the engine speed faster or slower to get the pressure you want.

6. Activate Discharge Relief Valve

Figure 3-10: Discharge Relief Valve



POM0003

For apparatus equipped with an ON/OFF switch, turn the Discharge Relief Valve ON. The Discharge Relief Valve prevents pressure spikes. It limits the maximum discharge pressure by opening a gate and bypassing water back to inlet side of pump.

If the discharge pressure goes above the relief valve setting, water goes from the discharge manifold back into the intake manifold until the water pressure in the discharge manifold drops below the relief pressure.

7. Adjust Discharge Relief Pilot Valve

The Discharge Relief Pilot Valve controls the pressure relief setting.

Turn the pilot knob counterclockwise to the left until the amber OPEN indicator light is ON and there is a slight drop in discharge pressure. Then turn the pilot knob clockwise to the right slowly to the point where the amber OPEN light is OFF and the green CLOSED light is ON.

If the amber light is ON, the relief valve is open and flow is being bypassed. If more pressure is desired, the relief valve must be adjusted upward. If the current pressure setting is adequate, reduce the engine speed until the green light is ON.

3-5.4 Controlling Engine Speed, Pumping—Pressure Governor Operation

If the apparatus is equipped with a pressure governor, the governor will regulate the engine speed automatically to maintain the desired pump pressure. When placed in the PRESSURE CONTROL mode, the system will monitor pressure, increasing or decreasing the engine speed to maintain the set pressure.

⚠ WARNING

Apparatus equipped with pressure governors normally do not have pressure relief valves. The pressure governor performs the function of the relief valve.

Always pump in pressure control mode.

Pumping in throttle (RPM) control mode can cause high pressure and/or pressure spikes. Pressure spikes can injure or kill.

NOTE: For additional information concerning the operation of specific pressure governors, refer to the following:

- PV-P-TM350, Pierce Pressure Governor Operator's Guide on CD-ROM and Group 2825-P-001, Pierce Pressure Governor System (in Service Manual)
- Group 2825-V-001, Class 1 Pressure Governor (in Service Manual)
- Group 2825-V-002, Detroit Diesel Electronic Fire Commander (in Service Manual)

1. Select Pressure Control Mode

Place pressure governor in the PRESSURE CONTROL mode. Switching methods will vary depending on the manufacturer of the pressure governor.

2. Adjust Desired Pressure

Use the INCREASE or DECREASE controls to change the desired pressure setting.

3-5.5 Controlling Engine Speed, Not Pumping—Pressure Governor Operation

The THROTTLE (RPM) CONTROL mode allows the operator to increase engine speed when not pumping, to increase alternator output, warm the engine, or other non-pumping operations.

NOTE: For additional information concerning the operation of specific pressure governors, refer to the following:

- PV-P-TM350, Pierce Pressure Governor Operator's Guide on CD-ROM and Group 2825-P-001, Pierce Pressure Governor System (in Service Manual)
- Group 2825-V-001, Class 1 Pressure Governor (in Service Manual)
- Group 2825-V-002, Detroit Diesel Electronic Fire Commander (in Service Manual)

1. Select Throttle (RPM) Control Mode

2. Adjust Desired Engine Speed (RPM)

Press the red button to cancel the current mode and return the engine speed to idle.

The red button also serves as the Emergency Stop. Practice using the Emergency Stop.

3-5.6 Controlling Engine Speed with Multiple Controls

⚠ WARNING

Transferring engine speed control between Hand Throttle and Pressure Governor can cause a jump in engine speed.

Engine speed changes can cause discharge water pressure spikes.

Spikes in discharge pressure can cause hoses to kick with great force, causing injury.

Some apparatus have both a Hand Throttle and a Pressure Governor. The Throttle Selector Switch determines which control is ON.

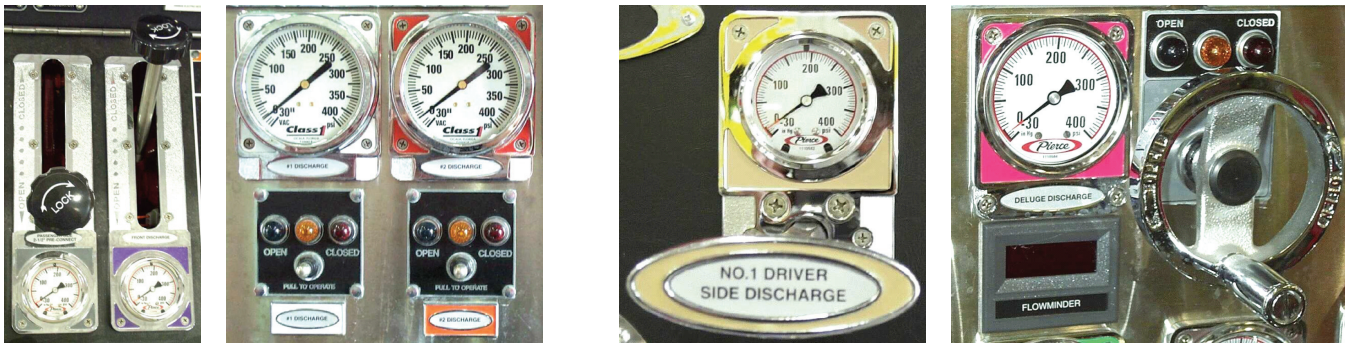
If Hand Throttle is selected, you will control engine speed manually.

If Pressure Governor is selected, the Pressure Governor controls engine speed.

ALWAYS return the control you are not using to the IDLE position.

3-6. Discharging Water

Figure 3-11: Typical Discharge Valves



POM0015, 0020, 0033, 0005

3-6.1 Connecting Attack Line Hose

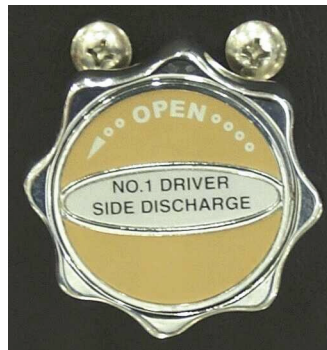
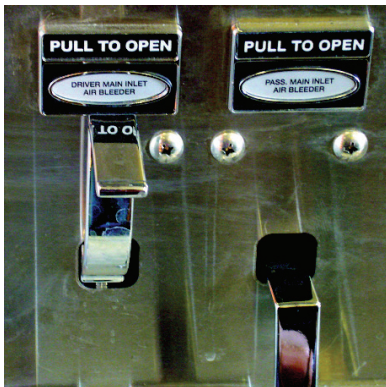
1. Close Discharge Valve

CLOSE Discharge Valve to keep water from flowing once the Discharge Cap is removed.

⚠ DANGER

ALWAYS OPEN Drain/Bleeder Valve BEFORE removing inlet or Discharge Cap.
Discharge lines can trap pressure if the valve is opened and left closed.
Discharge cap under pressure will blow off with explosive force.
Exploding Cap will injure or kill.

Figure 3-12: Drain/Bleeder Valves



1140/POM0021

2. Open Drain/Bleeder Valve

Pull up or turn Drain/Bleeder Valve counterclockwise to the left to OPEN.

Air pressure can be trapped between the Discharge Valve and the Discharge Cap. You must bleed off this pressure BEFORE the cap is removed. Otherwise, any trapped air pressure can blow the cap off with great force and injure someone.

3. Open Discharge Cap Vent if One is Provided

Some Discharge Caps have a pressure release vent on the cap. If cap has a vent, OPEN vent before removing cap.

4. Remove Discharge Cap

Remove the Discharge Cap after you are certain that pressure has been bled from behind it. You cannot tell by how hard the cap rotates whether pressure exists or not.

BEFORE removing Discharge Cap, OPEN the Pressure Release Valve or Drain Bleeder Valve to make sure that trapped air pressure escapes.

5. Connect the Discharge Hose

Connect the discharge hose to the discharge connection.

6. Adjust the Discharge Swivel

If the discharge connection has a swivel fitting, move the swivel so the hose points AWAY from the pump operator's area.

7. Close the Drain/Bleeder Valve

3-6.2 Charging Line

⚠ WARNING

Opening valves rapidly can cause pressure spikes.
Open and close valves slowly.
Pressure spikes can cause hoses to kick with great force, causing injury.

CAUTION

Opening valves rapidly can cause water hammer.
Water hammer can damage the pump and other water system components.

1. Slowly Open Discharge Valve

Open and close discharge valves slowly. Rapidly opening a valve sends a surge of water through the hose, making it difficult to control. Rapidly closing a valve will cause a pressure spike in other hoses.

OPEN Discharge Valve one-half OPEN until attack line is filled with water and air is expelled from hose.

Observe personnel on the end of the attack line while the hose is filling.

2. Adjust Discharge Valve

AFTER air is expelled from the line and water is flowing steadily from the attack nozzle, adjust the Discharge Valves to send the flow you want to each line.

3. Observe Tank Level Indicator

Figure 3-13: Typical Tank Level Indicators



POM0001, 0022

Water level in the water tank drops as water flows to the attack lines. Watch the Tank Level Indicator. Plan ahead to add external water before you empty the tank.

Learn how to open and close valves using these controls on your pump panel:

T-Handle Controls

- Pull to Open Valve
- Push to Close Valve
- Rotate Counterclockwise to the left to Lock

Lever Controls

- Pull to open valve
- Push to close valve
- Rotate knob clockwise to the right to lock

Hand Wheel Controls

- Rotate counterclockwise to the left to open valve
- Rotate clockwise to the right to close valve

Electronic Controls

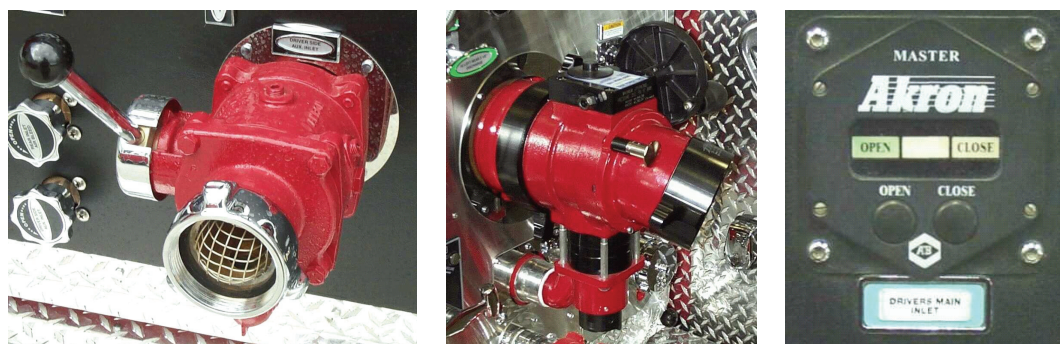
- Follow instructions on controls. Be sure to read the manufacturer's Operators Manual.

3-7. Discharging Foam

See Foam System Operator's Manual.

3-8. Changing from Tank to External Pressurized Water Supply (with Gated Intake Valve)

Figure 3-14: Typical Gated Intake Valves



POM0034, 0035, 0036

Soon after the pump is running and water is being supplied to the discharge lines, you need to establish an external source of water BEFORE the water tank is empty. This supply can come from a hydrant, from another apparatus, or from a draft source, such as a pond, river, or portable tank.

A gate intake allows you to maintain water flow at the same pressure at the same time you switch to an external water supply.

In the absence of a gate intake valve, clear fire fighters from the attack area before you change to external water supply, because you will lose all water pressure.

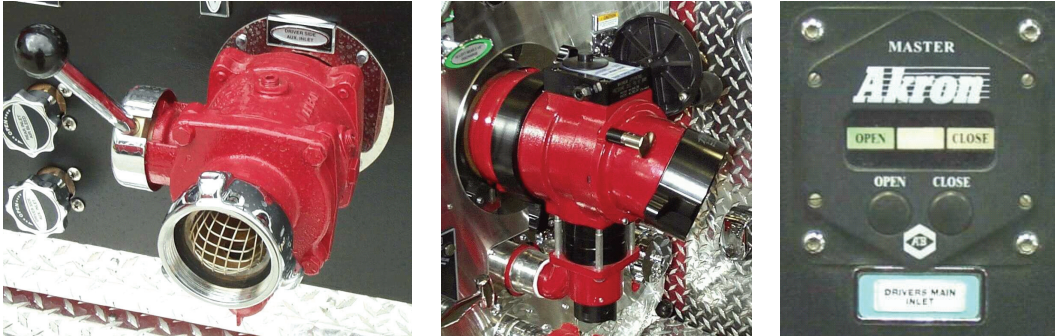
Most fire departments provide their own gate valves. Pierce recommends use of a gate valve.

Before using water from a hydrant, open and vent the hydrant for about 30 seconds to flush out gravel or debris. Always use intake strainers. Gravel can damage the pump and reduce pressure.

3-8.1 Connect Intake Hose

1. Close Intake Gate Valve

Figure 3-15: Typical Gated Intake Valves



POM0034, 0035, 0036

Close the gate valve on the intake connection to which the intakes hose will be attached.

⚠ DANGER

Always OPEN Drain Valve or Bleed Valve BEFORE removing Intake Cap.

Intake Lines can trap pressure.

Intake Cap under pressure will blow off with explosive force.

Exploding cap will injure or kill.

Always bleed air from Intake Line.

Air in lines can cause pressure spikes.

Air forced from nozzle can increase intensity of fire or cause a pressure surge. Air discharge can injure or kill.

2. Open Air Bleed Valve for Intake BEFORE Cap is Removed

Figure 3-16: Air Bleed Valve



POM0023

Intake connections with a shut-off (or gate) valve can trap pressure if the valve is opened and left closed with the cap in place. ALWAYS OPEN the Intake Air Bleed Valve to let trapped pressure escape BEFORE removing cap.

Air Bleed Valves are attached to a tube that is connected to the highest point of the pipe.

Opening the Intake Air Bleed Valve allows air trapped in the Intake Pipe to escape.

Rotate the knob one-quarter turn counterclockwise to the left to open the valve.

To make sure that all air pressure is removed from the system, keep the Air Bleed Valves OPEN until you start flowing water. Only then may you close it.

3. Remove Intake Cap

Figure 3-17: Intake Cap



POM0024

Remove the Intake Cap only after you are certain that trapped air pressure has escaped.

Make sure to OPEN the Air Bleed Valve or Drain Valve so that trapped air pressure escapes.

⚠ WARNING

Point intake hose away from personnel.

Hoses and connections under pressure can burst without warning.

Burst hose can injure or kill.

Inspect hoses and fittings regularly.

Replace if worn or damaged.

Worn or damaged hoses and fittings can burst.

Burst hose or fittings can injure or kill.

4. Connect the Intake Hose

Connect the Intake Hose that has been laid from the hydrant to the intake connection.

5. Adjust the Intake Swivel

If the intake connection includes a swivel fitting, adjust the swivel so that the hose points AWAY from the pump operator's area.

3-8.2 Charge the Intake Line (Pressurized Supply)

NOTE: Make sure that the pressure control has been set before charging the intake hose.

1. Charge the Intake Line

Once the intake hose is properly connected to the intake fitting, open the valve at the hydrant to allow water into the intake hose. Air will escape out the air bleed valve as it is forced from the hose by the incoming water.

2. Close Air Bleed Valve

Close the Air Bleed Valve after the air is gone from the intake line.

3-8.3 Supply the Pump

DANGER

Perform change to external water source properly.

Water flow can stop if change is performed incorrectly.

Loss of water flow can endanger fire attack crews, resulting in death or injury.

1. Open the Intake Gate Valve

OPEN the Intake Gate Valve slowly to change the flow to the external supply.

Always open the Intake Gate Valve slowly. Air in the intake line will then enter the pump slowly. Air will be sucked through with a steady flow of water.

If a large slug of air enters the pump, the pump can lose prime. Centrifugal pumps cannot pump air. If prime is lost, the attack lines will lose water pressure.

2. Close the Tank-to-Pump Valve

Once the Intake Gate Valve is open, the water pressure from a pressurized source keeps water from flowing from the tank. A check valve in the tank-to-pump line keeps the pressurized supply from flowing water back into the tank.

A draft source lacks intake pressure. Therefore water can continue to be drawn from the tank. If the tank is run dry, the pump can lose prime.

After the Gated Intake Valve is fully open, then slowly CLOSE the Tank-to-Pump Valve to make sure that water is drawn from the external supply only.

3. Close the Tank-Fill and Recirculating Valves

As long as the discharge lines are flowing water, the pump will have fresh water to keep it cool. With the Tank-to-Pump Valve closed and the Tank-Fill or Recirculating Valves OPEN, the tank will continue to fill until it overflows through the fill hatch.

- a. CLOSE the Tank-Fill or Recirculating Valves to avoid tank overflow.
- b. OPEN both valves again when pump cooling is required because discharge lines are CLOSED.

3-9. Pump Priming Problem Solutions

3-9.1 Control Valves That Leak

1. Cap Unused Discharge and Intake Pipes

Cap all unused discharge and intake pipes to reduce air leakage from a leaky valve.

3-10. Monitoring Intake Pressure

The Master Intake Gauge shows the intake manifold pressure.

1. Watch Intake Pressure

Look often at the intake pressure on Master Intake Gauge while pumping.

DANGER

Maintain positive intake pressure with soft intake hose.

Negative intake pressure will collapse soft intake hose.

Attack lines will lose water pressure if hose collapses.

Loss of water supply will endanger fire fighters on attack lines.

CAUTION

NEVER cavitate pump.

Low intake pressure or high vacuum can cause pump cavitation.

Cavitation can:

- **Cause loss of water pressure.**
- **Damage pump components, requiring expensive repairs.**

Avoid water hammer.

Water hammer can damage the pump system.

2. Maintain 20 PSI Intake Pressure (Pressurized Supply)

Maintain intake pressure at or above 20 PSI when operating from a pressurized external supply.

This provides a safety factor to avoid drawing a vacuum on the intake hose.

Changes in supply pressure can cause intake pressure to drop without warning. Drop in pressure below zero (0) PSI can cause water hammer, pump cavitation, or collapse the intake hose AND cause loss of water flow.

NOTE: 20 PSI may not be attainable in certain areas, depending on the hydrant system. For additional information, consult your Fire Department standard operating procedures.

3. Maintain 20 in. Hg. Vacuum (Draft Supply)

When operating from draft, always maintain 20 in. Hg. of vacuum or less. Intake vacuum of more than 20 in. Hg. can cause pump to cavitate.

4. Avoid Pump Cavitation

Pump Cavitation is happening when:

- Discharge pressure changes up and down.
- You hear a sound like gravel churning in the pump.
- Discharge pressure remains the same when you change engine speed.

Reduce discharge flow until cavitation ceases.

3-11. Refilling the Tank

ALWAYS refill water tank as soon as possible. If the supply source is interrupted, a full tank of water allows you to continue flowing water to the attack lines while an external water source is being restored.

1. Open Tank Fill Valve

OPEN the Tank Fill Valve slowly to ¼ OPEN to divert some supply water into the water tank.

2. Watch Intake and Discharge Pressure

Watch the discharge pressure gauges to make sure that you maintain attack hose flow at the desired pressure while you also fill the water tank.

If intake or discharge pressure drops below the desired pressure, either CLOSE the Tank Fill Valve to divert less water to the tank OR increase engine speed to maintain pressure.

Always keep the water tank full so that a steady discharge flow can be maintained if the intake supply must be shifted.

3-12. Changing from Tank to External Water Supply (without Gated Intake Valve)

If you change from the water tank to an external water source without an Intake Gate Valve, the water flow to the discharge attack lines must be stopped.

Pierce recommends that every pumper apparatus have an Intake Gate Valve.

Use these procedures if Gate Valve is absent.

Make sure fire fighters are withdrawn from attack area, because hoses will lose water.

3-12.1 Stop Flowing Water

1. Close Discharge Valves

Water pressure during the transition period can fluctuate. Protect attack line personnel from the hazards of pressure spikes by closing the Discharge Valves. Remember, you are also shutting off water to the attack hoses.

2. Reduce Engine Speed to IDLE

Running the pump without water will damage the seals and bearings. Reduce engine speed to IDLE to minimize wear on the pump while the water supply from the tank is stopped.

3. Close Tank-to-Pump Valve

CLOSE Tank-to-Pump Valve before the removing the Intake Cap to prevent tank water from flowing out the intake.

4. Connect Intake Hose

- a. Remove the Intake Cap.
- b. Connect the Intake Hose.

3-12.2 If you are connecting to a pressurized supply, charge intake line:**1. Open Tank Fill Valve or Discharge Valve**

OPEN the Tank Fill Valve. Air in the intake hose must be expelled before water can reach the pump. Air will pass through the pump and out the OPEN Tank Fill Valve.

- OR -

OPEN Discharge Valve and Discharge Drain Valve. Water will flow out the discharge drain valve once the air escapes. Close the drain valve once air has escaped.

2. Charge the Intake Line

OPEN the water valve on the hydrant to allow water to flow through the intake hose and into the pump. Before using water from a hydrant, open and vent the hydrant for about 30 seconds to flush out gravel or debris. Always use intake strainers.

3. Close Tank Fill Valve

CLOSE the Tank Fill Valve once water tank is full.

3-12.3 Resume Discharge Operation**1. Open Discharge Valve**

Open the Discharge Valve(s) slowly to resume attack line operations.

2. Increase Pressure

Continue to watch the Master Pressure Gauge. Increase speed until you reach the pump discharge pressure you want.

3-13. Two-Stage Pump Operation (Optional)

Two stage pumps have two smaller impeller chambers instead of one large chamber. Water is directed through both chambers in parallel when large flow is desired at moderate pressure.

Water is directed through each chamber in series when moderate flow at high pressure is desired.

Read, understand, and practice the procedures for two-stage pump operation found in the pump manufacturer's operation manual.

3-13.1 Select Either Volume or Pressure Mode

Figure 3-18: Typical Electric Transfer Valve Controls



POM0025, 0026

Shift the Transfer Valve to the VOLUME setting for high flow at moderate pressure.
Shift the Transfer Valve to the PRESSURE setting for moderate flow at high pressure.

3-13.2 Mode Selection with Pressurized Sources

NOTE: For departments operating with higher hydrant pressures:

- If the external intake pressure is high, then a pump in PRESSURE mode is able to run with engine RPM slightly above IDLE to provide desired discharge pressure. In this condition, the engine speed cannot be reduced enough for a pressure governor to react to pressure spikes caused when discharge lines are shut OFF.
- To avoid such pressure spikes, operate the Two-Stage Pump in VOLUME mode. This causes the engine to operate at a higher speed. The pressure governor then has more ability to control pressure spikes.

Operate a Two-Stage Pump in the VOLUME mode when pump is supplied by a pressurized external water source AND a pressure governor is used.

3-13.3 Priming a Two-Stage Pump

CAUTION

Changing between stages on a two-stage pump can cause a pressure spike in discharge hoses.
Give all fire suppression crews warning **BEFORE** changing stages.

Shift the Transfer Valve to the VOLUME setting when priming a two-stage pump.

3-14. Engine Status Display

Figure 3-19: Typical Engine Status Displays



POM0027, 0028

The Engine Status Display is either a group of gauges and indicator lights or an electronic display that gives you critical information on engine performance.

You must watch this information often during pump operation, and react to any abnormal readings.

Engine information includes:

- **Engine Speed:** shows current engine speed in RPMs.
- **Engine Oil Pressure Gauge:** shows engine oil pressure.
- **Engine Temperature Gauge:** shows oil temperature of the engine.
- **Electrical System Voltage Meter:** measures the voltage level of the vehicle's battery system.
- **Stop Engine Light**

⚠ DANGER

Replace apparatus when STOP ENGINE light is ON.

Engine can fail at any time without further warning.

Engine failure will stop water flow to attack lines, putting fire-fighting personnel in danger.

If the Stop Engine light turns ON, the engine's ECU (electronic control unit) has detected a critical error condition. That means engine failure is possible at any moment. Read and study the engine manufacturer's operations manual so you know how to react. **Practice your reaction to all different kinds of failure.** You need to be prepared in advance so you can react properly in an emergency.

Fire apparatus programming does not allow a critical engine failure to automatically stop the engine. The engine will continue to run until it self-destructs or fails.

It is your judgment call to balance the risks of damage to the engine with the need for the fire apparatus to remain operational.

If possible, replace the apparatus with another apparatus RIGHT AWAY if this light comes on.

- **Check Engine Light**

If the Check Engine light turns ON, the engine's ECU detects a non-critical error condition. Immediately check all gauges at the pump panel and compare with the readings of those in the cab. Compare both readings to normal operating parameters. This will help you make the decision to continue to run the apparatus or replace it with another. If the Check Engine light remains ON, schedule the engine for maintenance.

- **Check Transmission Light**

The Check Transmission light turns ON if the transmission's control unit detects a non-critical error. If the Check Transmission light remains ON, schedule the transmission for maintenance.

3-15. Ending Water Flow Operation

3-15.1 Shutting Off Water Flow

1. **Reduce Engine Speed to IDLE**

2. **Close Discharge Valves**

Close all discharge and inlet valves slowly to prevent water hammer.

3-15.2 Disengaging the Pump (Driveline Driven Pump)

1. **Reduce engine speed to IDLE**

Adjust Hand Throttle or Pressure Governor to bring engine to IDLE.

2. **Shift Transmission to Neutral**

- a. Shift the transmission into NEUTRAL. If the display on the transmission flashes an "N," then the transmission has FAILED to shift, because engine speed is too high.
- b. Make sure that engine is at IDLE speed.
- c. Shift Transmission back to DRIVE, and then shift back to NEUTRAL.
- d. Wait 3–5 seconds after shifting to NEUTRAL for pump drive shaft to stop spinning.

3. **Look at Tachometer**

Look at the tachometer in the cab to make sure the engine has remained at IDLE speed. If the engine has increased speed, the throttle control on the pump panel might not have been properly reset to IDLE. Exit the cab and return Hand Throttle and/or Pressure Governor to IDLE.

4. **Observe Speedometer**

Check that the speedometer has dropped to 0 MPH. If speedometer shows *any* vehicle speed (e.g., 1–10 MPH or more), then repeat the entire procedure.

5. **Apply the Service Brake by depressing and holding the Brake Pedal.**

6. **Shift Pump Control to ROAD**

Move the pump shift control to the ROAD position.

7. **Observe Indicator Lights**

Make sure that the PUMP ENGAGED and OK TO PUMP lights are OFF. If either light is ON, then repeat the procedure.

If one or both lights are ON, you have failed to switch the gears from PUMP to ROAD.

3-15.3 Disengaging the Pump (Stationary Operation)

1. Reduce engine speed to IDLE

Reduce engine speed to IDLE with the throttle control.

2. Observe Tachometer

Observe the Tachometer in the cab to confirm that the engine has remained at IDLE speed. If the engine has increased speed, the throttle control on the pump panel might not have been properly reset to IDLE. Exit the cab and return Hand Throttle and/or Pressure Governor to IDLE.

3. Shift Pump Shift Control to ROAD

Move the pump shift control to the ROAD position.

4. Observe Indicator Lights

Make sure that the PUMP ENGAGED light is OFF. If light is ON, repeat the procedure.

3-15.4 Disengaging the Pump (Pump and Roll)

1. Stop Apparatus

Bring apparatus to a full stop and reduce engine speed to idle.

2. Shift the Transmission into Neutral (N)

3. Pull Parking Brake to Apply

4. Disengage the Pump

Move the PTO Pump control to the OFF position. This disconnects the Hand Throttle.

5. Observe Indicator Lights

Make sure that the PUMP ENGAGED light is OFF. If light is ON, repeat the procedure.

3-15.5 Securing Pump System

1. Open Drain Valves and Bleed Valves

Open all pressure release valves to vent any trapped air pressure and water.

2. Open Nozzles

Relieve pressure from un-gated inlet hose by OPENING discharge nozzles.

3. Remove Hose

Remove all hoses from discharge and intake lines.

4. Replace Caps

Install Caps on Intake and Discharge connections to protect them from contamination.

5. Flush Pump

Flush the pumping system with clean, fresh water if required.

6. Purge Primer

If equipped with a fluid-lubricated primer pump, operate the primer pump until primer fluid comes out of the primer pump discharge. Check primer fluid tank level, and fill if needed.

3-16. Operating from a Static (Draft) Water Supply

Operating the pump from a draft source is the most demanding type of pump operation. Learn about the complexities and hazards of this operation by studying the IFTSA *Pumping Apparatus Driver/Operator Handbook* and through formal training.

Once the apparatus is prepared for draft operation and the appropriate suction lines are deployed, prime the pump as follows:

1. Close Valves

First, close all discharge valves, drain valves, bleed valves, and tank valves or the primer will fail to work.

2. Switch Pressure Governor to THROTTLE (RPM) CONTROL Mode

If the apparatus is equipped with a pressure governor, place it in THROTTLE (RPM) CONTROL mode. For governor equipped apparatus, this will hold the prime better than starting out in PRESSURE mode.

3. Increase Engine Speed

Increase the engine speed to 1000 RPM. This should provide about 50 PSI of water pressure once the prime is established.

4. Open Primer Valve

Pull to OPEN the Primer Valve and engage the primer motor. Listen to the sound of the primer motor as it pumps air out of the water pump to draw a vacuum. Listen for the tone change as the primer pump begins to expel a mix of air & water, and then begins expelling only water.

5. Observe Pressure Gauge

Watch the pressure on the Master Pressure Gauge to make sure that the water has entered the pump and the pressure is beginning to build.

6. Open Discharge Valve

Open the Discharge Valve slowly to begin water flow operation.

7. Switch Pressure Governor to PRESSURE CONTROL Mode

For pressure governor equipped apparatus, switch from THROTTLE (RPM) CONTROL mode back to PRESSURE CONTROL mode.

8. Increase Pressure

Continue to watch the Master Pressure Gauge. Increase the pressure until you reach the desired discharge pressure.



4-1. Inspection, Cleaning, and Maintenance

4-1.1 Maintenance Schedule

Develop a Standard Operating Procedure for the daily, weekly, monthly, and annual inspection and maintenance of this fire apparatus after careful review of all documentation provided. Inspection and maintenance requirements for components such as monitors, foam systems, flow meters, valves, etc., must be established by referencing the service manuals.

Follow the pump manufacturer's inspection and maintenance recommendations.

Follow the procedures for inspection, cleaning, and maintenance found in the IFSTA *Pumping Apparatus Driver/Operator Handbook* (latest edition).

Follow instructions regarding inspection, cleaning, and maintenance located in the Pierce Custom Chassis Operation & Maintenance Manual (Publication No. PM-C-OM012) or the Pierce Commercial Chassis Supplement (Publication No. PM-C-OM090).

4-2. Draining the Pumping System

CAUTION

Drain pumping system in cold weather.

Water in pipes can freeze.

Freezing water can damage pipes, valves, primers, and gauges.

NOTE: If it is desired to retain water in the water tank, the Tank to Pump and Tank Fill valves should be left in the closed position.

Every part of the water pump system must be drained if exposed to freezing temperatures.

1. **Locate the lowest points on every plumbing line and the drain valve that opens it**
2. **Remove Caps**

AFTER opening air bleeder valves, remove all intake and discharge caps.

3. Open Master Pump Drain

Figure 4-1: Typical Master Pump Drains



POM0029, 0030

The master pump drain (*Figure 4-1*) will empty both the discharge and inlet manifolds of water when opened.

4. Open Discharge Line Drains

Locate each Discharge Line and open the Drain Valves.

5. Open Intake Line Drains

Locate each Intake Line and open the Drain Valves.

6. Open Intake Relief Valve Drain—on apparatus equipped with relief valves

7. Open Control Valves

Open all Intake and Discharge Valves.

8. Purge Primer

Primer should be purged regularly in cold weather to prevent the primer from freezing.

9. Allow Water to Drain

10. Close all Valves

NOTE: If your apparatus is equipped with a foam system, refer to the applicable foam system manual for draining procedures.

4-3. Flushing the Drain Valves

4-3.1 Forward Flushing

Drain Valves are the lowest point in the pump system. Dirt and debris in the water will settle in the drain valve bodies. Flush each drain valve with clean water monthly or after pumping dirty or salty water. Flush drain valves to prevent sediment from accumulating in the valve body and hurting proper operation of the drain valve.

1. Fill Water Tank

Begin flushing procedure with a full water tank of clean, fresh water.

2. Cap All Intake and Discharge Connections

Cap all connections to hold the clean water from the tank in the pumping system.

3. Open all Intake and Discharge Valves

Open all control valves to allow fresh water to reach all points in the pumping system.

4. Open the Tank-to-Pump Valve

Open the Tank-to-Pump Valve to flood the pumping system with clean water.

5. Open Drain Valves One at a Time

Open each Drain Valve. Keep open until a steady stream of water flows from the valve for 20 seconds. If no water or reduced water flows, find out why water fails to drain and make a repair.

6. Close Tank-to-Pump Valve

Close the Tank-to-Pump Valve to prevent any more water from entering the pumping system.

7. Open Drain Valves

Open each Drain Valve again until remaining water is drained from the system.

8. Remove Caps

Remove Intake and Discharge Caps.

9. Allow Water to Drain

10. Close All Intake and Discharge Valves

11. Replace Caps

Replace Intake and Discharge Caps.

12. Close Drain Valves

13. Refill Water Tank

4-3.2 Back Flushing

The pump should be back flushed with municipal water after salt water or other debris have entered the pump.

1. Remove Suction Strainers

Remove the suction strainers so they are not blown out of the pump.

2. Open Transfer Valve (*if applicable*)

Hold the transfer valve clapper, in the second stage volute entrance, open so debris is not trapped behind it.

3. Pump Water

Pump fresh, clean water through all of the inlets and outlets, until you see only clear water.

4. Open & Close Valves

Open and close all discharge and intake valves to flush them with clean water.

5. Activate Primer

In the case of salt water pumping, activate the primer to get clear water through the primer valve and pump.

6. Activate Pressure Relief Valve

Activate the pressure relief valve with the pilot valve to flush that system, and move the transfer valve from Volume to Pressure a few times (if the pump is so equipped).

4-4. Annual Testing

Test all pumping apparatus annually per the specifications in NFPA 1911, *Standard for Service Tests of Fire Pump Systems on Fire Apparatus* (latest edition).

These tests are necessary to make sure that the apparatus will continue to perform to specification.

These tests help prevent breakdowns.

4-5. Flushing and Draining the Pump

DANGER

Pump packing gland and pump body heats to high temperatures during operation.
Touching hot areas of pump will burn.
Allow pump to cool before servicing.

Flush the pumping system after pumping dirty, contaminated, or salty water.

1. Supply Clean, Fresh Water

Supply clean, fresh water to the pumping system.

2. Open Discharge Valves

Open all discharge valves so that clean, fresh water flows through each discharge line and valve for one minute.

3. Fill Tank

Fill the water tank with clean, fresh water.

4. Flush Drain Valves

Flush all drain valves using the procedure listed under Flushing the Drain Valves.

4-6. Pump Storage

CAUTION

Store pump completely full of clean water, or completely dry.
Do not leave pump partially full of water.
Always store pump dry in freezing weather.

In warm temperatures store pump either entirely full of water or completely empty.

Pumps stored partially full of water will rust at the air-to-water interface.

In freezing temperatures store pumps dry, without any water in the pump chamber.

4-7. Primer Pump Lubrication

CAUTION

Use environmentally-friendly priming lubricants or use procedures that capture the oil as it is expelled. Expelling standard motor oil used as a lubricating fluid in the primer pump does not meet EPA regulations.

Figure 4-2: Primer Pump Lubrication Fluid or Oil Reservoir



POM0031

Some primer pumps require a lubricating fluid or oil. The fluid reservoir ([Figure 4-2](#)) is normally located in the pump house behind an access panel or access door.

For oil-type priming pumps, the lubricant is expelled with the air as the pump is primed.

Use only lubricating fluid that is approved by the manufacturer of the pump and approved for use in the environment.

4-8. Manual Pump Shift

Operate the manual pump shift control weekly to prevent build up of dirt, grime, and road debris that will inhibit the smooth operation of the cable.

4-9. Intake Relief Valve Drain *(Optional)*

Figure 4-3: Intake Relief Valve Drain



POM0032

Inlet relief valves can trap water inside the mechanism of the valve.
Drain trapped water from the valve daily, and before operating apparatus in freezing temperatures.
Frozen water will damage the valve.

4-10. Master Gauge Ports

Vacuum and Pressure Test Ports are provided for use during the annual testing and certification of the pump.

CAUTION

**Master gauge testing and calibration should only be performed by trained maintenance personnel.
NEVER remove plugs in these ports except for test purposes.**

1. Test Master Gauges Annually

The VACUUM test port leads directly to the Master Intake Gauge line.
The PRESSURE test port leads directly to the Master Discharge Gauge line.
Use certified test gauges to check and calibrate Master Gauges.



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