

# SPRAYER SYSTEMS TRAINING GUIDE

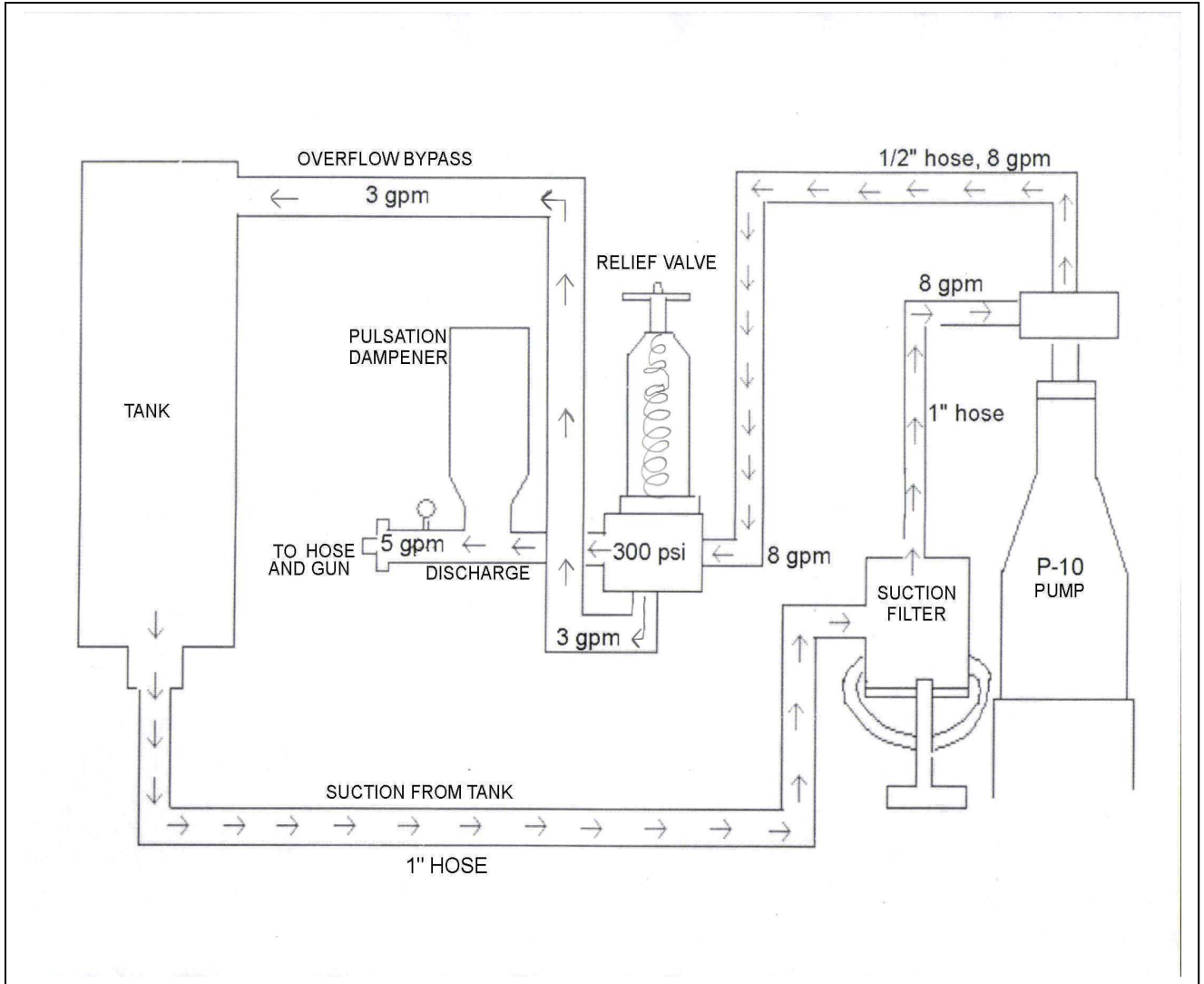


*Presented by:  
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# Sprayer Components

- Tank
  - The storage compartment for the water and chemical that is to be applied.
- Pump
  - Delivers the water and chemical from the tank to the spray gun or boom.
- Engine or Motor
  - Power source
- Spray Gun or Boom
  - Device used to apply the water and chemical to the targeted area.
- Spray Hose

# Journey Through a Sprayer System



# TANK SELECTION

DESCRIPTION	SIZE/SHAPE	EASE OF REPAIR	LIFE	COST	BAFFEL	AGITATION
<b>Poly</b>	Varies	Not Possible	5 - 10 years	Least Expensive	Very Limited	Jet Only
<b>Fiberglass</b>	Varies	Easily with fiberglass patch kit	Up to 5 yr warranty 20+ yrs	Moderate	Yes	Mechanical and Jet
<b>Stainless Steel</b>	Limited to rectangular or cylinder shape	Difficult. Special welding required.	Life, 20 years +	Most Expensive	Yes	Mechanical and Jet

## Split Tanks

### Advantages:

Carry two separate chemicals in one spray system.

### Disadvantages:

Applicator failure to switch valves can result in wrong chemical being applied. Can result in lawsuit or costly turf/tree replacement.

Tank can develop a leak in divider without operator knowledge and contaminate adjacent chemical. Resulting mixture can result in costly turf/tree replacement or lawsuit.

### Alternative:

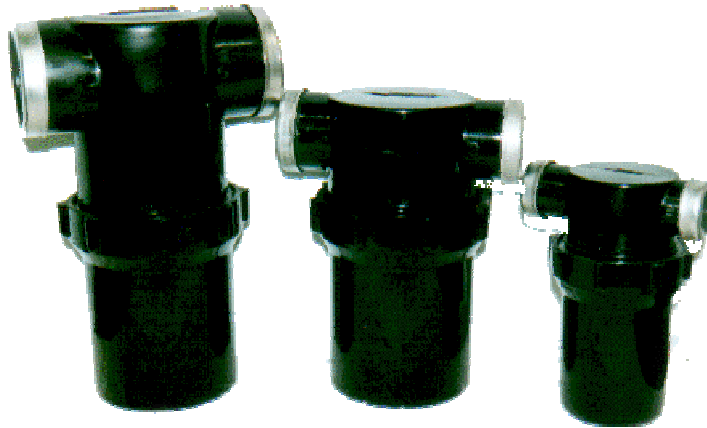
Two separate spray systems.

# ENGINE SELECTION

Brake Horse Power = (GPM x PSI/1715) x 2

*{the multiplier (2) is a safety factor for longevity}*

# SUCTION FILTERS



The purpose of the suction filter (aka Line Strainer) is to remove un-dissolved particles and debris from the solution before it enters the pump. This is to prevent clogging or damage to equipment.

The strainer is installed on the inlet side of the pump.

The strainer can be cleaned without removing it from the line.

1. Unscrew the bowl from the cap and take out the screen.
2. Flush the sediment from the screen.
3. Reassemble the strainer by first fitting the screen to the flange in the bowl.
4. Turn the bowl hand-tight, which provides a sufficient seal against the cap.
5. Make sure the rubber gasket is properly installed in the bowl. If it is not properly installed, there could be a suction leak and the pump will not function properly.

# PUMP SELECTION

Uses	Piston	Gear	Roller	Centrif	Diaphragm
Low Pressure Spraying 0 – 60 psi	G	E	E	E	G
Med. Pressure Spraying 50 – 250 psi	E	G	G	G	E
High Pressure Spraying 250 – 550 psi	E				G
High Pressure and Volume 700 psi	E				G
Non-Abrasive Liquids	E	E	E	E	E
Wetable Powders	G	P	P	E	E
Liquid Fertilizer	G	G	G	E	G
Copper Sulfate	G	P	P	G	E
Cleaners – Soap	E	E	E	E	E
Acid Cleaners	G			G	G
Trees to 30 Feet	E	P	P	P	E
Trees to 40 Feet	E				E
Trees to 50 Feet	E				G
Trees to 60 Feet	E				G
Trees over 60 Feet	E				G

## Pump Comparisons

Description	Advantages	Disadvantages
Diaphragm	<ul style="list-style-type: none"> <li>Works moderately well with abrasives at medium pressures, 300 – 500 psi.</li> <li>Can be run dry without damaging pump</li> </ul>	<ul style="list-style-type: none"> <li>Diaphragm can break without operator knowledge and leak chemical into the drive end oil sump, causing major damage before detection</li> </ul>
Piston	<ul style="list-style-type: none"> <li>Ease and low cost of repair</li> <li>Long life with regular maintenance</li> <li>Operates well at all pressures</li> </ul>	<ul style="list-style-type: none"> <li>Does not operate well with undissolved abrasives</li> </ul>
Centrifugal	<ul style="list-style-type: none"> <li>Operates best with abrasives and high volume</li> </ul>	<ul style="list-style-type: none"> <li>Most inefficient pump as compared to hp required to operate.</li> <li>Operates at low pressures only 200 psi max.</li> </ul>
Roller	<ul style="list-style-type: none"> <li>Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>Cannot run dry</li> <li>Cannot use abrasive material</li> <li>Extremely difficult to repair</li> </ul>
Gear	<ul style="list-style-type: none"> <li>Ease of repair</li> <li>Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>Cannot run dry</li> <li>Cannot use abrasives</li> </ul>

# PRESSURE REGULATOR

The key to a spraying system



The purpose of the pressure regulator is to govern the pressure of solution between the pump and spray applicator. You must have this control in order to ensure the proper application rate of your chemical.

The volume of solution from the pump remains constant. The pressure regulator determines the pressure at which the volume of solution required for the application is released to the spray applicator and returns the balance of the solution to the tank.

When the regulator is fully open, all liquid is returned back to the tank through the return line.

As the regulator valve spring tension is increased, an increase of pressure occurs. The greater the springs tension in the regulator, the greater the output pressure.

The pressure gauge and pressure regulator work together to ensure you are operating your system properly.

The pulsation dampener serves to stabilize the flow of water before it gets to the hose.

# Pressure Gauge



**Without a pressure gauge, it is impossible to calibrate your sprayer and keep it calibrated.**

The pressure gauge only provides a pressure reading at that specific point on your sprayer. If you have concerns about the pressure loss through the hose and fittings, it is wise to place an additional pressure gauge at the spray gun to ensure the proper chemical application rate.

The pressure gauge will also be an indicator of a malfunction within your sprayer. This easily visible indicator can help prevent serious damage to your sprayer.



# Tank Agitation

Tank Agitation refers to the method of mixing the chemicals and water into a solution to prevent un-dissolved chemical from settling on the bottom of the tank. Improperly mixed chemical will result in improper chemical ratio's being sprayed.

There are two types of agitation.

## Jet Agitation

1. Used for all types of tanks. Poly, Fiberglass, Stainless Steel.
2. Uses the solution originating from the tank, bypasses the pressure regulator, and returns through a special jet agitation fitting located in the tank.
3. Is generally acceptable in smaller tanks where the solution is not allowed to set for long periods of time.
4. Acceptable for most sprayer applications. The agitation occurs anytime the sprayer is running. When spray gun is turned off, the full amount of solution being pumped is returned through the jet agitator. When the spray gun is turned on, there is still a sufficient amount of solution being returned through the jet agitator for agitation. ***If there is no return when the spray gun or boom is turned on, the system is NOT properly set up.***

## Mechanical Agitation

1. Used for Fiberglass or Stainless Steel Tanks only.
2. Uses paddles attached to a steel rod mounted inside the tank to physically stir the chemicals.
3. Most practical for larger tanks or when a mixed chemical may set for a period of time sufficient for the un-dissolved chemical to settle to the bottom of the tank.
4. The mechanical agitator runs constantly while the sprayer is in operation. The rod is turned via a pulley that is connected to the pump pulley. Therefore, anytime the pump is pumping, the agitator is turning.
5. Mechanical agitation increases the likelihood of tank leaks because the shaft passes through a packing in the wall of the tank. This packing will wear over time.

# HOSE SELECTION

## Pressure Drop for Water Flow Through Various Hose Sizes

Flow In GPM	Pressure Drop in PSI (In 10ft. Length – Without Couplings)								
	¼" I.D.	3/8" I.D.	7/16" I.D.	½" I.D.	5/8" I.D.	¾" I.D.	1" I.D.	1 ¼" I.D.	1 ½" I.D.
0.2	.3								
0.3	.6								
0.4	1.0								
0.5	1.4	.2							
0.6	2.0	.3							
0.8	3.3	.5	.2						
1.0		.7	.3						
1.5		1.4	.6	.4					
2.0		2.4	1.1	.6					
2.5		3.4	1.9	.9					
3.0			2.4	1.2	.4				
4.0				2.0	.7				
5.0				2.9	1.0	.4			
6.0				4.0	1.4	.6			
8.0					2.6	.9	.3		
10.0					3.6	1.4	.4		
15.0						3.0	.8	.3	
20.0							1.4	.5	.2
25.0							2.0	.7	.3
30.0							2.8	.9	.4
40.0								1.6	.6
50.0								2.5	.8
60.0								3.4	1.2
70.0									1.6
80.0									2.0
90.0									2.6
100.0									3.0

Hose size plays an important role in calibrating your sprayer correctly. Note, as the diameter of the hose decreases, the pressure at the end of the hose decreases during operation.

# SPRAY GUNS & BOOMS

## BOOMS

Used for applying solution to wide areas and usually low pressure. Min. Drift, good for open areas, but difficult in small irregular shaped areas. Volumes can vary from very small to large depending on boom size and number of spray nozzles.

## LOW PRESSURE NYLON GUN (Lawn Spray Gun)

Specially designed for spraying Home Owner Lawns, mainly for Herbicides.

Large droplets prevent drift.

Pressure Range: 0-150 PSI Volume: Normal Range 2 – 5 GPM

## HIGH PRESSURE GUNS

Designed mainly to focus the spray material for targeted areas and to achieve spraying distances.

For applying solution to shrubs and trees

Pressure Range: 0 – 800 PSI

Volume: 0 – 40 GPM

## WANDS

Largely used by PCO's

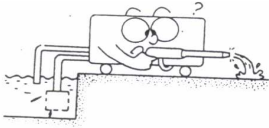
The wand is designed mainly for Low Pressure Target Spraying.

## BOOMLESS NOZZLES

Used mainly for large open areas for Herbicide applications when drift and targeting are not as critical.

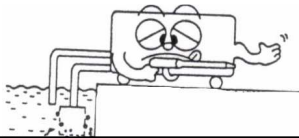
# HELPFUL HINTS FOR TROUBLE-SHOOTING YOUR SPRAYER

## Low or Lost Pressure



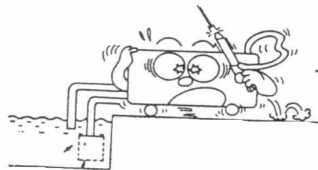
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## No Liquid at Spray Gun



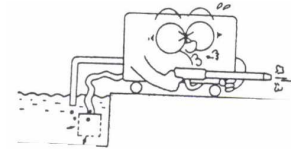
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## Abnormal Vibration



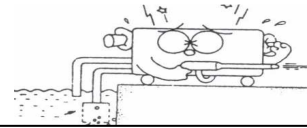
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## Abnormal Suction



Ref: 2, 3, 6, 7, 8, 11, 15, 16

## Abnormal Pump Noise



Ref: 2, 3, 7, 8, 11, 15, 16

## Troubleshooting Reference Numbers:

1. Spray gun tip too large or worn.
2. Suction filter clogged.
3. Loose suction line connection. Check suction filter gasket).
4. Malfunctioning pressure gauge.
5. Malfunctioning pressure regulator.
6. Worn pump suction and discharge valves.
7. Over speeding the pump.
8. Suction line too small.
9. Pulsation dampening chamber full of water.
10. Worn pump valve chamber.
11. Foreign object in suction line.
12. Plunger packing worn.
13. Pump drive belts loose.
14. Pressure regulator by-pass valve open.
15. Suction line valve closed.
16. Drive Pulley spinning on pump or engine shaft. Replace drive key.

# SALES

When presenting your customer with sprayer options, there are key points that should be answered in order to provide the most suitable match.

1. What is the area you plan to spray between refills?
2. How high will you need to spray (if for tree & shrub)?
3. What is the recommended application rate for the chemical you will use?
4. What is the recommended pressure for your application?
5. How much hose will you need?
6. What size vehicle will you be using to transport the sprayer?
7. What price range can you afford?
8. Is the chemical you plan to use 100% soluble?
9. Speed of application?

Test your knowledge.

Role-play with your neighbor and try to determine which complete sprayer system will best fill all the above requirements.